

Schooling for Sustainable Development 5

John Chi-Kin Lee
Rob Efrid *Editors*

Schooling for Sustainable Development Across the Pacific

 Springer

Schooling for Sustainable Development Across the Pacific

Schooling for Sustainable Development

Volume 5

Series Editors

John Chi-Kin Lee

Michael Williams

Philip Stimpson

This book series addresses issues associated with sustainability with a strong focus on the need for educational policy and action. Current attention and initiatives assume that Education for Sustainable Development (ESD) can be introduced successfully and gradually into schools worldwide. This series explores the issues that arise from the substantial and sustainable changes to be implemented in schools and education systems.

The series aims to counter the prevailing Western character of current research and enable cross-cultural comparisons of educational policy, practice, and project development. As a whole, it provides authoritative and comprehensive global coverage, with each volume providing regional/continental coverage. The volumes present data and insights that contribute to research, policy and practice in ESD-related curriculum development, school organization and school-community partnerships. They are based on ESD-related project experiences, empirical studies that focus on ESD implementation and teachers' perceptions as well as childhood studies that examine children's geographies, cultural characteristics and behaviours.

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John Chi-Kin Lee • Rob Efirid
Editors

Schooling for Sustainable Development Across the Pacific

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Editors

John Chi-Kin Lee
Asia-Pacific Institute of Curriculum
and Teaching Studies (APICTS)
Faculty of Education
Southwest University
Chongqing, China

Rob Efirid
Department of Anthropology, Sociology
and Social Work
Seattle University
Seattle, WA, USA

Department of Curriculum and Instruction,
Faculty of Education and Human
Development
Hong Kong Institute of Education
Hong Kong

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Series Editors' Introduction

Education for sustainable development (ESD) has rapidly become part of educational discourses worldwide. Within its global attractiveness lie both its strength and its weakness. Its strength lies in its capacity to alert educationists, broadly defined, to a shared concern for the future of both the planet and local communities. Its weakness lies in its lack of shared meaning and, stemming from this, the enormous difficulties encountered in trying to bring ESD into the mainstream activities of educational institutions.

In designating the period 2005–2014 as the International Decade of Education for Sustainable Development, the United Nations sought to bring to the fore the need for politicians, policy-makers and practitioners to seek ways by which ESD can become part of the fabric of formal and informal education. At the heart of the numerous initiatives that have been stimulated by this designation is the assumption that ESD should be introduced and can be introduced successfully into schools worldwide. It is assumed that children, older students and adults can be educated formally to act now in the interests of a sustainable future and to act internationally.

What is evident is that different nations have adopted different approaches to ESD, sometimes interchanging the term with environmental education, another term subject to a wide range of interpretations. These differences are evident in educational practice in regions, districts and individual schools as well as in academic studies and commentaries. Obviously, this is not to say that there is some common ground in policies and practice, it is simply to keep to the forefront the recognition that, even when nations make pronouncements about aspects of ESD, these should not be treated as authoritative statements about what is happening at the school and classroom levels. Broad statements have a value in highlighting issues and trends but they need to be treated with caution. The same caution needs to be applied to pronouncements emanating from academic sources. Academics have their own agendas and care must be taken when reading what appear to be authoritative statements about developments in ESD occurring within their own communities and nations.

Our series addresses the array of issues arising from attempts made to convert assumptions about, and definitions of, ESD into substantial and sustainable changes principally in schools. Underpinning the series is a concern for identifying those cultural forces that impact on national, regional and local adaptations to approaches to ESD that have international currency. In this, the editors of the books in the series, each based on experience in a single continent or extensive region, seek to counter the strong Western (Australian, North American, European) character of much research and writing in the broad field of ESD. Research and scholarly studies are commonly underpinned by values and assumptions derived from Western culture, broadly defined. The design of the series as a set of broadly continent-scale books seeks to bring together experts from various countries in each continent. The books bring out contrasting experiences and insights with a range of explanations of policies and practice.

Within the broad cultural contexts of the continents and regions included in the series, authors provide evidence of policies, formal curriculum developments and innovations and informal school-related activities. Some authors have paid close attention to policy making at various levels, others have addressed whole school organisational issues and others have provided detailed case studies of localities and individual schools.

Children and young people live in distinct worlds of their own. They have very distinctive cognitive and affective characteristics that vary from one culture to another, at whatever scale that culture is defined. They are also often targets for environmental campaigns that wish to promote particular behavioural changes. ESD is often construed as an attempt to change habits, to encourage children and young people to “think globally and act locally”. This series demonstrates how this and other slogans are translated in education systems and schools world-wide.

In this volume, *Schooling for Sustainable Development Across the Pacific*, the editors John Chi-kin Lee and Robert Efirid brought together an array of chapters highlighting the recent developments and issues related to schooling for sustainable development in selected places bordering the North Atlantic. In the opening chapter they provide the backcloth against which the following chapters are set. Society, economy and the natural environment are usually seen as the foundations underpinning the concept of sustainability and they demonstrate the enormous variety in all three in North America and East Asia. They explore the implications for schooling for sustainability for schools and higher education institutions in sharply contrasting political, economic and social cultures. The book provides the basis for trans-continental and international comparisons and contrasts when read alongside the other books published so far in the series that focus on Chinese communities, Australasia, North America and South America.

John Chi-Kin Lee
Michael Williams
Philip Stimpson

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Contributors

Osamu Abe is a Professor in the Department of Sociology and Director of the Education for Sustainable Development Research Centre at Rikkyo University, Tokyo. His specialty is environmental education and Education for Sustainable Development (ESD). He currently serves as Chair of the Japanese Society of Environmental Education.

Hye-Eun Chu is an Assistant Professor in the Department of Natural Sciences and Science Education, National Institute of Education, Nanyang Technological University of Singapore. Before she joined NIE, she worked on the Korean students' Environmental Literacy Project in Korea.

Courtney Crim is an Assistant Professor at Trinity University in San Antonio, Texas. Dr. Crim's research focuses on pre-service and in-service teacher preparation, particularly in the areas of differential instruction and environmental education. Dr. Crim is actively involved in the North American Association of Environmental Education as a member and is current co-chair of the Pre-service Advisory Board.

Blanche Desjean-Perrotta is Associate Dean for Teacher Education and Professor in the Department of Interdisciplinary Learning and Teaching at the University of Texas at San Antonio. Dr. Desjean-Perrotta's research focuses on early childhood and elementary teacher preparation, particularly in the areas of science and environmental education. Dr. Desjean-Perrotta is actively involved in the North American Association of Environmental Education as a member and former co-chair of the Pre-service Teacher Advisory Council.

Yushan Duan is Professor, Ph.D. supervisor and Associate Dean of the School of Geography Science, East China Normal University, as well as the Head of the Institute of Shanghai Geography Education and Teaching Research, East China Normal University. He is Vice Chairman of National Geographic Education Association and Chief Editor of *Geography Teaching*, a member of the Education and Science Committee of the China GIS Association as well as a core member of

the Ministry of Education's National High School Geography Curriculum Standards group and geography expert of the "National Primary and Secondary School Teacher Training Program" developed by Ministry of Education. His research foci are geography education, geographic information technology and education research, and geography examination and evaluation.

Rob Efrid is Associate Professor of Anthropology and Asian Studies at Seattle University. His research and writing focus on the effective use of environmental education to cultivate stewardship and sustainable lifestyles in different cultural contexts, particularly southwest China's Yunnan Province and the Pacific Northwest of the USA.

John Fien is a graduate of the University of Queensland (B.A., Ph.D.) and the University of London (M.A.) and is now Executive Director of the Swinburne Leadership Institute, Swinburne University of Technology, Australia. He was former Professor of Sustainability at RMIT University, Melbourne, Australia, where he was responsible for facilitating the development of teaching and research in the broad fields of sustainability across the university. His research includes studies of school-community learning partnerships, green skills, training for Indigenous employment in remote community housing, youth culture and sustainable consumption, and social learning for carbon neutral communities.

Catherine Hart has an M.Sc. in Environmental Biology and currently is a Ph.D. student in the area of Science and Environmental Education at the University of Regina.

Paul Hart is a Professor of Science and Environmental Education at the University of Regina, Canada, where he teaches both undergraduate and graduate students. He has published widely and has won several research awards and national grants for his work in Environmental Education.

Yu-Ling Hsu received a master's in Environmental Education from National Taichung University of Education in 2012 and has worked as Dr. Shih-Tsen Liu's assistant on National Science Council projects for 2 years. As a Paiwan aborigine, she regards it as her mission to highlight recent problems in aboriginal education.

Yu Huang is a Lecturer in the School of Geography and Chairman of the Student Affairs Committee at Beijing Normal University. He holds a Ph.D. in education, and has been a Visiting Scholar at King's College in England as well as a postdoctoral Fellow at Hokkaido University in Japan. Dr Huang's research interests are geographical and environmental education, tourism geography, global changes and higher education. He has published over 30 papers in Chinese, Japanese, and English and has edited and translated more than 20 books and teaching materials. He has also served as a consultant to WWF and other NGOs.

John Chi-Kin Lee is Changjiang Chair Professor and Director of Asia-Pacific Institute of Curriculum and Teaching Studies (APICTS) at Southwest University, China.

He is Vice President (Academic) and Chair Professor of Curriculum and Instruction at the Hong Kong Institute of Education, and the former Dean of the Faculty of Education at the Chinese University of Hong Kong. He has served as an Advisory Editor for the *Canadian Journal of Environmental Education* (Canada) and *Journal of Environmental Education Research* (Taiwan) as well as an editorial board member of other regional and international journals on curriculum studies, teaching and teacher education. His edited volumes include (with Michael Williams) *Environmental and Geographical Education for Sustainability: Cultural Contexts* (Nova Science: New York, 2006) and (with Michael Williams) *Schooling for Sustainable Development: Chinese Experience with Younger Children* (Springer: The Netherlands, 2009). He is the author, co-author and co-editor of more than 20 books, including the recently edited book *Research on Education for Sustainable Development in Cross-Straits, Hong Kong and Macao* (Guangzhou Education Press: Guangzhou, China, 2011) and (with Huang Yu and William H.T. Ma) *Design and Implementation of School-based Environmental Education: Towards sustainable development* (People's Education Press: Beijing, 2010).

Wen-Hui Lin entered the Master Program of Environmental Education and Management of National Taichung University of Education in Taiwan and served as Dr. Shih-Tsen Liu's research assistant from 2010. She develops the design and implementation of environmental education programs for environmental education facilities.

Shih-Tsen (Nike) Liu is an Associate Professor at the Graduate Institute of Environmental Education and Management at National Taichung University of Education in Taiwan. She has a Ph.D. from Penn State University in Agricultural and Extension Education. Her research interests include: nature centres and outdoor education, adult and intergenerational programs, and ecological and environmental community development. She has authored several education publications describing innovative ways to promote environmental education.

Xiaoxu Lu with a master degree of education from East China Normal University and a doctoral degree of science from Nanjing Normal University, works in the area of Geographic Education and Educational Geography at the College of Resources and Environment Science, East China Normal University.

William Hing-Tong Ma is Senior Curriculum Consultant at Hong Kong Baptist University and President of Green Environment Protection Association of Macau.

Rupert Maclean is Chair Professor of International Education and UNESCO Chair in Skills Development for Employability (TVET) and Lifelong Learning, at the Hong Kong Institute of Education. He is particularly interested in the contribution of skills development for employability to the "greening of economies" in both developed and developing countries. Before joining the HKIED in July 2009, he worked for UNESCO with senior posting in Rangoon, Bangkok, Paris and Bonn. He has been closely involved with UNESCO's leadership of the United Nations Decade of Education for Sustainable Development (ESD).

Christine Moseley is Chair and Professor in the Department of Interdisciplinary Learning and Teaching at the University of Texas at San Antonio. Dr. Moseley's research focuses on pre-service teacher preparation, particularly in the areas of science and environmental education. Dr. Moseley is actively involved in the North American Association of Environmental Education as a member and former co-chair of the Pre-service Teacher Advisory Council.

Ko Nomura is Associate Professor, Graduate School of Environmental Studies, Nagoya University. He is the co-editor (with Latipah Hendart) of *Environmental Education and NGOs in Indonesia*.

Bora Simmons serves as the founding director of the National Project for Excellence in Environmental Education. The project has drawn on the insights of literally thousands of educators across the USA and around the world to craft guidelines for top-quality environmental education. After 20 years as a professor of environmental education at Northern Illinois University, Bora retired in 2007 and moved the Project to the Institute for a Sustainable Environment at the University of Oregon. Bora has been actively involved in environmental education research, evaluation, and professional development for over 30 years. She has taught courses, given presentations, and facilitated workshops around the world. She was chair of the National Council for Accreditation of Teacher Education (NCATE) environmental education standards writing committee. She served as president of the North American Association for Environmental Education (NAAEE), serves on numerous steering committees and boards of directors, and was an executive editor of the *Journal of Environmental Education*. For her achievements, Bora received the Walter E. Jeske Award for Outstanding Contributions to Environmental Education, and the NAAEE Award for Outstanding Contributions to Research in Environmental Education.

Gregory Smith is a Professor in the Graduate School of Education and Counseling at Lewis & Clark College in Portland, Oregon, USA. He is the author of six books and numerous articles about ways schools can contribute to social and environmental health. His most recent volume was co-written with David Sobel and is entitled *Place- and Community-based Education in Schools* (Routledge, 2010).

Yeon-A Son is an Assistant Professor in the Department of Science Education, College of Education, Dankook University in Korea. She has developed environmental education programs for Korean teachers, and has written a textbook titled *Environment* for secondary schools.

Ekko Agus Suyono is Lecturer at Gadjah Mada University, Yogyakarta, Indonesia. His research focuses on sustainable development and biofuel production from microalgae.

Eric Po-Keung Tsang is currently Associate Professor in the Department of Science and Environmental Studies, the Hong Kong Institute of Education HKSAR. He has over 15 years of experience in the research and practice of ESD in Hong Kong and China through his role as an academic and the chairman of a major Green NGO in Hong Kong, Green Power. Over the years he has published many academic and consultancy articles, particularly on the review of Green Schools in Hong Kong. His recent review on the Green School program in Hong Kong has led to unprecedented changes in the programme.

Part I
Broad Themes and Issues

Chapter 1

Introduction: Schooling and Education for Sustainable Development (ESD) Across the Pacific

John Chi-Kin Lee and Rob Efird

Introduction

Education for sustainable development (ESD) has elicited worldwide attention, particularly from environmental education (EE) specialists. This variety has yielded common and peculiar features particular to certain locations. This book focuses on these commonalities and differences. We describe and explain the features that are evident in government policies for education, economy and society and in educational institutions that are required to respond to these policies. Grassroots movements differ from the initiatives generated in schools, local communities, and top-down movements and from the initiatives that originated from the governments. This book balances these differences. An ongoing debate exists about the linkages between EE, education for sustainability (EfS), and ESD.

People often use the terms “sustainability” and “sustainable development” (SD). The popular definition of SD was provided by the Brundtland Report (World Commission on Environment and Development 1987, pp. 8, 43), which states that, “sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs”. The publication of the Brundtland Report, which highlights economic development, facilitated the recognition of three interrelated aspects of SD, namely, economic, environmental, and social (Harris 2003).

J.C.-K. Lee (✉)

Asia-Pacific Institute of Curriculum and Teaching Studies (APICTS),
Faculty of Education, Southwest University, Chongqing, China

Department of Curriculum and Instruction, Faculty of Education
and Human Development, Hong Kong Institute of Education, Hong Kong
e-mail: jcklee@ied.edu.hk

R. Efird

Department of Anthropology, Sociology and Social Work,
Seattle University, Seattle, WA, USA
e-mail: efirdr@seattleu.edu

SD could be regarded as a process that contributes to sustainability or sustainable futures as end-points, emphasizes the equity between the present and future generations, and highlights the need for a sound environment, a just society and a healthy economy. However, the type of economy and society that will enable the socio-economic and political systems to develop such ideals should be examined. Certain scholars argue that the SD definition of Brundtland Report is limited and only focuses on human needs and limitations without due recognition of the natural environment. This limitation motivated some countries such as Australia to advocate for “ecologically sustainable and socially equitable development” (Diesendorf 1999, pp. 3–4). SD is subject to different value-laden interpretations which “serve particular social and economic interests and need to be critically assessed” (Fien and Tilbury 2002, p. 3). Similar to SD, “sustainability” also has various definitions and is subject to different interpretations. According to Stephens et al. (2008, p. 319), the time element in sustainability is essential: “Sustainability encompasses an inherent goal of being able to persist, sustain, and endure...A transition to a new pathway toward more sustainable practices and lifestyles is required”.

The concept of SD was presented in the Common Future (Brundtland) Report. However, *The Sustainable Development Timeline* of the International Institute for Sustainable Development cited the publication of *Silent Spring* by Rachel Carson in 1962 as the “turning point in our understanding of the interconnections among the environment, the economy and social wellbeing.” (IISD 2010, p. 1) This milestone was followed by important events such as the UN Conference on Human Environment (1972), which led to the development of the United Nations Environment Program (UNEP), the release of World Conservation Strategy (1980) by the International Union for the Conservation of Nature (IUCN), which highlighted the section “Towards Sustainable Development”, the Brundtland Report (1987) of the World Commission on Environment and Development, the Rio Earth Summit or the UN Conference on Environment and Development (UNCED) (1992), the World Summit on Sustainable Development (2002) and introduction of green economy into certain national governments in 2008 (IISD 2010).

The first official definition of EE was promulgated by the International Union for the Conservation of Nature (IUCN) in 1971, which defines the term as “... the process of recognizing values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the interrelatedness among men, his culture and his biophysical surroundings. EE also entails practice in decision-making and self-formulation of a code of behavior about issues concerning environmental quality” (INforEEP 2010, para. 2). EE was later promoted in the 1972 United Nations Conference on the Human Environment. After the launching of the United Nations Environment Program (UNEP) in 1975 and the Tbilisi Intergovernmental Conference on Environmental Education (1977), the objectives of EE, namely awareness, knowledge, attitudes, skills and participation, assumed several characteristics. Among these characteristics are the total consideration of the environment, including its continuous lifelong process, interdisciplinary approach, examines of major environmental issues from local, national, regional and international points of view, the explicit consideration of environmental aspects in developmental and

growth plans, and the utilization of diverse learning environments and a broad array of educational approaches to teaching/learning about and from the environment with emphasis on practical activities and first-hand experience (UNESCO-UNEP 1978, p. 3; Fien and Tilbury 1996, pp. 14–15). The increasing attention afforded to SD facilitated the evolution of EE towards ESD after the Rio Summit in 1992. The delegates at the 1993 UNESCO Asia-Pacific Regional Experts' Meeting on "Overcoming the Barriers to Environmental Education through Teacher Education" asserted that one of the goals of EE should be reshaped "to develop and reinforce new patterns of environmentally sensitive behaviour among individuals, groups and society as a whole for a sustainable environment" (Fien and Tilbury 1996, p. 18). Fien and Tilbury (1996, p. 20) also referred to an integrated EE comprising "education in the environment, *about* the environment and *for* the environment" (original emphasis), one which encompasses the key concepts of "interdependence, sustainable resource management, sustainable values and lifestyle choices, and civic participation". McKeown (2006) echoes that EE, significantly contributes greatly to ESD and EE considering its history that spans almost 40 years. In addition, ESD shares several similarities with EE such as its multidisciplinary nature, the call for behavioral change, and involvement in controversial issues.

Certain scholars view EE as one of the building blocks of ESD, whereas others argue that EE should be re-oriented to ESD. However, other critical educators argue that ESD is based on neoliberal market ideology and ESD is not superior to EE (Gadotti 2008, p. 30). Issues were raised on the relationship between development education (DE), EE and ESD when DE shares similar contents, methodologies and ideologies with ESD. According to Hogan and Tormey (2008, pp. 7–8), "the concept of education for sustainable development essentially combines development and environmental education by adding social and economic perspectives to environmental education and environmental concerns to development education...But... there are those within the ESD movement who see it primarily as an outgrowth, and a refocusing, of EE. One consequence of this is that some who call themselves practitioners of ESD still focus largely on environmental themes of climate change, pollution and resource use". Peters (2005, p. 240) also emphasized that "environmental education needs to come to terms in a new marriage with 'development education' at a time when 'development' has never been more open to question, particularly because of its deep and problematic relationship with 'modernisation'".

ESD rests on three pillars or foundations – namely ecology, society and economy – which implies ecological, social and economic SD (Campbell and Robottom 2008; Lee and Chung 2003). The interpretations of EE, ESD, EfS, EE for sustainability, and environmental ESD vary and use of these concepts are sometimes mixed (e.g. Fien and Tilbury 2002). The associated education paradigm would treat education as a training and information transfer process with a technical and rational nature when development is conceptualized as "continuous development owing to technological innovation and free trade" (Sauvé 1996, p. 27) and environment is viewed as "a resource to be developed and managed" (Sauvé 1996, p. 27). However, the associated education paradigm will be an innovative, "community-led process of critical investigation toward the

transformation of social realities” (Sauvé 1996, p. 27) if development is conceived as alternative development with the aim of fostering sustainable communities and environment as “a community project”. The discussion of ‘modernization’ is associated with the rise of United States as a “hegemonic world power but also with US financing of post-war reconstruction in Western Europe” (Peters 2005, p. 240).

However, the modernity-postmodernity debate in development studies and in other education and social science disciplines should not be ignored as well as the decolonization and changing contexts in Africa and Asia.

In addition to ESD, certain scholars, especially in the field of higher education, – use the term EfS, which has ten practical strategies (Jucker 2002, pp. 13–16); establishing EfS as the transdisciplinary core of all education; redefining notions of excellence; enabling self-determination in learning; doing, learning, going for the big picture and facing the consequences; practicing what we preach; shadow or hidden curriculum; we as the problem not the solution; looking beyond the limits of the imagination of our history, culture and ideology by re-learning; doing and acting; and learning for all including the experts. These practical and basic strategies are inspirational, visionary, and easy to implement. Moreover, different terminologies reflect various educational and ideological assumptions. The fundamental question should be addressed: agreeing on whether a concept is ESD, EfS, or EE if we do not sufficiently understand SD, sustainability, or the preconditions of a sustainable society.

Apart from the varying interpretations of “environment” and “development” in ESD and EfS, these concepts have various ideological underpinnings as different cultural ways of knowing. ESD and EfS emphasized a spectrum of ideologies that range from “cultural/bio-conservatism” and indigenous cultures (Bowers 2002) to conservation of right-wing libertarianism and neo-Social Darwinism, and feminist perspectives advocated by experts of different academic fields such as geography, biology, various social science and humanities disciplines and the creative arts (Lee and Williams 2006, p. 12). This method was adopted to counteract the potential “context-free” drawback of EE. The discourses of ESD and SD argue whether China could follow its own course based on the prevalence of a “Washington Consensus” (a US-knows-best approach “telling other nations how to run themselves”) and a “Beijing Consensus” (a Chinese perspective, being “pragmatic and ideological at the same time”) (Ramo 2004, p. 4; Lee 2009, p. 269). According to the “Washington Consensus”, SD could be achieved by reduced government expenditure, liberalization and privatization. On the other hand, the “Beijing Consensus” indicates that SD could be achieved by emphasizing on quality of life and knowledge and innovation-led growth (Ramo 2004; Nordtveit 2009, p. 157).

Obtaining an intellectual and practical understanding of SD, ESD, EfS is difficult because of the lack of consensus on the usage and definition of the terms, which stems from various contexts, paradigms, and perspectives. Stevenson (2007, p. 268) succinctly pointed out that, “(1) the discourses of environmental education and ESD remain an on-going site of struggle as the discourses do not represent a unified voice; and (2) the participants involved in the construction of these discourses have

been largely policymakers and academics and hence practitioner voices have been left marginalized.”

This book is an edited collection of chapters on ESD, which comprises EE across the Pacific. The Asia-Pacific region was chosen as the geographical area of study because of the following major reasons: (a) The Pacific implies a contrast between the East and West. (b) The book series *Schooling for Sustainable Development* contains books that are specific on ESD in North America, the Chinese communities, Australia, and South Asia. Thus, the Asia-Pacific region has become an area of attention, and countries in East Asia including Indonesia, which comprises islands and Islamic perspectives, are the foci of attention. (c) To some extent, this book builds on the books *Schooling for Sustainable Development in Chinese Communities* (Lee and Williams 2009) and *Schooling for Sustainable Development in Canada and the United States* (McKeown and Nolet 2013a, b) in the series. It is notable that *Schooling for Sustainable Development in Chinese Communities* (Lee and Williams 2009) highlights Chinese experiences in EE/ESD and focuses on young learners at the primary (elementary) stage of schooling while much of the existing literature covers adolescent learning in secondary schools. In *Schooling for Sustainable Development in Canada and the United States* places much attention on the status of ESD in the formal education (including primary and secondary grades as well as higher education) sector in Canada and the United States. Nonetheless, McKeown and Nolet (2013a, b, p. 4) rightly point out that “as the entire context of schooling evolves to meet the challenges and opportunities of the twenty-first century, the line between “formal” and “informal” education sometimes becomes blurred”. In our book, the content of the chapters related to the Chinese communities are somewhat complementary to those in *Sustainable Development in Chinese Communities* (Lee and Williams 2009). There are chapters showing rural-urban difference and regional variation in China (Chap. 5), green universities in China (Chap. 9), indigenous peoples’ education in Taiwan (Chap. 10), comparison of ESD projects between Hong Kong and China (Chap. 11), ESD in Macao secondary schools (Chap. 12) and the role of NGOs in EE in Kunming, China (Chap. 15). For the contents related to EE/ESD in Canada and the United States, there are discussions on the politics of culture and identity from Canadian experience (Chap. 2), excellence in EE (Chap. 4), EE in elementary educator preparation programme (Chap. 13) as well as place- and community-based education (Chap. 14). There is also one chapter on the Australian perspective of teachers’ thinking about ESD (Chap. 3) where Australia could be considered as a part of the Asia-Pacific region. More details about the status of EE/ED in Australia, and New Zealand could be found in *Schooling for Sustainable Development: A focus on Australia, New Zealand, and the Oceanic region* (Robertson 2012) in our book series.

This book examines ESD in selected places and countries across Asia-Pacific. Thus, understanding the various contexts or traditions that shaped their development is imperative (Fig. 1.1). McLaughlin and Talbert (1990) refer to the term “contexts” as the sociocultural, organizational, and policy contexts, including the school context that shape teaching and student learning. Taylor et al. (2009a, b, p. 4) subscribed the socio-cultural view of learning situated in “a social interactional, cultural, institutional, and historical context.”

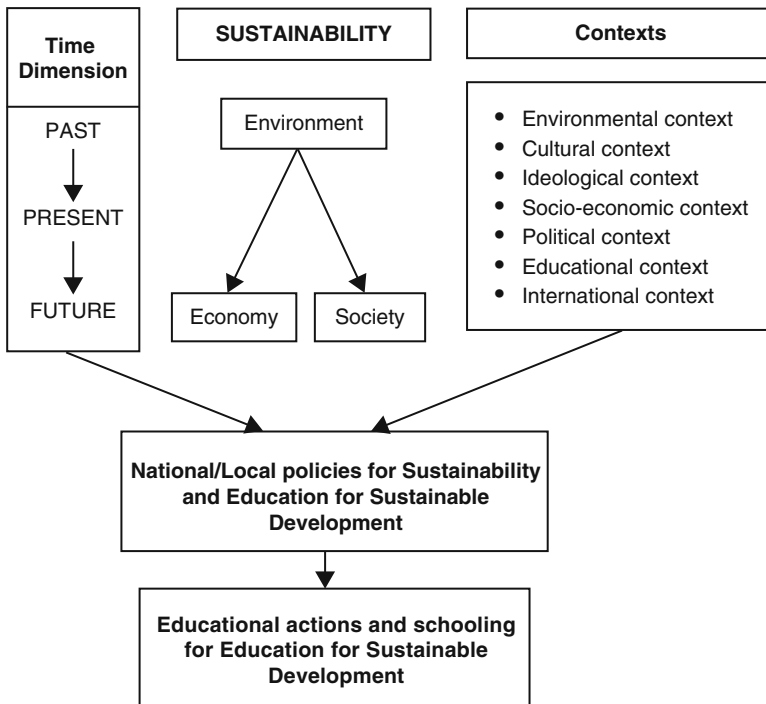


Fig. 1.1 Contexts that shape ESD (Source: Michael Williams, adapted by John Chi-Kin Lee)

Ideological Similarities and Differences Between “East Asia” and “North America”

Philosophical, Socio-cultural and Religious Foundations/ Traditions of ESD in Selected Countries in East Asia and North America

Asian environmentalism is different from that of the West because of the influence of Asian religion (e.g., Buddhism) and culture (e.g., respect for nature).

However, the interrelationship between environmentalism and socio-economic change tends to generate an ambiguous picture because of the progress of industrialization and the impact of globalization concomitant with drastic environmental degradation in many Asian communities such as Hong Kong, China, Taiwan, Japan, and South Korea. Nickum and Rambo (2003) found that the environmental concern of Hong Kong citizens is not closely related with religious reasons, whereas Americans tend to offer religious justifications for protecting nature (Choi 2011, p. 15). The popular but controversial Lynn White (1967) paper, “The Historical roots of our

ecological crisis,” focused on the influences of the Judeo-Christian tradition, which “had encouraged man (sic) to have dominion over the earth and therefore see himself exclusively amongst living creatures as created in the image of God and thus separate from the rest of nature” (Yencken 2000, p. 13). The paper of Callicott and Ames (1989) developed the thesis of “intellectual colonization,” which explained the introduction of Western science, technology, and ideas into the East accompanied by Western colonialism.

Several Asian societies, especially Chinese communities, are collectivist and group-centered because of the influence of Confucian thinking, which highlights respect for harmony and authority. By contrast, Western societies tend to be individualistic and children are nurtured as independent individuals. Differences in social norms, childrearing and education may have important consequences for environmental educators. A comparative study of the environmental concerns and behaviors of Canadian and Taiwanese Grade 5 students revealed no significant differences in environmental attitudes between the two groups. However, Taiwanese children have lower confidence of action, which may reflect, “parenting styles, social conventions, and education” (Huang and Yore 2003, p. 443).

Indonesia possesses ethnic diversity and religious pluralism with a predominantly Muslim population. Saleem Ali remarked that, “The advent of Islam as an organized religion occurred in the desert environment of Arabia, and hence there was considerable attention paid to ecological concerns within Islamic ethics” and “There is a reverence of nature that stems from essential pragmatism within the faith” (Gelling 2008, para. 10, 2009). However, Ali (2008) stressed the existence of Islam ideologies that challenge the accommodation of the SD paradigm. These challenges include the Islamic belief of humans as *Ashraful Makhloqaat* (the most superior creation), which may not be compatible with environmental ethics of animal rights and the Islamic emphasis on the after-life rather than the present, which might tend to promote complacency and fatalism about environmental conservation.

Furthermore, the *Qura’n* states that Allah (SWT) “established the exact balances and laws needed for a healthy environment; they concluded that environmental degradation is therefore caused by human negligence to spiritual and religious aspects of life” (Haddad 2006, p. 62). The Islamic approach to EE is based on a balanced tripod structure with Allah (SWT) as the head (nucleus) and of the three “legs” of “(a) knowledge/understanding, (b) manifestation/differentiation, and (c) faith/believing.” This structure was based on the holy *Qura’n* (Haddad 2006, p. 63).

The history of South Korea was influenced by China. Therefore, the eco-oriented early childhood education of South Korea contains influences from traditional Eastern thought including Taoism, Confucianism, Daoism, Buddhism, Donghak thought, and Life thought. The Donghak thought refers to the “traditional Korean thought, which views the sky, Earth, and the parent as one, in that the universe can be a parent and a parent can be the universe” and highlights the high regard for people and nature. Life thought views that “all living creatures in the universe are interconnected” and “all lives not only as a part of the whole, but also as the whole as it is” (Kwon 2008, p. 100).

According to Tetsuro Watsuji (1935–1979), people in Asian countries such as Japan are “living with nature,” whereas their Western counterparts are “fighting against nature” (Aoyagi-Usui et al. 2003, p. 23).

Back to the 1970s, Pirages and Ehrlich (1974) put forward the concept of Dominant Social Paradigm (DSP) which tended to highlight progress, material abundance, efficacy of science and technology and a view of humans as superior to nature. As a contrast to DSP, the New Environmental Paradigm (NEP) was conceived as an alternative, ecological worldview which highlighted harmony with nature and limited to growth (Dunlap 2008). Under this context, the NEP scale was developed to assess environmental attitudes or concern and later revised which has been used internationally (Dunlap and Van Liere 1978; Hawcroft and Milfont 2010).

Cultural differences in different societies based on the extent of individualism versus collectivism have often been employed to account for cultural differences in environmental concern (e.g., Kim and Choi 2005; Burn et al. 2012). From a societal perspective, there has been widespread advocacy for the New Environmental Paradigm (NEP) which views people as part of nature and acknowledges the limits to physical growth and development (Yencken et al. 2000). But NEP surveys in different parts of the world found variations in pattern and, in some cases, interpretations of the NEP scale in the Asia-Pacific context. A 1980s study of the ecocentric new environmental paradigm (NEP) showed that Japanese respondents have higher percentage of NEP acceptance compared with their counterparts in the United States (Pierce et al. 1987). An international empirical study revealed that the environmental values in the US are linked with altruistic values, which are contrary to traditional values such as honoring parents and elders, family security, and self-discipline. Environmental values in Japan are strongly linked with traditional values, but are also connected with altruistic values (Aoyagi-Usui et al. 2003, p. 23). Another study analyzed ecocentric NEP and the traditional, anthropocentric human exception paradigm (HEP). This study examined the separation of human separation from nature, revealed that the HEP and NEP of the university undergraduate students in the US are negatively and significantly related. By contrast, the HEP and the NEP “limits” of the Japanese sample were uncorrelated, which suggest that the HEP is not related to the imposition of limits to growth. These results suggest that the environmental belief structure may be indigenized and culture-dependent (Bechtel et al. 2006). In addition, the findings indicate that the majority of Japanese respondents showed strong environmental consciousness, but their knowledge of the causes and form of environmental problems was relatively weak. This result raises the question of whether ESD should pay more attention to behavioral change and environmental action via social learning and engagement with the public (Barrett and Kuroda 2002).

Recently, a study found that the Asian American and European American samples did not differ in the NEP but Asian American revealed higher score than European American on egoistic environmental values which may be related to the influence of collectivistic values (Burn et al. 2012). In Chap. 12, a revised NEP scale was used to assess Macao secondary teachers’ environmental concern and the results showed that

while the respondents became aware of human domination of nature and limits to growth, they had less agreement with the possibility of eco-crisis. While NEP scale was adopted widely, there were still limitations which called for more systematic study and rigorous statistical analyses (Hawcroft and Milfont 2010).

Socio-economic and Political Contexts of Environmental Activism and ESD in Selected Countries in East Asia and North America

Eight Asian economies, namely, Hong Kong, Singapore, Taiwan, South Korea, Thailand, Indonesia, Japan, and Malaysia, were identified in the 1990s with the capability of providing significant contributions to economic growth via educational investment and emphasis on skills development (Lee and Caldwell 2011). The Four Asian Tigers or Asian Dragons, namely, Hong Kong, Singapore, Taiwan, and South Korea, are known for their heavy government investment on education (Four Asian Tigers 2011). Indonesia, which is a member of the Association of South-East Asian Nations (ASEAN), was recently identified as one of the six growing economies or emerging markets known as CIVETS (CIVETS 2011). However, poverty remains widespread in the country. The case studies of selected countries in this book are Pacific Rim members of the Asia-Pacific Economic Cooperation (APEC) (Asia-Pacific Economic Cooperation n.d.). These countries pledged to contribute to SD in the mid-1990s and to focus on green growth in 2011 (Asia-Pacific Economic Cooperation 2010).

Little and Green (2009, p. 172) proposed that SD under the era of successful globalization should address “growth with equality and peace.” The concept of peace was not explored in this book. However, several Asian countries, such as China, India, Japan, and Taiwan, attempt to exert leading political and economic roles in the regional and global economies, which call for collaboration and dialogue instead of war and conflict.

Varying socio-political development affects environmental activism and ESD as well. For example, the citizen protest in Japan in the 1970s exerted a significant impact on environmental regulatory changes, but environmental activism weakened in the 1990s. A national environmental NGO was formed in the late 1990s, and the government adopted the corporatist approach towards civil society groups and movements. This approach was utilized by the Environmental Partnership Office (ERO) of the Ministry of the Environment in providing political opportunities and support that shaped the Japanese ESD movement and ESD policy implementation (Nomura and Abe 2009). Schreurs (2002, p. 59) commented that “it was not uncommon in Japan for groups wishing to obtain incorporation as a non-profit organization to hire former bureaucrats with connections to the ministries in order to expedite and facilitate the process...[T]he Japanese state has long tried to use activists to help it “Mold the Japanese Mind” and create a sense of “community”

that will reduce some of the social welfare burden of the state". In addition, complex relationships exist between the Ministries of Education and Environment concerning on their roles of promoting ESD in various many countries. Nomura and Abe (2009, p. 493) argued that, "The Ministry of the Environment.....now concentrates its efforts in ESD on the non-formal sector, with an emphasis on community development, as the formal education sector falls within the jurisdiction of the Education Ministry. Since ESD overlaps largely with 'environmental education', which the Ministry of the Environment has been engaged with for a long time, it would not be surprising to see its resources shifted from ESD to other environmental issues as they become more significant".

Sporadic local protests against environmental problems occur in Korea. However, strong environmental protest groups did not exist until the early 1990s when the Korea Federation for Environmental Movements, the League of Environmental Movements and Green Korea United were established. Notably, the student protest movements were linked with these environmental NGOs and the larger call for democratization. Unlike the Japanese environmental NGOs, which receive substantial help from the government, Korean NGOs secure foreign funding in addition to the funds received from the Environment Ministry (Schreurs 2002). The experiences of South Korea and Taiwan share a high degree of politicization of environmentalism (Choi 2011). South Korea represents a pattern of "congruent engagement" and maintains relative autonomy from political parties, whereas Taiwan reveals a pattern of "conflictual engagement" and NGOs maintain a close association with opposition parties (i.e., the Democratic Progressive Party (DPP)) (Kim 2000, p. 287).

Cummings (2008, p. 24) commented that "Asian values" assume a more authoritarian approach and environmental attitudes are influenced by government policies instead of individual initiatives. The results of a survey revealed that Chinese corporate managers and managerial students tend to endorse "centralization" and "national control over environmental regulations," whereas the Indonesian respondents supported "tighter restrictions on corporations" and emphasized "environmental performance audit" (Cummings 2008, p. 24).

Environmentalism in China is also unique because environmental movements are supported by the government, which implies that the grassroots environmental movement operates differently from those in other countries (Choi 2011, p. 143). The Beijing experience facilitated the formation of a collective environmental identity of NGOs with a sense of social responsibility, which reflects the Chinese cultural heritage and traditional moral education. This "Chinese characteristic" is also shown in the ability of NGOs to "strongly strengthen[s] the mobilization of masses and resources, and help[s] to preserve the movement's autonomy from international NGOs as their funding organizations" (Lei 2009, p. 18).

While some scholars argue for differences in environmental values and concern between the East and West and within the Asian region, the key differences across the Pacific may lie in the political systems, which allow very different degrees of dissent and opposition.

Issues of Aboriginal/Indigenous and Minority Perspectives for ESD

Aboriginal/indigenous environmental perspectives, which are perceived as traditional, primitive, and conservative, tend to be ignored, marginalized, or trivialized because of the dominance of Western Euro-centric perspectives of scientific and EE. Canada advocates for the inclusion of indigenous perspectives in mainstream curricula and the integration of Western, mainstream environmental management regimes with aboriginal environmental wisdom, stewardship and sustainability, such as the Walpole Island First Nations and Canadian Arctic experiences.

Aboriginal perspectives should not be treated as “add-ons” and aboriginal knowledge should not be romanticized after its integration into the school curriculum (Beckford et al. 2010). Biermann (2008, p. 33) suggested three shared characteristics of indigenous pedagogies and EE, namely, “the *experiential, group-dynamic* and *student-centred* nature of learning” (emphasis in original) which could be realized into “more integrated, project-based and goal-oriented work.” A large artisan community exists in Indonesia, which produces important crafts. The UNESCO National Commission organized several innovative programs that involve indigenous and local handicrafts and indigenous livelihood. However, more indigenous voices should be heard and more contribution from NGOs such as youth organizations should be encouraged (Surendra 2011, p. 45).

Educational and Schooling Perspectives of ESD

Certain western books on EE/ESD or the North American book in the series, *Schooling for Sustainable Development*, indicate that some western scholars use terms such as “student engagement”, “active learning”, “service learning” and “active students” without defining the terms. They assume that the meanings are self-evident across cultures or taken for granted from a western perspective.

A study on pedagogical practices revealed that Kaohsiung elementary schools in Taiwan continue to utilize traditional teacher-directed instruction with emphasis on environmental knowledge, whereas schools in Victoria, Canada highlight experiential learning and maintain balance among environmental knowledge, skills, and attitudes. The approach utilized by Taiwan “might develop knowledgeable children without the competence to apply the knowledge to real environmental problems and issues” (Huang and Yore 2003, p. 444).

Several countries promote EE/ESD as a cross-curricular theme or a curriculum framework. Taiwan includes EE in the six issues integrated with the seven learning areas. However, a case study revealed that the implementation of EE in Taiwan was unsatisfactory in three junior high schools. Yueh and Barker (2011, p. 146) remarked that, “...internationally, not just in Taiwan..., schooling continues to

wrestle with implementing environmental education in “framework” aspects of curricula. In New Zealand, early results...relating to “framework” implementation of the “New Zealand Curriculum” of 2007, are not encouraging; and the implementation of “sustainability” (the discourse which earlier environmental education has generated), conceived as a future focused theme and a value, is also tentative. Australia faces similar challenges as it currently explores the inclusion of sustainability as a cross-curriculum dimension in the first Australian Curriculum”.

ESD development is often shaped by national and local contexts. According to Murtlaksono et al. (2011), the development of environmental instructional materials for EE in Indonesia could be based on the concept of ESD created by UNESCO. This concept highlights “knowledge (science), skills (competence), issues (events/environmental policies), values (attitudes), and perspectives (assumptions)” (p. 37). In addition to the concepts of green school or eco-school, Indonesia introduced the *Adiwiyata* program which “means a good and ideal place wherein sciences, norms, and ethics can be obtained: all of these subjects become the foundation for the realization of social welfare and sustainable development.” In addition, this program established *Adiwiyata* schools with environmental policies, environmentally based curricula, and participatory activities (both inside and outside schools) (Murtlaksono et al. 2011, p. 40).

UNESCO-associated schools were also developed via the ASPnet program, which involves teacher knowledge assessment, ESD understanding, and the organization of student essay competitions and initiatives by nature schools (Surendra 2011, p. 42).

International Observations of ESD

Taylor et al. (2009a, b) observed the international development of EE. First, a slippage was found between EE and ESD policy and its implementation in school and classroom levels in some places such as Hong Kong. Second, they observed a tendency to maintain the emphasis on education about the environment, the use of a didactic expository approach in teaching EE content and downplaying education for the environment, which includes a socially critical approach to student involvement and decision-making in EE activities. Third, EE is marginalized in some Asia countries such as Malaysia and is accorded with a low status in the school curriculum. In addition, teachers often lack the pedagogical content knowledge and skills for teaching EE and for evaluation of EE programs.

However, signs of positive EE development were observed in some Asian countries such as Sri Lanka via EE projects organized by NGOs and school-community partnership projects in some parts of Thailand.

ESD share broad similarities with some previous or ongoing curriculum movements such as EE, citizenship education and DE (Little and Green 2009, p. 172). However, Tilbury and Janousek (2007, p. 138) lamented that “ESD has been

promoted as an intervention or means for attitudinal and behavior change rather than a learning process for improving social policy or corporate, government or institutional contributions to sustainable development. At other times, it has been promoted as quality education, thus missing opportunities to relate to the sustainable development education agenda including themes such as justice, equity and ecological footprinting". Certain Asian countries encounter challenges in establishing a coherent link between "adjectival education", such as education about peace, values and international understanding, and ESD initiatives in the education system. One of these exceptions is Indonesia where "the Education for All (EFA) and ESD activities are being addressed within the same goals and perspectives" (Surendra 2011, p. 45).

The emphasis on environmental and sustainability education in the higher education sector could be dated back to the Stockholm Declaration in 1972. The Talloires Declaration in 1990, which was signed by more than 70 U.S. college and university presidents, was "the first official statement made by university administrators of a commitment to environmental sustainability in higher education. The TD is a ten-point action plan for incorporating sustainability and environmental literacy in teaching, research, operations and outreach at colleges and universities. It has been signed by over 300 university presidents and chancellors in over 40 countries" (UNESCO n.d.) The Halifax Declaration was signed in 1991. Canadian universities, such as the University of British Columbia and McGill University, established their own institutional environmental policies based on the Talloires and the Halifax Declarations (Wright 2002).

Several institutions and universities promote sustainability by "greening" their campus in the areas of carbon and waste management and construction, which was inspired by the *Blueprint for Green Campus* in the U.S. in 1994. However, general themes emerged, which reflect the principles of sustainability in policies and declarations. Among these themes are "sustainable physical operations, sustainable academic research, environmental literacy, ethical and moral responsibility, cooperation amongst universities and countries, the development of interdisciplinary curriculum, partnerships with government, non-governmental organizations and industry, and public outreach" (Wright 2002, p. 214). Furthermore, recommendations for the incorporation of sustainability in teaching and practice were made, such as promoting interdisciplinary teaching and learning, fostering student engagement, establishing environmental reporting mechanisms, disseminating best practices, and increasing university emphasis and government support for sustainability by external stakeholders (Calder and Clugston 2003, pp. 10019–10021).

The University of Tokyo in Japan established the Integrated Research System for Sustainability Science., The United Nations University (UNU) Regional Centres for Expertise (RCEs) in ESD initiative were established to promote ESD. Community-level actions and multi-stakeholder approaches were also emphasized., as shown in the selection criteria of Contemporary GP [good practices] and in the "Environmental Leadership Initiatives for Asian Sustainability" (ELIAS). This program involves "the development of model higher education program; the launch of a

government-industry-academia multiple stakeholder consortium for environmental leadership training; and the creation of a network of graduate schools for environmental leadership training” (Nomura and Abe 2010, p. 124). Two RCEs were set up in Indonesia. An RCE was established in Gadjah Madia University, which involves the annual deployment of final year students to help rural village people improve their livelihood and disseminate the values of ESD such as literacy education and sustainable poverty alleviation (Purwadi 2009, p. 12). More than 100 multidisciplinary environmental study centers (ESCs) were also established in Indonesian universities for enhancing training, research and community development (Nomura 2009, p. 623).

More than 20 universities in Korea engaged in ESD and campus improvement via the network of Korean Green Campus Association (Ryan et al. 2010). Japan and South Korea host the TUNZA International Children and/or Youth Conference, which provides a platform for youth and children voices in environmental issues (UNEP n.d.). Tongji University in China collaborated with the Chinese National Commission for UNESCO in organizing the national launching of the Decade of Education for Sustainable Development (DESD) in 2005 (Tilbury and Janousek 2007). The Asia-Pacific approach and experience showed considerable progress in learning for sustainability across formal education and highlighted “partnerships and regional co-ordination; mobilization of the media, youth networks, and the private sector; and linkages across educational sectors and with other stakeholders” (Elias 2006, p. 84; Ryan et al. 2010, p. 111). The experiences of Taiwan and Japan revealed a synthesis between educational and environmental policies and the co-ordination of government departments in policy-making and funding support, which other countries in the Asia-Pacific region lack. Despite these success, higher education institutions encountered international ESD challenges, such as aligning the particular academic strength of the institution with the specific local needs and features of the region and developing systemic and interdisciplinary learning for sustainability of the formal curriculum (Ryan et al. 2010, p. 114). In addition, certain universities faced challenges such as “a lack of leadership, a lack of accountability mechanisms, and fiscal constraints” (Wright 2002, p. 4). Higher education, as a change agent for sustainability in different cultures and contexts, encounters five critical issues (Stephens et al. 2008, p. 323), namely “the dominant sustainability challenges of the region; the financing structure and independence; the institutional organization; the extent of democratic processes; and communication and interaction with society”. Most of these promises and pitfalls in different education sectors can be identified in the following book chapters.

Across the Pacific: From the United States to the Asia-Pacific

The roots of EE as part of ESD in the United States (US) can be traced back to conservation education and the liberal-progressive philosophies. An example of this philosophy is that of John Dewey (Gough and Gough 2010). The emergence of environmental concerns in the United States was further evident in Rachel Carson’s

Silent Spring, which was published in 1962, the first US federal Clean Air Act in 1963, and the first Earth Day in the US in 1970, which organized via student-based efforts. The development of EE obtained international support by the Principle 19 of the Stockholm Declaration in 1972, which stated that EE should be provided from grade school to adulthood to “broaden the basis for enlightened opinions and responsible conduct by individuals, enterprises and communities in protecting and improving the environment in its full human dimension” (United Nations Conference on the Human Environment 1972; Calder and Clugston 2003, p. 10004). The Tbilisi Declaration first promoted the interdisciplinary nature of EE. Pedagogical approaches to EE have existed since the 1980s, which range from the individualistic “green” approach inspired by deep ecology, such as the “Earth Education.” This approach is compatible with education in the environment and the red, socially critical or ecopolitical approach, which supports the spirit of education for the environment (Gough and Gough 2010). EE advocates for education about, in, and for the environment. However, the International Environmental Education Program of the United Nations Educational, Scientific, and Cultural Organizations-United Nations Environment Programme (UNESCO-UNEP) in 1975 and 1995 were important in promoting EE. This program utilized Hungerford and Peyton’s (1994) technical approach to EE curriculum development and Hungerford and Volk’s (1990) environmental behavior model. Sauvé et al. (2007, p. 36) argued that “the UN documents’ perspectives on education, environment, and development” did not show significant variations in the past three decades. The belief that “Education is an instrument to support a political and economic agenda; environment is reduced to problems of resources; and development is mainly associated with sustained economic growth” (Sauvé et al. 2007, p. 36) also decreases over time.

The following key lessons for implementing ESD remain relevant following the Earth Summit in 1992 (UNESCO 2002, pp. 5–6):

1. Education for sustainable development is an emerging but dynamic concept that encompasses a new vision of education that seeks to empower people of all ages to assume responsibility for creating a sustainable future.
2. Basic education provides the foundation for all future education and is a contribution to sustainable development in its own right.
3. There is a need to refocus many existing education policies, programs and practices so that they build the concepts, skills, motivation and commitment needed for sustainable development.
4. Education is the key to rural transformation and is essential to ensuring the economic, cultural and ecological vitality of rural areas and communities.
5. Lifelong learning, including adult and community education, appropriate technical and vocational education, higher education and teacher education are all vital ingredients of capacity building for a sustainable future.

Scholars, including Gough and Gough (2010, p. 341), commented on the launch of UN DESD: “Although most would argue that we need it, many still argue about what it is and where it can fit into an already over-crowded curriculum”. ESD programs and activities tend to vary and become culturally appropriate and locally

relevant. However, these programs strive to echo the following four global thrusts: improving access and retention in quality basic education; reorienting existing educational programs to address sustainability; increasing public understanding and awareness of sustainability; and providing training (UNESCO 2007, p. 6; Little and Green 2009, p. 172). ESD comprises ten emerging fields in UNESCO, namely, poverty reduction; gender equality; promotion of health; environmental conservation and protection; rural transformation; human rights; intercultural understanding and peace; sustainable production and consumption; cultural diversity; and information and communication technologies (González-Gaudio 2005, p. 243). The integration of environmental conservation and education with other universal and societal issues is advocated by several environmental educators in Latin America and the Caribbean. González-Gaudio (2005, pp. 244–245) pointed out that ESD “is now being asked to promote education as more of a social process than a curricular process; an education more focused on people than on nature”. The “silencing of non-Western perspectives” has been a dominant trend in EE (Gough 1997, p. 36). Noel Gough (2002, p. 123X) suggested that “for those of us who work in Western knowledge traditions, a first step must be to represent and perform our distinctive approaches to knowledge production in ways that authentically demonstrate their localness”. Some scholars such as Nomura (2009) argued that EE is more common in some developing countries, whereas ESD is a new and elusive concept that “emerged from the international policy discourse and not from the local context” (p. 626). ESD comprising EE was used in this book because of the diversity of interpretations between EE and ESD.

Yencken et al. (2000) compared the knowledge, attitudes and behavior of young people in the Asia-Pacific region, including Australia, south China, India, Japan, South East Asia (Singapore, Thailand, Indonesia, Philippines, Brunei) and the South West Pacific (Australia, New Zealand and Fiji). Their study facilitated the implementation of several programs and actions at various levels in the Asia-Pacific region. Most importantly, the United Nations launched the DESD (2005–2014), which promoted EE and ESD worldwide, including countries across the Pacific. Unprecedented educational and curriculum reforms were mentioned in authoritative reports, which indicate the high achievement levels of the Programme for International Student Assessment (PISA) results of some countries in the Asia-Pacific region. The latter attracted scholarly and media attention (Kennedy and Lee 2010; Lee and Caldwell 2011).

Increasing worldwide efforts have been devoted to the promotion of ESD. However, only six countries have enacted or promulgated EE acts, which include the 1990 National Environmental Education Act 1990 of the United States, the National Environmental Education Policy Act of Brazil in 1999 (Wolfson 2004), the Law for Enhancing Motivation on Environmental Conservation and Promoting of Environmental Education in Japan (2003), the National Environmental Education Act of South Korea in 2008 (Murtlaksono et al. 2011), the National Environmental Awareness and Education Act of 2008 in the Philippines (Congress of the Philippines 2008), and the recent Environmental Education Act of Taiwan (2010). The 1990 National Environmental Education Act of the United States advocated the

establishment of the Office of Environmental Education, EE training program, EE grants, environmental internships and fellowships, EE awards, EE advisory council and task force, and the National Environmental Education and Training Foundation. The Law for Enhancing Motivation on Environmental Conservation and Promoting of Environmental Education (hereafter referred to as the EE Law of Japan; Government of Japan 2003) in Japan highlighted the importance of self-consciousness and motivation and multiple ways of participating and supporting local EE activities, which embed the concepts of transparency and sustainability. According to Binstock (2006, p. 17), “At the state level, it is proposed [in the EE Law of Japan] that measures will be implemented to aid in encouraging willingness for conservation activities and EE in cooperation with local governments (Government of Japan 2003)... EE in particular, the intent of the Law is to encourage the promotion of EE both within the formal school setting and through other non formal channels (Government of Japan 2003)”. The National Environmental Education Act of South Korea focuses more on the establishment of EE centers, qualification system for social environmental leaders, and certification system of EE program (Lee 2008, p. 80).

In addition to EE laws and regulations, the role of local and international NGOs in the promotion of EE/ESD should not be under-emphasized. In Taiwan, for example, the North American Association for Environmental Education (NAAEE) certification system was introduced but there was a diversity of views on the merits and constraints of introducing the certification system among governmental agency staff, graduate students, university professors, and experienced teachers (Chang et al. 2007). On the other hand, the successful partnership between the government (Ministry of Education, China), the NGO (WWF-China) and the multinational business organization (British Petroleum) as well as the universities in the Environmental Educators’ Initiative could provide important lessons for future collaboration and partnership between various agencies (Lee 2010; Lee et al. 2013).

Status of ESD in the Asia-Pacific Region and Selected Countries Across the Pacific: China, Hong Kong Special Administration Region (SAR) of China, Macao SAR of China, Indonesia, Japan, South Korea, Taiwan, and the US

Hilary Clinton, the former US Secretary of State, remarked at the Asia-Pacific Economic Cooperation (APEC) forum in 2011 that, “the western hemisphere’s influence in the world was rapidly waning, and the US was shifting its focus from Europe to Asia. It is becoming increasingly clear that the world’s strategic and economic centre of gravity will be the Asia-Pacific, from the Indian subcontinent to western shores of the Americas” (McNeill 2011). She also commented on the Clinton (2011) report on Asia-Pacific: “The Asia-Pacific has become a key driver of global politics. Stretching from the Indian subcontinent to the western shores of the

Americas, the region spans two oceans – the Pacific and the Indian – that are increasingly linked by shipping and strategy. It boasts almost half the world’s population. It includes many of the key engines of the global economy, as well as the largest emitters of greenhouse gases. It is home to several of our key allies and important emerging powers like China, India, and Indonesia” (Clinton 2011). Several key challenges for SD were identified in the Asia-Pacific region, which covers most of East Asia, South East Asia, and Oceania (Asia-Pacific n.d.). These challenges include (Wals and Kieft 2010, pp. 31–32): ethnic, linguistic, and religious diversity; disappearance of indigenous and traditional knowledge and persistence of certain traditional beliefs; inadequate inter-ministerial coordination and collaboration; existence of remote and rural areas that cause difficulties in communication provision of support; lack of donor and financial support for some developing countries and marginalized and disadvantaged groups; impact of natural disasters; and low adult literacy in some developing countries, especially women. ESD is mostly focused on formal education. However, “there is insufficient government funding for non-formal and informal ESD awareness raising programs and initiatives. Furthermore there is little attention for the development of ESD-materials and tools for groups that fall under the category of non-formal and informal education.” (Wals and Kieft 2010, p. 33). Mochizuki (2010, p. 40) utilized the comparative education perspective to indicate the presence of local adaptations and manifestations based on “divergence theory of educational principles policies and practices” and the influence of local agency despite the presence of international (e.g., UNESCO and DESD) discourses of ESD and convergent influence of world culture. The next section provides a brief discussion of ESD in selected countries in Asia-Pacific.

China

In our book series “Schooling for Sustainable Development”, the book *Schooling for Sustainable Development in Chinese Communities: Experience with younger children*, co-edited by Lee and Williams (2009), sufficiently discussed EE and ESD in Chinese communities (China, Taiwan, Hong Kong SAR and Macao SAR). The National Environmental Education Act and the North American Association for Environmental Education (NAAEE) were enacted and established in the United States in 1970 and 1971, respectively. EE became an official cross-curricular theme of the national curriculum for schools in England in the late 1980s. However, EE was included as part of extra-curricular activities in China only in 1990, which permeated through various school subjects such as nature study (*ziran xuexi*). This development was followed by the emphasis on population, resources, and environment in the basic education curriculum via the announcement of the *Nine-Year Curriculum Plan for Full-time Compulsory Education in Elementary, Middle, and High Schools (trial implementation)* by the Ministry of Education (Lee and Williams 2009, p. 12).

ESD in curriculum reform is often delivered by school-based (*xiaoben*) and/or local curriculum with emphasis on the learning mode of “going to our community”

and higher-order skills, such as critical thinking and problem solving. The core values or the “Four Respects” of ESD are instilled among schoolchildren, which is embodied in the following statement: “Respect for All, Respect for Cultural Diversity, Respect for Nature and Respect for Science” (UNESCO Beijing (Education) with inputs from the Chinese National Commission for UNESCO 2009, p. 72).

It is notable that the Ministry of Education launched the *National Environmental Education Guidelines* (NEEG) (trial) document and *Syllabuses for special topics education on preventing AIDS, preventing drugs and environmental education for primary and middle school students* in 2003 which would be further discussed in Chap. 9 (Huang and Lee) and Chap. 15 (Efird). The first EE center was established in Beijing Normal University in the 1990s. Some EE teacher training activities were organized via the support of the World Wide Fund for Nature (WWF), which later worked with the Ministry of Education and British Petroleum in launching the Environmental Educators’ Initiative (Lee 2010). In addition to the WWF, other NGOs such as Friends of Nature (FON), the Global Village of Beijing (GVB), and the China Environmental Protection Foundation (CEPF) devoted substantial efforts to the development of EE and ESD in China. The Center of Environmental Education and Communication (CEEC) of the Ministry of Environmental Protection (MEP) is also instrumental in several EE and ESD activities, which include the Green School Project (informed by the European eco-schools), the tripartite (China-Japan-Korea) Environmental Education Network (TEEN), the Green Ribbon of the Earth program (CLOBE), and others. McBeath and McBeath (2009, pp. 10–11) commented on the status of EE in China:

The trajectory of change in China is also different from that in the West. Obviously, external agencies of change, such as international government organizations and NGOs have played a more important role in the diffusion of the concepts of environmental education than they have in economically developed nation-states. The media are increasingly important change agents, but as noted they do not have the access to environmental events and crises that media do in countries with autonomous civil societies; and in an authoritarian polity, highly controversial environmental events may not enter the information stream at all.

ESD attained significant achievements in China in recent years. However, other limitations continue to exist, such as the priority afforded to technology for solving environmental problems without sufficiently addressing political, economic, and ecological concerns; the existence of utilitarian-oriented public EE; and the downplaying of humanistic and scientific values by the formal education system (Tian 2004, p. 38).

Indonesia

The Republic of Indonesia is an archipelago of more than 17,500 islands and supports the world’s second highest level of biodiversity (Indonesia n.d.). Indonesia experiences several natural disasters such as volcanic eruptions, earthquakes, and

tsunami. The Ministries of Education and Environment in Indonesia launched the DESD in 2005 by initially focusing on environmental protection and conservation. A senior university academic administrator was appointed as national coordinator and an ESD committee was formed to prepare for the incorporation of SD into the educational system (Surendra 2011). The government developed the National Standard of Educational Content, which encompasses the three perspectives of environment, society, and economy, and allows schools to introduce ESD via local relevant examples. The Minister of National Education further integrated ESD with moral education concepts in 2008 (“Noble Character Education” known as Pendidikan Akhlak Mulia). These concepts suggest that, “once a person reaches this level of morality, their actions will be in accordance with and in full cognizance of” the three perspectives of ESD (Purwadi 2009, p. 12).

Thus, the school curricula highlight the environment, conservation, and natural disaster mitigation by the infusion of different subjects, which range from natural sciences, social sciences, physical education, and religion, or the block method. Issues on the connection between overpopulation and poverty, democratization, justice, gender were highlighted (Murti Laksono et al. 2011; Nomura 2009; Surendra 2011). An educational board game called Disaster Master was developed for secondary school students, supported by UNESCO Jakarta. Furthermore, advocacies for world heritage sites such as the Prambanan Hindu temple and the Water Palace were strengthened via school education (Wagner-Gambie and Elias n.d., pp. 4–6). Indonesia attained significant achievement in promoting EE and ESD. However, some challenges and obstacles were encountered in the curriculum development, teaching, and learning processes of ESD, which may be encountered by less developed countries in Asia (Surendra 2011, p. 46): ESD was less prioritized compared with more urgent issues such as poverty and health. In addition, schools lack time for ESD implementation. Less attention was afforded to ESD by middle managers and school practitioners because of other demands from parents, the government, and corporate businesses. Other issues were also observed such as lack of coherence between education projects and other ESD initiatives, lack of balance and linkage between different sectors of education and between formal and non-formal education, and lack of capacity-building for enhancement of teacher and curriculum development.

Japan

The history of EE in Japan originated from two forms. First is the “nature conservation education,” which dates back to the mid-1950s or conservation education as part of EE and its link with the long cultural history of respecting nature and wildlife. The second origin of EE in Japan comes from “pollution education,” which dates back to the late 1960s. Pollution education is linked with the environmental movement for the protection of children’s health from “*kōgai* [pollution]” (Sato 2009, p. 40). Sato (2009, p. 41) explained that, “both of nature conservation

education and pollution education tried to eliminate social contradictions from an ecological perspective (environmental perspective in the sense of ESD) and the pollution victim's perspective (socio-economic perspective in the sense of ESD) respectively." Notably, the emergence of ESD facilitated the progress of conservation education and its incorporation with ESD via the RCE network by working with institutional and community stakeholders (Kobori 2009).

ESD in Japan contains the following four tenets that are closely related to Japanese contexts and traditions (Mochizuki 2010, pp. 42–53): (a) ESD highlights the societal component as an upgraded version of EE, which is closely related to experience-based nature learning; (b) ESD as an umbrella term that supplements forerunning education initiatives and programs; (c) ESD as a community development ("*machizukuri*" literally meaning "town building") process, which aims to "restore the lost functions of local communities, inclusive of (but not limited to) educational functions" (p. 48); and (d) ESD as a lifelong learning process that "can potentially revive and enhance traditional "*shakai kyoiku*" (social education) practices" (p. 52).

One of the key features of ESD in Japan is the adoption of the "building a better society" perspective and the organization of participatory and problem-solving learning activities across school levels, which extend to higher education, communities, and enterprises even before the DESD was launched (Interministerial Meeting on the UNDES, Japan 2009, p. 1). Unlike the key learning area approach of Hong Kong and the learning area approach of Taiwan, the curriculum guidelines of Japan continue to adopt "subject" as the basis of curriculum framework. The integrated, 3-h class time per week in primary schools for Life [Environmental] Studies (*seikatsuka*, literally meaning 'life class') combines elements of science and social studies and highlights nature and social relationships, which is one of the important means for delivering EE for schoolchildren. The "period for integrated study" was also introduced in primary and secondary schools to implement school-based integrated curriculum, which became an important vehicle for EE and ESD, and covers topics such as international understanding, health, welfare, information, and environment. The "comprehensive-system EE" thematic category, which comprises natural, global, and life systems, has gained currency since the 1990s. Some of these elements were incorporated into the formal school curriculum in 2002. EE was basically integrated into every subject and extra-curricular activities. The Ministry of Education prepared "environmental education guidance materials" to help teachers promote EE activities. These materials covered five aspects of teaching examples, namely, "EE related to subject contents;" "EE utilizing teaching materials;" "EE respecting active experience;" "EE related to home and community;" and "EE related to whole school activity" (Mizuyama 2005, pp. 13–14). The Associated Schools' Project Network of UNESCO was also used as a platform for promoting ESD (Interministerial Meeting on the UNDES, Japan 2009, p. 11). The Ministry of Education successfully developed the Junior Eco-Club (*kodomo-eko-kurabu*) scheme as non-formal EE. The local government (prefecture and city government) and the Council for the Promotion of the Decade of ESD (ESD-J) integrated more than 90 organizations as members, which promoted the systematic implementation

of ESD (Abe 2005). The future implementation of ESD at the local levels should consider the following ten aspects (Sato 2009, p. 47): “(1) awareness of relationships; (2) contextualization of activities; (3) formulation of sustainability principles and concepts; (4) respect for environmental ethics and diverse values; (5) utilization of and learning with diverse educational methods and higher-order thinking skills; (6) interaction amongst diverse education community; (7) collaborative approach and capacity building; (8) social learning mechanism and creation of a lifelong learning system; (9) connections with international education initiatives; and (10) positive societal transformation.”

Republic of Korea/South Korea

EE has become increasingly important in the school curriculum since the 1980s. The EE guidelines were included in the fourth (1981–1987) and fifth national curricula (1987–1992), respectively. An eclectic approach to EE was observed in the sixth curriculum revision, wherein primary schools highlight multidisciplinary integration and middle and high schools emphasize interdisciplinary integration. The seventh curriculum revision in 2000 emphasized EE in Korean schools, particularly in elementary and primary schools where “the time for environmental education was expanded as the time for discretionary activity has been doubled” (Chu and Treagust 2009, p. 300; Ministry of Environment, Republic of Korea 2011). The recent national curriculum or the eighth curriculum revision introduced additional and more comprehensive environmental topics at the secondary level such as the “restoration of eco-space, environmental justice, ecological, sensitivity” (Lee 2008, p. 76).

EE in South Korea is broadly categorized into ecological education and EE, which are sub-categorized into school and social education. Ecological education introduces values change and environmentally friendly lifestyles. The “Academy for Life Movement” and the “Ecological Field Trip” were also organized, as well as the development of alternative schools and curricula, which reflects ecological thinking. Several NGOs, such as the Korean Federation of Environmental Movement and the Korea Sustainable Development Network, implemented programs such as the Ecological School, the Tree School, and the Green School. “Environmental studies” in the middle school curriculum and “environmental science” in high school become optional subjects (Ryoo n.d.).

SD and ESD were highly prioritized after 2005. This development was evident in the enactment of the “Basic Law on Sustainable Development” in 2007 and the National Environmental Education Act in 2008. The situational analysis of the ESD in South Korea revealed the need to establish the connections between SD policy issues and values education and the promotion of public and community awareness of lifestyle changes related to SD. Recently, the Korean government increased their focus on the work of the Education Committee under the Presidential Commission on Sustainable Development and promoted ESD via values education such as the

Education for International Understanding (EIU) and the development of ESD teaching materials and ESD guidelines for teachers (Surendra 2005, p. 13; Kwon et al. 2009, p. 69).

Taiwan

EE in Taiwan was introduced to school curriculum in the 1990s along with the promulgation of *Essential Components of Environmental Education* in 1992 under the Environmental Protection Administration Executive Yuan (Lee and Williams 2009, p. 17). The *Nine-year Articulated Curriculum Guideline* was announced in 1999. This guideline included the components of school-based and integrated curriculum as EE and the integration of one of the six key issues. According to Shaw (2008, p. 1), “From 1997 onwards, the focus of environmental education has shifted from pollution control to sustainable development...Environmental education also follows the principle of lifelong learning, course integration, active participation in problem solving, achieving a balance between global and local perspectives, sustainable development and international co-operation.” Similar to Japan, Australia, France, and Hong Kong, Taiwan advocated the promotion of EE by a “whole school approach.” This approach was exemplified by the success of the Green School Project, the Taiwan Sustainable Campus Program (TSCP) in higher education (Su and Chang 2010), and other initiatives. The TSCP at Taiwan Normal University was composed of the following four initiatives (Chang 2007, pp. 36–37): rainwater harvest, black water treatment, and recycling system; increased campus biodiversity by increasing the diversity of surrounding habitat and introducing the green roof (rooftop garden) system; the implementation of energy conservation system; and the implementation of EE and interpretation system. Overall, the TSCP presented the following achievements (Su and Chang 2010, p. 170): “offering undergraduate courses on sustainable development; developing teaching materials for sustainable development at school level; conducting ESD in-service teacher training for elementary and secondary teachers; networking with local NGOs on issues and activities related to sustainable development; establishing educational facilities for demonstration to students and community of projects on topics such as energy and water conservation, wastewater treatment by man-made wetland, and organic farming on rooftops; and implementing and advising the campus environmental management, curriculum development, instructional development, and professional development for teachers.”

North America: US and Canada

The US has a long history of EE. However, “the U.S. Federal government neither embraces sustainable development (SD) as paradigm nor uses sustainable development to create national policy” (McKeown 2006, p. 283). The transformation of EE

to ESD was advocated at the Asia-Pacific Region launching of the UNDESD in Nagoya, Japan in 2005. Resistance to the transformation of EE to ESD was observed in North America. McKeown regarded this as a healthy phenomenon: “[s]uch separate directions and the accompanying growth and change will bring new educational initiatives and depth to the evolving concepts of sustainable development and ESD” (McKeown 2006, p. 292). Feinstein (2009, p. 1) succinctly explained the apparent absence of national ESD agenda in the US:

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...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).

A conspicuous national ESD agenda does not exist in the US. ESD could be discerned at the following levels: the ESD toolkit developed by McKeown (2002) at an international level, the ESD-related projects (often under the label of EE) offered by environmental and educational regulatory agencies and NGOs at state and/or local levels, and the projects and activities at school and classroom levels. ESD has three prevalent approaches in the US, namely, the Investigating Environmental Education Issues and Actions (IEEIA) approach based on Hungerford and Peyton’s (1994) environmental behavior model, the environment-based education approach, which uses environmental themes and adopts “interdisciplinary, collaborative, student-centered, hands-on and engaged” pedagogy, the and place-based education approach, which is more connected with sustainability (Feinstein 2009, pp. 29–31).

The DESD was endorsed in Canada, whereas Environment Canada works closely with the Council of Ministers of Education Canada (CMEC) and the national NGO, Learning for a Sustainable Future (LSF). The Education for Sustainable Development Working Group under the CMEC was established in 2008, and the document, Learn Canada 2020, which contains ESD as a core activity, was released. Recently, a Pan-Canadian ESD framework for collaboration and action was formulated with the following priority areas: the integration of SD concepts into the curricula; the provision of ESD-related pre-service and in-service teacher education and support; the development of ESD-related teaching resources and materials; and the implementation and assessment of ESD programs at the school and school-district/board/division level (Education for Sustainable Development Working Group 2010, pp. 11–12). Similar to the US and in other countries, ESD in Canada is sometimes conducted under the label of EE, such as in Ontario. Human values education is one of the components of ESD in Canada, which emphasizes on the promotion of equality, diversity, fairness, and justice across Canada. Canada implemented several systemic efforts and attained significant achievements. However, the implementation of ESD in Canada encountered

several difficulties such as overloaded school curriculum, the size and complexity of SD issues, resistance to “more activist teaching in schools around environmental concerns,” linguistic differences across regions, lack of ESD in pre-service teacher education, and the need for more evaluation in monitoring ESD effectiveness (Council of Ministers of Education, Canada 2007, pp. 51–52).

The book *Schooling for Sustainable Development in Canada and United States*, co-edited by McKeown and Nolet (2013a, b), sufficiently discusses ESD in North America. The first chapter of their book succinctly provides the following analysis:

The contexts for ESD are very different in Canada and the United States. Canada has embraced the sustainability paradigm since the mid-1990s whereas, in the US, ESD was absent from the policy agenda during much of the last decade. However, the Obama administration has embraced the term and the concept of sustainability can be found in a wide variety of federal initiatives in the United States, including in the Department of Education. However, efforts to reorient education systems to address sustainability are more advanced in Canada than in the US today (p. 4).

However, values education in the school curriculum remains skewed towards character education with relatively limited emphasis on equity and social justice. The authors also accurately emphasized that the biggest challenge for Canada and the US as industrialized and advanced developed countries is how to address consumerism.

Synopsis of the Chapters in This Book

This chapter provides a general and brief overview on the status of ESD that comprises EE across the Pacific in the context of EE and education reforms. Contrasting and diversified challenges and common futures of ESD across the Pacific were identified. The marginalization of ESD status in the school curriculum, the lack of policy and resource support, and inadequate pedagogical content knowledge of teachers facilitated the improvement of ESD in teacher education and the introduction of teacher education standards for ESD. Increased attention and efforts were devoted to the development of ESD in higher education sectors. The increasing potentials of ESD were harnessed via school-community-university collaborative projects, NGO involvement, and the use of schools, parks, and environmental learning centers. This chapter concludes by providing chapter overviews and suggestions for future directions of scholarly enquiry and ESD development.

This book captures the wider scope and status of ESD in formal (i.e., early childhood education, primary, elementary, and secondary schooling via higher education) and non-formal education sectors (involvement of NGOs, parks and governmental efforts) in selected countries across the Pacific. This purpose was influenced by the earlier success of the book, *Schooling for Sustainable Development in Chinese Communities: Experience with younger children* (Lee and Williams 2009), which is mainly concerned with the primary (elementary) focus on the stage

of schooling in China, Taiwan, Hong Kong SAR, and Macao SAR. This book is a collection of chapters by ESD academics and professionals at different levels of the formal and non-formal education communities. The chapters reflect cutting-edge practice, innovation, and depth of experience. The following chapters discuss the expertise, lessons learned, and insights of the authors into the status of EE and/or ESD in their own countries or the issues that attract regional and international attention. These EE and ESD initiatives were presented vis-à-vis the administrative, economic, social, cultural, and ecological realities of selected countries at various levels of policy, planning, and implementation.

The ESD examples described in the chapters are locally relevant and culturally appropriate for the contexts in which they were discovered. In addition, these examples provide clear models and strategies for expanding the application and influence of ESD in other areas. The book has two main parts and fifteen chapters. The first part includes Chaps. 1, 2, 3 and 4 and highlights broad themes and issues while the remaining chapters in the second part highlights case studies and country experiences which discuss issues on ESD, quality and standards for environmental education, teacher development and student learning, as well as case studies/country experiences from the United States, China, Taiwan, the Hong Kong Special Administrative Region (SAR) of China, The Macau SAR of China, South Korea, Japan, and Indonesia.

In Chap. 2 Paul and Catherine Hart point out the phenomenon of the ‘participation gap’ in respect to the actions of schools in local communities. They call for environmental educators to address the onto-epistemological and socio-culturally constructed nature of environment and sustainability education. In Chap. 3, John Fien and Rupert Maclean eschew a technical, behavioristic approach to EE for teacher education, and instead analyse both the pedagogical content knowledge and the images of self, students and society that teachers need to conduct EE. In Chap. 4 Bora Simmons suggests a “mainstream”, orthodox emphasis on standards and accountability measures as a means to achieve excellence in EE for primary and secondary schools in the US.

The second part, which includes Chaps. 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 and 15, broadly cover EE/ESD in higher education, pre-school, K-12 and secondary schooling. The analysis by Yushan Duan, John Chi-Kin Lee and Xiaoxu Lu in Chap. 5 reveals that urban schools in the eastern part of China have a relatively high level of ESD partly because of more educational resources and a higher level of teaching than the rural schools in the western part of China, where educational conceptions tend to be backward and educational resources tend to be scarce. In Chap. 6, Osamu Abe comments that while teachers in Japan are not able to take cross-curricular approaches in teaching these issues, they use the “integrated study period” as the vehicle in the school curriculum for delivering EE/ESD. In addition, non-formal EE activities have been promoted by NGOs including the ESD-J (the Japan Council on the UN Decade of Education for Sustainable Development) and the designation of ESD model areas by the Ministry of the Environment. In Korea, Hye-Eun Chu and Yeon-A Son, in Chap. 7, explain that in addition to the non-formal activities, a separate environmental education subject in secondary schools and co-curricular activities related to EE programs are offered across all school years. For the island country of Indonesia, in addition to increasing systematic efforts for promoting ESD in

schools, Ko Nomura and Eko Agus Suyono in Chap. 8 analyze the trend of community engagement/development in their sustainability efforts in higher education, echoing a similar trend to that found in universities in other Asia-Pacific countries. For higher education in China, Huang Yu and Lee Chi-Kin John in Chap. 9 examine “green action” and “green universities” in China and point out that for China as a large country, “green universities” need the top-down drive or initiative from the Ministries of Education and Environmental Protection together with concerted efforts of related bureaus and the establishment of operations and dynamic systems of maintenance for the healthy development of universities. Turning to schools for aborigines in Taiwan, Shih-Tsen Liu, Yu-Ling Hsu and Wen-Hui Lin in Chap. 10 analyzes the cultural conflict when mainstream Western environmental education collides with aboriginal culture, and discusses how the resulting conflict may lead us to examine the limitations of present sustainable education model. In Chap. 11, Eric Po Keung Tsang and John Chi-Kin Lee compare ESD projects in China and Hong Kong, and find that the Green School Program in China is to some extent based on international accreditation standards such as ISO14001 and informed by the “Eco-Schools” in Europe. In Chap. 12 William Hing-tong Ma and John Chi-Kin Lee address the issues of environmental literacy of secondary school teachers and students and the relationship between their backgrounds and teaching and learning experiences along with their environmental literacy in Macao.

In Chap. 13 Christine Moseley, Blanche Desjean-Perrotta and Courtney Crim explore how the NAAEE *Guidelines for Excellence in the Professional Development for EE Educators* are applied in an early childhood teacher certification program at a large urban university in the US. In Chap. 14, as a contrast to the discourse of globalised approaches to EE, Gregory Smith discusses place- and community-based education as an approach to teaching and learning that focuses on the incorporation of local knowledge, issues, and actions into students’ school experiences. In Chap. 15, Rob Efirid analyzes the reasons for a “green gap” between the Chinese Ministry of Education’s environmental education policy and the practice of EE in urban primary “green schools” in the southwestern Chinese city of Kunming.

Concluding Remarks

UNESCO Bangkok published “ESD currents: Changing perspectives from the Asia-Pacific.” This document provided valuable and updated information on the status and issues of ESD in the Asia-Pacific region. This improvement contributed the following lessons: focusing on ESD on national SD priorities; incorporating ESD into national development plans and establishing inter-ministerial ESD support; internalizing ESD within national budget structures; and establishing support for capacity building (Elias and Sachathep 2009, p. 9).

Cultural and political systems differ across the selected countries in the Pacific because of different attitudes and approach to sustainability. However, globalization and interchange across the Pacific led to some degree of convergence.

Choi (2011, p. 151) analyzed environmentalism based on the World Values Survey (WVS) data and found that “Japan, Korea and Taiwan marked the lowest level of environmental participation,” but these three societies reflected higher levels of global concern. China did exhibit high levels of postmaterialism and local environmental concern, but showed an increasing degree of environmentalism. Other findings suggested that the umbrella term “Asian environmentalism” could be a misnomer because of complicated structures and variables. The future development of countries across the Pacific and elsewhere should address the potential and the challenge of the Asia-Pacific “bridge” by cross-fertilization and genuine international, cross-cultural dialogue and/or “divide” via ideological disagreement.

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Chapter 2

It's Not That Simple Anymore: Engaging the Politics of Culture and Identity Within Environmental Education/Education for Sustainable Development (EE/ESD)

Paul Hart and Catherine Hart

Introduction

In the introduction to this book of perspectives on education for sustainability across countries of the Pacific, Lee and Efirid are searching for the kinds of societies that may provide educational transition points toward more ecologically sustainable futures. They are searching for new pathways, new ways to think about the complexities of shifting learning environments in directions long since contemplated by environmental educators. Recognizing that environmental education (EE) has always advocated for fundamental change in educational thinking and practice, in this chapter we (re)conceptualize the principle that once defined this change in behavioral terms. We do this by interrogating the more recent focus on *values* and ethics using concepts of culture and identity. In this refocusing, we posit a counter-narrative to discourses of EE/ESD as a way to rethink the *participation gap* within education relative to environment and sustainability.

While acknowledging the complex evolution of ideas that have impacted the field of education in recent decades and how many of these ideas have worked to keep EE/ESD on the margins, we also recognize the power of cultural discourses (sacred stories) that persist. Our interest is in thinking about deeper connections among people, education and environment, that is, about different ideologies, about how we are hailed by different discourses, and about how subjectivities are differentially formed. Thus, we have chosen to return to fundamentals internal to human thinking, the onto-epistemic roots of our subjectivities and identities, as preconditional to

P. Hart (✉) • C. Hart
Faculty of Education, University of Regina, Regina, SK, Canada
e-mail: Paul.Hart@uregina.ca

educational change. As Carr and Kemmis (1986) said in *Becoming Critical*, changing thinking is prerequisite to changing action.

As Lee and Efirid indicate, fields of EE/ESD have themselves become more complex and contested, as manifested in interpretations of theory and practice across cultural boundaries. Against a backdrop of knowledge economies, technological innovation, and increasingly uncertain environmental change, it is not surprising that many societies recognize the place of EE or ESD in the school curriculum. As education systems within different cultural contexts learn how to address environment as more than a “little added frill” (see Hart 2010, p. 155), that is, as legitimate means to address sociopolitical issues, different pedagogies will be required to explore natural tensions between economic, social, and environmental issues in terms of socio-political cultural discourses (see Bell 2004; Bonnett 2007; Stevenson 1987, 2007). Over the last 40 years, these tensions have been addressed or avoided in many ways. For example, EE/ESD has been embedded within existing educational provision or featured in many ‘pull out’ programs, aligned with outdoor and/or experiential education associated with nature centers and science centers. Indeed, depending upon political-cultural interests, there are many ways to lose sight of environment in the curriculum or in society, (e.g., refocusing on ‘the basics’ or removal of expendable non-core programs).

The problem with EE/ESD, despite the conceptual debates, is not with the rhetoric itself but in the rhetoric-reality gap between its socially critical charter and the dominant educational paradigm, submerged within neoliberal or neoconservative ideologies, and associated educational ideals of individualism, economic privilege, social network theory, and globalization (Peters 2012). As Sauvé et al. (2005) have said, sweeping cultural goals of EE/ESD discourse remain as troubling paradoxes to educational systems reframed within a tidal wave of globalized economic priorities that demand particular kinds of educational accountability. Arguments for change within educational systems such as for inclusive, Aboriginal, disabled, or culturally diverse programs, render EE/ESD as simply one demand amongst many.

In this chapter, we position ourselves within a Canadian context, immersed in debates about social-environmental issues in need of educational space. We argue that just as it is important to continue to press for principled implementation of change, it is also crucial to search through deeper assumptions concerning what is wrong with current processes of educational change. We argue that these assumptions implicate questions of the structure-agency and theory-practice kind that serve to frame and to control thinking. One assumption concerns changing concepts of knowing (and learning) that have evolved over several decades. Another concerns evolving thinking about inquiry. A third emerges from these as connections between *subjects* and educational theory-praxis. We argue that it is only in thinking at the intersection of philosophies, pedagogies and subjectivities that deeper assumptions can begin to inform rhetoric-reality gaps within societies and within educational systems governed by them.

‘Living in These Troubled Times’: Diverse Contexts—One Country

There is no Canadian ‘story.’ No matter how hard we have tried to construct ‘Pan-Canadian’ frames for EE/ESD, provincial governments, not federal, control the goals of education. We have it in the constitution. We critique futile American educational reform initiatives and accountability failures, then follow similar pathways. If we have, as McKeown and Nolet (2012) suggest, been more successful in embracing a sustainability agenda than elsewhere in North America, it is because we have been fortunate enough to avoid conservative political agendas. That is, until now; we are rapidly losing ground. In many ways, what was said over 20 years ago about EE/ESD within American contexts applies in Canada today.

Given the provincial/territorial mandate for education and despite a Pan-Canadian Science curriculum framed as ‘Science-Technology-Society-Environment’ (STSE), current practices reveal traditional subject-centered provision. Existing curriculum resources are regarded as sufficient to implement EE within standards-based frames of accountability (see Hart 1990, 2010). Within such frames, ideas for change are managed and constrained in outcomes-based policy models within a dominant social paradigm that maintains a kind of “dynamic stability in the face of change” (Robottom and Hart 1993, p. 51).

Historically, many well known initiatives have emerged locally and achieved national and international attention. For example, the UNESCO-based Man [sic] and the Biosphere Network (MABnet) initiated by Chuck Hopkins, current UNESCO Chair at York University, evolved into EECOM, a Canadian affiliate of the North American Association for Environmental Education (NAAEE). Recently, a network of regional centers of expertise (RCEs) has provided some coherence for EE activity. A focus on ‘greening’ university/college campuses, reorienting teacher education, and supporting local community initiatives are illustrations of RCE activity. Key individuals in many provincial university education faculties have been supported through federal research grants. Ann Jarnet, formerly with Environment Canada, generated support for many NGOs and publications such as *Green Teacher* magazine as well as initiatives such as *A Framework for Environmental Learning and Sustainability in Canada* (Environment Canada 2002). The latter comprised a part of the federal Ministry of Environment’s presentation to the World Summit on Sustainable Development, Johannesburg, South Africa in 2002. As many Canadian environmental educators are aware, a complex of international, national, and regional programs and initiatives, over many years, have resulted in variable uptake of environment in school curricula.

It is difficult to estimate the value of local and global contributions to ‘the Canadian worldview,’ if such a thing exists. It is equally hard to see the value of national consultations in the framing of goals and guidelines for educational programs that involve jurisdictions representing separate government ministries of environment and education. Survival of EE/ESD within education systems seems less a result of government leadership than testimony to the grassroots spirit of EE/ESD

movements across diverse regions and competing interests. A significant accomplishment for these grassroots efforts, however fleeting, was the federal sanctioning (at the time) of the section of the Johannesburg framework on ‘values,’ as representative of Canadians advocating environmental learning that accommodated knowledge and values. It is the sentiment that we as Canadians, rather than the governing institutions, must find our own ways of working toward ecological sustainability and find balance in social, economic and environmental systems that have and will continue to sustain work to transform policy and practice in this country.

A New Regional Landscape of EE/ESD in Canada

In the ‘decade’ or so since the World Summit in Johannesburg, there is evidence that certain significant provincial and regional engagements with STSE (from the Pan-Canadian Science curriculum) have resulted in the incorporation of EE/ESD resources in school curriculum and pedagogy. There is also evidence that the Canadian government endorses the STSE dimension of the science curriculum as a means for accommodating ESD as cross-curricular within existing school programs (CMEC 1997, 2008). While uptake of curriculum policy or even actual curriculum material obviously varies in practice, the contested nature of ESD means that what appears in schools is more familiar EE materials and resources. Significant in this country is the prominence of Canadian scholars who have been active in debates about the value of ESD (e.g., Bob Jickling (1992) and Lucie Sauvé et al. (2005)). In Canada, we believe that ESD is less likely to be used uncritically by a new wave of ESD theorists and practitioners. Thus, we see mixed uptake of ESD rhetoric by provincial curricula (e.g., Ontario’s mandate for EE, Manitoba’s for ESD (International Institute for Sustainable Development and Manitoba Education 2011)).

John Fien’s (2012) case studies of EE/ESD governance and policy frameworks included Ontario, Canada and, although he reported strong programs of community/local advocacy and goals applied from ESD Canada to promote a culture of ESD through partnership, his cautions included the need for a core philosophical perspective and increased focus on social living. As Fien (2012) says, as a result of parallel studies in several countries, we need to move beyond narrow behaviorist conceptions of learning, lack of awareness of recent research on new learning theory, and traditional assumptions about school governance for real change to occur in schools. Change in pedagogical practices that begin in teacher education programs as well as a changed research base and evaluation strategies seem more congruent with the proposed changes.

In this chapter we argue that, however well meaning, policy, curriculum and practical suggestions for change are in themselves insufficient. We suggest that unless internal, subjective work on how young people construct themselves as social (and environmental) beings is also addressed as part of a culture’s core values, change will be short-lived. Peters (2012) and Hargreaves (2003), in advocating new philosophical

groundings for curriculum progression with new views of society in mind, argue that educators must engage educational issues at deeper levels. Changes implicated by 'current' research on learning, in terms of how young people learn how to connect (or disconnect) within learning communities and social networks, are really about creating conditions to challenge what we take for granted. Old orthodoxies, as many on-the-ground educational practitioners recognize, simply will not do.

Given major shifts in thinking about key educational issues of policy, governance, research and learning with new bases in sociocultural, sociopolitical and socio-environmental theory of curriculum and pedagogy, the time for EE/ESD as something other than mainstream requires serious philosophical work at a different level of consciousness than the level that created it. As St. Pierre (2011) says, I expect educators to have studied several bodies of high-level theory because it is these theories that underpin curriculum in science or social education. Probyn (2003) views this theory work as preparation for contestations (about education and teaching) which compel us to rethink ourselves, to explore ways of reconfiguring ourselves and the philosophical ground we have decided to stand upon. We need to explore how interplay between knowledge and identity provides grounds for troubling what it means to educate and, in particular, what it means to educate environmentally (Godón 2004). As foreshadowed in the introduction, EE and subsequently EE/ESD call for fundamental changes in educational systems as part of change within larger social systems. It is only at the most fundamental levels of thinking about knowledge and knowing, about meaning and values, that we can acknowledge the warrants of different worldviews—that is, different onto-epistemic promises for action.

Rethinking Our Ground: Educational Change with Ecological Sustainability in Mind

Twenty-five years ago, Bob Stevenson described contradictions between traditional purposes and structures of schooling and the rhetoric of EE. In fact, he raised the question of a rhetoric-reality gap in ways that EE materials were 'adapted' to fit the system. Notwithstanding ideological differences within the environmental movement, EE aspires to educate in ways that foster ecological harmony and social justice, whether or not this contrasts with existing educational programs whose traditional purpose is to preserve the existing social and economic order. In North America, Gruenewald and Manteaw (2007) refer to the No Child Left Behind Act of 2001 to illustrate how educational application of principles of A Nation at Risk (National Commission on Excellence in Education 1983), through measurable standards of accountability, can be linked to strengthening the economic advantage of an entire nation. Aligning these principles with purposes such as closing historic achievement gaps among racial, cultural and socio-economic groups has created an educational policy climate where selling EE philosophy to schools becomes a Faustian bargain, according to Gruenewald and Manteaw, where any innovation must closely align with this overarching discourse of schooling. Although research (for example,

Lieberman and Hoody 1998) attempts to demonstrate how EE may actually increase students' scores on universal measures of school achievement makes sense within discourses of schooling, it may be argued that using EE/ESD for instrumental economic ends contradicts EE/ESD's fundamental purposes of transforming schooling.

While forms of 'EE accounting' seems to be gaining some ground within parts of the North American EE community, significant challenges also sustain debates within the recent literature. Many of these challenges have taken the form of encouraging educators and students to engage social, economic and environmental issues, critically and responsibly, from thoughtful morals-and values-based positionings. Application of participatory forms of pedagogy, new (ecological) literacy strategies, and learning how to read and deconstruct arguments in popular media and specialized position papers have had the effect of changing school practices (see, for example, Bowers 1993, 1997; Fien 1993; Fien et al. 2002; Huckle and Sterling 1996; Orr 1992; O'Sullivan 1999; Smith and Williams 1999). As Gruenewald and Manteaw (2007) indicate, contradictions between EE and schooling, identified by Stevenson in 1987, are finally gaining ground within educational literatures on culturally-responsive schooling, community-focused and place-based education, as well as in participation-based critical pedagogies and critical action research.

However, another side to Stevenson's (1987) original argument warrants attention. Alongside curriculum and pedagogical pressures for change, and beyond structural arguments, lie deeper ideological issues. People's views about what knowledge is most valuable and what counts as knowing and learning can both permit and delimit our individual and collective performance of ourselves. Because teacher educators' and teachers' views about knowledge and teaching have been pre-structured by cultural discourses, forms of EE/ESD that challenge these taken-for-granted assumptions may be ignored or resisted. Despite international agreements that espouse fundamental change, what matters educationally is whether and how educators are prepared to engage these issues. We believe that there is a need to examine how ideology and cultural discourse have operated to constitute subjectivity in both educators and their students. If we choose to engage these issues, based in different conceptualizations of social and educational goals inclusive of wider ranges of interests across socio-cultural and ecological boundaries, and involving new arrangements of education and community, then serious investment in rethinking our most basic metaphors for what counts as education is required. We argue here that this is what EE (and perhaps some forms of ESD) is really about. This is a nuanced and much more pervasive view of EE than has been evident in ways that EE/ESD has been practiced.

Problems of Knowledge: (Re)conceptualizing Ourselves Within Education

If our focus in this chapter is to look into educators' views about knowledge and teaching/learning, that is, their onto-epistemic beliefs and how they came to construct the particular frames that predispose them to conduct education in certain

ways, then views of knowing that evolve from juxtaposing issues of EE with traditional schooling provide a useful entry point. Although teaching is about learning and knowing, curriculum theorists have engaged in questions of (re)conceptualizing what can count as knowing and learning for several decades without much practical effect. The problem, according to Peters (2012), is that philosophical analyses are the only real means we have for opening up educational discourse to consider anything other than the dominant onto-epistemic or conceptual frames.

While many educators, particularly those with post-graduate education, are to some extent familiar with the notion of forms of knowledge that underlie pedagogical processes, deeper understanding of the value of forms other than the objective, measureable kind, that is, subjective and critical, socially-constructed knowing from experience, may be limited. The technical way of knowing (and learning) is valued, whilst practical and critical ways of knowing have less status. Teachers' (often tacit) presuppositions are embedded within institutional frames designed to preserve the school's legitimate function of 'objectively' assessing and credentializing individuals. This provides powerful pressure within teacher socialization processes to accept the dominant epistemological position (Young 1971). When ideas for school change are reframed within certain educationally acceptable limits, for example, for inclusion of issues of race, gender, class and perhaps EE/ESD, they are often (re)-interpreted in ways that do not challenge existing theory and practice.

Looking at foundational EE rhetoric, we can see that much of this thinking already exists as part of a larger critique of the socio-political and educational status quo. If well argued, at deeper substantive levels, issues of EE/ESD can have value within the broad goals of education. We need to re-examine ways in which we represent knowing and being (i.e., onto-epistemic positioning) as well as the warrants we have for what counts as 'trusted' knowledge. Jaros (2009) addresses this challenge (see also, Goodson and Deakin Crick 2009; Haste 2009) in pointing to the value of knowledge networks as different ways of being (in time and space) and knowing/learning as emergent and adaptive rather than fully specifiable in advance. The agenda here, amongst each of these writers, is to bring curriculum and pedagogy closer to new ways of knowledge building. For us, the fact that attention in education is directed at onto-epistemic arguments provides a key link to the importance of the need for educators to become more sophisticated in understanding how they have come to construct themselves in respect of traditions of schooling and implications from EE/ESD.

Within the EE literature, we see obvious connections between general educational thinking about goals and processes, critical ecological ontology (see Payne 1999) and deeper assumptions concerning knowledge and wider worldview perspectives. Particularly at a time when the meaning of *knowing* and *learning* are changing, it seems necessary to rethink our relationship as educators to the theoretical rationale that drives educational practice. As Jaros (2009) says, rethinking our onto-epistemic groundings requires focusing beyond discrete traditional conceptions of knowledge, attitudes and values (as EE research has itself done in the past). We suggest that rethinking should be directed toward exploration of processes of educator/teacher identity, that is, toward subjectification processes that

may give agency to educate across existing boundaries. Within EE/ESD, critical and poststructural arguments have begun to articulate multi-onto-epistemic repositioning of what can count as knowledge and as knowledge building (see Barrett 2009; Lotz-Sisitka 2009; Payne 2010). The remainder of this chapter extends the argument for such re-positionings in terms of subjectification processes (i.e., identity formation with EE/ESD values in mind).

Problems of Subjectification: Conceptualizing Identity Within Cultures

We think that a promising way to look at identity, in respect of EE/ESD, is to think of how people, especially young people, come to construct themselves in relation to others; people, place(s) and environment(s). This is what Probyn (2003) and many others, including Butler (1997), refer to as processes of subjectification—how we construct our identities that give us agency to perform in certain, perhaps ecologically sustainable ways, or not. The fact that a recurring theme in pedagogical circles is the ‘teacher-self’ and associated concepts of subjectivity-identity and agency (Zembylas 2003), we are encouraged that EE/ESD, as a field, problematizes assumptions about the teacher-self by re-conceptualizing the self (i.e., identity) not as an autonomous individual but as a form of working subjectivity (i.e., the self in relation to the world). And, given the openings created by expanded notions of what counts as knowledge (i.e., narrative epistemologies) as well as recent developments in social theory that focus on the social construction of identity, we look at subjectification processes in terms of their narrative construction. This approach to identity/subjectivity is congruent with problematizing traditional assumptions of teacher-self as coherent, bounded, unitary, the origin of its own thoughts, beliefs and actions, in favor of notions of teacher-selves who become who they are (in EE/ESD) through discourses or bodies of meaning that frame and are framed by social contexts.

Subjectification processes acknowledge the complexities of how people (including teacher-selves) come to be who they are, how they become intelligible about their value position, despite the contradictions, and choose to perform EE/ESD in certain ways within their cultural contexts (i.e., discourses) and educational institutions (see Youdell 2006). It is important to note that, although our focus here is on narrative constitution of identity/subjectivity, as Lecourt (2004) says, language is only part of discourse, interpreted as an intricate web of practices, both discursive and material (see also, Henriques et al. 1984, p. 106). However in order to provide a base for looking critically into social and relational dimensions of subjectification/identity formation, we pursue the idea of narrative constitution to establish epistemological warrant. We can, in effect, use narrative means to explain issues of understanding how EE/ESD is construed and why it is implemented in certain ways as issues of teacher subjectivity/identity. Thus, narrative construal of identity enables (re)conceptualization of teacher-self concepts as concepts of social or relational

onto-epistemology. Indeed narrative inquiry is becoming a preferred way of pursuing identity work in EE/ESD.

This is not to say that notions of the social/cultural construction of identity or its study through the concept of narrative are not problematic. The complexities of role identification, the politics of EE/ESD and the demands of professional/institutional discourse, as well as historical baggage of the term *identity* all impose contradictions, limits and boundaries that confound identity work. As Probyn (2003) says, the term subjectivity (and rarely, identity) can be used to associate the concept of the subject with the idea of ideology (or discourse, or worldview). Recognizing *ideology* as central to cultural theory has taken form within concepts such as *discourse*, conceived in the Foucauldian sense of metadiscourses or systems of ideas. We think that understanding how educators construct environmental identities within cultural discourse is crucial to understanding the participation gap within EE/ESD. The point is that we can now approach cultural difference in terms of a discourse-identity gap and question both whether and how we might want to bridge it.

A growing body of research argues that we come to be who we are by being located within social/relational narratives rarely of our own making. If we think of subjectivity/identity as interrelational with culture, then we must question the power of cultural discourse and cultural knowledge in one's subjectification. Only by interrogating the discursive (i.e., cultural) spaces from which questions of identity are posed can we frame how culture has constituted identity—that is, how we become citizens with certain predispositions (i.e., values/ethics). As each of us struggles in the processes of coming to know, we struggle not as autonomous beings but as those who learn how to recognize themselves within the social structures of culture (Britzman 1993).

Within EE/ESD research, narrative-based inquiry can reveal how people construct identities by locating themselves within a repertoire of emplotted stories. This can happen in complex ways based in personal, social-relational projections, expectations, memories derived from multiple power-ridden and perhaps limited repertoires of available public and cultural *stories*. Social science inquiry has just begun to address this project of construing subjectivities in terms of narrative identity formation (see, for example, Lundegard and Wickman 2009). Research foci have shifted from an almost exclusive focus on observable social behaviour to explorations of expressions of social-environmental (well)being (an onto-epistemic shift). As Somers (1994) says, it is unlikely that we can interpret people's (social/environmental) positions in actions if we fail to get to the onto-epistemic roots of being and identity.

In discourse-identity work, subjectification processes are conceptualized in terms of what someone wants to be. These processes of 'becoming' have the potential to lead to participation and action, in other words to becoming agentive through onto-epistemic rich narratives or life stories—for example, autobiographical accounts of our journeys to make sense of ourselves in the world(game). So basic to agency is our worldview-inspired story that if we want to make sense or meaning of our inclinations to act, we look at our subjectivities, however partial, fragmented or contradictory. We look at our life histories and significant life experiences in relation to others, embodied and intellectual, in search of ourselves.

Narratives of place endow us with identities in time and space as intersubjective webs of relations that have the power to sustain and transform ours and others stories (McIntyre 1981). Applied to EE/ESD as part of local cultures, Taylor (1989) and Calhoun (1991) describe how worldview, as onto-epistemic narrative in relation to our communities of praxis, becomes the masternarrative that underwrites our agency and action (whether we know it or not). The challenge is in finding the language and concepts to become more conscious of, and then to deconstruct and reconstruct, our worldviews so that changes in our thinking and in our agency can be accommodated—not an easy matter but a worthy pursuit in search of a more critical thought and perhaps pedagogy.

Interrogating EE/ESD from the Perspective of Cultural Subjectivity/Identity

New theories of subjectification, identity and agency have shifted explanations for why people do or do not change from attempts to measure attitude to exploring narratives of identity formation, from studies of external ‘drivers and barriers’ to internal struggles of identity agency, and from behaviour change to how do we become predisposed to act/perform in certain ways. Grounding her ideas within a sociological frame that legitimates narrative as an onto-epistemic (versus representational) form for the study of the meanings that people attach to social agency and social action (and more recently in collective identity in social networking), Somers (1994) argues that the traditional separation of philosophical issues of social being, identity and ontology from practical research on action by studying observable social behaviour is untenable. This argument, we believe, applies directly to EE/ESD research where interest in changing behaviour is now viewed as a limited mode of analysis that deprives EE researchers of deeper analysis (possible only by linking concepts of identity/agency and action). Given a fundamental interest in changing worldviews, characteristic of many environmental educators, our interest in people’s and educators’ capacity to act depends, says Charles Taylor (1989), to a great extent, on having an evaluative framework (i.e., theoretical or onto-epistemic) shaped by fundamental principles and values.

Taking a Foucauldian approach to these ideas, Butler (1997) works out a notion of subjectification that denotes the *becoming* or the making of a subject as an effect of discourse (including power relations) enacted in performative politics, hence the subject is said to have discursive agency. As Youdell (2006) says, performative politics offer significant promise for poststructural politics of change. Through such practices, meanings might either re-inscribe or unsettle thinking and existing values. Notions of subjectivation, identity and agency may help researchers and participants (i.e., educators) see how we have been constituted through the discourses of society, education professionalism as well as our own histories. By understanding how these discursive practices operate, we can perhaps begin to see how we have been framed, or at least experience tensions, between our core values, new worldviews and

dominant discourses as a prerequisite to thinking about what to do (i.e., engage in performative politics).

Another way of considering these discourse practices is as *ontological narratives*, that is, the stories we use to make sense of and to decide what to do in our lives. Given that we must inescapably understand our lives in narrative form, our ontological narratives render identity and the self capable of agency. According to Somers (1994), so basic to agency (doing, changing) is ontological narrative that if we want to explain ourselves, to make sense of ourselves, or to account for or predict our actions, we must recognize the role of the intersubjective web of relations, experience and life history from which our ontological narratives arise. We must learn how to recognize this web in conjunction with or in opposition to traditions, structures, discourses or cultural narratives (e.g., governmentalities, canons, master or meta narratives, sacred stories). The challenge of these *conceptual* narratives is to find a language that we can use to become more conscious of how we were formed or constructed/constituted in time, space and place—that is, the identity politics (Aronowitz 1992) of our subjectification from the relational coordinates of onto-epistemic, public and cultural narratives.

In EE/ESD research, using a narrative identity approach to understand change assumes that social/environmental actions become intelligible in terms of people's structural and cultural histories and relationships and by the stories that give meaning to their identities. In other words, this approach assumes that people will choose to act in certain ways because not to do so would fundamentally violate their sense of *being* (i.e., their onto-epistemic position) at that particular time and place (Calhoun 1994; Somers 1994). If we conceive of environmental sustainability in terms of narrative identity, then the focus for EE research becomes more local and cultural, perhaps in search for masternarratives in which we are always embedded, or discourses that encode our perspectives, often beyond our awareness or consciousness. For instance, we might look for ways of investigating how social systems act to denarrativize our own stories within dominant discourses of *common-sense* and taken-for-granted cultural norms of market practices and institutional discourses. Or, we might look for ways to reconstruct or rethink our worldviews.

As EE researchers we presume that our thinking, once conscious of our constitutedness within cultural discourses, can transcend the stories we have lived by and taken as natural (Cahill 2007; McKenzie 2004; Nelson 1999). Pedagogically, as critical educators who operate within EE/ESD curriculum materials and pedagogy, we work to create conditions that enable our students to construct conceptual vocabularies that can locate and critically engage their developing socio-ecological narratives within local community and national and international cultural practices. For example, within Canadian schooling we have now to incorporate Indigenous epistemological perspectives in school subjects and practices. These concepts can be used to explore our own constitution of worldviews and onto-epistemic perspectives as possibilities that can inform and reconfigure our social actions. It is complex new pedagogy that can critically engage consciousness-raising of social forces that are more aware of cultural subtexts and how they work to construct identities within an increased range of social-environmental contexts.

In fields of feminist, cultural, race-based, Aboriginal and gender studies, we see how methodological diversity, directed away from instrumental notions of fixed agency and toward narrative and participatory/relational analyses of identity formation, has given social-ecological meaning to people's lives. And we continue to wonder why so few EE researchers have associated these perspectives with struggles to overcome the participation gap within EE/ESD. Researchers in these other fields have explored notions of agency-action continua that ground themselves theoretically/philosophically in relational analyses of identity formation. It is complex inquiry with potential to engage authentic explorations of eco-social action that encompass the complexities of historical and contemporary analyses of social relational epistemologies (e.g., collective memory work, auto-bio-ethnographic studies, critical phenomenology and action research). In many of these explorations, identities are foregrounded and we are beginning to see deeper analyses of how people come to construct worldviews, constitutive of self, identity-agency-action, or of cultural-historical activity theory amongst many other possibilities that may be found within expanding arrays of emergent methodologies and methods.

Infusing EE/ESD with Social/Cultural Meaning

The conceptual shift from older psychological conceptions of instrumental agency to narrative analyses of subjectification processes provides another view of social participation. Actions are interpreted not exclusively a product of external 'factors' to be discovered but as relationally constituted, that is, through participation. It is on these grounds that identity/agency are historically and socially constituted within people and can be made accessible in autobiographical accounts of significant experiences. Within EE/ESD it is apparent that UNESCO-based discourse has been influential in the construction of environmental subjectivities. Counter-narratives such as the declaration of the NGO forum at Rio have also been important for critical environmental educators in the re-interpretation of Agenda 21. It is why EE itself persists in the face the newer ESD discourse favored by governments. It makes us skeptical of those with interests in maintaining the inequality between economy and environment in the representations of ESD (see, for example Hegarty 2008). In ways similar to those working in gender studies, Indigenous, endarkened and critical race theories, environmental educators have argued that difficulties experienced by teachers and academic educators in constructing and enacting their environmental identities within educational institutions are manifestations of representational silences tantamount in maintaining inequalities between environment and economics. These are silences that favor the sacred stories or cultural discourses that replicate the metanarratives of classical educational discourse.

There is a powerful argument, more familiar within feminist poststructural accounts (Britzman 1995; Davies 2003), for the significance of alternative public narratives in countering young people's educational assimilation into the dominant social paradigm. Exposing how the stories/discourses that young people have

available to them as children privileges certain perspectives can challenge the silences and provide groundwork for rethinking how subjectification works. The idea that struggles over such narrations are in fact struggles over identity provides a rationale for different thinking about what should count as basic education. Writing counter-narratives becomes a crucial pedagogical strategy when embracing notions of multiple consciousness and multiple subjectivities. That these counter-narratives reveal alternative values and worldviews deepens the argument for onto-epistemic-based narratives in the construction of social-environmental identities. Provision for socio-cultural variations in school children's narratives thus becomes a more meaningful focus than environmental attitudes in EE research as these variations direct researchers to investigate the *habitus*, the socio-cultural, relational settings from which identity-agencies arise. This focus for inquiry allows researchers to work collaboratively across cultures to make sense of situations where people may share environmental sensitivities but vary in their choice of political/social/environmental activities. We become less concerned about generalizable findings and more interested in cultural variation and difference.

Studies of subjectification or processes of identity formation have the potential to make a major contribution to our understandings of why change is so difficult and why change in EE/ESD is about worldview and about culture. At one level we must learn how to resist tendencies to conflate identities into fixed essentialist categories aggregated from variables (e.g., age, race, class). We do this by bringing rich dimensions of ontological narrativity to new identity approaches to social agency and social action. At other levels, this work asks critical questions of social and institutional practices mediated by discourses of political power, hence the *politics* of identity. We learn how to view agency constituted socially within cultural networks, specifically those *other* agents such as cultural others or as EE/ESD people in terms of more particularistic identities. This new sociology of identity endows previously marginalized others with a new sense of subjectivity grounded in the legitimacy of multiple worldviews. On the other hand, this work suggests that, for EE/ESD, socio-cultural identities can be re-constituted beyond dominant cultural and institutional discourses in the interweaving of a person's history, narrativity, social knowledge and relational experiences. These complex notions of social identity-agency permit the possibility of resistance (i.e., willful contradiction) to the dominant social paradigm.

Viewing subjectification in terms of onto-epistemic narrativity reminds us that we do not have to refer to cultural others to recognize hardening-of-the-categories problems within new narrative sociologies of identity. As Somers (1994) indicates, the difference between fixed taxonomic categories and narrative accounts is that, in the latter, the actual category *is* the narrative position and not the person. Thus the classification of the narrative itself can still be abstracted from context with the person's ontological integrity intact. For example, in a study of EE/ESD, it is not difficult to classify certain participants' narratives as falling into a category of nature-oriented or outdoor adventurer (in some cases the two may coincide); it is the narrative and not the person that is categorized. So, while there remains a place for the sociological use of categories—people with shared interests or attributes—such

a position should remain critical; it can vary in time and space. Following Brint (1992), there is no reason to assume that people with similar interests or attributes will be moved to common social action unless they share similar onto-epistemic identities and perhaps cultural or relational settings. Bringing narrativity to identity provides conceptual sinews for tighter couplings of social identity and agency, whilst opening the categories of choice (Somers 1994).

(Re)conceptualizing Identity Politics Within EE/ESD Across Cultures

Recently, within the EE/ESD field, there has been much soul searching about whether and how to engage concepts of culture in discussions of direction and purpose for this field. We think that an interesting and critical part of this task involves exploring how people produce themselves as subjectivities within and across cultural boundaries. That is, we think it valuable to define subject positions in strategic difference to dominant socio-cultural paradigms. Just as critical ethnographers have deconstructed objectivist and essential notions of culture, and have challenged their own methodological authority to define authentic culture, their subjects have found dominant discourses to be focal in their attempts to show their uniqueness and difference from it.

Such issues implicate a politics of identity and positionality as an important aspect of problematizing culture. Studies of subjectivity are necessarily complex as embedded within productive contexts of interaction and experience and discursive fields of subject formations that consider contingencies of history, social relations and ideology. The focus of such politics is intended to direct attention to questions of identity within their (cultural) contexts discursive production. Questions are directed at awareness, in identity work, of who controls the discourse of cultural settings and authenticity, in whose interest, and for what purpose? Here, politics is taken as processes by which plays of power and knowledge constitute cultural/contextual identities. Questions for EE/ESD concern how not only (young) people come to construct their environmental/ecologically oriented selves but how this happens within cultural fields of discourse. In other words, what are the processes, complex and ambiguous, that work to establish certain meanings as embodied and intersubjective?

If we move away from thinking of the environment as a cultural object or the environmentalist or environmental educator as a cultural subject, might we position EE/ESD discourses in term of how they were produced? In other words, as researchers we tell stories by following environmental educators' talk and then follow their stories in terms of the meanings they produce in the young people who experience the products of these stories in the educational activities they create. Here the ideas and meanings of environmental/ecological identity exist within the narratives as described in dialogue or written autobiographically. Thus, meanings are intertextually negotiated where researcher and participants both speak in ways

that interrupt each other, attempting to recognize the power that inevitably contaminates.

Thinking about narrative this way means having to consider, reflexively, the stories *in relation* rather than looking past them to some kind of external determination. Each narrative becomes a performative act where meanings are emergent in what we do. The meanings of how we came to construct and enact our environmental selves are heterogeneous and accommodate difference as much as themes in common. They are located in personal histories as significant in our socio-cultural lives. Recognizing that such meanings may be partial, contradictory or interpreted from memory is the nature of the process of learning about what is, or perceived to be, important and should be reflected in the research approaches undertaken.

Narrative processes of coming to know are more about the person than the *real* nature of environment. As such it is discursive work that interrupts the realist project of outlining similarities and differences amongst distinctly bounded cultures or countries. In the traditional sense, there may be a legitimation problem with stories that do not end in explanatory categories that can speak of cultural difference/distinctiveness or of similarities across cultures. However, *talking environment*, as a narrative form, is a style of identity/subjectivity construction that gives voice to *being/knowing environment* in ways that do not simply reproduce the logic of *UNESCO discourse* or dominant cultural discourses. Indeed, talking environment is rather messy work because *environment* is not understandable to many who have not ventured outside or away from the mimicry of films and industry discourse about environment. There is no pure space or pristine image of environment—the perceptual spaces are already inscribed in cultural discourse and so there are many flight lines, hybrid formations and emergent positions. In eliciting such perceptions researchers encourage participants to get beyond the simple enactment of narrative conventions (i.e., poetry is rare) in reference to environment talk, almost universally influenced subliminally by the globalized mass media culture industry.

At issue is the nature of power in marginalized voices, as signs of cultural accommodations and resistances, popular voicings, old childhood stories, social categories and shifting allegiances (as in the EE/ESD debates) as well as the histories that produce them. The result is shifting and contingent positions—a heterogeneous collection of voices whose stories may be compelling and powerful for those who take the time to read and listen, but having no fixed essences or responses to the hegemonic systems—mobile positions within fields of power relations. The focus is not so much the popular, coherent, generalizable attitude or voice of environmentalist or environmental educator but how those voices were produced in the first place. Our interests for the time being are in the meanings and the politics of production—within education in particular, but within culture—in how people subjectively come to create figures (figurations) of identification and to situate themselves within their stories of themselves and of the world.

Adopting approaches to environmental sustainability based in narrative identity assumes that the intelligibility in environmental action, while guided by structural-cultural discourses and relations, may be found in the processes of subjectification. We also require approaches to inquiry that provide tracings of actions that transcend

culturally constructed stories. We need approaches to education that facilitate this work. As researchers and educators we look for meaningful experiences that have worked to reconstitute identities which may cause students to become critical or skeptical of what seems to be common sense in institutions and in economic life in general. We look for ways to *see* how people's narratives are incorporated within *becoming* processes of subjectification, how people are *mediated* through a wide spectrum of socio-cultural and political practices as well as larger matrices of relations that shape our lives.

Within EE/ESD curriculum and pedagogy, the idea is to create conditions for young people to construct ideas and concepts as socio-ecological narratives that are open to critical scrutiny and discursive analytic processes. In other words, we look for educational programs whose subtexts involve exploring worldview positions that have been constituted culturally and yet can be reconstituted in relation to socio-ecological conditions. It is complex pedagogy that considers how social-cultural processes operate to create certain kinds of thought and practice and that is onto-epistemically aware of how identity formations can take place within relational-community settings. Arguably, this is the kind of critical pedagogy, rather than the tacking on of environment-related activities to existing curriculum materials, that EE has always been intended to perform.

Taking Culture Seriously: Locating the Politics of Identity Within Socio-cultural Contexts—A Partial View from Canadian Experience

In this chapter we have argued that work directed toward understanding environmental identity, conceptualized within cultural discourses, has potential to counter-narrativize generalized accounts of environmental behavior studies as rather singular, acultural dominant discourse concerning change. We have proposed that challenging silences within EE/ESD research involves learning how to express and represent diverse subjectivities beyond the one true story, the “good oil” (Robottom 1988, p. 116). We believe that creating conditions that give voice to the centrality of values and ontological positionings, in the personal-relational construction of social identities, can do cultural work. We argue that socio-environmental theory-action (i.e., the participation gap) thus loses its categorical stability and purchase as a dominant education perspective and research masternarrative (where action is distinct from of knowledge and attitude). Emerging from this perspective, the tendency to think of identity work as individualist has given way to renderings of narratives that place ‘actions’ as onto-epistemic possibilities. To think (and act) outside taken-for-granted procedures involves thinking critically and politically about socio-cultural narratives and actions within participatory action frames.

Social theorists seem reluctant to accommodate the idea that identity/subjectivity might be a focus of political interest. Newer research on social movements is

beginning to recognize that social and cultural ideologies operate as discourses with many voices. Thus, social and educational researchers are now pressed to make sense of 'difference' not only in the objective world but also within subjective worlds that operate within discourses of power. This means that new EE/ESD research and praxis must take culture seriously and engage post-critical research perspectives that challenge essentialized accounts of culture and cultural identity as unified or composed of certain obvious core features. Such perspectives can expose social complexities of decentered multiple subjectivities as well as the variety of ways social/cultural identities can be achieved as configurations of different or even incommensurable value spheres (i.e., as different onto-epistemic life narratives). As Butler (1992) indicated, traditional social theory has suffered from the lack of attention to the discursive work of socio-cultural constitution. We believe that it is no longer possible to defer questions of politics once the significance of subjectification is recognized. A final glimpse at identity politics within Canadian culture may illustrate how this can work.

Socio-cultural Identity Politics Within Canadian EE/ESD

International EE/ESD policies and practices have always played a role in the politics of environmental or sustainability education within Canadian contexts. What is interesting, however, is how the politics have evolved over several decades, from conceptual debates about quality, curriculum coherence and relative claims about categories of individuals (e.g., environmentally sensitive) to notions of personal and socio-cultural identity relations that are also more race, class and gender sensitive. These kinds of discussions are more attuned, it seems, to the current politics of cultural theory.

Framing EE/ESD discourses-practices in terms of their politics, particularly as a politics of identity, permits a view that may be familiar as we become more sensitive to aspects of a culture of Canadian identity. Within a cooperative atmosphere of contacts and support, we have raised sharp questions about worldview. We have engaged individuals to represent their identity (e.g., Burch 2000) consciously toward some kind of intelligibility of thought across what postcritical theorists such as Foucault (1982, 1988) might refer to as discursive formations (e.g., in the formation of EECOM). We might even venture that such discourses at least open the field to expose complexities of EE/ESD as applied regionally and locally, without general labels or categories. Our cautious approach to representing the politics of Canadian EE/ESD acknowledges the complexities of representation across a multi-cultural (now a contested concept) nation that we believe is not reducible to labels, categories or assumptions that one region or territory actually knows what another is doing. St. Pierre's (2000) question of how one becomes available to intelligibility in such circumstances encourages us to look deeper into people's narratives and practices in search of assumptions about what constitutes people's subjectivities within particular contexts in places where education has no national mandate (e.g., *Canadian Journal of Environmental Education*, Volume 10). Her suggestion that

there is indeed no easy place to begin resonates here. Knowing that one must immerse oneself in the discourses-practices by doing the hard work—reading regional and local stories, not as representative of anything larger than that space and time—is a beginning. Recognizing that it is no longer acceptable to discuss and perhaps critique practice without having lived the experience is helpful but acknowledging our limits to represent is paramount.

The political struggle to achieve trump-card salience for identity categories, such as EE over ESD, is debatable in these circumstances, whether from environmentalist, feminist, Aboriginal or cultural movements. The question of whether or not a position is right, coherent or even interesting, says Butler (1995), is less informative than questions of why it is we have come to occupy the territory that we do. This is our place-based justification for the focus of this chapter—a focus in theory and praxis intended to get beyond cultural categories and to get inside people within cultures—across the participation gap. Every personal, social or cultural identity, as consciously conceived, is open to internal dialogue and to contestation. Tensions across these levels of identity, if they remain open, plural, flexible in actively seeking to know more and to become more aware of their core values, become a more natural part of what we expect from social-cultural collectives. These are not settled accomplishments fixed in time and space. Rather they are active, seeking to be more conscious of one's value positions on environmental issues amongst others, as well as politically engaged, interested but always skeptical of givens, critical of taken-for-granted assumptions about the way things have always been and actively working for change—as they say, wanting to have better wants. Weaknesses of will notwithstanding, the contradictions we live within, the internal tensions and the inconsistencies will evolve in time and place. Thus, politics, internal and external, of personal and socio-cultural identity work is more complex than we want it to be but it remains a key reason why we have concerns about cultural and cross-cultural work.

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Chapter 3

Researching Teachers' Thinking About Education for Sustainable Development

John Fien and Rupert Maclean

Introduction

This chapter has its beginning in discussions between the co-authors about a seeming paradox in many contemporary discussions about education. If it is true, as many research studies suggest, that the key influence on learning in schools is the quality of the teacher, why is so little attention paid to what and how teachers think about curriculum and pedagogical processes and their impacts on effective teaching? That, is, why is there so much more interest in educational, public and political circles in what teachers should be doing rather than on what they are already actually doing, and why? Such questions were a concern in education generally, and environment and development education, more specifically, two decades and more ago, and much more than they are today (see Yero 2010). Thus, research on teaching, today, has a tendency to focus on the behavioral elements of effective teaching, rather than on the nature and scope of teacher thinking as a central element in the teaching-learning relationship.

Thus, in seeking to refocus attention on the teacher at the center of educational activities, this chapter addresses the very important question of 'Why do teachers teach the way they do?' This is an especially important question because the achievement of the significant values, skills and action outcomes of education for sustainable development will be realized more through the learning experiences provided for students than through learning about sustainability. As a teacher in one study argued:

J. Fien (✉)

Swinburne Leadership Institute, Swinburne University of Technology, Melbourne, Australia
e-mail: jfien@swin.edu.au

R. Maclean

Department of International Education, Skills Development for Employability (TVET) and Lifelong Learning, Hong Kong Institute of Education, Tai Po, New Territories, Hong Kong
e-mail: maclean@ied.edu.hk

It's not just about giving the kids knowledge because that doesn't really work...and you know they're only going to get my point of view or the text book point of view. It's about getting them to think much wider and make decisions for themselves. (in Kennelly et al. 2008, p. 53)

The question – ‘Why do teachers teach the way they do?’ – has been of concern since the early 1980s. Then, there was much concern among environmental education researchers about the seeming ‘gap’ between normative theories of environmental education (ie. what it ought to be, as laid out in important international documents such as the Tbilisi Declaration¹ and government policies) and what was actually happening in classrooms. This led one commentator at the time to argue that environmental education has been subject to the processes of curriculum “deletion” and “dilution” (Greenall 1981: 164), with

...the radical [values and] ‘action’ components ... deleted and the less controversial cognitive and skill ones retained, together with the name ‘environmental education’. It is then claimed that the programme is environmental education, although only some of the characteristic objectives of environmental education are included. (p. 257)

On one level it is easy to understand why this is the case. Cognitive/knowledge and skill objectives are much easier to assess than are action and citizenship ones. Indeed, they are the predominant focus of almost all examinations, and parents have the realistic expectation that schools will do all they can to help students achieve success in achieving good examination results. This is not to detract from the fact that written examinations generally are limited in the range of objectives they can assess, especially in countries that have mass public examination systems. Thus, environmental education in the past, and education for sustainable development today, tend to be more limited in practice than in theory.

In seeking to explain this ‘rhetoric-reality’ gap, researchers have provided two categories of explanation, Stevenson (1987) has described these as those concerned with “the professional ideologies that underlie teachers’ organization and transmission of knowledge” and those concerned with the “structural organization of schools”. Unfortunately, few studies of the rhetoric-reality gap acknowledge the inter-relatedness of these two types of explanation. Indeed, since the pioneering research on teachers’ thinking in environment education by Hart (2003), research in environmental education and education for sustainable development has taken a decidedly normative and descriptive turn, and has generally not addressed the factors that affect classroom (and out-of-classroom) practice. Thus, we are left with little guidance apart from research from this seminal period in the development of environmental education and education for sustainable development in the 1980s and 1990s, which is, nevertheless, perhaps still very apt and appropriate today.

Explanations of teaching practice in Stevenson’s first category – those that focus on teachers’ views – see teachers as lacking the expertise or will to critically engage

¹This was reflected in the 1977 Tbilisi Declaration, adopted by the First Intergovernmental Conference on Environmental Education, and has also been adopted again in the 2012 Tbilisi+35 Communiqué on ‘Educate Today for a Sustainable Future’.

students in environmental issues. For example, Ham and Sewing (1987–1988) reported that the North American teachers in their study were deficient in four areas needed to teach environmental education effectively, in that: the teachers had serious misconceptions about the nature and scope of environmental education; they saw it as mostly appropriate to the science curriculum; they had misgiving about their competence to conduct environmental education programmes; and, they perceived a lack of logistical support in terms of resources, time and suitable class sizes. Similarly, research by Linke (1984) argued that several of the key characteristics of environmental education, such as the examination of attitudes and values, and the encouragement of ethical pro-conservation action, are difficult for teachers to implement. He argues that these go “beyond the normal expectations” of teaching, especially when they focus on “the critical self-appraisal of both the teacher’s and the students’ (and by implication, their respective families) personal lifestyles” (p. 3). Another teacher-focused explanation concerned the pressures teachers may fear from colleagues, school administrators, parents, community groups and politicians if they encourage their students to become interested in controversial issues. Maher (1986) has argued that self-censorship is a common defensive reaction under such circumstances, and that only those teachers with a clear definition of their own educational goals and political positions are able to resist the pressures to conform. As a result, she argues that many teachers fall back upon the ‘safer’ approaches of teaching *about* the natural and social world rather than *for* social justice and conservation, which underpin contemporary views of sustainable development.

Unfortunately, none of this research has considered teachers’ environmental beliefs (e.g. in relation to the values of the Dominant Social Paradigm or the New Environmental Paradigm) as a possible influence on different approaches to environmental education. Similarly, there is no research on the social, environmental or educational beliefs of teachers from which extrapolations can be made about differences in approaches to environmental education. This is despite research by Spork (1990) that suggests that values and citizenship objectives are unlikely to be important to teachers unless they have strong environmental values, themselves, and are active members of environmental groups and/or regularly engage in pro-environmental practices, such as travelling by bicycle or public transport, recycling and minimizing their use of garden chemicals, in their daily lives (pp. 78–86).

However, one teacher-focused explanation of the rhetoric-reality gap, developed by Robottom (1987), did attempt to relate teachers’ educational views and experiences to the societal and organizational contexts of teaching, the second category of explanations. Robottom’s explanation is based upon the conflict between the conceptions of knowledge and teaching inherent in what environmental education ‘ought to be’ and the ‘practical theories of teaching’ that many teachers have been socialized into accepting uncritically. These practical theories are rarely expressed in written form and generally are held unconsciously. However, they can be identified in teachers’ talk about their work and in their teaching practices. Robottom has explored the practical theories of teachers of environmental education in a number of studies

(Robottom 1984) in which he found that the practical theories of most teachers valued discipline-based teaching, propositional knowledge, didactic teaching methods, the avoidance of controversy, and competitive forms of assessment. This led him to conclude that the practical theories of most teachers involved in environmental education “coheres most closely” with teaching *about* the environment (Robottom 1984, p. 12). As a result, he argued that education *for* the environment requires “a conscious change in teachers’ practice associated with a corresponding change in their supporting theory” (p. 12).

Through a review of research on the conservative influence of the institutional contexts of teaching, Stevenson (1987) explained that the lack of such a change in teachers’ thinking leads many to engage in ‘defensive teaching’ based upon an informal pact with students to make minimal class demands in exchange for compliant behaviour. Thus, teachers tend to decrease the degree of difficulty and intellectual challenge in the tasks they set students, and to increase the degree of classroom structure and control, when confronted with management problems in classrooms where educational goals are subordinated to the exigencies of classroom order. The need for order and control both predicates and sustains the dominant practices of schooling (such as the focus on teacher authority, the rote learning of abstract and discipline-based facts and skills, closed questioning, individual achievement, and regular testing) that are the antithesis of values and citizenship oriented education.

The interesting aspect of this work is the way it integrates the individual and structural explanation of teachers’ practices. This aligns with a long-standing tradition in research on teachers’ thinking and pedagogical decision-making that argues that teachers do not teach the way they do solely on the basis of their personal values nor are they totally limited and constrained by the social and political contexts in which schools are located. Rather, teachers teach the way they do because of the “dynamic interaction between exterior and interior forces – the exterior world of the classroom and the interior world of the teacher” (Costa, cited in Quina 1989, p. 4). However, apart from Robottom and Stevenson, most researchers have tended to focus on one of these or the other.

The problem of this dualistic thinking has been overcome in the wide body of educational research on teachers’ thinking. Under the influence of structuration theories that see a reciprocal dualism between individual beliefs and social structure (Giddens 1990), such research has sought to identify how teachers’ beliefs and thinking influence their pedagogical decisions and activities (ie. their ‘agency’) whilst, at the same time, bearing in mind that what teachers believe, value and think is strongly influenced by the expectations, traditions and rules embedded in educational settings. Thus, Kirk (1989) argues that the dialectic of agency and structure in structuration theory renders it “a key theoretical construct for curriculum inquiry” (p. 45).

The next section of this chapter illustrates how teachers’ pedagogical decision making in environmental education/education for sustainable development can be researched and understood using structuration theory.

Researching Teachers' Perspectives

A wide range of terms has been used to refer to the nature and components of teachers' professional thinking. These include: beliefs, conceptions, craft knowledge, pedagogical content knowledge, personal practical knowledge, and so on (see Shulman 1987; Pajares 1992; Maclean 1992). While there is an extensive body of research on each of these aspects of teachers' thinking, none give adequate attention to the dialectic relationship between teacher agency and the structural and ideological contexts of teaching. Thus, Liston and Zeichner (1988) argue that such studies of teachers' thinking:

...neglect the larger social context of teaching, either focusing primarily on isolated teaching acts or assuming an insular institutional context. As a result the student of education is left with detailed and indeed interesting accounts of educational practice, but with relatively little knowledge about the social and political context of this practice. (p. 19)

Addressing this weakness has been the domain of a body of research on what has been called teachers' 'perspectives'. With origins in studies of the sociology of professions, the term 'perspectives' refers to beliefs as mediated by context and then put into practice in particular situations, i.e. they are the contextually mediated beliefs that determine how a person will behave in particular decision making situations (Becker et al. 1961; Waller 1961; Connell 1985).

Thus, Goodman and Adler (1985) state that:

The concept of perspectives captures the ideas, behaviors (sic), and contexts of particular teaching acts.... Unlike more abstract constructs, perspectives are set in the concrete world of actual situations and refer to particular actions. Teacher perspectives take into account how the situation of the school and classroom is experienced; how this situation is interpreted given the teacher's background of experiences, beliefs and assumptions; and how this interpretation is manifested in behaviors. (p. 2)

As a result, researching the perspectives of teachers is a two-step process based upon (a) interviews or questionnaires that ask teachers how they would resolve various dilemmas in their existing school situations, and (b) follow-up classroom observations and interviews to monitor the consistency and reliability of the expressed perspectives (Maclean 1992). Ennis and Hooper (1988) have developed a questionnaire to identify the perspectives, or what they termed the 'educational value orientations', of teachers based upon decisions that commonly have to be made when teaching a particular subject, such as music or geography, to a specific class in a particular school. Five broad categories of teachers – based upon their dominant approach to such situations – have emerged from this research, based upon whether a teacher concentrates primarily on: disciplinary mastery, learning processes, student self-actualization, ecological integration of self and environment, and social reconstruction. This approach has been applied primarily in physical education research (Ennis and Chen 1995; Curtner-Smith and Meek 2000; Liu and Silverman 2006) and has also been applied to investigating predispositions and intentions regarding pro-environmental behaviour (De Groot and Steg 2007, 2008; Hansla 2011).

The next section of this chapter presents findings of a study that applied this research focus to the pedagogical decision making of an Australian geography teacher in relation to the knowledge, skill, attitudinal and civic action objectives of environmental education in the senior secondary school.

Seven's Perspectives

Steven was 30 years old at the time of the study. He had spent all his life in Brisbane prior to his posting to country schools. He described his family background as "small business" with his father being recently elected to the Brisbane City Council as an alderman for the Liberal Party. He described his environmental consciousness as growing gradually throughout his high school years with family camping and bush-walking trips and his time in Army Cadets which was influential in building a strong love of the outdoors. A geography lecturer during his teacher training years was influential in Steven's coming to a strong conviction about the scale of the environmental crisis and the need for conservation. She had impressed upon him the importance of the small everyday things that individuals can do to reduce the impacts of their lives on the environment, also. These convictions made Steven an avid reader of environmental books. Authors such as Carson, Ehrlich, Meadows, Gribbin and Suzuki were well represented by the books on the shelves in his office at school. These were complemented by a number of "green living" guides.

Stephen is the senior geography teacher at the 5-year old Suburban High School, which is located on the southern outskirts of Brisbane, Australia, in an area that was still market garden farm land only a few years previously. The area is now a middle class dormitory suburb of brick homes and attractively landscaped gardens. Pockets of farm land remain on the fringe of the suburb and are used for geography field-work. A large foundry built during the Second World War adjacent to a railway line is 2 km from the school. Today, it makes railway tracks and engine casings. However, most parents of students at Suburban State High School work in the professions, commercial administration, the public service, retailing and construction. Often, both parents are in paid employment. They have high aspirations for their children and support the school through the Parents' Association. As a result, the school has many facilities and resources not normally associated with a reasonably new school.

Stephen's beliefs about teaching were easy to identify. In early interviews, he variously said:

I am teaching at a fantastic time in the history of the world. We are at a turning point in the world. Great decisions are being made that will have profound effects. We are going to have to make choices because the world's environment cannot go on being abused like it is. It is just like Home Economics and Manual Arts. There are correct ways to bake a cake or cut wood. So, there are correct ways of living.

People power is a reality. There are so many examples that can inspire confidence in students for them to know they can make a difference.... People power is not just "stopping things".

It is also involves how we live. We are getting class sets of three books on “green lifestyles” and consumerism so students can see what actions they can take in their own lives.

This is an important life philosophy that I encourage. It reminds me that I am not just teaching geography but helping to build a person, a character, for life.

To understand how these beliefs were affected by external factors and, therefore, mediated what Stephen actually taught and the teaching and assessment methods he used, a two part strategy of using a questionnaire and interviews to identify Stephen's perspective followed by long-term (one-semester) and intensive classroom observations was followed. After several preliminary interviews in which statements such as the above were made, Stephen completed an adapted version of Ennis and Hooper's questionnaire for measuring educational value orientations suitable to the Australian geography teaching context.² This was administered as a structured respondent interview in which Stephen was asked to consider fourteen classroom scenarios – and to rank the five possible responses to each one in relation to how well each one described his typical classroom practices with his Year 12 geography class in that school that semester. A measure of Steven's commitment to each of Ennis and Hooper's five educational value orientations was possible as the five orientations were reflected in each of the five sets of descriptions. A measure of Stephen's perspective was obtained by averaging the rankings Steven gave to each orientation in the fourteen sets of descriptions, with the scores (out of a maximum of five) being in inverse proportion to the degree of commitment.

Figure 3.1 displays Steven's rankings and the average “commitment” score he obtained for each educational value orientation. It also depicts the strongest depictions of his teaching in each of the 14 scenarios and the reasons he gave to explain his choices. This figure indicates that Steven's highest commitments were to the “ecological integration” (2.28) and “self-actualization” (2.64) orientations. Descriptions of his teaching that reflect the “ecological integration” orientation were ranked as “No. 1” in five of the fourteen sets and as “No. 2” in a further three sets. Together with the six occasions on which Steven ranked the “self-actualization” orientation as “No. 1” or “No. 2”, this may be seen as a reflection of the importance of environmental values objectives in his teaching with that class that semester. The low level of commitment expressed towards the “social reconstruction” educational value orientation (3.50) is a reflection of the lack of emphasis on social critique, structural change and the social action skills of political literacy in Steven's teaching. This orientation was ranked as “No. 4” or “No. 5” in 7 of the 14 sets of descriptions.

The explanations that Stephen provided for each of his rankings during this interview provide further indication of the effects of the dialectical interaction of agency and structure in Stephen's thinking as a teacher. While the relative strength of the self-actualization and ecological integration orientations was to be expected from his statements in earlier interviews, the weakness of the social reconstruction orientation was quite unexpected. The subsequent observations of over 50 h of

²A copy of the questionnaire is available on request from the authors.

ORIENTATION	DESCRIPTION OF TEACHING	REASON
<p>Ecological Integration (Commitment Score: 2.28)</p>	<p>1. I try to plan experiences that students can use after they leave school. Value: Future relevance of learning</p> <p>3. Students in my class learn to ask questions related to their use of the environment now and in the future. Value: Future relevance of learning</p> <p>4. I would like my students to be concerned with events that occur in the world. Value: Individual autonomy</p> <p>5. I expect students to respect the rights of others both in and out of class. Value: Balanced development</p> <p>9. I expect students to be careful with books and equipment and with the natural environment surrounding our class. Value: Balanced development</p>	<p>“This is what schools are really (for) ... I want to feel that I have a role in turning out thinking, interested and involved students. This is why inquiry learning on environmental issues is so important”.</p> <p>“This is where the trust factor comes in ... (A)s I see it, the nature of the <i>People and the Environment</i> course demands it. If the kids walk out of a class with a concern they have not raised, then I have failed”.</p> <p>“This must be the No. 1 choice in any social science teaching”.</p> <p>“This is a very personal value of mine – both me to them (students) and vice versa. This is a very important part of the hidden curriculum. Trust is so important between teacher and student”.</p> <p>“This is an important life philosophy I try to encourage. It reminds me I am not just teaching geography but helping build a person, a character, for life”.</p>
<p>Self-Actualisation (Commitment Score: 2.64)</p>	<p>2. I believe that students need to take chances to learn new things about themselves. Value: Self discovery</p> <p>8. I would like my students to challenge themselves to be the best they can be. Value: Personal challenge</p> <p>10. I try to plan my class to include students’</p>	<p>“Kids need to face challenges. One of my favourite mottos, on the wall of my office, is ‘Go boldly forth where no one has gone before’. I like to see students try something they have not done before”.</p> <p>“This is critical to me. Even if a person ends up a street-sweeper, they (sic) need to be encouraged to be the very best street-sweeper he or she can be. This is what we emphasise in the army”.</p>

	<p>suggestions about topics and experiences they find interesting. Value: Child centred learning</p> <p>13. Students learn to give their best effort. Value: Personal challenge</p>	<p>"I do this as often as I can ... This is why I did not use ... (a) textbook ... which does not relate to kid's lives in any way".</p> <p>"This is crucial, We always have to do our best. This is my life philosophy".</p> <p>"Time is very important for efficiency. I concentrate on teaching the students research and writing skills ... Discovery Learning takes a lot of time. So I tend to save it for vital issues so it will have more impact."</p> <p>"I say to myself, this class needs this knowledge, especially ... in the last unit on future prospects. These are critical issues they must have an option on but they must understand the concepts first".</p> <p>"I like high participation lessons. That is why I had seminars this time. Not only does it develop individual research skills and personal values clarification but it also requires students to listen to each other and respect other viewpoints".</p> <p>"I want my students to become independent, autonomous learners".</p>
<p>Discipline Mastery (Commitment Score: 2.64)</p>	<p>6. I teach my students the most efficient way to perform different skills. Value: Learning proficiency, mastery of knowledge</p> <p>7. There are some environmental principles and concepts that everyone needs to know. Value: Knowledge transmission</p>	
<p>Social Reconstruction (Commitment Score: 3.50)</p>	<p>12. I try to plan so that each student has a chance to participate in activities of his or her choice without disrupting the rest of the class. Value: Society is more important than the individual</p>	
<p>Learning Processes (Commitment Score: 3.71)</p>	<p>11. I would like my students to understand why and how they are doing different activities. Value: Student understanding of learning process</p> <p>14. I am sure that the skills I teach my class apply in other classes outside of environmental education. Value: Transfer of learning</p>	<p>"This is vital for the application of skills and also for the clarification of personal values. I want what they do in class to be relevant for the rest of their lives".</p>

Fig. 3.1 Model of Steven's perspective in education for sustainable development

Stephen's teaching of his Year 12 geography class over an 18-week period confirmed this seeming paradox between his statements of beliefs and the perspectives that he practiced with this class.

Together, these various data provide information upon which four conclusions may be drawn about Steven's pedagogical reasoning. The first conclusion is that Steven had personal and professional beliefs that affected his long-term goals and that were very important in guiding his pedagogical decisions and practices. These beliefs included: raising student awareness of events in the world, promoting knowledge of environmental concepts and issues, encouraging the development in his students of feelings of care, concern and responsibility for themselves, other people and the environment. As he said:

This is what schools are really (for) ... not just in a vocational sense or in controlling the social order. I want to feel that I have a role in turning out thinking, interested and involved adults. This is why inquiry into environmental issues is so important.

Second, Steven believed that his teaching was directed by his own values. He acknowledged these values on several occasions when asked to give reasons for describing his teaching in a particular way. The following types of statements were quite common:

This is what schools are really (for).
 This must be the No. 1 choice in any social science teaching.
 This is a very personal value of mine.
 This is critical to me.
 This is my life philosophy.

This very conservative view of the role of personal values in directing behaviour was confirmed by the relative neglect of contextual factors in his pedagogical reasoning. Steven did not mention context when discussing the reasons for any of the fourteen "No. 1" rankings in the Education Value Orientation questionnaire, which *best* described his teaching. Nevertheless, two indications of contextual factors may be deduced from his explanations. The first is that Steven must have perceived contextual factors subconsciously in a positive light as he was able to pursue his personal values and goals with relative ease. Factors which contributed to this which he mentioned during the semester included: the high national and global levels of environmental concern; the support of the school administration, teacher librarians and his geography teaching colleagues; the high levels of motivation and interest of his students, the treble period each week; and the privacy of the classroom in which teachers are able to operate relatively unimpeded by close scrutiny. This last factor coupled with the good supply of resources in the library meant that Steven felt able to ignore the class set of official textbooks that were available because he believed they did "not relate to kid's lives in any way". The second indication of the influence of context was his reference of the constraint of time. The pressure of course coverage led him to restrict time-consuming learning experiences, such as discovery learning, to "vital issues where (they) ... will have more impact".

Interestingly, the interviews provided several indications of the influence of the micro- and macro-contexts of teaching in Steven's explanations of the descriptions

that *least* described his teaching. Three of these referred to enabling aspects of context. First, Steven said his students were generally well motivated and he did not have to counsel them about late work or poor grades very often. Second, he said that he could be flexible in the choice of teaching strategy because this class was comprised of Year 12 students not juniors who tended to be less focused or well-behaved. Both of these relate to the micro-context of the school and class. The third enabling factor was in the wider education systems level of context, which was based upon school-based assessment right through to Year 12 and, thus, provided schools with control over assessment. As a result, Steven said that he viewed assessment as “just a part of the course” or “just another learning experience” for students rather than as a barrier to the pedagogical practices of his choice. This contrasts with the situation in other educational systems where the influence of assessment, especially external examinations, is often a barrier to environmental education.

The first real constraint on his teaching that Steven recognized was time. For example, when explaining how the pressure of time prevented him from adopting learner-centred and experiential pedagogies as much as he would like, he said:

I would like to put this higher in the ranking but, in reality, I cannot do that as there is never sufficient time to respond to every child's needs.

The second constraint he mentioned could be seen as quite a major one in his pedagogical reasoning even though he did not seem to recognize its potential severity. A discussion of this point introduces the fourth conclusion about the role of structure and agency that can be drawn from Steven's explanations of his pedagogical reasoning. This is the role of the process of structuration in creating Steven's environmental education perspectives and determining his pedagogical practices in the classroom.

Steven's perception of this second constraint arose when he was asked to explain why he ranked the following description as *least* typical of his teaching in one decision set:

When students argue for solutions that are not fair to everyone, I insist that they decide how to change them to make them fair for all

Steven's answer indicates that he understood the role of the 'teacher as change agent', and that he believed he could achieve small changes but, also, that changing student's values on major issues was an unreasonable expectation of teachers:

I often challenge kids' views but I certainly know I am not going to change their attitudes. I might on some environmental issues but not on things like racism. No, I can help students to see why what they think might be unfair but, in five forty-minute periods a week, I am not hopeful of changing many misconceptions.

Three comments may be made on this statement. First, it was not an isolated comment as it is very similar to an interview answer he had provided previously:

It's very difficult in five periods a week, for 35 minutes a day, to change kids' attitudes and values. A lot of those attitudes and values come from their parents and those parents probably won't have done ... geography at school.

Second, these statements indicate that Steven was aware of the structural constraints on education as a vehicle for social change, even if time and the attitudes of parents were the only barriers that he could recognize. The third comment is a problematical one. It concerns the question of why Steven believed that structural constraints were a barrier to teaching for social change, i.e. towards a co-operative and just society, but that he could change attitudes towards some environmental issues and, indeed made developing environmental ethics and the student exploration of personal lifestyle changes a major part of his teaching throughout the semester. One explanation may reside in the relative strength of the “ecological integration” and “self-actualization” educational value orientations over the social reconstruction orientation in Steven’s pedagogical reasoning. This would be valid, but limited, explanation as it is based upon an individualistic theory of agency.

Structuration theory suggests an explanation that recognizes the influence of structure on the creation of personal subjectivity and agency. Such an explanation would view Steven’s reasoning as the possible result of the hegemonic influence of neo-liberal cultures, such as Australia’s, which can accommodate the liberal focus on values and lifestyle changes provided complementary structural changes are not advocated. This means that Steven’s pedagogical decisions and practices cannot be explained in terms of free choice based upon his personal and professional values. Instead, they need to be explained as the result of the dynamic interaction of several personal and contextual variables in his pedagogical reasoning. These variables include:

- The focus on individualism in the strength of deep ecology in his environmental beliefs and his “ecological integration” educational value orientation, which resulted from the many socializing influences in his personal and professional life history;
- the hegemonic influence of the neo-liberalism which afforded Steven little opportunity through his education and professional socialization to develop a deep understanding of the structural contexts that influenced educational thinking and practice; and
- the support and opportunities for liberal-progressive educational practices afforded by his local education system, the nature of the geography syllabus, the micro-context of teaching at Suburban State High School, and the nature of the students in this Year 12 geography class.

All these factors interacted in a dynamic and simultaneous way so that it is not possible to say which came first, whether one or another was the paramount influence on Steven’s pedagogical reasoning, or even to tease out the many different ways that each influenced the other. Indeed, as indicated, Steven was not conscious of many contextual influences on his environmental and educational values or his pedagogical intentions and actions and would have had difficulty trying to assist in this as a result.

Thus, in summary, Steven’s teaching perspective could be described as what has been labelled elsewhere as ‘liberal education *for* the environment’ (Fien 1993). This was because of the predominantly deep ecology and “ecological integration” orientations that characterized his environmental and educational values and because of the

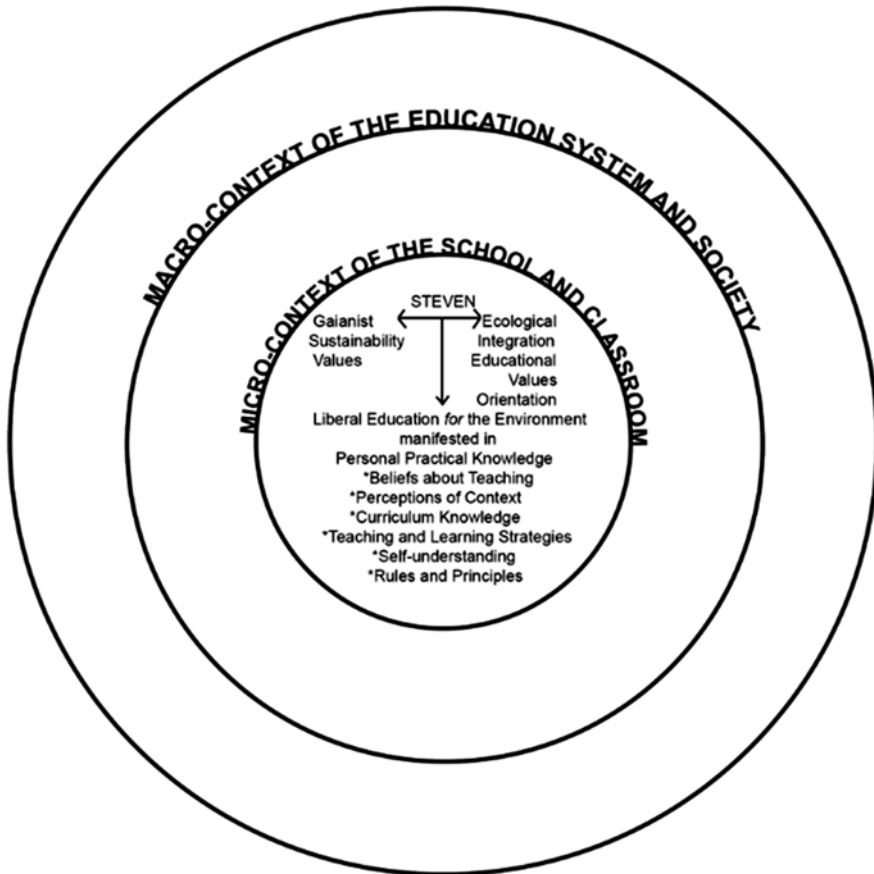


Fig. 3.2 A model of Stephen’s ESD perspective

relative neglect of contextual influences. Figure 3.2 is a model of Steven’s perspective. It illustrates the interaction of context and values, of structure and agency, which produced Steven’s perspective and determined his pedagogical reasoning. The following description of the model focuses upon elements of pedagogical content knowledge that both flowed from and, in turn, reinforced, Steven’s perspective.

Steven’s Pedagogical Content Knowledge

According to Shulman, pedagogical content knowledge comprises the teacher’s knowledge of subject matter, curriculum development skills, repertoire of teaching skills, self-understanding and appreciation of the context of teaching. Steven displayed a very high level of theoretical and practical knowledge in the first three of

these. First, his knowledge of geography and environmental issues was more than adequate for the task of teaching Year 12 students. Steven ensured that he maintained his currency in these fields through a programme of quite extensive reading both from magazines in the school library and books that he purchased himself. He regularly watched (and recorded) television documentaries relevant to his courses and obtained inspection copies of all newly published learning resources relevant to them. Second, he was an experienced teacher whose early rural school appointments meant that he was responsible for planning all his own courses from his first year of teaching. He was given many of the responsibilities of senior teachers for curriculum development very early in his teaching career (e.g. work programme writing, assessment, and membership of regional moderation panels). Nevertheless, Steven was careful in his course planning and made a point of attending appropriate in-service education events, liaising with other teachers in his department, and examining local resources before writing the work programme for this school. Steven also understood that the official requirements in work programme writing were largely procedural and that his mental objectives and plans would be the most influential in semester, teaching unit and activity planning. He also understood the school- and criteria- based system of assessment in his school system and appreciated the advantages that this had for the flexibility of his teaching and assessment programmes and catering for the learning needs of his students.

Third, Steven had a wide range of teaching skills from which he was able to select strategies that matched his objectives. Thus, he was able to construct a range of learning experiences that encouraged students to be responsible for their own learning and engaged them in values inquiry on a regular basis. He had a very good knowledge of the resources available in his school and which would support these learning experiences and was willing to replan his work when what he believed to be more suitable resources became available. The values education strategies that Steven understood and used during the semester included: inculcation, modelling, dialogical class discussion, values clarification, values analysis, role play and personal decision making. Steven did not have personal experience in many of the social action skills of political literacy and, as a result, learning experiences aimed at developing such skills in his students were not a part of his repertoire of teaching skills.

These three aspects of Steven's pedagogical content knowledge provided him with a very high level of teaching proficiency. This meant that he was able to prepare learning experiences that interested and motivated his students and, therefore, was not forced to adopt defensive teaching procedures to maintain class control. This, in turn, meant that he was able to maintain his focus on the affective objectives that were paramount to him in teaching geography.

The fourth and fifth content components of pedagogical content knowledge are self-understanding and knowledge of the context of teaching. Steven's knowledge of these two components was not as strong as it was of the other three components. However, this statement is a relative judgement as Steven could be described as having a reasonably high level of self-understanding in many areas. For example, he was conscious of his environmental values and why they were important to him in

both his personal life and his teaching. He understood that he was not a “radical” or “left-wing” environmentalist and that his own lifestyle was not very different from those of his students:

Sometimes I feel like I'm the biggest conformist in the world ... I lead a normal existence like everybody else does, with two cars and a home and a wife and a job that you go to everyday and down the beach on weekends occasionally. You spend your money on Thursday night at shopping and so on.

This identification with his students and their families gave Steven confidence to pursue his environmental values and lifestyle change objectives because his students could appreciate that “It's the average person like (them and me) ... who can still have an important influence”. This belief in the efficacy of personal transformation is a reflection of Steven's belief in deep ecology. However, there were at least two areas in which Steven displayed a relatively low level of self-understanding. These were his lack of appreciation of the social construction of his personal values and identity and of the way the neoliberalism is able to accommodate the challenge of his belief in deep ecology provided they do not challenge social structures.

Steven's lack of appreciation of these processes also influenced the degree to which he understood the context of teaching for the full scope of the objectives of environmental education. This lack of appreciation was manifested mostly at the macro-context level for Steven had an excellent appreciation of the micro-contexts of the community, school and classroom. Thus, Steven was able to utilize the resources he possessed as a senior teacher to operate within these levels of context with a high level of effectiveness. Indeed, he displayed a great ability to manipulate the school environment so that he would be able to teach in the ways that he wanted. However, he did not display a deep understanding of the ideological context of teaching environmental education. He interpreted data on high levels of environmental concern in Australia and overseas as evidence of a fundamental shift of values in society. He did not appreciate that the shift was from what might be called a *cornucopian* approach to a neoliberal *managerialist* one (Mol et al. 2009), that surveys of environmental concern produced contradictory findings, or that expressions of environmental concern were not a reliable guide to appropriate behavioural changes. Likewise, he appreciated neither the ethos of economic growth behind Australian government policies in economic restructuring and the corporatization of education, nor the contradictions between these policies and public expressions of concern and environmental protection legislation by national and state governments which, in effect, did little to address the hegemony of ‘resourcism’ as the basis of continued economic prosperity in Australian society. These factors meant that Steven did not appreciate the extent to which his desired objectives could be seen as counter-hegemonic nor that powerful interests might oppose him should his teaching prove effective.

These conclusions need to be moderated, however, by the press of time in the cycle of teaching across a semester. Steven was acutely aware of the need to complete all planned learning activities on a topic prior to scheduled assessment periods. This regularly caused him stress and, on all occasions, Steven changed

from his preferred pedagogical approaches to a more didactic approach in order to meet time pressures. It was on such an occasion, towards the end of a 3-week unit on Antarctica that Steven altered his plans to engage students in a role play on the Antarctic Treaty and, instead, replaced it with two expository lessons.

This accommodation to at least one aspect of context leads to a discussion of the wider rules or principles of practice that are core parts of a teacher's perspective. These are most often seen rather than articulated. However, the extensive period of classroom observation and numerous interviews conducted in this study enabled brief, but clearly formulated, statements of what Stephen most commonly did in different teaching situation to be identified.

Steven's rules for himself as a teacher of Year 12 students included being less directive and expository than he was with younger students. This rule, and the principle behind it, is summarized well in this statement:

I am not going to teach everything. In Year 12 my aim is to model a process of inquiry and a way of life – to show them how to learn. I want to reinforce the skills and encourage them to develop over a period of time.

This principle included not seeing this 'period of time' as ending at the completion of secondary school as "they have to finish it off over the rest of their lives". Thus, Steven provided a range of learning experiences that fostered the development of learning skills and encouraged students to be autonomous learners, responsible for the planning and conduct of much of their own work.

Hard work and the pursuit of excellence were rules that Steven brought to teaching from his childhood. These rules were central to Steven's theory of teaching for himself and of learning for his students. In part, this was based upon his images of himself as a teacher and his image of students as people with intrinsic worth. Steven explained the relationship between these aspects of his practical theory of teaching when he said:

Everyone has a sense of worth but you can only have this if you know that you are doing your best. So I try not to allow anyone to "sloth-off".

Steven also had a number of principles and rules concerning the nature of meaningful learning. He believed that the values and lifestyle change objectives he sought were best achieved in lessons in which students (a) were active participants rather than consumers of knowledge, (b) understood the values that supported alternative claims and interpretations and clarified their own values and opinions about them, and then (c) reflected on the relevance of what they were studying to decisions they were making about the way they wanted to live. A sound general knowledge of environmental issues acquired through wide reading was an important foundation for student participation in such lessons as was a willingness to engage in values clarification and analysis and to share one's views publicly. Steven modelled these traits for his students and established a relationship of trust with them so that they were willing to discuss their opinions, clarify the values beneath them, and reflect on alternative lifestyle practices with other students in the class. A dialogical approach to class discussion was the major teaching method that Steven used to

encourage this approach to learning. He had a number of rules for both himself and students during these discussions to ensure that the values aspects of issues were treated in depth and that all students were treated fairly by him and other students. These rules were enunciated in the following brief statements made to students in class or during interviews:

- Everyone gets a chance to express viewpoints and is not ridiculed for them.
- Ideas are critiqued not criticized.
- Reasons have to be given for all opinions.
- Students have to clarify the values that underlie their reasons.
- All students are questioned in detail with no favourites.
- Issues should be left up in the air if students do not appear ready to reflect personally on them.

Another rule that Steven followed in teaching was to be honest with students at all times in order to earn their trust. This meant acknowledging the limitations of his reading and knowledge, admitting doubts and mistakes when appropriate, and being willing to discuss his opinions and values and be questioned on them by students. This was one of the major ways that Steven created the atmosphere of goodwill and trust that characterized his classes. Another rule that Steven followed was to recognize that students ultimately have to make up their own minds on issues. This rule recognised the principles of respecting students as autonomous individuals with the freedom to choose from alternatives, and taking responsibility for one's own decisions in order to live with one's own conscience. This rule was also a recognition by Steven of his trust in the validity of his environmental beliefs and the material he presented to students. Indeed, Steven viewed the case for conservation as so strong that free thinking and values clarification would bring most students to only one conclusion. Thus, when Steven was asked about his teaching of issues over which he had strong personal views against, for example, nuclear energy, whaling or rainforest logging, he said:

I don't know whether I would come out and say it plainly but I would certainly get them to look at alternatives. Is there any justification in what is being done? Can it be held economically or environmentally or scientifically? That is, is there a valid argument for doing it? And most of the time the kids will arrive (at my view). I suppose you can say I'm guiding them down that path. Anyway, but in some things I think we've got to take a stand. There are some things that the kids won't know about unless we tell them, or won't understand about, unless we help them understand it and I think we've got to do that for some things

This argument enabled Steven to reconcile the 'tension of consciousness' in his image of himself as a teacher who encouraged students to be free thinkers who could make up their own minds on issues but still teach according to his personal values commitments. It also highlights the lack of a commitment, personally or professionally, to address the skills of active citizenship that are central to environmental education/education for sustainable development.

Discussions with Steven of this analysis of his teaching indicated that it was not his intention to neglect what he called 'citizenship education'. In fact, he defended the action-focused objectives that he was able to achieve. These included: increased

levels of environmental awareness and knowledge, a willingness to read and be informed on current issues, an appreciation of the limitations of the mass media in reporting environmental matters, the ability to analyze the values that underlie alternative arguments about the environment, the clarification of personal viewpoints, and an ability to argue with others in a logical way and not get upset by what they say. These are important achievements. However, Steven acknowledged that these skills could be seen as ways of helping students understand and fit into the present system more than they help them to participate in creating a new social system.

Later, Steven acknowledged that reflecting on these discussions led him to want to plan activities which helped students understand the social interests behind alternative visions of the environment and the sources of power that were available to different groups. He said that he would like to use case studies that focused more on the politics of environmental issues than the ones he was currently using. He said that the objectives that he could achieve with such activities were in keeping with the objectives of the geography syllabus and that he did not think that it would be difficult to rewrite his teaching units to do this. Nevertheless, he still believed that there were a number of barriers to involving students in environmental action projects in Year 12. These included his desire not to diminish the personal lifestyle reflection emphasis in his approach to geography teaching. He also identified a number of difficulties in using action oriented approaches with Year 12 students. He thought that it would be difficult to find an appropriate issue in the local vicinity of the school that could be used every time he taught this semester unit. Class sizes of 24 students in Year 12 meant that he might need to find four or five issues every semester in order to ensure that all students experienced the mix of content, values analysis and action experiences that would be necessary to achieve all the objectives of such a study. He also thought that some issues would be more amenable to successful resolution within the limited amount of time that would be available for an action project during a semester and that this may disadvantage some students in assessment. Steven was reluctant to delete any topics from his present course as he believed that achieving all the objectives of geography teaching, not just the social action ones, meant that students had to study the core topics in the syllabus.

Conclusion

What can we conclude from this study of the teaching perspective of one teacher? First, the study has provided a deep understanding of the 'lifeworld' of this one teacher and the complex interaction of personal and contextual factors in determining how he will teach. Second, and beyond the focus on the individual, the case study illustrates a set of concepts for understanding pedagogical decision making and action, which could form the basis of professional development in education for sustainable development. These include: perspective; education value orientation; context – both the micro-context of the classroom and school and the macro-context of wider social, political and economic systems and structures; pedagogical content

knowledge; and rules/principles of practice. The case study also illustrates a method for researching teaching perspectives and, in the use of structuration theory a way of explaining pedagogical action, which goes beyond the dualities of individual agency and controlling structures.

Importantly, the case study also illustrates that education for sustainable development is a challenge in many education systems, and there is the risk that its indispensable values and civic action objectives, may become 'colonized', 'diluted' and/or 'deleted' just as has occurred in environmental education for many years (Greenall 1981). Helping teachers meet these challenges involves more than capacity building or professional development for teachers. It also demands capacity building within education systems – and building systems capacity means reviewing the roles of education in society and its place in national development planning as well as a review of systems support in the form of curriculum guidelines, syllabuses, assessment procedures and teaching support materials. The significance of this extensive range of actions led UNESCO to develop the *ESD Lens* as a tool for building systems capacity to support education for sustainable development (UNESCO 2010).

Finally, the case study and review of research on teachers' thinking that underpins it will, hopefully, help refocus research in education, and education for sustainable development, so that the quality of the education experienced by learners and the quality of their learning outcomes once again becomes of paramount concern to educational policy makers. Research on teachers' thinking refocuses attention on the most important influence in quality education: that of the teacher.

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Chapter 4

Excellence in Environmental Education for Elementary and Secondary Schools in the United States

Bora Simmons

Background and Context for Formal Education in the United States

As with most nations, education in the United States (U.S.) is influenced and defined by its history, cultural traditions, and politics. This is especially true for environmental education and how it is practiced within the formal elementary and secondary school systems.

To provide a bit of context, in the U.S., formal education begins with elementary school. Children enter the formal education system in either kindergarten (5 years old) or first grade (6 years old) and continue through grade eight (14 years old). Secondary school or what is referred to as high school, continues through grade twelve, with graduation at approximately age 18. After graduation from secondary school (high school), students typically join the workforce or military, continue their education at a college or university, or continue their education at a technical/trade school. A public and essentially free education system, funded through federal, state and local taxes, is available for all children throughout the U.S. Only about 10 % of elementary and secondary age students attend private schools. (<http://www.capenet.org/facts.html>) Although each state's laws are different, children are required to attend school until they reach at least the age of 14, with compulsory education ending at age 16 in most states.

Historically, formal education in the U.S. has been a grass roots effort. Control of education has always been situated at the state and local levels. Elected officials at both the state and local levels established school policy and determined much of the day-to-day operation of schools. Each state, and in some cases each school district, determined its own curriculum, selected its own textbooks, and devised its

B. Simmons (✉)

Institute for a Sustainable Environment, University of Oregon, Eugene, OR, USA
e-mail: borasimmons@gmail.com

own rules for student achievement. The U.S. does not have a national curriculum. There are no nationally adopted or mandated textbooks. There are no national exams administered to all students. Teacher preparation and licensure is defined by state governments. It was within this context that environmental education grew – essentially as a grassroots movement designed to meet local and regional needs. However, the need to respond to formal education movements and mandates emanating at the national level has become increasingly important throughout the last three decades.

The Emerging National Role in Education

The educational landscape in the U.S. began to change with the publication of *A Nation at Risk* (National Commission on Excellence in Education 1983). The very structure of American education and the ability to compete in an ever expanding global marketplace came into question. For the U.S., the age of education reform fully emerged in the late 1980s, trumpeting an era of national education standards and increased accountability.

The education reform movement of the 1980s onward, championed by both major national political parties (Republicans and Democrats), reversed the traditional emphasis on decentralized, locally controlled education. Beginning with mathematics in the late 1980s and continuing with the 1994 passage of Goals 2000: Educate America Act (P.L. 103–227), voluntary national standards were developed for each of the core curriculum areas (i.e., science, geography, mathematics, English-language arts, history, civics). Articulating the knowledge and skill bases of their respective fields, these standards, for the first time, defined what students should know and be able to do by the time they graduate from secondary school in order to be considered geographically literate, scientifically literate, mathematically literate, etc. Even though these national standards were considered voluntary, they were used to create standards by many of the individual states, thus beginning the slow movement towards a nationally defined curriculum.

The passage of the No Child Left Behind Act of 2001 (P.L. 107–110) continued to transform education policy and practice within the U.S. Signed into law by President George W. Bush in January 2001, No Child Left Behind (NCLB) established, for the first time, a national requirement for standards-based curriculum and accountability. The era of voluntary efforts was over. In order to receive federal school funding, states were required to create student standards for reading and mathematics (science was to be added later in the implementation schedule). States were also required to assess all students in specific subjects and specific grade levels. Schools that were deemed to have failed to make sufficient progress in raising achievement in reading and mathematics were subject to penalties. In addition, NCLB required that states set specific standards for teacher preparation and continued licensure. The results were perhaps unsurprising: “Because educational policy emphasizes the results of summative assessments within accountability systems,

teachers and administrators will focus instruction on what is included in state assessments” (Pellegrino and Hilton 2012, p. Sum-9).

It should be noted that each state was allowed to set their own standards and administer their own assessments. The overall decentralized nature of education in the U.S. – states establishing their own standards and curriculum – remained in place.

Interestingly, the pressures and costs of the standards and assessment mandates spawned yet another shift in the educational landscape. Although there remained a strong sense that there should be no national standards or national assessment of learning, it was recognized that the costs of each state setting their own standards and developing their own assessments were high. Large groups of states have come together within the last few years to develop what have become known as the Common Core Standards for English Language Arts (National Governors Association Center for Best Practices 2010a) and the Common Core Standards for Mathematics (National Governors Association Center for Best Practices 2010b) (<http://www.corestandards.org/>). The Next Generation Science Standards were published in 2013 (NGSS Lead States 2013). An effort to develop common core standards for the social sciences is in the beginning stages. The trend is for states to adopt the common core standards. In lieu of their own state-specific standards, 45 of the 50 states and the District of Columbia have adopted common core standards for English language arts and mathematics (<http://www.corestandards.org/in-the-states>). As might be expected, there are parallel efforts to develop a set of common student assessments to measure achievement. Two different consortia of states are working together to develop these assessments (<http://www.parconline.org/> and <http://www.k12.wa.us/smarter/>).

The national call for education reform and the mandates associated with NCLB have effectively narrowed the curriculum to a primary focus on reading and mathematics achievement. Social studies, art, music, physical education, and even science have been marginalized by the emphasis on reading and math testing. As would be expected, environmental education in the U.S., which always fought to find a place within the curriculum, was in danger of becoming even more marginalized. These changes to formal education set the stage for a variety of efforts within the U.S. environmental education community to build capacity and strive for a genuine place at the table.

Building Environmental Education Within the Elementary and Secondary School System

It is estimated that approximately 20 % of the U.S. population – children, teachers, administrative staff – spend their days within the formal, elementary and secondary school system. This system is expected to prepare each generation for college, careers, and citizenship; it is through formal schooling that students learn the concepts and skills that will prepare them to be able to take on a range of personal

and civic responsibilities, including responsibilities as environmental stewards. How environmental education is conceptualized and implemented in the elementary and secondary schools is critical if we are to meet our ultimate goal of environmental literacy.

In the end, the ability of the elementary and secondary school systems to provide comprehensive environmental education will depend on the systematic availability of quality curriculum resources, impact of curriculum mandates such as state standards and assessment, and, importantly, the preparation of teachers.

For over 40 years, environmental educators in the U.S. have made efforts to expand the reach of environmental education, to improve its effectiveness, and to professionalize the field. Each of these efforts has met with successes and disappointments. This chapter is intended to consider environmental education within the context of policy and politics in the U.S. and to outline strategies for the improvement of environmental education practices within this context.

Starting with the Teacher

Classroom teachers in the U.S. are certified by the state in which they practice. As with much of education in the U.S., teacher education is decentralized – to a degree. Individual states determine licensure requirements. Many states provide multiple avenues for meeting teacher licensure requirements. Some require a college or university degree at the undergraduate level. Others require a graduate degree. Some require the individual to pass a battery of tests before becoming a classroom teacher; a growing number of states forego exams and require evidence of teaching competency in the classroom. Since teachers are prepared within the standards-based curriculum and high-stakes testing framework established under NCLB, the preparation and professional development of classroom teachers is bound to education reform initiatives at both the state and national levels. As mentioned above, NCLB has placed constraints on classroom teaching and as a result, constrains teacher preparation. Even so, efforts are being made to incorporate environmental education into teacher preparation.

Ensuring that classroom teachers are both willing and able to provide effective environmental education is particularly important because of the strong relationship between student learning, instruction, and teacher preparation (Darling-Hammond et al. 2007; Marzano et al. 2001; Fortner et al. 2005). As might be expected given the pressures of NCLB, external barriers such as lack of time and the need to meet curriculum standards impact teacher willingness to include environmental education instruction in the curriculum (Kim and Fortner 2006). Teacher competencies such as pedagogical knowledge and content knowledge have also been identified as internal barriers to successful instruction (Rule 2005; Summers et al. 2000, 2001; Ko and Lee 2003; Kim and Fortner 2006).

Addressing internal and external barriers through professional development can impact teacher attitudes, perceptions and practices. Research indicates that teachers

who participate in pre-service or in-service environmental education training are more likely than those who have not to: (1) believe that teaching environmental education is important, (2) feel confident in their abilities to teach environmental education, and (3) actually implement environmental education in their classrooms. (Forbes and Zint 2011; Plevyak et al. 2001)

Unfortunately, state and federal policies that support professional development in environmental education are limited. Although the number has grown over the last couple of years, few states have standards or requirements related directly to teacher training in environmental education (Mckeown-Ice 2000; Mastrilli 2005). Only 4 out of the 50 states (Wisconsin, Pennsylvania, Kentucky, and Washington are the notable exceptions) have instituted these types of policies. When environmental education is included in teacher education, it is primarily because of the dedication of a few higher education faculty members. Consequently, pre-service environmental education is not institutionalized or systematic, its implementation varies tremendously across programs and institutions, elementary education pre-service teachers are more likely to be exposed to environmental education than secondary, and it is most often infused into an existing science methods course. (Mckeown-Ice 2000; Powers 2004; Mastrilli 2005)

The focus on standards and accountability that pervades elementary and secondary education also drives much of teacher education, especially pre-service teacher education. Faculty who prepare teachers for licensure follow standards set by either a national accreditation organization (e.g., Council for the Accreditation of Educator Preparation (CAEP)) or by a state agency. These standards cover both content knowledge and pedagogy. The content knowledge standards are often derived from standards set by national level disciplinary societies (e.g., National Science Teachers Association, National Council for the Social Studies) or the state level student content standards. Although there is some flexibility in how the standards are addressed, teacher preparation programs are held accountable for the outcome. More and more, programs must provide evidence of their students' – the pre-service or in-service teachers' – competence in meeting these standards. As with elementary and secondary classroom instruction, these standards effectively narrow the curriculum and encourage a disciplinary bias.

Recognizing that teacher education is crucial and that impacting teacher education institutions is critical, the North American Association for Environmental Education (NAAEE) became a member of CAEP in 2000 with the expressed goal of influencing the future preparation of teachers. CAEP, a coalition of 33 of the largest professional education organizations in the U.S., sets standards for the preparation of teachers and other school professionals and uses these standards as a means of measuring the quality of teacher preparation institutions. Approximately 60 % of the colleges and universities that prepare teachers and other school personnel in the U.S. are accredited by CAEP.

Strategically, as a member organization of CAEP, NAAEE has the ability to influence the development of teacher standards for the other member fields (e.g., science teachers, elementary school teachers, social studies teachers). Furthermore, as a member of CAEP, NAAEE established *Standards for the Initial Preparation of*

Environmental Educators (NAAEE 2007). These standards describe seven teacher competencies related to environmental education practices:

- Standard 1. Nature of Environmental Education and Environmental Literacy
- Standard 2. Environmental Literacy of Candidates
- Standard 3. Learning Theories and Knowledge of Learners
- Standard 4. Curriculum: Standards and Integration
- Standard 5. Instructional Planning and Practice
- Standard 6. Assessment
- Standard 7. Professional Growth in Environmental Education

The standards were developed over a period of 4 years, involving hundreds of participants in a nation-wide critique and consensus process. Environmental educators at all levels (i.e., teachers and administrators, nonformal educators, higher education faculty members) were given multiple opportunities to provide input into the development of the standards. In addition, a concerted effort was made to obtain feedback from teacher educators representing a range of areas of expertise (e.g., science education, social studies education, elementary education, early childhood education). Implemented late in 2008, the standards have already impacted teacher education and higher education, providing credibility, a way of gaining national recognition (through CAEP accreditation) for individual environmental education teacher preparation programs, and an accepted framework for states interested in the development of endorsements and institutions of higher education interested in (re)designing teacher education programs.

Not all teacher education institutions are part of the CAEP accreditation system, though. Influencing institutions that participate in CAEP accreditation is only one piece of the puzzle. Perhaps more importantly, teacher professional development (pre-service and in-service) is provided by a range of organizations and institutions, most of which would not be required to follow CAEP standards. Many teachers learn about environmental education through workshops and courses offered by an array of organizations (e.g., zoos, museums, nature centers, government agencies).

In order to impact how environmental education is included in the formal classroom, a broader effort focusing on professional development of teachers and other providers was needed. At least in an attempt to address this need, the National Project for Excellence in Environmental Education published, in 2000, *Guidelines for the Preparation and Professional Development of Environmental Educators* (NAAEE 2010a, 3rd edition). This document was designed to provide a set of recommendations about the basic knowledge and abilities formal and nonformal educators need to provide high-quality environmental education. As with the NCATE standards, these guidelines and all of the documents produced through the National Project for Excellence in Environmental Education were developed through a broad, national process of critique and consensus. Thousands of educators provided input into drafts of the guidelines.

The *Guidelines for the Preparation and Professional Development of Environmental Educators* were designed to provide a mechanism for gauging the quality of environmental education preparation and professional development

programs whether sponsored by an institution of higher education or another organization. Instead of offering fixed rules, these guidelines suggest a broad vision – a goal to work toward and a guide for professional and programmatic development. The use of the term “guidelines” was deliberate.

The *Professional Development Guidelines* were also written with the recognition that not all educators who teach environmental education in formal school settings are either classroom teachers or prepared by institutions of higher education to become classroom teachers. The guidelines were designed to apply:

- within the context of preservice teacher education programs and environmental education courses offered to students with varied backgrounds such as environmental studies, geography, liberal studies, or natural resources;
- to the preparation of instructors who will work in both formal and non-formal educational settings, offering programs at the prekindergarten through 12th grade levels;
- to those preparing to be full-time environmental educators and those for whom environmental education will be among other responsibilities or integrated within the curriculum.

It should be noted that the CAEP standards were modeled after and are quite similar to the *Guidelines for the Preparation and Professional Development of Environmental Educators*. The *Professional Development Guidelines* are organized around six core themes:

- Environmental Literacy
- Foundations of Environmental Education
- Professional Responsibilities of the Environmental Educator
- Planning and Implementing Environmental Education
- Fostering Learning
- Assessment and Evaluation

Shortly after the publication of *Guidelines for the Preparation and Professional Development of Environmental Educators*, NAAEE and a number of state environmental education organizations took the lead in adapting the guidelines for use as core competencies for professional environmental educator certification (<http://www.naaee.net/programs/certification>). Certification programs are intended to provide credibility, encourage on-going professional development, and recognize the knowledge and skills of professional environmental educators. These certification programs are sponsored by the state-level professional environmental education associations, not state education agencies, and do not lead to teacher licensure. By using a common set of competencies across the country as a foundation for certification, states are able to design program requirements that have been vetted nationally, while still allowing each state the flexibility to meet local needs.

Although classroom teachers are eligible to earn environmental educator certification within these programs, the focus has been, in most cases, on nonformal educators. Not only do nonformal environmental educators provide direct instruction to children and the public, they are also responsible for a great deal of in-service

teacher professional development. There is no *typical* path to becoming a nonformal environmental educator in the U.S., however. Although there are university courses and degree programs, most environmental educators have learned through on-the-job experience. Certification provides an avenue for professional development and recognition. Importantly, the professional environmental educator certification programs developed in cooperation with NAAEE are all competency-based. That is, the educators must *demonstrate* that they possess the necessary knowledge and skills to be certified. Participation alone in courses, workshops or other professional development activities is not sufficient to gain certification.

Equipping classroom teachers and those who work with them with the necessary knowledge and skills to deliver environmental education programs is a monumental task. The task becomes even more daunting within the school environment created by the standards and accountability movement. Creating guidelines, joining NCATE, and building mechanisms such as environmental educator certification represent part of an overarching strategy to professionalize environmental education in the U.S.

Focusing on Environmental Literacy

Much, though by no means all, environmental education in the U.S. looks to the Belgrade Charter (UNESCO-UNEP 1976) and the Tbilisi Declaration (UNESCO 1978) as foundational. More often than not, the Tbilisi Declaration has been used to define the purposes of environmental education in the U.S. As environmental education has continued to develop as a field over the last few decades, the way in which these purposes are articulated has also evolved. More often than not, the ultimate goal of environmental education is now typically discussed in terms of the development of an environmentally literate citizenry. The breadth and depth of what it means to be an environmentally literate citizen impacts directly on how environmental education is practiced in the elementary and secondary school classroom.

Defining environmental literacy, especially within the elementary and secondary school system, is an on-going effort. Most recently, the *Framework for Assessing Environmental Literacy* (Hollweg et al. 2011) has defined "...an environmentally literate person as someone who, both individually and together with others, makes informed decisions concerning the environment; is willing to act on these decisions to improve the well being of other individuals, societies, and the global environment; and participates in civic life. Those who are environmentally literate possess, to varying degrees:

- the knowledge and understanding of a wide range of environmental concepts, problems, and issues;
 - a set of cognitive and affective dispositions;
 - a set of cognitive skills and abilities; and
 - the appropriate behavioral strategies to apply such knowledge and understanding in order to make sound and effective decisions in a range of environmental contexts.”
- (pp. 2–3)

Ultimately, environmentally literate individuals possess a sophisticated set of skills that allow them to solve novel environmental problems and determine the best set of actions; they are thoughtful, skillful, and active citizens in a democracy. Through the various documents of the National Project for Excellence in Environmental Education (NAAEE 2010b, 4th edition), four key elements of environmental literacy have been further articulated:

Questioning, Analysis and Interpretation Skills

Environmental literacy depends on a willingness and ability to ask questions about the surrounding world, speculate and hypothesize, seek and evaluate information, and develop answers to questions.

Knowledge of Environmental Processes and Systems

- The earth as a physical system
- The living environment
- Humans and their societies
- Environment and society

Environmental literacy is contingent upon a deep understanding of the environmental processes and systems that are typically included in the Earth system sciences and the ecological sciences. Importantly, environmental literacy is also dependent on an equally deep understanding of human systems, including political, economic, cultural systems and their relationships and interactions with Earth's physical and living systems. Understanding the ramifications of the interdependence of these systems is essential.

Skills for Understanding and Addressing Environmental Issues

- Skills for analyzing and investigating environmental issues
- Decision-making and citizenship skills

Environmental literacy is not limited to a set of understandings. The environmentally literate individual is able to identify, investigate, and formulate potential solutions to environmental issues. Environmentally literate individuals have the skills needed to determine what if any action is warranted and to make reasoned decisions about their own involvement.

Personal and Civic Responsibility

Individual dispositions are also critical to environmental literacy. Environmentally literate individuals accept the premise that true civic engagement depends on the recognition of rights and responsibilities. They understand that what they do as individuals and in groups makes a difference and they are willing to take responsibility for the effects of their actions.

Efforts to define environmental literacy or to establish frameworks that can be used in curriculum development or assessment are critical. They help those in the field articulate essential underpinnings of environmental education and guide the development of programs and materials that are comprehensive and more likely to lead to environmental literacy.

Within the context of the political realities of education reform, articulating a framework for environmental literacy was not, however, sufficient. *Excellence in Environmental Education – Guidelines for Learning (K-12)* (NAAEE 2010b, 4th edition) was first published in 1999 at the height of the national standards development movement. By design, the *Guidelines for Learning (K-12)* explicitly addresses common education reform issues by providing direct links between the

standards-based core curriculum and environmental education. As national voluntary standards and state standards were developed, it became essential that environmental education demonstrate its alignment to the standards-based classroom – the expectations set for science, social science (e.g., history, civics and government, economics, and geography), mathematics, and English language arts (primarily reading and writing) achievement. Consequently, in developing the *Guidelines for Learning K-12*, an effort was made to follow the model of other national standards and set expectations for performance and achievement in fourth, eighth, and twelfth grades. Intentionally, the *Guidelines for Learning (K-12)* made clear the argument that environmental education was not separate from mandated education priorities, but should be integral to them. The conceptual framework could be used to craft a comprehensive environmental education program that leads towards environmental literacy while also helping educators meet the requirements of the officially sanctioned and assessed standards-based curriculum.

To highlight the alignment between the *Guidelines for Excellence (K-12)* framework and standards, a number of “crosswalk” documents have been created. The crosswalks are matrices that cross reference the intersection between key elements of the *Guidelines for Excellence (K-12)* and specific state or national standards. As an example, the Kentucky Environmental Education Council has created two crosswalks, one for the Common Core Standards for English Language Arts and the second for the Common Core Standards for Mathematics (<http://keec.ky.gov/Publications/Pages/KELP.aspx>) (KEEC 2012). These crosswalks are designed for the very practical purpose of assisting teachers wishing to integrate environmental education into the curriculum through standards-based lessons. The crosswalks help educators identify natural opportunities for integration and a way of connecting the curriculum through a comprehensive vision. The crosswalks can also be used as political documents, making the argument that environmental education is a legitimate avenue for addressing standards: “By doing this analysis of the standards one can see that instruction through environmental education can provide a myriad of ways to address the common core standards, while providing the basis for an environmentally literate Commonwealth.” (KEEC 2012, p. 1)

An explicit connection between environmental education or environmental literacy and education reform efforts addresses a major roadblock to inclusion in elementary and secondary schools. The nature of the intersection of the components of environmental literacy and the traditional school curriculum raises yet another challenge. The environment is not bounded by the academic disciplines that traditionally define the school curriculum (e.g., science, history, mathematics, reading writing). Environmental education takes a broad view of the environment, “incorporating concepts such as systems, interdependence, and interactions among humans, other living organisms, the physical environment, and the built or designed environment” (NAAEE 2010a, p. 9). A focus on systems requires an understanding of the relationships and interactions among the parts. Interdependence incorporates not only the concepts embodied in ecology, but the

need to understand that human well-being is tied to environmental quality and that humans and the systems created by humans – societies, political systems, economies, religions, cultures, technologies – impact, and are impacted by, the total environment. The knowledge, skills and dispositions outlined in the *Guidelines for Learning (K-12)* (NAAEE 2010b) conceptual framework further describe this interdisciplinary approach.

The unambiguous focus on the integration of knowledge and skills is one of the primary factors that distinguishes environmental education from a traditional view of curricular disciplines. The synthesis of learning among subject material and ways of knowing is a deliberate outcome of environmental education and essential to environmental literacy (Disinger 1993). The fallacy inherent in teaching about the environment discipline by discipline is supported by research evidence (Pellegrino and Hilton 2012) suggesting that teaching concepts and skills in one discipline does not necessarily transfer to another discipline or to applications outside of the original discipline.

Even beyond the constraints of fitting within the standards driven curriculum, and along with the ever present barriers of time and budgets, the implementation of an interdisciplinary curriculum is limited by teacher preparation and perceptions. Evidence suggests that elementary teachers possess narrow mental models of the environment (Mosely et al. 2010), lack a background in environmental issues (Mckeown-Ice 2000; Forbes and Zint 2011), and have limited confidence in their ability to teach topics related to science (Powers 2004). In a study of elementary school teachers, Forbes and Zint (2011) found that "...while many respondents reported that they had completed at least one environmental science or studies course as part of their postsecondary education and/or teacher education (60 %), fewer reported having participated in professional development experiences focused on environmental issues (40 %), and even fewer indicated that they had completed an environmental education methods course (20 %)." Similarly, there is little evidence to suggest that secondary level teachers gain a broad preparation outside of their disciplinary area.

Philosophical, structural, and political barriers limit the incorporation of environmental literacy into the elementary and secondary school curriculum. The current educational climate that focuses on standards and state-mandated assessments effectively narrows the taught curriculum to those concepts and skills being tested. Disciplinary silos make integration difficult. Moreover, teachers are often ill prepared to teach environmental content and processes. If environmental education is to be effectively included in the formal school system, teachers need ongoing support and access to quality instructional materials that work within the standards-based curriculum. Professional development should prepare teachers to use these materials effectively, including the ability to select and implement teaching strategies that integrate content and skills from across disciplines. As Disinger (1993) suggested, synthesis of concepts and skills needs to be taught. The systems linkages of disaggregated content may well never be understood without explicit synthesis.

Providing Quality Instructional Materials for Environmental Literacy

This chapter began with the argument that teachers and therefore teacher preparation are critical to the successful implementation of environmental education. Certainly, there is little doubt that understanding the nature of environmental literacy is also crucial. The next key element is to ensure that teachers are provided with the tools and educational atmosphere necessary to plan and implement instruction – they need model instructional strategies and effective instructional materials.

The interdisciplinary nature of environmental education, as mentioned previously, poses specific issues within a curriculum design that is tightly structured around disciplines. Integrating environmental education within broad subjects such as science or social studies is challenging; when the curriculum becomes further narrowed through an emphasis on specific standards and courses separated into biology, chemistry and physics, or history, civics, and geography, opportunities for true integration and synthesis are further diminished.

The emphasis on skills development, and particularly citizenship skill development, inherent in environmental literacy frameworks (NAAEE 2010b; Hollweg et al. 2011) presents a different set of issues. A common thread within the various guidelines developed as part of the National Project for Excellence in Environmental Education is the notion that learners “should gain basic skills needed to participate in resolving environmental issues” and that “materials should promote civic responsibility, encouraging learners to use their knowledge, personal skills, and assessments of environmental problems and issues as a basis for environmental problem solving and action.” (NAAEE 2009) Similarly, being able to plan and implement instruction for environmentally responsible citizenship is central to both the *Guidelines for the Preparation and Professional Development of Environmental Educators* (NAAEE 2010a) and the *NCATE Standards for the Initial Preparation of Environmental Educators* (NAAEE 2007). Concerns over the lack of skill development for civic engagement within public schools are shared within the wider education community (Sloan 2012; Pellegrino and Hilton 2012).

In practice, however, much of environmental education instruction and materials center on the development of awareness, appreciation and content knowledge, with far less focus on the development of citizenship skills or the commitment to action (Oulton et al. 2004; Simmons 2005). This is perhaps not too surprising given teacher preparation. When environmental education is included in pre-service instruction a number of authors have found that the focus tends towards nature education and how to use outdoor teaching skills. Little attention is paid to helping teachers learn how to implement instructional strategies that promote the development of citizenship skills. (see Mckeown-Ice 2000; Powers 2004; Mastrilli 2005; Heimlich et al. 2004) Although some teaching strategies such as service learning are widely used in classrooms and instructional models designed to specifically address the development of citizenship skills have been widely available for decades (e.g., Hungerford et al. 2003; Hammond 1997; Ramsey 1998; Stapp et al. 1996; Stevenson and

Dillon 2010), much of environmental education instruction fails to reach beyond content, especially science content, and embrace the breadth and depth of environmental literacy. There is little reason to believe that informed decision-making and action will occur with an *information only* approach to learning *about* the environment. Understanding environmental systems is foundational, but not sufficient.

There is little doubt that considerable work is required to ensure that environmental citizenship skills are included as a component of a comprehensive and cohesive instructional model in elementary and secondary schools in the U.S. The need to fit into a rigid standards-based curriculum and lack of teacher preparation certainly represent significant barriers to the inclusion of environmental citizenship skills. Perhaps of greater long term significance is the likelihood that teachers are shying away from teaching these essential skills because they perceive them as being controversial. For example, the 2012 Texas Republican Party platform (a document that describes official policy stances) opposes the teaching of critical thinking skills in the schools, claiming that they would lead to education programs with a “focus on behavior modification and have the purpose of challenging the student’s fixed beliefs and undermining parental authority” (Strauss 2012).

Long lists of education topics (e.g., evolution, climate change, and homosexuality) consistently invoke political and religious controversy in the U.S. For example, there has been an on-going battle to limit the teaching of evolution in science classes. Boards of education at both the state and local levels have passed regulations that require that any teaching of evolution be paired equally with creation science. The controversy finds its way into state science standards and, on occasion, into court battles. (NSTA 2003) Climate change education has been similarly thrust into the political limelight with states and some local school boards introducing legislation that would either prohibit the teaching of climate change science or require that “climate denial” (the position that climate change is not caused by human activity) is taught as an equally legitimate scientific explanation. (Reardon 2011; Banerjee 2012) According to Banerjee’s reporting, the controversies surrounding evolution and climate change are different: “Attacks on evolution come largely from conservative Christians who believe in a literal reading of the biblical creation story. Climate change denial is mostly rooted in political ideology, with foes decrying it as liberal dogma...” Most recently, the push back against climate literacy education has come from a politically conservative think tank called the Heartland Institute when they announced plans to publish curriculum materials that are designed to be used in the classroom to counter climate science. (Lehmann 2012)

Environmental education evolved from the long traditions embraced by nature study education, conservation education, and outdoor education. It emerged at the dawn of the modern environmental movement in the U.S. and in response to the widespread recognition of environmental crisis. Environmental education developed during the same time frame that major pieces of environmental legislation passed the U.S. Congress and were signed into law by the President of the United States (a conservative Republican). These landmark pieces of legislation, supported by both political parties, addressed the need to ensure clean air and water and the protection of endangered species. (Carter and Simmons 2010) The co-evolution of

environmental education and the modern environmental movement posed specific hazards, especially where environmental education was practiced within public education. Early on there were efforts to make a distinction between environmental education goals and environmental advocacy goals. One of the first nationally available sets of environmental education instructional materials, *Project Learning Tree*, adopted the slogan “teaching children how to think, not what to think” (<http://www.plt.org/plt-historical-overview>). In his frequently quoted essay, John Hug (1977) argued that the “two hats” of environmentalism and environmental education are often blurred or mistaken for one another by practitioners and the public alike. He suggested that even though environmental educators might naturally wear the hat of an environmentalist as well, “They must scrupulously strive to get all the facts, examine and illuminate all the viewpoints, and keep from letting their own particular position (as an environmentalist) from mixing with their educator role” (Hug 1977).

The “two hats” dilemma continues to dog environmental education; the field has been a frequent target of criticism focused primarily on issues related to bias, inaccuracy, and advocacy. (Sanera and Shaw 1996; Kwong 1995; Independent Commission on Environmental Education 1997; Salmon 2000; Angle 2011) Jo Kwong (1995), in a report for the Center for the Study of American Business, described what she believed to be “unsettling trends,” asserting that environmental education practice is often based on emotionalism and misinformation, focused on issues and not information, dedicated to activism and politics, and encourages an anti-anthropocentric philosophy.

Although most certainly there are instances in which individual environmental educators are guilty of participating in these “unsettling trends,” the field itself has made strenuous strident efforts to distinguish education practice from environmental advocacy. Through the National Project for Excellence in Environmental Education, NAAEE developed *Environmental Education Materials: Guidelines for Excellence*. (NAAEE 2009) First published in 1996, this set of guidelines provides a set of recommendations to help developers of activity guides, lesson plans, and other instructional materials produce high quality products and to help educators evaluate the wide array of available environmental education materials. The guidelines describe six key characteristics of quality environmental education materials:

- Fairness and accuracy
- Depth
- Emphasis on skills building
- Action orientation
- Instructional soundness
- Usability

These guidelines were designed to offer a way of judging the relative merit of different materials, a standard to aim for in developing new materials, and a set of ideas about what a well-rounded environmental education curriculum might be like, whether that curriculum delivery takes place in formal settings such as schools or nonformal settings such as outdoor education and nature centers.

Although these guidelines are geared toward the development of instructional materials, they were also written as a tool for teachers and others to use while *selecting* materials for use in the classroom. These same criteria are useful when applied to classroom instruction. Teachers need to use strategies to detect bias, and identify when their own teaching and the materials they use advocate a particular position or action. Although teachers may “understand that their commitment as environmental educators is to provide accurate, balanced, and effective instruction – not to promote a particular view about environmental conditions, issues, or actions,” (NAAEE 2010a), they may not be skilled in recognizing bias in their own instruction. For example, in an observational study of teacher classroom behavior, Cotton (2006, p. 237) concluded that “...all of the teachers studied experienced great difficulty in implementing their beliefs about balance and neutrality, and the classroom data suggest that the influence of the teachers’ own environmental attitudes was greater than they either intended or, in all probability, realized.” Consequently, providing teachers with professional development that explicitly addresses strategies for managing discussions of controversial issues and helps them critically analyze their own attitudes and beliefs is critical. Similarly, teachers need access to a wide array of quality instructional materials that support their teaching.

It must be recognized that no education is value-free. The line between education and advocacy is often shaded, and there are few clear rules for finding an appropriate level of balance. However, by focusing on skills development, teachers and their students will be better able to detect bias. Further, by explicitly considering factual accuracy, reliability, and balance, teachers and their students begin to understand how to gauge the credibility of sources and to weigh evidence. Importantly, as they weigh evidence, they will confront the need to make decisions when there is uncertainty. Finally, creating a classroom environment that is open to inquiry encourages learners to explore and respect differing perspectives.

Making Environmental Education Part of the Formal Schooling at the Policy Level

Initiatives to address the political and structural issues related to environmental education in elementary and secondary education have been instituted at the national level in the last several years:

No Child Left Inside

In April 2009 the No Child Left Inside Act (NCLI) was first introduced, with bipartisan support, into both houses of the U.S. Congress. Although NCLI has not yet been signed into law, it represents a ground breaking effort. If passed by Congress and signed by the President, this legislation would substantially increase federal

funding and support for environmental education. Introduced as an amendment to the re-authorization of the Elementary and Secondary Education Act (ESEA), commonly known as No Child Left Behind (NCLB), this legislation provides policy direction for elementary and secondary level schooling and teacher preparation throughout the U.S. NCLI would be administered through the Department of Education and if fully funded, would provide \$100 million in support annually. The majority of that support would go directly to those states with approved environmental literacy plans. If enacted, NCLI would represent a significant sea change for environmental education within the U.S. Not since 1981 when the Office of Environmental Education was eliminated by the Regan Administration has environmental education had an official presence within the Department of Education.

Perhaps as important, efforts to develop support for NCLI have been orchestrated by a broad-based coalition. The No Child Left Inside Coalition was founded in 2006 by five organizations with interests in promoting environmental education nationally. Since that time, the coalition has grown dramatically. The NCLI Coalition, housed within the Chesapeake Bay Foundation, is made up of over 2,080 organizations, representing over 50 million people across the United States (www.eenclb.org). Several states have replicated this model, creating state specific coalitions and legislative initiatives (e.g., No Oregon Child Left Inside).

Well-Rounded Education

The Obama administration published *A Blueprint for Education Reform* in 2011. (http://www2.ed.gov/policy/elsec/leg/blueprint/publication_pg7.html) This policy and budget statement outlined the administration's priorities for elementary and secondary education. Under the heading of Ensuring a Well-Rounded Education, the administration set a priority for "strengthening the teaching and learning of arts, foreign languages, history and civics, financial literacy, environmental education, and other subjects." This is the first time since 1981 that environmental education has been explicitly included in K-12 federal education policy.

Green Ribbon Schools Award

In the fall of 2011, the U.S. Department of Education created the Green Ribbon Schools award program. (<http://www2.ed.gov/programs/green-ribbon-schools/index.html>) The Green Ribbon Schools "...recognition award honors schools that are exemplary in reducing environmental impact and costs; improving the health and wellness of students and staff; and providing effective environmental and sustainability education, which incorporates STEM, civic skills and green career pathways." In its inaugural year, 78 schools from 29 states were honored by the U.S. Department of Education. The Green Ribbon Schools award program represents a

significant achievement for environmental education. Whole schools are being recognized for integrating environmental education across the curriculum and providing professional development for teachers and administrators. Although the Green Ribbon Schools program was initiated by the U.S. Department of Education, it is administered in cooperation with the state departments of education. Each state is able to nominate up to four schools for the award. General criteria for the recognition program are outlined by the Department of Education, but each state is encouraged to tailor the criteria to their own needs. It is at the state level that schools apply and it is through the state department of education that schools are selected for nomination. The program builds support and recognition for environmental education at every level – local, state and national.

Conclusions

Environmental education in the U.S. continues to evolve. It would be expected that environmental education would make strides, as a field, to improve practice, especially in response to developing understandings of pedagogy, how students learn, and environmental literacy. This evolution, however, is also situated within the context of a highly political nationwide debate which has been raging for nearly 30 years – a debate that has effectively moved the center of educational policy from the grassroots level to something far closer to the national level. The outgrowth of this debate has been the development of national and state policies that effectively narrowed the curriculum to a focus on reading and mathematics. Other core disciplines have been marginalized by the emphasis on reading and math academic achievement as measured through standardized tests. Environmental education, which has always fought to find a place within the curriculum, stands in danger of becoming even more marginalized. Simultaneously, environmental education must respond to repeated political attacks – attacks that impact the educational atmosphere, discouraging teachers from engaging their students in civic learning. Environmental education has responded to these important trends through a series of efforts to professionalize the field and build the necessary capacity to implement coherent and cohesive environmental education programs nationwide.

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Part II
Case Studies/Country Experiences

Chapter 5

Education for Sustainable Development (ESD) in Chinese Schools: Rural-Urban Difference and Regional Variation in East and West China

Yushan Duan, John Chi-Kin Lee, and Xiaoxu Lu

Introduction

The world is facing threats of serious environmental pollution and environmental degradation. As the most populous and rapidly growing developing country, China has become the world's largest greenhouse gas emitter (Guo and Marinova 2011). Despite efforts to combat pollution and reduce emissions, Ye Qi, a professor at Tsinghua University, remarked that, "China's emissions, which were 20 % higher than the United States' in 2010, could be as high as 49 % more by 2015." He further commented that, "There is no question now China is the largest emitter, and the gap between Number 1 and Number 2 is enlarging" (Friedman and ClimateWire 2012). He et al. (2011, p. 91) utilized the study by Wen and Chen (2008) and commented that, "The costs of environmental degradation, unsustainable resource consumption and the effects of regional disparities diminish the impact of economic growth and, therefore, China's real growth has actually been quite low."

The Chinese government launched a program called "Western Development" (Xībù Dàkāifā) near the start of the new century. This program covers six provinces (Gansu, Guizhou, Qinghai, Shaanxi, Sichuan, and Yunnan), five autonomous regions (Guangxi, Inner Mongolia, Ningxia, Tibet, and Xinjiang), and one municipality (Chongqing) (China Western Development n.d.). This plan to develop the

Y. Duan (✉) • X. Lu

School of Geography Science & Institute of Shanghai Geography Education
and Teaching Research, East China Normal University, Shanghai, China
e-mail: ysduan@geo.ecnu.edu.cn

J.C.-K. Lee

Asia-Pacific Institute of Curriculum and Teaching Studies (APICTS),
Faculty of Education, Southwest University, Chongqing, China

western part of China emphasizes environmental protection and preservation. However, regional disparities continue to exist across China not only in economic development, but also in environmental education (EE) and education for sustainable development (ESD). Empirical work that evaluates the level of EE and ESD via different indicators in Chinese schools in different regions is limited. This chapter addresses this gap. First, the chapter provides brief overviews on EE, ESD, and regional disparities in China. Second, the findings of an exploratory study are presented and discussed. Third, EE and ESD examples in rural schools are described. Finally, the implications for future development of EE and ESD in Chinese schools are explored.

EE, ESD, and Schools in China

The Rio Summit in 1992 marked the entrance of Chinese EE into the “sustainability” phase (Lee and Tilbury 1998; Lee 1998). The Chinese government advocated a three-pronged strategy for national development in 1996 with the theme “Invigorate China through Science, Technology and Education as well as Sustainable Development.” This initiative was followed by the issuance of the *Guideline for Advocating Education for Sustainable Development in China* by the State Environmental Protection Administration (SEPA) (now the Ministry of Environmental Protection), the Central Bureau of Publicity, and the Ministry of Education (Lee 2009). The Ministry of Education issued the National Environmental Education Guidelines (NEEG) in 2003 in association with the Environmental Educators’ Initiative (EEI) (Lee 2010). The implementation of EE and ESD in China has three main avenues: thematic ESD lessons and projects (Lee et al. 2010); EE and ESD content infusion into school subjects (e.g., nature, moral education, geography, and biology); and EE and ESD-related extra-curricular activities that seem popular and successful (Lee 2009, p. 266; Wang 2004).

The implementation of EE, ESD, and environmental protection policies in China should be understood under the socio-political context of centralized government. The government has a relatively low level of decentralization, which is exemplified by the small percentage (approximately 5 %) of school-based curriculum under the three-tier curriculum management system. The influence of Confucianism motivates people to assume a role in the hierarchy, and the tendency to obey the order of superiors is higher in China than in western countries. Thus, the “political level decides all” principle is prevalent in China (Qiu and Li 2009).

Regional Disparities: An Entrenched Education Issue in China

The different levels of educational development, including the development of EE and ESD, are attributed to the vast size of China and the unbalanced economic development in different regions of the country. Furthermore, urban-rural

differences are an issue of concern in the educational development of China. The population in the eastern region accounted for 44.71 % of China's population and 59.50 % of the GDP in 2010. The population of the central region accounts for 33.55 % of the country's total population and 26.73 % of the GDP. The western part accounts for 21.73 % of the total population and 13.77 % of the GDP. The urban population accounted for 51.27 % of China's population in 2011. The census data analysis of Hannum and Wang (2006, p. 262) showed "evidence of rising, or at least static, geographic inequality among subsequent cohorts...the rising importance of place of birth is quite plausible in light of rising regional economic disparities, fiscal decentralization, and rising geographic disparities in educational spending under market reforms. These trends play out in wide regional gaps in the qualifications of teachers, in the cost of families, and in the quality of education experienced by children." Lee et al. (2009) also discovered the significance of regional disparity in senior secondary (SS) education and the gaps in teacher qualifications, school resources, and teaching facilities among eastern, central, and western regions. Li's (2001) survey on environmental knowledge showed that approximately one-third of the Chinese respondents possess knowledge of environmentally "sustainable development." However, sustainable development is not highly prioritized compared with economic development (Harris 2008, p. 162).

According to Choi et al. (2009, pp. 46–47), low environmental awareness is due to the lack of EE in poor areas such as the western rural areas. On the one hand, enterprises and local governments emphasize economic benefits and ignore environmental risks. On the other hand, people who are not aware of their rights remain silent. By contrast, the coastal region is more developed. People in this region possess a higher level of environmental consciousness and tend to be more proactive in fighting against construction projects that generate pollution. Harris (2008), whose review of existing studies reveals that environmental knowledge related to ecology and environmental issues is limited outside of major urban areas (p. 174), supports this finding. Chinese farmers and villagers possess weak environmental knowledge and limited environmental awareness "because in Chinese villages there tends to be very little environmental education" (p. 156). Harris (2008, p. 174) also notes that "more educated, affluent, and urbanized people have more pro-environmental attitudes." Guo and Marinova (2011, p. 1077) write that the environmental petitions and environmental proposals submitted by National People's Congress and the Committee of the Chinese People's Political Consultative Conference between 2003 and 2008 contains more environmental petitions and environmental proposals in East China than in other parts of the country.

In addition to regional differences, there are also significant urban-rural differences. Sun and Xie (2008, pp. 292–293) found higher levels of classroom collaboration, teacher involvement, and support in big cities of the eastern coastal region than in middle-sized cities there. A descending trend was observed in counties. However, empirical studies that examine the situation of EE and ESD based on indicator system and from a regional perspective in China are limited. This exploratory study fills this gap.

EE/ESD Indicator System

Yen et al. (2006) established a school EE indicator system in Taiwan based on the input-process-output model. The school EE indicator system has 29, 19, and 31 indicators for universities, middle schools or high schools, and elementary schools, respectively. The main indicators are “team power,” “systematic reform,” “pollution prevention,” “resource management,” “landscaping,” “activities planning and participation”, and “student literacy” (p. 102). Our exploratory study focused on the status and relative perceived levels of EE and ESD in secondary school education in different parts of China. The study was divided into two stages. The first stage involved the employment of the analytic hierarchy process (AHP) developed by Thomas L. Saaty in the 1970s (Analytic Hierarchy Process [n.d.](#)).

The AHP provides a comprehensive and rational framework for structuring a decision problem, which, in this study, refers to the development of an EE and ESD indicator system. Figure 5.1 shows the model of the AHP used in this chapter. The destination layer is the level of EE and ESD, and the criterion layer or the first-tier indicator comprises the educational processes and outcomes. The sub-criterion or the second-tier layer is the sub-factor of every factor in the criterion layer, i.e., the educational environment and educational work under the “process of environmental education” factor and educational perceptions and educational outcomes under the “outcomes of environmental education” factor.

The development of EE and ESD indicators is based on several principles. The first principle is the scientific principle. For example, the levels of EE and ESD are reflected by educational outcomes and the educational process. Educational outcomes may be reflected in environmental knowledge, skills, attitudes, and behaviors of students. Educational process encompasses the inputs of resources and support by infrastructure and manpower and the impact of the educational environment and EE and ESD activities. The second principle is availability. Practicality and reality should be considered in China. Therefore, indicators should be designed and operationalized to enable survey data to be obtained easily. The final principle is guidance. Evaluation and assessment are unavoidably value-laden, whereas indicators reflect certain viewpoints and value positions. For example, this study introduces indicators related to the educational environment of the family and the community, the perceptions of process and individual participation with the intention of emphasizing the importance of family and community in nurturing the environmental literacy of SS students, and the imperative of process and participation as part of EE and ESD experiences.

Each indicator should be assigned varying weights in accordance with their perceived relative importance. For example, the first-tier indicator A of “education outcomes” is more important (with greater weight) than indicator B “educational process.” The second-tier indicator A2 of “educational work” carried greater weight than indicator A1 “educational environment.” The third-tier indicator A22 of “school environmental education work” is more important than A12 “community’s natural environment” from the perspective of school EE.

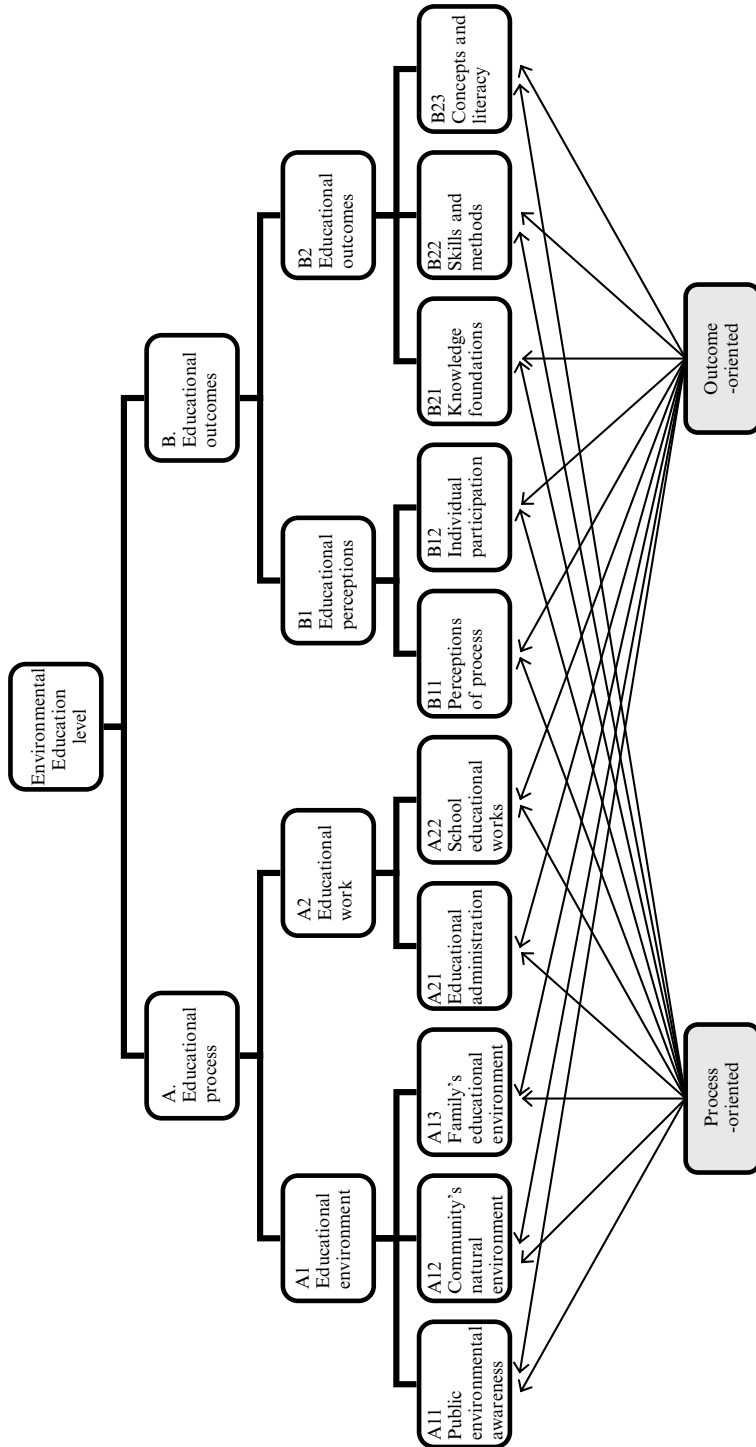


Fig. 5.1 EE and ESD indicator system

The AHP in this study represented and assigned different weights to different indicators to relate those elements to the overall perceived level of EE and ESD in SS schools.

Table 5.1 shows that the software, yaahp 0.5.2, was used to assign the index weights of the criterion layer, the first-tier indicator and the sub-criterion layer, and the second and third tiers indicators, respectively.

The following formula was adopted to calculate the weights:

$$F = \sum_{i=1}^n \omega_i Z_i.$$

F refers to the level of EE and ESD in a particular region (eastern, central, and western); i is the serial number of the evaluation indicator; n refers to the total number of indicators; ω_i refers to the total weights of serial number i indicator; Z_i refers to the evaluation scores of serial number i (Chen and Tang 2011).

The second stage of the study involved a questionnaire survey. The sample comprises SS students who were contacted by readers and authors of the professional journal *Geography Teaching*, members of the Geography Teaching Research Society of China, the China Educational Association, and teacher education graduates. Student respondents came from different parts of China. Thus, the results to some extent reflect the perceived status of EE and ESD in China. A total of 204 SS students participated in the September 2012 study, which comprises 48 SS1 students (23.53 %), 82 SS2 students (40.20 %), and 74 SS3 students (36.27 %). Approximately 86.27 % of the 204 respondents came from the east region, whereas 6.37 % and 7.35 % of the student respondents came from the central and western regions, respectively. Student respondents from the cities or urban areas comprise 82.35 %, whereas 17.65 % came from rural areas.

The questionnaire contains items on the personal background of students such as gender, grade in the SS school, locality of school (e.g., typical city, town similar to a city, town similar to the rural village, typical village), perceived quality of school in the local context (best school, better school, ordinary school, relatively weak school), family income in the local context (relatively high, quite high, average, relatively low, very low), and the highest educational qualification of parents (postgraduate level, postsecondary/specialized subject level, and below postsecondary/specialized subject (*zhuānkē*) level). The questionnaire contained 52 items, which were rated on a five-point Likert scale (5 indicates that the “match [is] very much or very consistent,” whereas 1 stands for “does not match very much or very inconsistent”). The items that reflect the perceptions of students agree with the third-tier indicators. Table 5.2 shows the numbers of questions of the third-tier indicators.

The following are some examples of questionnaire items for the third-tier indicators.

A11 Public environmental awareness: The local context has a rich cultural atmosphere of environmental protection. The public has a strong environmental consciousness and the community often organizes environmental publicity activities.

Table 5.1 Indicators of EE and ESD levels and their weightings

First-tier indicator and weightings		Second-tier indicator and weightings		Third-tier indicator and weightings		Total weightings
Indicator	Weightings	Indicator	Weightings	Indicator	Weightings	
A Educational process	0.3543	A1 Educational environment	0.1978	A11 Public environmental awareness	0.3289	0.0231
				A12 Natural environment of the community	0.1805	0.0127
				A13 Educational environment of the family	0.4906	0.0344
		A2 Educational work	0.8022	A21 Educational administration	0.3100	0.0881
				A22 School educational works	0.6900	0.1961
B Educational outcomes	0.6457	B1 Educational perceptions	0.4502	B11 Perceptions of process	0.5000	0.1453
				B12 Individual participation	0.5000	0.1453
		B2 Educational outcomes	0.5498	B21 Knowledge foundations	0.1946	0.0691
				B22 Skills and methods	0.3104	0.1102
				B23 Concepts and literacy	0.4950	0.1757

Table 5.2 Number of questions concerning the third-tier indicators

	Third-tier indicators	Number of questions
1	A11 Public environmental awareness	1
2	A12 Natural environment of the community	1
3	A13 Educational environment of the family	1
4	A21 Educational administration	2
5	A22 School educational works	10
6	B11 Perceptions of process	11
7	B12 Individual participation	5
8	B21 Knowledge foundations	10
9	B22 Skills and methods	4
10	B23 Concepts and literacy	7

A12 Natural environment of the community: The local context does not include events related to environmental pollution and ecological degradation.

A13 Educational environment of the family: My parents often act as role models in energy conservation and exert strict requirements on me.

A21 Educational administration works: The local education bureau has organized many EE stations or facilities. We often go to these EE stations outside the school to conduct activities.

A22 School educational works: Our school leadership has a strong environmental awareness. The school has a comprehensive EE plan or planning. The school has specialized school-based EE materials and has arranged school-based EE curricula with designated lesson hours.

B11 Perceptions of the process: I am satisfied with the ecological environment of the school campus. My living environment has no noise pollution.

B12 Individual participation: I have been a member of an environmental protection group for a long time. I have participated in school activities related to environmental protection leading to deliverables (e.g., essays, reports, and project proposals).

B21 Knowledge foundations: Environmental components are interdependent. Problems generated by one of the components will affect the entire environmental system.

B22 Skills and methods: I am very concerned about, and acquire ways of handling, environmental pollution.

B23 Concepts and literacy: I am always worried about ecological and environmental problems.

However, this study has several limitations. First, the student samples were conveniently rather than randomly selected. Second, the sample size is not sufficiently large and included more students from west China and the rural areas because of resources and time constraints. Finally, weights were assigned to the indicators. An external specialist panel could be formulated with sufficient time and resources to obtain consensual weights for individual indicators.

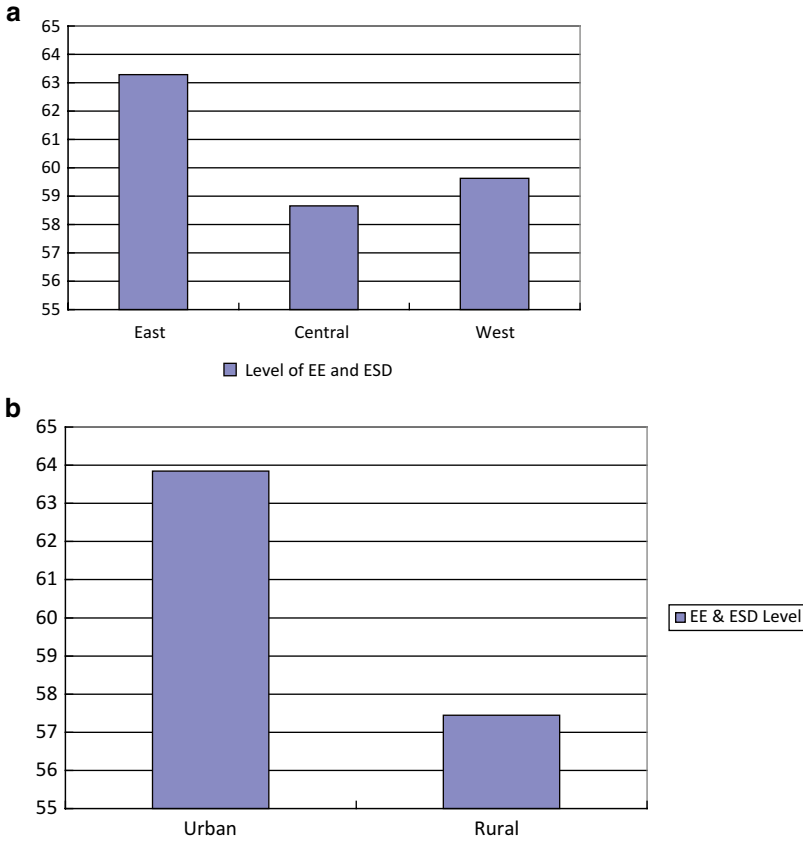


Fig. 5.2 EE and ESD levels (a) East, the central, and west China (b) Urban and rural

Discussion of Findings

The results indicate that the perceived level of EE and ESD in the eastern and coastal parts of China is 63.29, which is higher than that of the central and western parts, which had scores of 58.66 and 59.63, respectively (Fig. 5.2a and Table 5.3). Figure 5.2b and Table 5.4 shows that the EE and ESD level in urban areas is 63.85, which is higher than the 57.45 score in rural areas. Notably, Fig. 5.3a, b show that the first-tier indicator of “educational outcomes” has received a higher score than the indicator of “educational process” across different regions and areas. “Educational outcomes” under the second-tier indicator received a higher score than “educational environment,” “educational work,” and “educational perceptions” indicators. However, Figs. 5.4 and 5.5 shows that the “educational

Table 5.3 EE and ESD levels and their three-tier indicators in the three geographic areas of China (Max. 100)

Objectives	First-tier indicators	Second-tier indicators	Third-tier indicators	The east	The middle	The west
Comprehensive levels				63.29	58.66	59.63
	A Educational process			58.46	50.62	55.15
		A1 Educational environment		61.13	53.14	58.79
			A11 Public environmental awareness	58.30	41.54	50.67
			A12 Natural environment of the community	50.23	43.08	41.33
			A13 Educational environment of the family	67.05	64.62	70.67
		A2 Educational work		57.80	50.00	54.26
			A21 Educational administration	52.95	40.77	48.00
			A22 School educational works	59.98	54.15	57.07
		B Educational outcomes		65.94	63.08	62.09
			B1 Educational perceptions	53.07	50.01	49.83
			B11 Perceptions of process	54.98	47.41	48.73
			B12 Individual participation	51.16	52.62	50.93
			B2 Educational outcomes	76.47	73.77	72.13
			B21 Knowledge foundations	74.56	73.54	71.07
			B22 Skills and methods	69.40	65.38	66.33
			B23 Concepts and literacy	81.66	79.12	76.19

environment” indicator has relatively higher scores than “educational work” and “educational perceptions.”

An increasing trend was observed in the scores of other indicators from SS1 (aged 15–16) to SS2 (aged 16–17), except for the second-tier indicator of “individual participation.” The second-tier indicators of “public environmental awareness,” “educational environment of the family,” “educational administration,” “school’s

Table 5.4 EE and ESD levels and their three-tier indicators in the urban and rural areas of China (Max. 100)

Objectives	First-tier indicators	Second-tier indicators	Third-tier indicators	Urban area	Rural area
Comprehensive levels				63.85	57.45
		A Educational process		59.11	51.23
			A1 Educational environment	61.37	56.17
			A11 Public environmental awareness	57.98	50.56
			A12 Natural environment of the community	50.24	43.89
			A13 Educational environment of the family	67.74	64.44
			A2 Educational work	58.55	50.01
			A21 Educational administration	53.33	44.72
			A22 School educational works	60.89	52.39
		B Educational outcomes		66.46	60.86
			B1 Educational perceptions	53.73	47.53
			B11 Perceptions of process	55.01	49.49
			B12 Individual participation	52.45	45.56
			B2 Educational outcomes	76.88	71.77
			B21 Knowledge foundations	75.26	69.44
		B22 Skills and methods	69.94	64.17	
		B23 Concepts and literacy	81.87	77.46	

educational works,” and “perceptions of educational process” revealed a declining trend in SS3 (Fig. 5.6 and Table 5.5).

These results suggest that the cumulative educational outcomes of EE and ESD improve from SS1 to SS2, but most EE and ESD activities are arranged in SS1. Secondary schools pay relatively less attention to the organization of EE and ESD activities in SS3 possibly because of the needs of students to prepare for college/university entrance examinations. Thus, SS3 students spend less time on extra-curricular activities. Students gain knowledge and concepts, but their skills decrease possibly because of the “washback” effect of public examinations on EE and ESD.

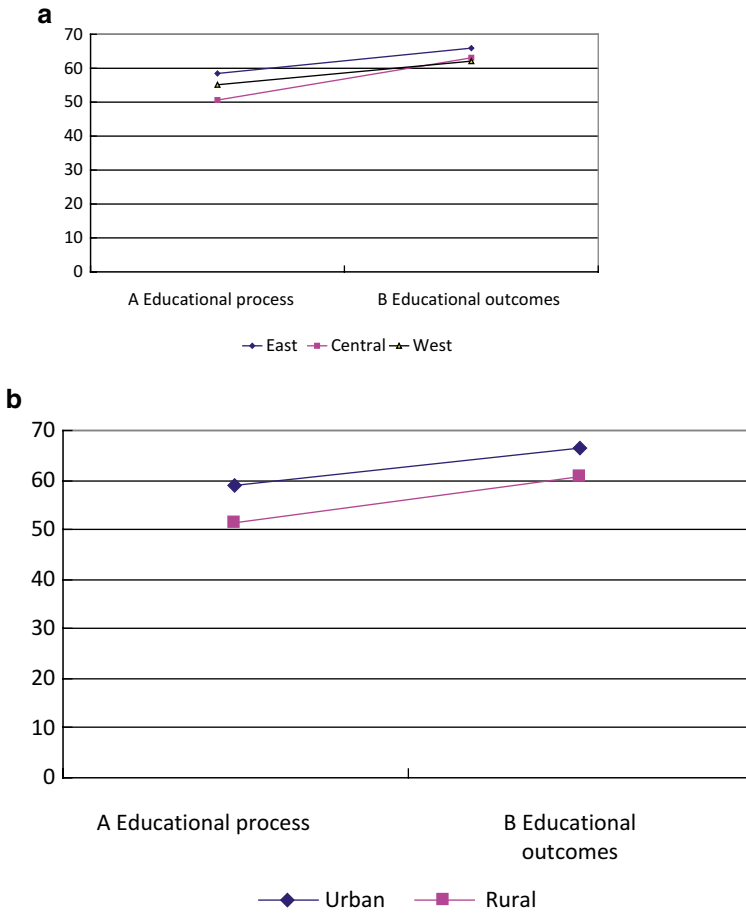


Fig. 5.3 The process and outcome of EE and ESD in China. (a) East, central, and west. (b) Urban and rural area

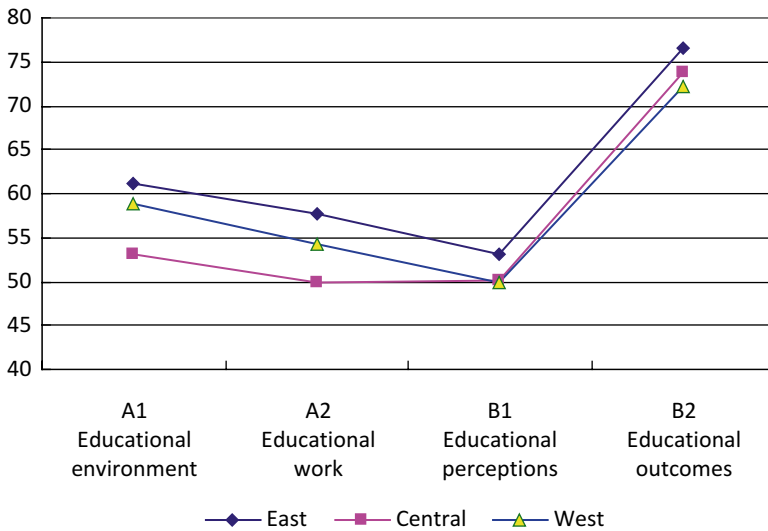


Fig. 5.4 Comparison of second-tier indicators of EE and ESD (East, central, and west)

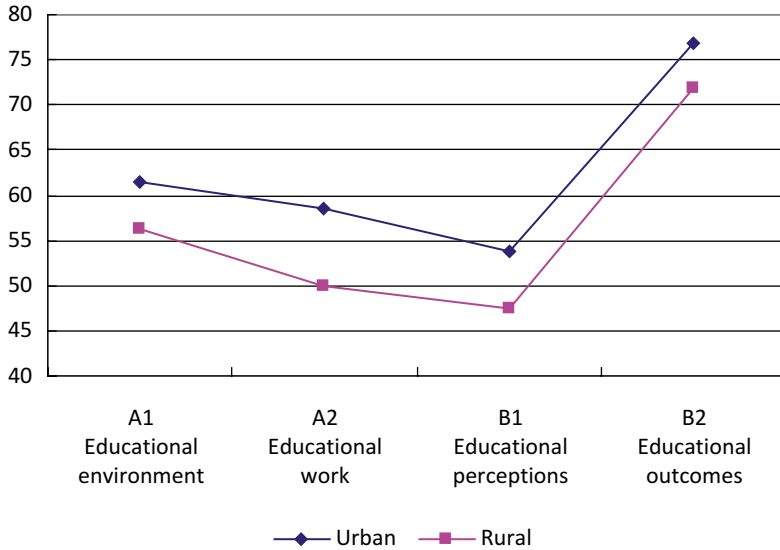


Fig. 5.5 Comparison of second-tier indicator of EE and ESD

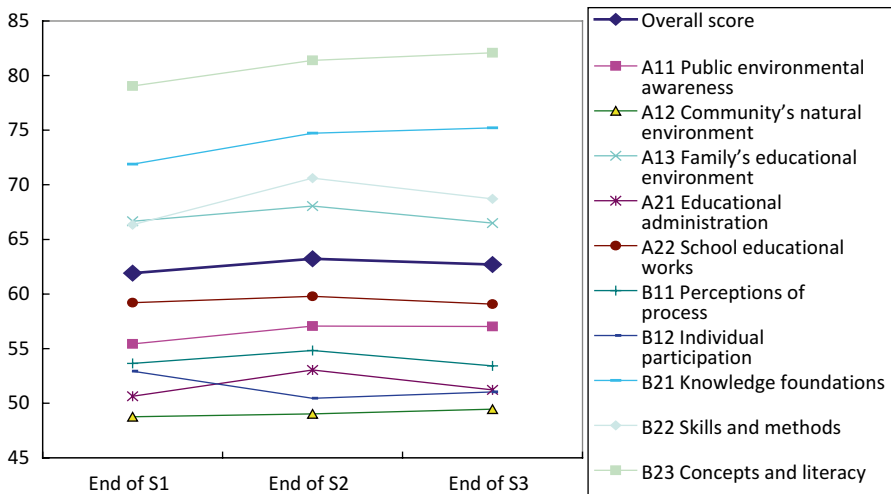


Fig. 5.6 EE and ESD levels in different grades

The “washback” effect could be attributed to the time constraints and pressure experienced by teachers “to narrow the curriculum and lose instructional time, leading to ‘teaching to the test’” (Pan 2009, p. 261). This situation negatively affects the arrangement of EE and ESD activities for SS students.

Female respondents perceived higher scores for “family’s educational environment” and “school’s educational works” indicators compared with their male counterparts. The “skills and methods” and “knowledge foundations” scores of

Table 5.5 EE and ESD levels across grades and their trends

	End of senior one	End of senior two	End of senior three	Senior one to senior two	Senior two to senior three
Overall score	61.91	63.22	62.7	Increase	Decrease
A11 Public environmental awareness	55.42	57.07	57.03	Increase	Decrease
A12 Natural environment of the community	48.75	49.02	49.46	Increase	Increase
A13 Educational environment of the family	66.67	68.05	66.49	Increase	Decrease
A21 Educational administration	50.63	53.05	51.22	Increase	Decrease
A22 School educational works	59.21	59.78	59.08	Increase	Decrease
B11 Perceptions of process	53.64	54.83	53.42	Increase	Decrease
B12 Individual participation	52.92	50.44	51.03	Decrease	Increase
B21 Knowledge foundations	71.88	74.73	75.22	Increase	Falling of increase rate
B22 Skills and methods	66.35	70.61	68.72	Increase	decrease
B23 Concepts and literacy	79.05	81.39	82.08	Increase	Falling of increase rate

male students were slightly higher than those of female students. However, female students had higher scores in “concepts and literacy,” “perceptions of educational process,” and “individual participation”. These results may be that the result of female students cultivating their environmental concepts and literacy through individual participation (Table 5.6).

The discrepancy in the perceived level of EE and ESD in different regions in China could be partly attributed to varying levels of economic development (Fig. 5.7). These results agree with Wasmer (2005, p. 25), who suggests that the implementation of EE in China is affected by the geographical extension of the country and the financial conditions in different places and regions.

The western region has a lower level of economic development compared with that in the middle and eastern coastal regions. The relatively high level of EE and ESD perceived by students could be attributed to the severity of environmental problems, which have heightened the environmental awareness of students in the western region. In addition, some provinces in the western region actively explore EE legislation and EE and ESD development. For example, the legislation office and environmental protection bureau of Ningxia jointly established the Environmental Education Ordinance of Ningxia Hui Autonomous Region (Revised) in 2008. Other provinces/special economic zones/direct-controlled municipalities such as Gansu and Chongqing are actively exploring EE legislation (Zhou 2012).

Table 5.6 EE and ESD levels of female and male students

	Male	Female	Difference between male and female
Level of EE and ESD	61.05	64.07	3.02
A Educational process	55.03	59.88	4.85
A1 Educational environment	58.58	61.95	3.37
A11 Public environmental awareness	55.82	57.35	1.53
A12 Natural environment of the community	49.01	49.2	0.19
A13 Educational environment of the family	63.96	69.73	5.77
A2 Educational work	54.16	59.37	5.21
A21 Educational administration	49.56	53.63	4.07
A22 School educational works	56.22	61.95	5.73
B Educational outcomes	64.35	66.38	2.03
B1 Educational perceptions	51.61	53.46	1.85
B11 Perceptions of process	52.85	55	2.15
B12 Individual participation	50.37	51.93	1.56
B2 Educational outcomes	74.78	76.95	2.17
B21 Knowledge foundations	75.16	73.49	-1.67
B22 Skills and methods	68.96	68.89	-0.07
B23 Concepts and literacy	78.27	83.36	5.09

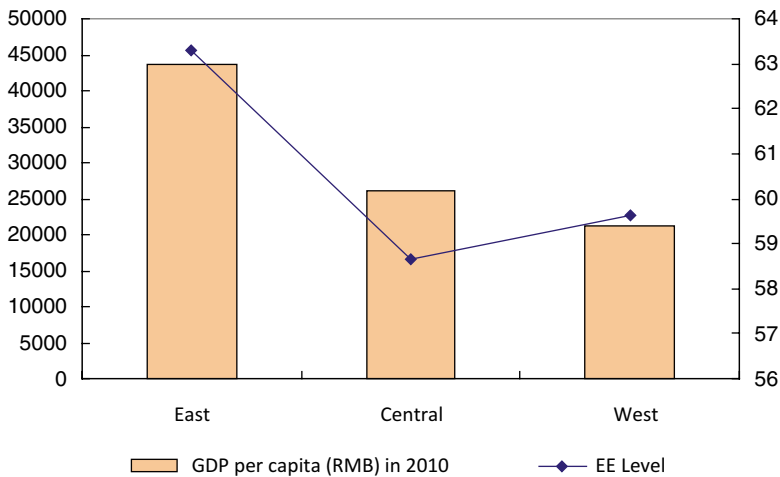


Fig. 5.7 The correlation between EE and ESD level and economic development

Comparison of the EE and ESD levels of different school qualities in the local context (best school, good school, ordinary school, relatively weak school) shows that local best schools had an average score of 63.80. This result indicates no significant difference with the scores of better and ordinary schools. However, the relatively weak schools only received a score of 42.37 (Fig. 5.8). Figure 5.8 also shows that the scores for different indicators were quite similar among the best,

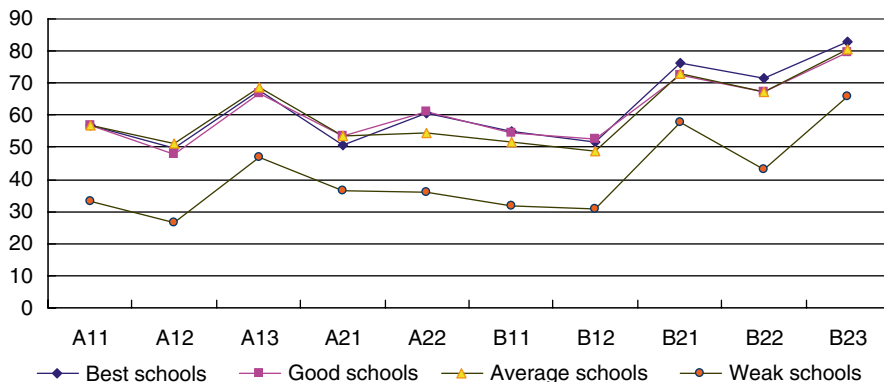


Fig. 5.8 Scores of EE and ESD for schools of different quality

good, and ordinary schools. These results indicate the urgency of enhancing the overall EE and ESD school quality and capacity among the “relatively weak schools” with student intake of low academic ability.

The scores of second-tier indicator, “educational outcomes,” was highest followed by “educational environment,” “educational perceptions,” and “educational work.” The “skills and methods” scores of students from different regions and localities were lower than those of “concepts and literacy” and “knowledge foundations” in the “educational outcomes” EE and ESD. Thus, China should pay more attention to EE and ESD processes and to the enhancement of the skills, methods, and individual participation of students. This finding reflects Harris’s (2008, pp. 174–175) review, which suggest that Chinese people are concerned about their own home environment and living, but not necessarily their neighborhood. Therefore, the promotion of EE may be linked with environmental behavior and environmental health.

Examples of EE and ESD in Urban and Rural Schools in China

Numerous examples of EE and ESD programs and schools can be found in the urban areas in China, especially the big cities (Lee et al. 2010). One of the examples that attracted national and regional attention was that of Suzhou High School and Suzhou Industrial Park in Jiangsu Province. These institutions developed the textbook “The Wetland” for the school-based curriculum in 2008 and established a specialized wetland-themed Xima Museum within the school campus of a former village. This museum was designated by the World Heritage Institute of Training and Research for the Asian and the Pacific Region of UNESCO as one of the first batch of World Heritage Education Bases for the Youth in 2010 (“Wetland-Themed Museum” 2010). The school-based curriculum utilizes a wide variety of resources

and platforms including the ecological garden, the Xima Museum within the school, the nearby organic farms, and other field sites in Da Hu (Cai 2012). The textbook covers wetland ecology, the value and distribution of wetlands, wetland civilization and wetland study, and the field skills and activities conducted in the wetlands (Academic Department of Suzhou High School-SIP 2008).

Some schools have devoted efforts to promoting EE and ESD despite the relatively low level of EE and ESD development in different parts of rural China. For example, a primary school in the rural areas of Chongqing in southwest China implemented a project related to water education concerning the Yangtse River (Changjiang), the longest river in China. The teachers were provided with training related to water conservation and water culture. The school-based material, “Highlights of water knowledge” and the school-based newsletter, “Water resources education – river in our village” and some information sheets were produced. These initiatives were supported by Southwest University. Teachers and community members encouraged students to conduct small-scale investigations of water quality-related issues via telephone interviews, web-based search, and literature review.

The concept of water conservation was also incorporated into subject teaching and character education of students. Activities such as broadcasting messages, speech competitions, jingles, and musical and dance performances were organized to raise public awareness about protecting water quality for students and community members. An action group was formed by the school principal, the village head, and community representatives to formulate plans for protecting the water quality of the nearby river in the village. A thematic EE study required grade three and four students to deliver a presentation on “the status of river in the village and environmental protection” to students from five other primary schools and residents in a nearby community. Drama, storytelling, poetry reading, and picture displays were also arranged to publicize EE messages. This event captured the attention of the officials of the county education bureau, who commented on the project and related activities. However, safety is a critical issue for outdoor activities in China. Parents and the government are skeptical toward outdoor and environmental studies despite its inherent value.

Another significant example is the “Shangri-La Sustainable Community Initiative” in Yunnan Province, which promoted community action research projects and provided teachers with interactive professional training. The two schools that participated in this project were encouraged to form conservancy associations/groups. The student members in these groups engaged in nearby river studies and disseminated environmental protection messages to people in the village. Students and teachers also worked with the local military police and environmental protection bureau to collect rubbish from the riverbanks and plant willow trees. Finally, large-scale propaganda was organized to promote environmental awareness among community members (Lee 2010).

Xu and Qian (2012)’s book on the use of ESD resources in rural schools in Beijing and other areas contains examples of using ESD resources related to social, cultural, environmental, and economic aspects in rural settings. Some schools integrated ESD with life and safety education, education for social harmony, and education for civic rights and responsibilities in the use of ESD resources related to the social context in rural areas. One primary school and two secondary schools used two mosques as a platform for ESD inquiry to explore the link between education and social harmony.

The history of the mosques and Muslim culture were explained to the students via surveys, interviews, and visits. The importance of appreciation and respect for the culture and habits of different ethnic groups and national solidarity were also explained (pp. 96–102). The students gained better understanding of Islamic religious culture. They also recognized the diversity of religions and cultures. Some schools integrated ESD with Chinese culture and education for respecting cultural diversity and world heritage by the use of ESD resources related to the cultural context. For example, two schools collaborated with a teacher training college and the Peking Man Museum or the Zhoukoudian Anthropological Museum to develop curriculum resources and to increase student awareness about protecting world and cultural heritage (pp. 124–129). Some schools integrated ESD with climate change education, biodiversity education, environmental pollution, and control education, and natural disaster prevention education in the use of ESD resources related to environmental protection. One primary school in Hubei Province utilized a local curriculum entitled “I Love the Mother Lake” to enhance student understanding of Hong Lake (Hong Hu), China’s seventh largest freshwater lake. This approach encompasses knowledge of ecological agriculture, green food, food chains, rare species, wetlands, and water resources via a wetland survey, classical poetry readings, and reporting to local government bureaus on cases of illegal fishing and rearing of fish (pp. 159–162). Certain schools integrated ESD with rural development, green consumption, sustainable cities, and cyclic/circular economy education in the economic use of ESD resources. For example, a secondary school employed a hydro-electric power station model within the school to explain rainwater utilization and the effluent of electricity generation as well as to promote the appreciation of water lift design as an ancient invention using physics and history (pp. 165–168).

Implications for EE and ESD Future Development in China

This chapter provides a comparative analysis of the status of EE and ESD, one which reflects the rural-urban difference and regional variations between the eastern and western parts of China. These differences are related to educational policy support, management of curriculum and teaching, approaches to education, evaluation, and the availability of education resources. The analysis shows that city schools in eastern China have a relatively developed level of ESD, which is partly attributable to greater educational resources and a higher level of teaching compared with rural schools in western China where ideas about education are less progressive and education resources are scarce. However, the disparity between eastern and western China is gradually being narrowed because of the advance of basic curriculum reform, and rural schools in different parts of China are also promoting EE and ESD.

This chapter presents three main propositions and interrelated directions for future EE and ESD in China. First, regional differences in the development of EE/ESD between the eastern and central regions and between the central and western regions should be eliminated. The relatively slow development of EE and ESD in

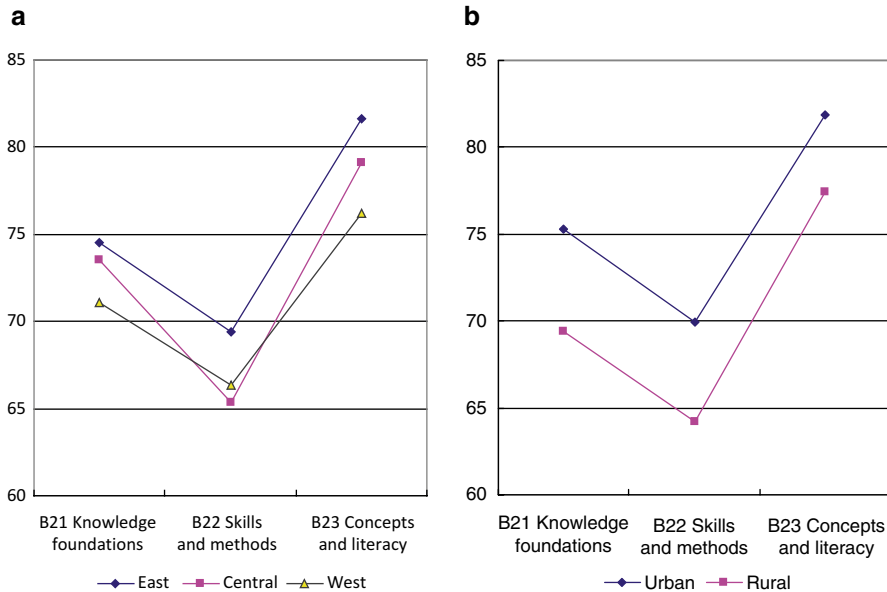


Fig. 5.9 Third-tier indicators and EE and ESD levels. (a) East, central, and west. (b) Urban and rural area

rural areas should be addressed via two main approaches. One is to enhance the economic development of the less developed western and remote areas and improve transfer payments (Transfer Payment n.d.). Transfer payments in China include general and earmarked transfer payments and allowances. However, it should be noted that western China is heavily dependent on transfer payments. Establishing a higher level of economy that generates more tax revenues and is less dependent on transfer payments is a more desirable long-term approach (Wang et al. 2010).

A second method, as shown in Fig. 5.9a, b, is the enhancement of “process education,” perceptions, and educational processes, as well as the reinforcement of students’ individual participation levels, skills, and methods. Finally, the findings indicate that the educational qualifications of parents and family income might be associated with the EE and ESD perception levels of students in China (Fig. 5.10a, b). SS students from very low-income families perceive lower EE and ESD levels in schools. In addition, SS students whose parents’ educational qualifications are at the lower postsecondary/specialized subject (*zhuānkē*) level have lower EE and ESD levels compared with those whose parents possess postgraduate qualifications. These results suggest that more attention should be given to SS students from disadvantaged backgrounds. This finding to some extent echoes the *Outline of China’s National Plan for Medium and Long-Term Education Reform and Development (2010–2020)* (hereafter referred to as the Plan), which emphasizes educational equality in terms of educational opportunities. The Plan states that, “Impoverished and ethnic autonomous areas are trailing behind

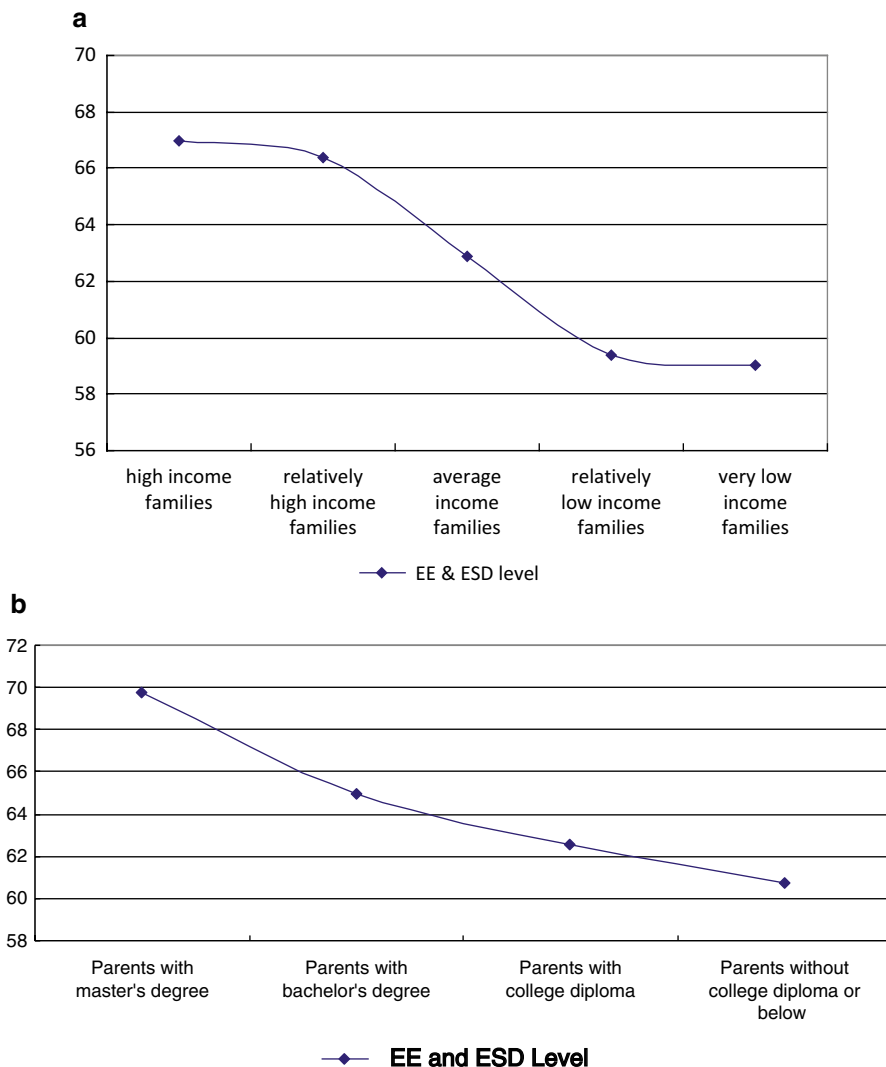


Fig. 5.10 (a) Family income and ESD level. (b) Educational level of parents and ESD level

in educational development, which is also uneven between urban and rural areas and between different regions. Education funding cannot keep up with demand, and education is yet to be accorded the strategic priority it deserves.” (Ministry of Education 2010, p. 6) The Plan also focuses on enhancing capacity building for the ability of students to innovate and adapt to society as well as sustainable development for the overall development of strategic themes (Ministry of Education 2010).

Finally, more localized curriculum materials should be developed and students should be encouraged to understand their surroundings, investigate local environmental issues, and share their knowledge and experience with their parents, community members, and government officials (He 2010). Political will is important in China to make a difference. The central and local governments and every Chinese citizen should work together in reducing regional disparities in economic and educational development as well as the level of EE and ESD in the country.

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Chapter 6

ESD Projects in Japanese Schools and in Non-Formal Education in Japan

Osamu Abe

Introduction

At the “World Summit on Sustainable Development” in Johannesburg in 2002, the Japanese Government and NGOs proposed that the 10 years from 2005 be the “Decade of Education for Sustainable Development” (hereafter called DESD). The proposal was approved unanimously at the United Nations General Assembly’s 57th meeting in the same year.

According to Japan’s Action Plan for the DESD (2006), ESD is defined as education that makes each of us “realize that we are living in close connection with people in the world, future generations, and the environment and, thus, must change our activities.” (<http://www.cas.go.jp/jp/seisaku/kokuren/keikaku.pdf>, accessed on 12th November 2012) In other words, ESD refers to educational activities that intend to empower citizens as sovereign members of society to proactively participate in the establishment of a sustainable society. Introduction of ESD has enabled the stakeholders and efforts that were not previously related or the subject of collaboration, to be “linked” together through sharing the same perspectives to realize a sustainable society.

“Sustainable Development” was raised the first time in The Brundtland Commission in 1987 (World Commission on Environment and Development 1987). The concept of sustainable development is not only intended for environmental issues, but also includes other challenges such as development, poverty, peace, human rights, gender and health. Previously, environmental education, developmental education or peace education was taught individually to find solutions for global issues. However, it has been recognized that these issues are closely related to one another since global environmental issues became obvious in the 1980s.

O. Abe (✉)

Department of Sociology & Education for Sustainable Development
Research Centre, Rikkyo University, Tokyo, Japan
e-mail: osamu@rikkyo.ac.jp

Therefore, the need for comprehensive solutions has been addressed and called global education or world studies.

In this sense, ESD is the integration of education on global issues that has been conducted in the past. Moreover, these forms of education have the same objective, *raison d'être*, and common characteristics that can be called the essence of ESD. These characteristics are the belief that “human beings are unique, and are the part of nature”, the competence of “respecting diverse values and communication”, and the learning approach of “participatory method or process of continuous learning”. All of these can be regarded as the essence of any education, and are very important.

From Environmental Education to ESD

Responding to the adoption of *Agenda 21* from the Earth Summit, UN agencies that have promoted environmental education (such as UNESCO) started activities to mainstream “sustainable development” as the core concept of education. In this process, traditional environmental education had developed worldwide into ESD. This movement was further spurred by the proposal of DESD at the Johannesburg Summit.

Japan proposed to establish the Brundtland Commission at the Nairobi Meeting in 1982. Therefore, it is significant that Japan, who brought about the idea of “sustainable development”, proposed DESD to mainstream ESD. After the declaration of DESD, every title with “education that aims to build a sustainable society” has been merged into ESD. The interim meeting was held in Bonn, 2009, by UNESCO and the German government, to share the progress of DESD. At that time, it was decided that the final meeting will be held in Japan in 2014.

Environmental education in Japan prior to the 1990s focused on nature and environmental problems. It was classified roughly into three types, namely, nature-oriented, life-oriented, and Earth-oriented, and the efforts of each type were made separately. However, the interrelatedness of these three types has gradually started to be understood since the 1990s when global environmental problems emerged. That transformed the narrow definition of environmental education to the broad definition of environmental education, which is “comprehensive environmental education” that improves “the relationship between human beings and nature,” “the relationship among human beings,” and “the relationship between human beings and society.” The appearance of “comprehensive environmental education” represented a qualitative development from environmental education to ESD.

At present, comprehensive environmental education has been promoted in the way that it encompasses not only environmental efforts such as integrated studies and food and agriculture education at school and the building of environmental municipalities and sustainable communities, but also welfare [social sustainability] and the promotion of local industries [economic sustainability]. These are, without doubt, ESD efforts.

Environmental education was officially mentioned for the first time in Article 25 of Japan's *Basic Environmental Law* (<http://law.e-gov.go.jp/htmldata/H05/H05HO091.html>, accessed on 12th December 2012) in 1993. The *Law for Enhancing Motivation on Environmental Conservation and Promoting of Environmental Education (Environmental Education Promotion Law)*, which was developed based on the Article 25 in the same year, describes only environmental education on 'environmental conservation'. With the revision in 2011, the definition of environmental education in *Environmental Education Promotion Law* is developed considering the ESD concept, as "education and learning to deepen the understanding on the relationship between environment, society, economy and culture, and other related environmental conservation issues, for achieving a sustainable society" (http://www.env.go.jp/policy/suishin_ho/kaisei-h23_b1.pdf, accessed on 12th December 2012).

Furthermore, environmental education has been integrated in the laws supervised under the Ministries that had not previously engaged in environmental education, such as the Ministry of Land, Infrastructure, Transport and Tourism and the Ministry of Agriculture, Forestry and Fisheries. For example, environmental education has been conducted as a part of the development plans for hilly and mountainous areas (or as the revitalization of adequate agricultural production activities) under the *Food, Agriculture and Rural Areas Basic Act*. Environmental education has also been conducted under *Law for the Promotion of Ecotourism* for the purpose of promoting sustainable natural resource utilization that can contribute to the tourism industry. This trend shows that environmental education has been conducted as a part of community development based on the integration of environment, economy and society; in another words, as a part of ESD.

Two new sentences were added in the 'Objectives of Education' (Article 2) of the *Revised Basic Act on Education* in 2006. One is "to foster an attitude to respect life, care for nature, and contribute to the protection of the environment," and the other is "to foster an attitude of respect for our traditions and culture, love the country and region that nurtured them, together with respect for other countries and a desire to contribute to world peace and the development of the international community" (http://www.mext.go.jp/b_menu/houan/kakutei/06121913/06121913/001.pdf, accessed on 12th December 2012). These have supported the introduction of ESD in the school system in Japan. In fact, both the *Basic Plan for the Promotion of Education* and *Revised Curriculum Guidelines* mention 'sustainability', 'sustainable society building', 'ESD' and 'DESD'. They also describe ESD as one of the key issues that the education field in Japan faces. An ESD promotion foundation has been organized through the development of organizational and institutional frameworks. Based on the *UNDESD International Implementation Scheme* (2005), *Japan's Action Plan for UNDESD* was formulated by the Interministerial Meeting on the UNDESD in 2006. Based on Japan's Action Plan, ESD initiatives were started, including an ESD Roundtable meeting by the experts, ESD promotion projects by the Ministry of the Environment (MoE), UNESCO Associated School promotion and the promotion of environmental education for sustainable society at universities by the Ministry of Education, Culture, Sports, Science & Technology (MEXT).

As clearly mentioned in 2006, *Japan's Action Plan for UNDESD* was revised in 2011, based on the outcome results from the ESD World Conference in Bonn, 2009 and the discussion outcomes from the ESD Roundtable Meeting. With this revision, phrases like 'making ESD visible', the promotion of 'connectedness' and ESD promotion based on the *Revised Curriculum Guidelines*, were newly added.

The *Revised Japan's Action Plan for UNDESD* covers the current ESD promotion situation, and serious issues like the Great East Japan Earthquake and subsequent Fukushima nuclear plant accident. However, the Interministerial Meeting has hardly functioned due to the lack of the Cabinet office's leadership and the sectionalism of the governmental administration. In any case, the vision for a sustainable society that ESD should aim at has not been clearly developed by the Japan's government, so *Japan's Action Plan for UNDESD* does not mention the vision clearly. In order to promote ESD comprehensively and systematically, the government ESD department should function to eliminate the sectionalism and take cross-cutting approaches. In order to do so, politicians' initiatives are significant. It is also vague and problematic how the implementation plans in *Japan's Action Plan for UNDESD* are to be evaluated. Some issues above still remain, but ESD is becoming gradually common under DESD.

For further ESD promotion, four efforts should be made: (i) development and implementation of a public advocacy strategy for ESD dissemination; (ii) making ESD visible through project registration and competition; (iii) setting coordination functions for ESD promotion at a local community level; and, (iv) strengthening ESD in school education (pre- and in-service teacher trainings, periodic renewal of teaching licenses, developing evaluation techniques, etc.).

ESD in Formal Education

In Japan, in relation to ESD, issue-based education such as environmental education, human rights education, education for international understanding, and food education have been implemented in formal education. However, as there are no subjects directly teaching these issues at present, teachers' focus is on the objectives and goals of the existing subjects. Because of this situation, teachers are not taking an interdisciplinary approach in teaching the above-mentioned issues.

On the other hand, "integrated studies" taught based on children's participation in nature and hands-on learning in the environment, social welfare, and community issues share certain characteristics with ESD. The Japanese National Commission for UNESCO (JNCU), which belongs to the Ministry of Education, Culture, Sports, Science and Technology (MEXT), promotes ESD in primary, secondary, and high schools through the UNESCO school network. However, "integrated studies," which might have been a good opportunity for practice of ESD, has become different from what was originally envisioned. In the official curriculum guidelines (the national curriculum) revised from 2008 to 2009, "integrated studies" was substantially cut in terms of time allotted in the curriculum. According to MEXT, the

reason was the need to enrich learning activities that would improve knowledge and skills in each subject prior to the integrated studies; hence, the MEXT increased periods of Japanese, science, and math. On the other hand, existing individual, issue-based types of education, such as environmental education and human rights education, are referred to as ESD.

JNCU has been committed to ESD promotion through the UNESCO Associated Schools Project (ASP), in order to “work on all the sustainable progress issues holistically from environmental, economic and social dimensions” (http://www.unesco-school.jp/?action=common_download_main&upload_id=5728, accessed on 12th December 2012). The project targets schools at all levels, including kindergartens/preschools, primary, middle and high schools, special schools, specialized professional high schools and universities, for ESD promotion.

ASP was started in 1953 in order to take the philosophies stated in the UNESCO Charter and put them into action in schools. It now targets global issues including international understanding education and environmental education. Because of the overlapping themes with ESD, JUCN has been focusing on ASP, and working on increasing the number of ASP schools to 500 by 2014 (there are 675 as of February 2014). For supporting ASP schools, the Interuniversity Network Supporting the UNESCO Associated School Project Network (ASPUniv Net) was established in 2008 under the MEXT guidelines. It proposes to: (i) assist schools in their application for ASP and activities; (ii) provide university intellectual resources for ASP school activities; (iii) link ASP schools in Japan and overseas together; and, (iv) promote partnerships with local educational institutes and other ASP schools.

ASP schools can be described as ESD model schools, and they have been an effective tool for ESD promotion at schools. Most of the primary and middle schools like in Kesennuma City, Tama City, Kanazawa City, Nara City and Omuta City joined in ASP in order to conduct ESD because of the strong leadership of the governor or the head of the education board. On the other hand, there are risks that schools might see ESD as trouble, because becoming an ASP school could bring them additional work.

Including ASP, ESD covers various themes such as environmental education and international understanding education. Nara City has been working on ESD through the world heritage education, taking advantage of the unique local characteristics which are UNESCO cultural heritage sites. It is very effective to visualize the connectedness between the different grades and different subjects (or to build the connectedness between subjects) for systematic and comprehensive ESD promotion at schools, and this is called an ESD calendar. In many cases, schools are carrying out ESD programs by converging different subject outcomes into the comprehensive study subject and developing a partnership with multiple local stakeholders.

Here, it is important for not only educators but also all Japanese people to recognize the role of education in building a sustainable society and to reflect on their lifestyles with regard to global sustainability. Furthermore, it is indispensable to fundamentally reform the educational system from primary to higher levels under the concept of ESD. It is still difficult to emphasize any aspect other than academic development in the current Japanese educational system. Japan, however, urgently

needs to evaluate ESD practices comprehensively not only from the viewpoint of learning achievement but also from the viewpoint of a zest for living and sustainability at both local and global levels, and to clarify the priority of ESD over conventional education. As ESD is composed of three dimensions, environment, economics and society, it is extremely important to connect it with non-formal education such as local community education and lifelong education. Japan's Action Plan for UNDESD clearly specifies that "it will become important for students to study ESD in curriculums or in the period of integrated study through the entire school educational system from primary schools to junior high and high schools." It is necessary to put this into practice.

The roles of ESD at all levels of formal education could be: (i) to cultivate basic literacy for a sustainable society by integration of knowledge and experiences; (ii) to learn about participatory democracy by encouraging participation in the society as a subject; and (iii) to nurture the capacity to envision and build a sustainable society through practical learning activities with various stakeholders, so that children can be positive about their future.

In addition, in the wake of the Great East Japan Earthquake and the Fukushima Daiichi nuclear power plant accident, new educational challenges have emerged in the field of ESD, including the recovery of local communities and the promotion of radioactivity education, which are directly related to the realization of a sustainable society. In order for ESD in school education to play such a role, the conventional education system is not sufficient. Therefore, it is an urgent task to specify the superiority of ESD to conventional education by evaluating ESD practices comprehensively not only from the perspective of academic development but also from the perspective of a zest for living and sustainability of local communities and the world. In this respect, the National Institute for Educational Policy Research (NIER) developed a guideline for the ESD promotion at schools, in 2012, from the perspectives of OECD competency and "Zest for Living" by MEXT (http://www.nier.go.jp/kaihatsu/pdf/esd_saishuu.pdf, accessed on 16th January 2013). This will have a significant influence on ESD promotion at primary, middle and high schools.

ESD in Higher Education

Promoting ESD in higher education is of great importance because it is directly connected to developing human resources which build a sustainable society. There is a program supported by the MEXT called "Good Practice (GP)," which aims to develop ESD-related university curricula. The GP includes "Support Program for Distinctive University Education (Distinctive GP)" (2003–2007), "Support Program for Contemporary Educational Needs (Contemporary GP)" (2004–2007), and "Program for Promoting High-Quality University Education" (2008), and, in the framework, 42 university environmental education programs were adopted and implemented from 2003 to 2009. In 2006 and 2007, based on *Japan's Action Plan on UNDESD*, "the promotion of environmental education that will lead to a

sustainable society” was selected as a GP theme. There were 157 applications for the GP, and 30 of them were adopted. One example is Iwate University, which restructured and reorganized its liberal arts curriculum based on the concept of ESD through Contemporary GP. The GP provided all students with opportunities to learn about ESD.

Moreover, there is an increasing number of universities that have set up ESD-related research/education centers. One example is the ESD Research Center of Rikkyo University established in 2007 for the first time in Japan, and it has been contributing to the opening and the enrichment of ESD-related courses for its undergraduate and graduate schools. The Center also has made achievements in its research praxis by constructing ESD research networks in the Asia-Pacific region. Hokkaido University of Education, Chubu University, and Nara University of Education also set up the ESD centers (as of 2012). As ESD in higher education institutes in Japan is still at an immature stage as a research area, these centers are expected to play a central role.

Since 2005, the United Nations University has regarded higher-education-based ESD model areas as Regional Centres of Expertise (RCE) (127 RCEs as of February 2014). Each RCE has been promoted and practiced through collaboration between higher educational institutions and local communities. The RCE network has expanded worldwide. In Japan, there are six areas, including Okayama, Greater Sendai, Yokohama, Kitakyushu, Chubu, Hyogo-Kobe, and many community-based ESD programs have been implemented through collaboration between universities and communities (http://www.ias.unu.edu/sub_page.aspx?catID=1849&ddIID=183, accessed on February 2014).

In 2008, Japan’s Ministry of Environment developed a *Vision for Environmental Leadership Initiatives for Asian Sustainability in Higher Education* based on Japanese government’s *21st Century Environmental Nation Strategy*. The Vision aims to strengthen the development of environmental leaders who “consider the importance and urgency of solving environmental problems based on one’s own experience and ethical thinking, have a strong motivation to build a sustainable society and to realize integrated development in the environment, society and economy through business and civil activities by using one’s expertise, and take leadership roles on innovative social changes” (<http://enviroscope.iges.or.jp/modules/envirolib/upload/2385/attach/vision%20for%20environmental%20leadership%20initiatives%20for%20asian%20sustainability%20in%20higher%20education.pdf>, accessed on 16th January 2013). The Network for the Promotion of Sustainability in Postgraduate Education and Research (ProSPER.Net), which is also a governmental DESD promotion initiative, has been developed based on the Vision. The Environmental Consortium for Leadership Development (EcoLeaD) was also established in 2011, as a practical platform in which all stakeholders of government, academia, industry and civil society can participate, exchange information relating to environmental leadership development, and interact with each other. These are governmental top-down efforts, and show the expectation of the government that higher education institutes will commit to achieving sustainable development.

On the other hand, bottom-up efforts have also been made. Many universities have placed ESD in their curricula by setting up faculties, graduate schools, and/or courses related to environmental education under the DESD. Those universities worked together and set up a network on ESD in higher education (HESD Forum) in 2007 in order to share information and experiences. As seen in Iwate University, ESD efforts for reforming the university curricula and enhancing the partnership between the university and society have become a part of the university's social responsibility (USR).

It is vital to conduct participatory and experience-based education in ESD programs in higher education by integrating training, fieldwork and internships. ESD practices through collaboration with communities are also significant.

In order to promote ESD at higher education institutes, it is first necessary to convince the university executive office (management and curriculum) and organizations for inter-university partnerships (Japan Association of National Universities, Japan Association of Private Colleges and Universities, Association of Private Universities of Japan, etc.). But, at the same time, it is also necessary to visualize the benefits of ESD efforts by higher education institutes. Returning the outcomes from sustainability research to the education and *Gakushi Ryoku* to be described later, are examples of the visualization of ESD benefit. It is also effective to organize and enhance the ESD promotion structure on campus by setting up such things as an ESD research center. The number of higher education institutes that have introduced environmental management system (EMS) has also increased. In the future, the search for sustainability in higher education institutes can develop into some form of certification scheme like EcoLeaD. In this sense, there are great potentials as well as issues in ESD enhancement in higher education institutes.

On the other hand, Japan's Central Education Council mentioned ESD in their proposal to ensure the "quality" of university graduates, a quality referred to as *Gakushiryoku*, in order to respond to the globalization, knowledge-based society and the universalization of the university (December, 2008). This is the university version of 'Zest for Living' that MEXT has proposed for primary and middle school education. Thirteen capacities are presented as *Gakushiryoku*, covering four fields; knowledge/understanding, general skill, attitude/orientation, comprehensive learning experience and thinking. Some capacities, such as "understanding of the knowledge of diverse and different cultures", "understanding of the knowledge of human culture, society and nature", "communication skills", "social responsibility as a citizen", and "the capacity to utilize comprehensively the obtained knowledge, skills and attitudes, in order to encourage the student to find and solve problems", overlap the capacities aimed at by ESD. This also can influence ESD's introduction in higher education institutes in the future.

As mentioned above, ESD coordinators at a school and in a local community are essential for ESD promotion, and universities are expected to play this role. From this view, ESD has been incorporated into the university curriculums for the ESD leaders development, such as at Kobe University (ESD Sub Course), University of the Ryukyus (Minor in Comprehensive Environmental Studies), Hokkaido University of Education, Kushiro Campus (ESD Planner). For example, Kobe

University started an ESD Sub Course that has been carried out collaboratively and interdisciplinary by four faculties including Human Development, Literature, Economics, and Agriculture. “Sub Course” means that the subjects are elective in addition to the student’s major field of studies. This course aims to raise the students’ comprehensive understanding of ESD through the action research method, and to develop their competency as an ESD practitioner. Certification as an ESD Practitioner is provided after students complete 14 credit points.

ESD in Non-formal Education: Community Building and ESD

After the launch of the DESD, ESD activities have been promoted as part of sustainable community development through the efforts by NGOs such as the Japan Council on the UN Decade of Education for Sustainable Development (ESD-J), as well as through the designation of ESD model areas under the Ministry of the Environment’s ESD Promotion Project (2006–2008).

The Japan Council on the UN Decade of Education for Sustainable Development (ESD-J) was established by NGOs and individuals who proposed DESD jointly with the Japanese Government in 2003. ESD-J is an umbrella organization that consists of over 100 organisational members from various fields, including not only environment but also such areas as human rights and peace, who have been working together for ESD promotion. Besides policy advocacy on ESD, ESD-J has been developing ESD institutional frameworks, promoting ESD practices, and networking with NGOs in Asia. In a sense, ESD-J is a central player for non-formal ESD promotion (<http://www.esd-j.org/>, accessed on 16th January 2013).

In the ESD activities, there are activities that have been rearranged from the standpoint of ESD, which means that activities have newly been initiated after the launch of the DESD and they had been conducted before the birth of the ESD concept as identified by the DESD. There are two representative ESD efforts by municipal governments: that of Okayama City, which newly started ESD efforts motivated by the launch of DESD, and that of Minamata City where existing efforts can be evaluated as ESD.

As mentioned above, Okayama City, which was acknowledged as one of RCEs, has made innovative ESD efforts. The citizens, who participated in the World Summit on Sustainable Development (WSSD) in 2008, started ESD program from environmental education perspectives beginning in 2005, targeting students from primary to high schools in their own residential area, Kyoyama district (24,000 population and 11,000 families). This is called the Kyoyama ESD Environmental Program (Okayama KEEP). It is characterized by the school-society partnership, where the community learning center has played a central role to connect local schools, Non Profit Organizations (NPO) and local business/industries. It is an excellent ESD case that has developed strong involvement by the local community, and has conducted an “ESD Certification Test”. Okayama KEEP established the Okayama ESD Promotion Council based on their “Okayama City ESD Project

Basic Plan” (2005) in order to promote ESD (<http://www.kc-d.net/pages/esd/index.html>, accessed on 17th December 2012).

In Minamata City, where residents in the past suffered from Minamata Disease caused by environmental pollution, the local residents organized “*Yoro-kai* (gathering meetings)” in 1991 in order to do something good for their local community, and members started to map local resources. They collected detailed information on the local life histories and the environment through hearing from the local elders, created a map, and developed commercial products based on the map. In 1992, their efforts resulted in the declaration of Minamata City as an *Environmental Model City Development*, in order to overcome environmental pollution and to develop a recycling-based environmental model city. Based on the declaration, Minamata City launched an environmentally-sound, healthy and welfare-robust community development through *Moyainaoshi*, “the reconnection.” After this, Minamata City conducted local community evaluation in all areas by using the approach of *Jimotogaku*, “home community studies,” which have helped local citizens to recover their pride. In Minamata City, the initiatives for local revitalization were enthusiastically and dramatically developed by the city government and the local community in 1990s: domestic garbage separation (1993), Minamata Disease Patient’s Story Telling System (1994), Minamata Guide System (1996), Waste Reduction Women’s Council (1997), Minamata Field Tour (1997), Environmental Master Certification System (1998), Zonal Environmental Agreement (1999), Educational Tour Invitation and Promotion Council (1999), Environmental Coexistence Model Community Development (1999), ISO Domestic Version System (1999), ISO School Version System (2000), Ecomuseum for Whole Village Life System (2002), etc. Now, Minamata City has been working on holistic community development incorporating environment/economy (promotion of tourism and primary industry and invitation of environmental industry), and society (welfare, health and human rights), based on four pillars; (i) environmentally-friendly life practice, (ii) environmentally sound industrial development, (iii) environmentally sound city development in harmony with nature, and (iv) environmental learning city development. This wide range of efforts by the city government, citizens and business was developed by utilizing the local resources and taking advantage of lessons learnt from Minamata Disease, through the *Jimotogaku* approach, which represents “searching not for what you do not have, but what you have”. In recent years, Minamata City has been conducting an Minamata Environmental University Project for learning about sustainable society based on the case of Minamata Disease. The efforts in Minamata are ESD in a community development context, based on the committed environmental and human rights education at schools and the established *Jimotogaku* in the local communities.

Jimoto-gaku, which is the basis of community development in Minamata City, means “intellectually creative activities in which the local people become the main actors to learn about their community along with getting advice or viewpoints from outsiders, and build an unique local lifestyle (culture) in everyday life through realizing the distinctive features of their own community” (Yoshimoto 2001, p. 195). ESD is diverse, and it has to be based on what already exists in the circumstances of

the local community (environment, economics, society, culture, etc.). In this sense, *Jimoto-gaku*, in which local people realize the local resources and become the main actors in the community, is distinctly a good approach to ESD.

Other than *Jimoto-gaku*, the “eco-museum” in which the entire community becomes a museum, is also known nationwide as an example of ESD. Eco-museum aims to help conserve and utilize local resources and bring sustainable development to a local community through citizen participation in learning not only nature, history and culture but also industry. At present, there are many eco-museums in Japan such as Asahi Town (Yamagata Prefecture), Towa Town (Iwate Prefecture) and Toyooka City (Hyogo Prefecture). Most of these communities have been implemented as community development mainly through citizens learning environmental, economic and social perspectives. In Toyooka City, there is a project for reintroduction of the oriental white stork. The Toyooka case shows that learning like *Jimoto-gaku* has been promoted as the keyword for the “oriental white stork”, through nurturing and strong emotional attachment to the oriental white stork among the local people.

In the “Asaza Project” in Kasumigaura (Ibaraki Prefecture), the local community is understood not from the municipal governmental point of view but from a comprehensive point of view. The Asaza Project was originally started to rehabilitate Kasumigaura Lake, but has become a dynamic environmental education project linked to local community revitalization, and has led to ESD through environmental conservation, revitalization of the local economy, urban-rural exchange, and respect for local wisdom.

The last case that I would like to introduce is ESD based on endogenous development theory. Miyamoto (1982) analyzed innovative successful cases in rural communities suffering from depopulation and developed the “endogenous development theory”. The theory emphasizes citizens as the main actors, local industry promotion, and a bottom-up approach. This is concerned with community revitalization related to not only the economy, but also environment, culture, education, healthcare and social welfare.

Today, Japan has many problems, including recovery from the Great East Japan Earthquake, a rapid conclusion of the Fukushima Daiichi nuclear power plant accident, energy issues, an aging society with fewer children, depopulation, and destruction of the natural environment. In particular, rural villages find themselves in an unsustainable situation, thus facing the need of ESD based on the standpoint that integrates environmental, economic, and social aspects. In addition, it is impossible to continue sustainable community-building without active and creative participation of local residents. Seen in this light, it can be said that the role played by ESD will be extremely significant from now on in achieving sustainable community-building.

According to the survey by the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) targeting 62,271 villages of 775 municipalities in Japan that have de-populated areas (2007), 7,873 villages (12.6 %) are marginal villages in which over 50 % of the population is over 65 years old, and 2,917 villages (4.7 %) have serious difficulties in maintaining community functions. Four hundred and

twenty-two villages are at risk of extinction within 10 years, and 2,219 are at the risk of extinction “sometime in the future”. The number of these villages at risk has been increased 284, compared to the survey in 1999.

Progressing depopulation has not only impacted the biological diversity referred to in Japanese by the concept of “*satoyama*”, a human influenced natural environment that has been maintained by the local community people, but it also means the deterioration of primary industries such as agriculture, weakening disaster prevention function due to forestry deterioration, and the extinction of knowledge and culture regarding harmonious living with nature. The aging population and de-population issue is critical for Japan’s sustainable future. In this regard, nature schools, which have developed their environmental education activities based on the rural villages, have played a central role in sustainable community development, and are expected to be an important player for local community revitalization.

Nature Schools as a Community Focus of ESD

A nature school is a social learning organization that has a local site for their activities. It carries out programs throughout the year, and has a permanent teaching staff. Since being introduced in Japan in the late 1980s, nature schools have won dramatic social acceptance in recent years, and now involve business, industry, and government in their activities.

The definition of a nature school in Japan was set forth by the directors of various schools in 2010 as follows:

1. *Principles & Significance.* To encourage a symbiotic relationship between humans and nature, and to contribute to the creation of sustainable societies by implementing activities that create deep connections between the individual and nature, among individuals, and between the individual and society.
2. *Activities.* To implement nature-experience activities, community development life-culture activities and other educational opportunities, under the guidance of specialists in a safe and organized manner.
3. *Organizational Structure.* To be composed of responsible parties, instructors, designated contact information, an activities program, and participants (Committee on Nature School National Survey 2011, p. 288).

According to Nature School National Survey (2011), the number of nature schools increased from almost zero in the 1980s to about 2,000 in 2002, and about 3,700 in 2010 (Committee on Nature School National Survey 2011, p. 285). In the early stage, nature schools provided nature experience opportunities in hilly and mountainous areas for youths and adults from urban areas. Responding to changes in society in the last 20 years, nature schools have become focal points for sustainable community development, small business and social entrepreneurs in hilly and mountainous areas suffering from depopulation, and their efforts have been highly regarded. Nature schools will likely play a significant role in ESD that responds to the ongoing depopulation and the devastation of *Satoyama* and life in these communities.

Obviously, characteristics and methods vary among Japan's nature schools, but the educational areas that they generally encompass are "Outdoor Education", "Environmental Education", "Adventure Education", "Food and Craft Education", and "Healing Education". Most of the schools utilize an experiential approach in their educational methods, one that emphasizes thinking, feeling, decision-making and action based on experience. Through this they hope to raise awareness among participants of the "experience – learning – behavioral change" process.

The core of a nature school is the learning that relates to ESD, such as experiential learning, dialogue and collaboration, and re-evaluation of traditional knowledge. There are cases where nature schools play key roles for local small businesses such as ecotourism and green tourism through the employment of the local residents and the consumption of local agricultural products. Nature schools as ESD focal points contribute to enhancing local social and economic independence by envisioning sustainable society or sustainability, connecting various resources and materials organically (comprehensively and integratively), and creating business for human development.

Partnership with United Nations' Decade on Biodiversity

Biodiversity is the most appropriate example for understanding the sustainable development issue in the Japanese context. The adoption of the Convention on Biological Diversity (CBD) has changed people's recognition of environmental conservation from the efforts for the conservation of a particular area or species, to the efforts for the conservation of the total biodiversity including ecosystem diversity, (inter-)species diversity and (inter-)genetic diversity. The CBD is underpinned by the sustainable development concept, which is the conservation and utilization of wildlife. The biodiversity crisis of our country is characterized by the deterioration of biodiversity such as *Satoyama*, by the loss of human interaction with the natural environment due to changes in lifestyles and industrial structure and depopulation. Under this circumstance, the *Satoyama* Initiative was adopted at the 10th Conference of the Parties to the Convention on Biological Diversity (COP10), held in Nagoya City in 2010, aiming to conserve sustainable human-influenced natural environments where humans live in harmony with nature, which are equivalent to Japan's *Satoyama*. Furthermore, inspired by DESD, the Japanese Government proposed the United Nations Decade on Biodiversity (UNDB: 2011–2020) at COP10, and UNDB was adopted at the UN General Assembly's 65th meeting in the same year. The CBD Secretariat focuses on Communication, Education and Public Awareness (CEPA) in order to raise the public awareness on the importance of biodiversity. CEPA is inseparable from ESD, in terms of its concept and methods.

All over Japan, traditional knowledge, life and culture for the utilization and management of natural resources still remain. Our long history of rice farming and fishing culture has created *Satoyama* biodiversity where human live in harmony with nature. Based on both traditional knowledge and the latest modern scientific knowledge, ESD can contribute to biodiversity conservation. In another word, we can acquire scientific knowledge of biodiversity by focusing on experience-based and life-based traditional knowledge.

Conclusion

Under the banner of the DESD, unique and diverse ESD efforts have been made in Japan. However, there still remain challenges. The first challenge is that ESD has not been spread throughout Japanese society. The broad definition of the ESD concept is one of the factors making ESD difficult to understand. The second is the necessity to connect wide-ranging sustainability-related efforts and places with the ESD perspective and to cultivate ESD coordinators who connect them. The third challenge is to promote ESD in school education and strengthen ESD efforts of corporations.

In order for ESD to be prevalent in society, it is necessary to make ESD easy to understand, that is, to “make ESD visible” by establishing an ESD media strategy and sharing good practices. As a project to “make ESD visible,” the Ministry of the Environment initiated “+ESD Project” in 2011 (<http://www.p-esd.go.jp/top.html>, accessed on 17th December 2012). Because of this, relevant efforts have been promoted, including the stimulation of local ESD activities and the nationwide dissemination of them. Fortunately, the 2014 DESD final meeting (The UNESCO World Conference on ESD, November 2014) by the U.N. will be hosted by the Japanese government, and will provide a great opportunity to communicate the idea of ESD and to make Japan a leading sustainable society. In so doing, “all-Japan” collaboration among stakeholders such as the government, NGOs, and businesses is essential, and the government is expected to prepare a national structure to promote ESD.

In particular, it is essential to organize a framework for developing those who can coordinate ESD from the perspective of sustainable society development, by connecting multi-stakeholders and more deeply rooting ESD for post-2014 implementation. Now is the time for the Japanese government to respond to international expectations as the country that made the proposal to the Brundtland Commission to disseminate the concept of sustainable development, and as the country that proposed the DESD.

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Chapter 7

The Development of Environmental Education Policy and Programs in Korea: Promoting Sustainable Development in School Environmental Education

Hye-Eun Chu and Yeon-A Son

Introduction

The rapid economic growth in Korea that was initiated by the government since the 1960s has resulted in extensive pollution of the environment. As a result, several policies have been introduced since 1981 to educate citizens about the importance of environmental education (EE) and the need for them to play an active role in greening the environment and protecting natural resources. This awareness led to the introduction of EE in the school system.

Since the twentieth century, due to increasing international attention to global environmental issues and social environmental changes, EE needed to move from focusing on prevention of environmental pollution toward a problem-solving-centered and productive EE. This paradigm shift require students' education about sustainable development from preprimary to higher education levels as well as citizens' awareness. The government is aware that school children are the best agents for implementing any initiatives to safeguard the environment for the future of the nation. School education should help students to develop values and skills they can use to solve environmental problems by helping them acquire knowledge about sustainable development of the environment. For this reason, key issues related to EE as education for sustainable development have been progressively introduced into the school curriculum at various levels in five government initiatives since 2012.

H.-E. Chu (✉)

Department of Natural Sciences and Science Education, National Institute of Education,
Nanyang Technological University, Singapore
e-mail: hyeeun.z@nie.edu.sg

Y.-A. Son

Department of Science Education, College of Education, Dankook University,
Yongin-si, South Korea

Historical Development of Environmental Education

The characteristics of Environmental Education (EE) policy in Korean schools can be explored through the historical development of EE in Korea. EE in Korea is divided into five periods (Choi et al. 2007), based on the background of what was occurring socially, economically, and educationally at that time: the initial period (up to 1980), the formative period (1981–1991), the settlement period (1992–1999), the establishment period (2000–2010), and the reinforcement period (from 2011 onwards). The initial period, up to 1980, was the pioneer period for EE that aimed to direct people’s attention to environmental issues such as air and water pollution, destruction of green belts, such as deforestation around urban areas, and the destruction of some species of flora and fauna. During the formative period, 1981–1991, EE was first implemented within the school curriculum in primary and secondary schools, incorporating it into regular subjects and as an extra-curricular activity. The settlement period, 1992–1999, was the time when EE took on the status of a separate subject within the secondary school curriculum. During the establishment period, 2000–2010, the topic “ecology and environment” was introduced in the high school curriculum (Choi 2006), giving more attention to sustainable school EE in Korea compared to previous years. The reinforcement period, from 2011 onwards, is a crucial time for Koreans to ensure that the foundations of the school EE curriculum are strong enough to provide future citizens with the necessary competencies to implement various policies and programs of the government, such as the Green Growth National Vision for a Green Economy, Green Energy, and a Green Environment (Ministry of Environment 2012a, b).

Environmental Education (EE) Before the Initial Period (Before 1980)

Before 1980, the focus in Korea was on economic development. As a result of the Korean War from 1950 to 1953, poverty was prevalent. A Five-Year Plan for economic development (1962–1966) accelerated the Korean economy in an attempt to eradicate poverty in the country. However, in the middle of 1970, when the country was in the process of the third Five Year Plan for economic development, serious cases of environmental pollution around industrial areas proliferated due to rapid economic development. In this period, the EE policy was not implemented institutionally because economic growth was the main concern in Korean society. Therefore, EE was not mentioned in the first three Korean national education curriculums (1954–1981).

In the latter part of the Third Korean National Curriculum in 1977, basic research on developing an education curriculum was conducted by the Korean Education Development Institute (KEDI). In this initiative the importance of EE in the national school curriculum and ways to implement EE in schools was considered by policy

makers and educators (KEDI 1997). In addition, the Ministry of the Environment (MOEnv) was established as a government organization in 1980, and “the right of environment”, which includes citizen’s rights to live in a clean and healthy environment, was added in the national constitution.

Environmental Education (EE) in the Formative Period (1981–1991)

Rapid economic development in the 1970s upset the balance in the ecological system due to deforestation in the country. Also, increased Gross National Income (GNI) and Gross Domestic Product (GDP) allowed people to improve their lifestyles and expect a higher quality of life. As a consideration of national interest and due to social pressure, the Fourth National Curriculum (1981–1987) introduced groundbreaking regulations, including the introduction of EE across all subjects. Also, in the detailed exposition of the curriculum, specific environmental terminologies were included, such as “industrial pollution” in social studies subjects and “environmental pollution” in science subjects.

In 1985, the Agency of Environment introduced the “Environmental Conservation Pilot School” program in primary school (7–11 years old) and middle school (12–14 years old). Four schools in each level were selected for implementing the program in the first 2 years. These selected schools showed that EE could be effectively related to subjects in the curriculum (Hwang et al. 2006). In 1987, the Fifth Curriculum solidified the commitment to EE in the curriculum. This curriculum was constructed with the idea of “respecting human beings with loving nature”, with the curriculum regulation of “preparing a basis for all citizens’ happiness in an optimal environment” (Ministry of Education 1987).

Furthermore, academics at the university level in diverse areas such as language education, social studies, science education, and earth science education started research studies on EE related to their respective academic areas. Academic interest in the importance of EE led to the establishment of the Association of Korean Environmental Education (AKEE) in 1989. Moreover, the Department of Environmental Education Research in the Korean Educational Development Institute (KEDI) was founded in 1991 for the purpose of conducting systematic research in EE theories and in developing teaching and learning resources.

Environmental Education in the Settlement Period (1992–1999)

In the 1990s, citizens’ concerns were not only about simply recognizing the damage caused by environmental pollution but also about investigating ways to solve environmental issues. The recognition of sustainability in environmental conservation in various areas such as society, economics, and culture was expanded by active civic

groups (Lee 2010). Due to this social atmosphere, in the Sixth Curriculum in 1992, EE was introduced in elementary schools through school discretionary hours and extracurricular activities. In addition, new subjects, entitled “Environment” and “Environmental Science,” were introduced in middle schools and high schools, respectively.

The MOEnv became an important government organization with the addition of an environment minister in 1994. The MOEnv also includes the Department of Nongovernmental Environmental Cooperation and made efforts to include EE in school and in public life. During this settlement period, an economic crisis caused the country’s economy to shrink and the MOEnv was one of the agencies that experienced budget cuts. Schools could not employ teachers for the new EE subjects. During this time of economic crisis, citizens supported the concept of sustainable development rather than emphasis on the importance of environmental conservation.

Environmental Education in the Establishment Period (2000–2010)

The Seventh Curriculum, which was announced in 1997, was implemented in schools during this period. Thus, schools were able to choose the subject “Environment” in middle school and the subject “Ecology and Environment” in high school, which had originally been announced as “Environmental Science.” These subjects are optional in middle and high schools. Schools started to set up sustainable school EE programs during this time. Also, the first generation of teachers majoring in EE graduated from schools of education.

During this period, the Presidential Commission on Sustainable Development (PCSD) was established to operate and support the United Nations Conferences on Environment and Development (UNCED) Agenda 21. The Agenda 21 guidelines included (1) conservation and management of natural resources, (2) changes in consumption behavior, (3) ensuring financial expansion, development technology, and science by means of actualization, and (4) emphasis on partnership and governance for a wide range of interests and participation in the process of pursuing sustainable development (PCSD 2006).

Internationally, three Northeast Asian countries, China, Japan and Korea, formed the Environmental Education Network (TEEN: Tripartite EE Network) and decided to have regular Environmental Ministers Meetings (TEMM: Tripartite Environmental Ministers Meeting) so that through networking they could try to improve regional environmental quality and promote sustainable development (TEMM 2011).

These Korean and international foundations provided opportunities for environmental educators to develop teaching and learning materials and conduct research studies in EE. Also, these foundations encouraged policy makers and educators to be more active in EE. Therefore, in 2005, the Association of Korean Environmental

Education (AKEE) published a research report consisting of a 10-year plan for development of both EE research and professional development programs to improve teacher expertise in EE. Moreover, the “Korean EE Network (KEEN)” was established for sharing information and experiences useful in overcoming the difficulties of designing and conducting sustainable EE programs. Both on-line and off-line central places were available to enable schools, individuals, communities, and organizations to meet when designing programs for sustainable EE (KEEN 2012).

In high schools, the EE subject curriculum of “Environment and Ecology” was changed to “Environment and Green Growth” because of the Green Growth national policy in Korea which started in 2008. The government under then-new president Lee Myung-bak suggested a new policy paradigm for national growth. It emphasized green-friendly growth strategies instead of mainly focusing on short-term high economic growth (Green Growth 2009). Green growth strategies include job creation which fosters low-carbon emission and reduced environmental pollution. It also includes education of students as leaders who will be responsible for sustainable economic progress.

EE in the Reinforcement Period (2011–Present)

Public understanding of Low Carbon and Green Growth has been achieved widely, but there was strong criticism of the lack of efforts to transform these initiatives into practice. Thus, a specific roadmap needed to be prepared for practice-oriented EE. For such demands, the MOEnv established an EE Master Plan (2011–2015) through the Act on the Promotion of EE that includes three important aims: (1) educating talented people who can lead future green growth, (2) nurturing citizens as practitioners through EE, and (3) building the foundation for a variety of EE opportunities (MOEnv 2010). In particular, it attempts to establish institutional and financial bases to cultivate citizens who are equipped with eco-friendly values and environmental competencies by means of EE through experiences and practices.

In schools, EE has been emphasized for sustainable development through curricular activities and co-curricular activities. In most primary schools, the EE program is conducted through co-curricular activities like Creative Activity for 3–4 h per week, while in high schools, it is implemented with the support of the independent optional subject “Environment and Green Growth.” These programs were implemented in 2011, and a middle school program will be implemented in 2013. Excellent EE programs such as the Environmental Conservation Pilot Schools Program, the School Forest Project, and the UNESCO-associated Schools Projects, were introduced in schools by the Ministry of Education to disseminate best practices. These programs aim to encourage students’ participation in developing creative solutions to environmental issues in their daily life. Also, the Ministry of Environment runs the training program that targets school principals and deputy principals to strengthen EE expertise as well as to build a foundation for practical EE in their schools.

The Direction of School EE for Sustainable Development

Based on the development of the EE policy, EE programs/curricula in schools were integrated into the concept of “education for sustainable development.” Due to the Government’s and MOEnv’s efforts related to education for sustainable development for the Green Growth policy, a detailed roadmap for training future leaders and citizens in their living practices was designed. To put this detailed blueprint into action through students’ learning about the sustainable development of green society, the MOEnv (2012a, b) selected five initiatives for the school EE “Development of Global Green Human Resource for Future Green Growth” program. These five important initiatives and solutions to related problems are as follows:

Initiative 1: Strengthen Environmental and Green Growth Education in the School Curriculum

In 2009, the Ministry of Education, Science, and Technology released the “Plan for Green Growth Education” to proclaim a national vision (MOEST 2009a, b). Thus, in the revised curriculum in 2009, the title of the environmental subject curriculum was revised to “Environment and Green Growth” in high school and subsequently in middle school in 2011. In primary school, without a separate independent curriculum, co-curricular activities such as Creative Activity periods (3–4 h each) were used and also environmental-related education was infused into individual subjects (see Table 7.1). Moreover, in 2011 the National Information Strategy Committee of the Ministry of Education, Science, and Technology (MOEST) announced a plan for developing a digital textbook for EE to promote smart education strategies for an intelligent and personalized teaching and learning system.

However, there are not enough EE textbooks, resources for school EE, and teachers specializing in EE in schools. Only 8 % of teachers who are in charge of EE in schools have specialized training in EE. Moreover, secondary school participation in EE was very low because of the university entrance examination-oriented education climate. Based on 2011 statistics, the percentage of schools that chose “Environmental and Green Growth” subjects as an optional subject was only 21.7 % in high school and 5.5 % in middle school.

One of the alternatives that the MOEnv provides for schools is to develop and distribute EE textbooks. For primary school, an appropriately designed textbook for infusing environmental issues into independent subjects is needed. The elementary textbooks which were developed by Seoul City for the purpose of infusing EE issues into individual subjects were titled “With *Hwan-yi* and *Keong-yi*” (*Hwan* and *Keong* are the two syllables of the word *environment* in Korean); *Hwan-yi* and *Keong-yi* were used as cartoon characters’ names in the textbooks. The textbooks for Primary Years 1 and 2 were developed in 2009, Years 3 and 4 in 2010, and Years 5 and 6 in 2011 and distributed to schools in Seoul (see Fig. 7.1).

Table 7.1 Summary of Korean EE programs in school curricula (revised from summary table in Chu and Treagust 2009)

School level	School years	Approach	Content
Primary school (7–8 years old)	1–2	Multidisciplinary approach	Stories about animal life, animal habitats, and seasons are integrated in the subjects of Korean language and <i>Seul-gi-ro-un saeng-hwal</i> (Wisdom). Stories about environmental attitudes and behavior are integrated in other subjects such as <i>U-ri-nun il-hak-yeon</i> (We are Year 1) and <i>Ba-reun saeng-hwal</i> (Good manners)
Primary school (9–11 years old)	3–6	Interdisciplinary approach	Integrated with science, social studies, fine arts, morals, and practical arts
Middle school (12–14 years old)	7–9	Multidisciplinary approach Interdisciplinary approach (with science subjects) Independent approach	Schools incorporate EE programs into School Discretion Hours Environment-related science topics, natural environment and our life, the ecosystem, and the use of natural resources Human beings and environment, environmental issues/solutions, environmental conservation, global environment and climate change, natural resources and energy, sustainable society, and green growth (optional subject: “Environment and Green Growth”) Biomagnification, acid rain, the greenhouse effect, and noise
High school (15 years old)	10	Interdisciplinary approach (environment unit in science subjects)	“Environment and Green Growth” subject belongs to liberal arts curriculum
High school (16–17 years old)	11–12	Independent approach	Basic 5 units and increment of 1 unit can be implemented by schools’ choice during any Year level across Years 10–11 Schools incorporate EE programs in “Creative Activity” time and get the connection with programs in social environmental education Emphasis on the life of human beings and environment, resources and energy, understanding of climate change and countermeasures, green growth and sustainable communities, and ways to attain a green society Learning through environmental project

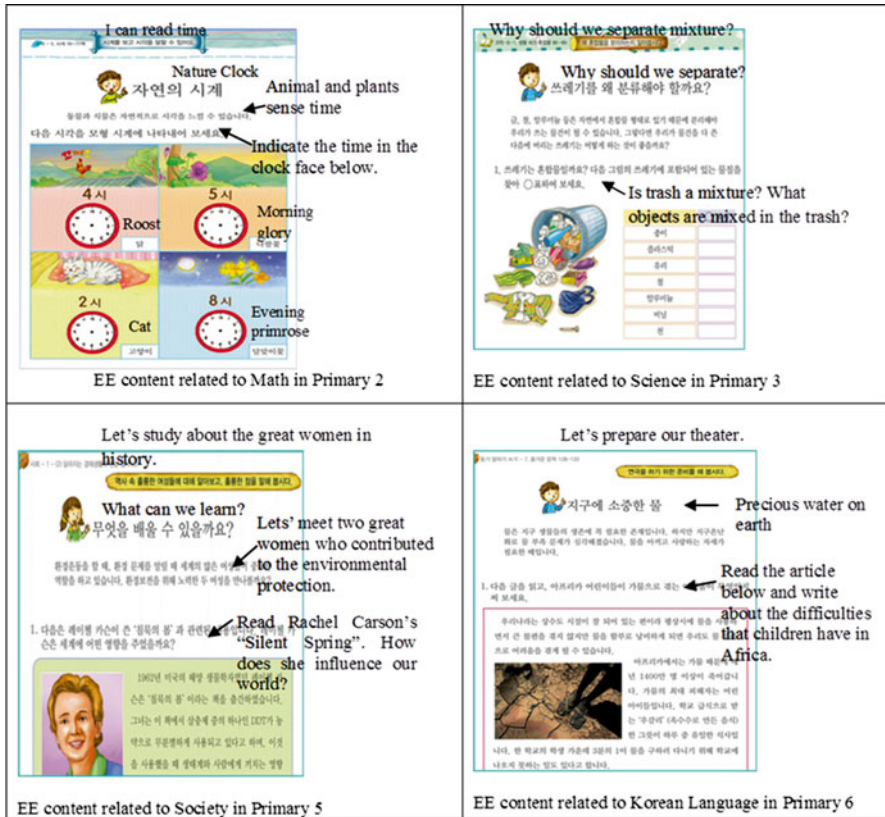


Fig. 7.1 Examples from the text book With *Hwan-Yi* and *Keong-Yi* (SMOE 2012)

This multidisciplinary/interdisciplinary textbook developed by Seoul City will be revised to take into consideration regional characteristics for other parts of the country. For secondary school, an independent EE textbook and a textbook which is infusible into independent subjects also need to be developed and disseminated.

In 2011, in accordance with the revised curriculum of 2009, which reinforces EE in line with the green-growth national policy, a workbook was developed for the subject “Environment and Green Growth” as well as for the co-curriculum activity “Creativity Activities” in high school. This workbook was designed for self-regulative and inquiry-based learning. Topics include Environmental Projects, the Life of Human Beings and Environment, Resources and Energy, Understanding of Climate Change and Countermeasures, Green Growth and Sustainable Communities, and Ways to Attain a Green Society (MOEnv 2011). Infusing EE into individual subjects such as Languages, Social Studies, Science, etc., can be the solution to remedy the low percentage of schools’ choice of EE subjects. As one of the leading IT countries (OECD 2001), Korea has encouraged digital textbook development in EE applying the standard EE model. It is suitable for customized EE to meet the

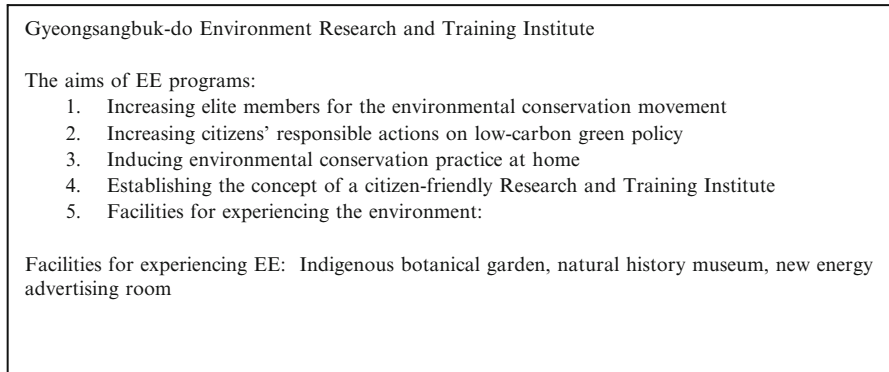


Fig. 7.2 An example of Natural Resource Research and Training Institute (Gyeongsangbuk-do Environment Studying and Training Institute 2009)

individual needs of subject teachers. This digital textbook's contents can be connected to real time data, for example increasing rates of CO₂ gas, birth and mortality, deforestation, etc.

Initiative 2: Increasing Opportunities for Youth EE Through Experience

Informal Education Outside of Schools

For out-of-school informal education, the Natural Environment Studying and Training Institute was opened in 2011 in each region to provide youth a way to experience their regional environment. The main purpose of these institutions is to increase citizens' knowledge of their regional resources and natural environment (see Fig. 7.2). Citizens/students can spend time in nature in their local environment for periods of several hours to up to two nights through a program that emphasizes environmental conservation. However, the programs in these regional institutes have to be more age-specific and follow-up activities have to be put in place. In 2010, the MOEnv conducted a survey at the institutions that had already run the program which found out that youth and citizens were generally satisfied with the facilities and EE programs (MOEnv 2010). However, the effects of the education program need to be evaluated further.

Another approach is government support for program development in EE through experience in schools and local groups. Since 2000, the MOEnv has invited schools and public groups to develop programs that are more interactive with nature. See Fig. 7.3 for a sample of a program developed by primary school teachers in a rural area.

Title: Developing and applying a model of EE through interactive experience
Aim: developing a model of an environmental education program in a small rural school that includes residents around the school.
Program: the program can be conducted on a farm, in a school, in the field, or in a regional art gallery as an independent school subject or using discretionary activity time. The types of activities include approaches of inquiry, expression, and participation.
- Inquiry: Observation and investigation during a field trip
- Participation: Participating in gardening, forest conservation, beekeeping, energy-saving cooking, etc.
- Expression: Express what we feel and think through discussion, reflection writing, singing, drawing, etc.

Fig. 7.3 A sample of a program developed by primary school teachers in a rural area (Kim 2007)

Table 7.2 Number of selected pilot schools in 1985–2010

Years	Preprimary school	Primary school	Middle school	High school	Total
First-eleventh selection (1985–2005)	38	63	52	20	173
Twelfth selection (2005–2006)	5	15	8	4	32
Thirteenth selection (2009–2010)	–	9	5	2	16

MOEnv (2009)

Increasing Number of Pilot Schools in EE

Since 1985, the MOEnv has run the “Pilot schools in EE” program in preprimary, primary, and secondary schools (see Table 7.2). Selected schools were chosen to specialize in EE. These schools have to develop and activate EE related to individual subjects as well as involve the regional communities. The school grounds, forests, and wild flower gardens can be shared with the communities around the school. There are pilot schools supported by different government sectors: for example, Zero Carbon Schools supported by the MOEnv/MOEST Environmental Pilot Schools supported by the MOEnv, Green Growth Research Schools supported by the Ministry of Education, Science, and Technology, and Climate Education Schools supported by local governments. The network among pilot schools needs to be created to increase the effects of pilot school programs and encourage sustainable development even after the period of government support ends.

Increasing Mobile EE

An increase in the number of Mobile EE (MEE) classrooms is also considered necessary to provide youth with more opportunities in EE. An MEE classroom is in an eight-ton vehicle, *Pureumi* (which means “greenish” in Korean), that uses eco-friendly fuel and is decorated inside using eco-friendly materials. *Pureumi*

carries environmental teaching materials, some of which can generate energy using solar power. Schools were highly satisfied with this MEE program as reflected in the MOEnv survey in 2010. However, the supply of MEE vehicles could not keep up with the high demand. Every year about 1,200 schools request this MEE program, but only 58 % of these requests were able to be met. Therefore, the original eight vehicles will be increased to 16 by 2015 and various thematic EE programs will have to be developed (MEE 2012).

Strengthen EE Through After-School Programs

In 2006, programs entitled “Specialty Aptitude Education” and “Supplementary Study,” which consider students’ learning difficulties were integrated into after-school programs in all Korean schools. The MOEnv is making an effort to reinforce the EE program through this after-school program. The “Environmental Chemistry Classroom” program, which was started by the MOEnv and Environment Preservation Association, was introduced in 184 primary schools and 18 local children’s centers from March to December, 2009. This program was meant to give children accurate information about the beneficial or detrimental effects of the chemical substances on the environment and to drive the concept of energy saving for green life. It also contributed to the creation of jobs in green-growth policy for graduates with science or engineering degrees. About 142 undergraduates in this program were educated as pre-service EE teachers through mentoring by experienced environmental educators (Future Eco 2010).

In 2012, 5-day-a-week classes were enforced in all Korean schools. Therefore, the urgent task right now is developing and disseminating various EE programs to schools and certain local institutes that need to have after-school programs on Saturdays. However, most schools prefer English or athletic/artistic-relevant programs to EE programs. The lower percentage of choice for EE programs is caused by both an examination-oriented education and the lack of EE programs. Therefore, more EE programs need to be developed for students in primary and middle schools who have less examination pressure. Based on previous experience in 2009, creative programs related to environmental science using an experimental approach could be introduced as EE programs in Saturday after-school sessions to develop children’s environmental sensitivity as well as scientific literacy. Moreover, society expects these programs to result in a reduction in the need for private education after school and provide a higher quality of after-school programs for students from low-income families.

Initiative 3: Formalizing EE for Preschool Children

The early childhood curriculum, *Nuri* (*Nuri* means “world” in classical Korean), for 5-year-old children was revised and announced in 2012 while *Nuri* for

Table 7.3 Summary of curriculum related to EE programs for sustainable development in preprimary school

School level	Approach	Content
Preprimary school (3–5 years old)	Multidisciplinary approach	Three to four years old (inquiry life, healthy life): EE program will be designed based on views of respect and love of people and nature. Using activities through experience, exploration of living creatures/natural phenomena will be the emphasis of EE program Five years old (inquiry of nature): Play-centered integration process that helps children to explore the world with curiosity; designed with emphasis on the importance of living creatures and exploration of a good environment for living creatures through scientific inquiry

3- to 4-year-olds will be announced in 2013. The *Nuri* Curriculum includes five areas: body movement, communication, social relationships, artistic experience, and nature exploration, which includes environmental conservation (MOEST 2011). The emphasis on EE programs in *Nuri* has been summarized in Table 7.3.

In order to introduce EE in preschools, the Early Childhood Education Agency in Seoul conducted a science professional development program in 2011 emphasizing the “Green in our life and environment.” During this program, early childhood teachers were introduced to scientific and creative EE teaching approaches and experienced ways of conducting EE programs through young children’s experiences. The lack of EE resources for early childhood education was the main difficulty that teachers had in introducing EE activities. A MOEnv survey (2012a, b) involving early childhood educators in 109 preschools in large cities showed the real state of affairs of EE in preschools. Among the respondents, 48 % answered that there was lack of EE-related textbooks, teacher guidebooks, and teaching and learning resources/tools, and 77 % responded that EE was delivered mainly by preschools themselves without support from the government or local communities. Therefore, teacher guidebooks for EE, professional development workshops, and teaching and learning resources will be developed, and EE activity centers for preschoolers will be increased by 2015. The survey also revealed optimistic visions of EE in preschools. Of the participants, 66 % responded that EE is necessary for preschool children and 98 % suggested that they were willing to attend EE-related workshops. Several research studies indicate that field trips, experience-oriented activities, and nature-friendly education programs are key factors that determine young children’s environmental attitudes and responsible behavior in Korean schools (Choi 2010; Chu et al. 2007; Kang et al. 2012; Kim and Kim 2006; Rho 2005). Therefore, EE programs in preschools are developing towards more experience-oriented activities, including field trips, observing forests/rivers/birds across the four seasons, gardening, etc.

Initiative 4: Extension of EE in Higher Education

There have been continuous discussions and requests that universities should play a leading role in green growth and climate change in Korea. Recently, many universities have voluntarily promoted the Green Campus Movement. In 2011, presidents from 28 universities declared the “Green campus movement” at a meeting held by the Korean Green Campus Council supported by the MOEnv. Each university has already started its own Green Campus program with initiatives like constructing clean-energy buildings, replacing university walls made with cement, rock, or concrete blocks with plants and tree walls, constructing hydrophilic facilities using stream water, constructing sky gardens on rooftops, etc. (MOEnv 2011).

Many universities have already introduced environment-related units into their environmental science courses that are mainly concerned with scientific approaches to studying pollution of soils, rivers, and the atmosphere, without considering aspects of environmental literacy education. Some universities that are actively participating in the green campus movement run environmental education courses as liberal arts courses for their students. However, in higher education, the lack of textbooks and curriculum materials are causing difficulties for EE educators in conducting these courses.

Since 2011, the MOEnv and the Korea Environment Corporation have been supporting ten universities financially and technically as “low-carbon green campuses” to establish a greenhouse gas emission inventory for the next 3 years that can track trends in emissions and their removal in campuses and communities. These universities have also been developing curricula to include green growth policies designed to enhance students’ environmental literacy and responsible action. In addition, research foundations have been established by collaboration between academic and industry agencies to reduce greenhouse gas emission in campuses and communities. This collaboration between academics and industry contributes to educating young students who can take a leading role in a green-growth society. Government support to establish a greenhouse gas inventory for a low-carbon green campus should be extended to all Korean universities in accordance with Article 4 of the Higher Education Act, which relates to university facilities. Also, the government needs to support higher education institutions to develop curricula for lifelong-learning Graduate Schools which would award a related degree in low-carbon green growth. This support will help higher education institutions to be leaders in low-carbon green growth in the communities.

Initiative 5: Strengthening the EE Professional Development (PD) Program with the Green Growth Concept

There have been changes in EE programs in schools since 2008 with the emphasis being a transition from EE towards EE for sustainable development. However, a uniform teacher PD program is yet to be finalized.

In the 2009 revised curriculum, 20 % of standard curriculum time may be used at the discretion of the School Curriculum Committee, which includes the school principal and vice principal, depending on the demands of their school. The School Curriculum Committee determines key subject-based supplementary programs, community-service programs, or EE programs after surveying parents and students to find out what they need in their schools. Therefore, it is necessary to provide EE-related workshops, seminars, and leadership programs for principals and vice principals to enable them to recognize the importance of EE. Starting in 2011, in the qualification training program for new principals and vice principals, EE for national green growth has been made mandatory and has been introduced in in-service teacher training programs. Even though the qualification training program has contributed to increased awareness of the role of new principals/vice principals in EE in a green-growth society, the program did not include the existing generation of principals/vice principals. So far, only 1.3 % of them have had the training program. Therefore, the EE training program conducted by the human resource development unit of the MOEnv should be extended to all existing principals and vice principals as well.

The quality of the EE programs in schools is determined by teachers. Unfortunately, teachers who have majored in EE are seldom employed in schools. Moreover, it is difficult to improve teachers' expertise as environmental educators because secondary environment teacher qualification training programs are conducted on an irregular basis.

EE can be conducted as an independent subject and can also be infused into individual subjects in schools. A systematic PD program should be considered to provide EE training programs to all teachers in primary and secondary schools, not just to those who have majored in EE. Also, the MOEnv encourages nation-wide pre-service teacher education programs in colleges of education to include environment and energy courses as a major in order to equip them with the necessary EE expertise.

There are many PD programs conducted by social and environmental institutions, the MOEnv, and local school districts that provide teachers with experience in environmental issues and nature. These PD programs need to be developed in a systematic and effective manner for all preprimary, primary, and secondary school teachers.

Summary of Initiatives

The five initiatives discussed above are summarized diagrammatically in Fig. 7.4. Korean EE also includes environmental specialist education in social education, which was not discussed above as this chapter aims to introduce only school education for sustainable development in Korea. The previously discussed initiatives in school education and social education in this chapter are highlighted in bold in Fig. 7.4. The non-highlighted ones are existing EE programs which were not elaborated in this chapter.

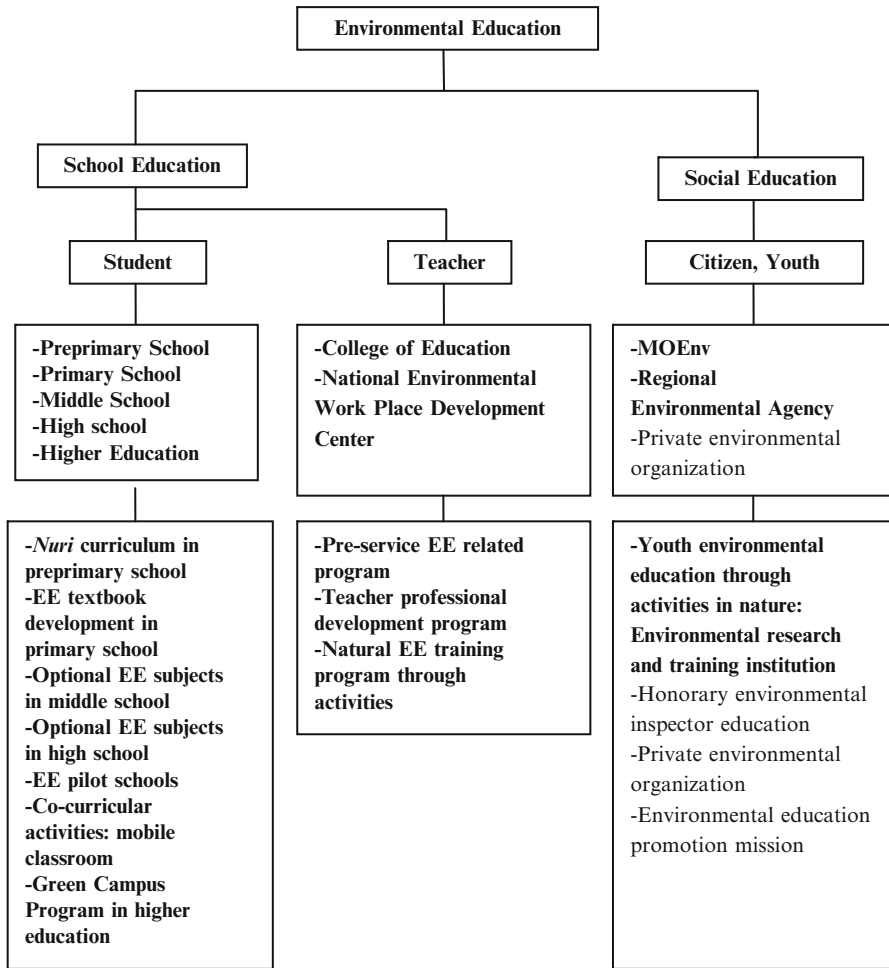


Fig. 7.4 Summary of EE initiatives (Adapted from MOEnv 2009)

Conclusion

Historically, the Korean government has made concerted efforts to address the pollution problems resulting from the rapid economic development in the country. The government has long realized the importance of sustaining a green environment that involves protecting flora and fauna and ensuring that they do not become extinct, keeping our waterways clean so that aquatic and marine life can flourish, regenerating forests that are cleared for timber, recycling waste materials, and finding alternative clean sources of energy/fuels. These are examples of initiatives that require the support of both the government agencies that provide the funding as well as awareness among citizens for the need to conserve the environment for the

benefit of future generations. Since they recognize this need, the Korean government has taken the initiative to introduce their Green Growth Policy. In addition, together with several non-government agencies, the government has taken the initiative to educate the citizens as well as progressively implement EE programs in schools. This has been evident in the implementation of five initiatives since 2012. As a result, a gradual change in the life-styles of students and citizens towards the end of achieving a green society is expected.

The Korean EE program is unique in that all subjects in the curriculum are moving towards education for sustainable development, such as Green Growth Education (GGE) through social communities, government institutions, and research support. The government introduced the Green Growth Education policy as an ontological, nation-wide change from emphasis on producing leaders purely for economic success to those who have concerns for the green environment as well. By integrating social and ecological aspects with emphasis on students', citizens', and CEOs' new consumer patterns, these new leaders will facilitate the sustainable economic development of the country. Hence, EE will now be recognized as part of education for sustainable development/green growth education.

Furthermore, by infusing EE in all subjects instead of having only an independent EE subject and by incorporating EE in out-of-school activities, the government's investment in the school curriculum is likely to bear fruit in the future when today's children become future leaders in a green society.

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Chapter 8

The Environment, Sustainability and Universities in Indonesia: An Examination of the Nexus

Ko Nomura and Eko Agus Suyono

Introduction

The trend and the shape of current efforts of education for sustainable development (ESD), or how educational institutions comprehend sustainable development and contribute to achieve it, can be understood well when taking into account the nexus between the environment and sustainability. This can be paraphrased as the nexus between the existing concept and practices of environmental education and the novel idea of ESD, a topic which has been actively debated since the latter emerged in the international policy agenda (e.g. Jickling 2005; McKeown and Hopkins 2003).

Higher education institutions (HEIs) in the Asia-Pacific region are worthwhile examining in this context, although they may not have received commensurate attention from researchers so far, with some exceptions (e.g. Ryan et al. 2010; Nomura and Abe 2011). They have shown significant commitment to the efforts towards sustainability. Besides, they have a critical role in leading and helping the society to face the challenge of sustainability, which is most pressing for the region due to its expanding economies, serious environmental conditions, and wide social inequality and cultural diversity. One cannot overvalue the significance of studying them.

Since a key trend of the endeavors of Asia-Pacific HEIs towards sustainability is the emphasis on community services, or being a change agent for sustainable development at the community level (Ryan et al. 2010), it is meaningful to highlight HEI's community service function in such research. Several good practices have been reported, for example, from India (e.g. Chhokar 2010), Japan (Itoh et al. 2008), and Malaysia (Sanusi and Khelgat-Doost 2008). This trend can be due to HEI's

K. Nomura (✉)

Graduate School of Environmental Studies, Nagoya University, Nagoya, Japan
e-mail: nomura.ko@a.mbox.nagoya-u.ac.jp

E.A. Suyono

Faculty of Biology, Gadjah Mada University, Yogyakarta, Indonesia

reaction to the challenge of globalization that affects the region's social diversity, environmental conditions, and economic development at the local level, assisted by government policies (Nomura and Abe 2011). However, more research seems necessary to affirm such views.

Recognizing the need to study more about HEIs in the Asia-Pacific and consider the reasons for their development, especially with reference to the environment-sustainability nexus as well as HEIs' function of community service, this chapter examines the historical development of the efforts by Indonesian HEIs, which has been neglected so far. The purpose of this chapter is to document the historical development and the present state of environmental and sustainability efforts by Indonesian universities in order to capture their drivers and consider the environment-sustainability nexus. In this context, this chapter also introduces the developments in ESD policy and practice in formal and non-formal sectors in a comprehensive manner. The analysis emphasizes the Indonesian HEI's actions for and with communities. In addition to reviewing the national trend, this chapter studies the case of Gadjah Mada University (Universitas Gadjah Mada or UGM) in Yogyakarta, which is a leading university in Indonesia, including the field of sustainability.

The structure of this chapter is as follows. First, this chapter reviews the historical development of the efforts by Indonesian HEIs in the field of the environment, as well as that of environmental education in primary, secondary and non-formal sectors in general, followed by the case study of UGM. Then, their endeavors toward sustainability are examined likewise, at the national level and the case of UGM, after a brief introduction to the development of sustainability education across various educational sectors. In conclusion, this chapter describes the prospects of sustainability in higher education in Indonesia, as well as summarizing the arguments.

The discussion of this chapter focuses on universities (*universitas*) and institutes (*institut*) among other HEIs in Indonesia, such as polytechnics.

The Environment and Universities

The Environment and Education: A Brief Review

Before introducing the historical development of environmental education at universities, let us take a comprehensive look at the history of environmental education, which dates back to the mid/late 1970s (for more detailed information, see several chapters included in Nomura and Hendarti 2005). This section illustrates, although briefly, how environmental education in Indonesia has developed "ESD-ish" since far before the novel concept of sustainable development emerged, by involving various socio-economic and political issues as well as environmental conservation. This information is important when considering the nexus between the environment and the new concept of sustainability (or sustainable development), which is the theme of this chapter.

Since its early days, the government's efforts in environmental education have attached importance to the relations between environmental degradation and other

developmental issues such as over-population, instead of focusing on the former. It seems to have reflected the utmost significance of improving socio-economic problems, which was highlighted by President Suharto's authoritarian regime. For example, the population and environmental education project was started in 1978, following the preceding project on education and population growth. Over-population had long been considered as the major cause of poverty in Indonesia (particularly in Java), and the government started working on this problem earlier than its environmental efforts. (This link between population and environmental issues in education continued until the Ministry of Education re-named the project as the environmental education program in 2004.) Environmental education, which is incorporated into existing subjects at primary and secondary schools such as natural sciences, social sciences, religion and physical education (i.e. not provided as an independent subject), still emphasizes the relationship between the environment and other socio-economic issues.

As for extra-curricular activities, Scouting (boy/girl scout) plays an important role in Indonesia, and incorporates many elements of outdoor environmental education. First introduced in 1912, Scouting has a long history in Indonesia. It started developing in earnest in 1961, when President Sukarno issued a decree to recognize and unite the then separate groups from all over Indonesia, mainly to instill ideals of service in and amongst youngsters and contribute to national unity and national development (Nomura 2009).

Like the formal education sector, it is important to note that socio-economic and political issues are also emphasized in non-formal environmental education, in which non-governmental organizations (NGOs) have played a central role. (See Nomura 2009 for the detailed accounts of the historical development of environmental education by NGOs in Indonesia). In fact, NGOs are keener to involve those issues than schools are, perhaps due to their flexibility in determining their educational contents and their proximity to communities, which has attuned them to local needs. When NGOs started to provide environmental education in the late 1970s, the focus of their activities was to raise the public's environmental awareness concerning environmental conservation; however, in the 1980 and 1990s, NGOs put more emphasis on community development as well as environmental conservation, as they increasingly realized the importance of the former in achieving the latter in developing countries like Indonesia (Nomura 2009). At the same time, the rise of the democratization movement from the mid-1980s sensitized NGOs about the importance of socio-political issues such as social justice and human rights for sustainable development, which made NGOs link such issues to their environmental education activities (Nomura 2007, 2009).

The Environment and Universities: Historical Development

The history of environmental efforts by universities in Indonesia also dates back to the 1970s, particularly when Professor Emil Salim was appointed the first Minister of the Environment (it was then called State Minister for the Development

Supervision and the Environment) in 1978. Salim, who had been an economist involved in development planning, emphasized “eco-development” (*Pembangunan Lingkungan*), in presenting environmental policies so that they did not look disadvantageous to economic growth – the national priority under Suharto’s developmentalist regime (Salim 1982, 1983). Under his initiative, environmental education at HEIs has reconciled environmental conservation and economic growth since its inception by incorporating related socio-economic issues.

Salim emphasized a scientific approach to show the legitimacy of environmental policies in the authoritarian government (Nomura 2007). For that, however, the Ministry of the Environment lacked human and financial resources within and outside of the Ministry at that point. Accordingly, Salim started to support human resources development at universities and non-governmental organizations (Nomura 2009). Thus, it can be understood that environmental efforts of Indonesian HEIs started with a view to balancing with, or incorporating the elements of, economic development. Although it seems different from the history of environmental education in the Western industrialized countries, environmental education in Indonesia started by significantly reflecting the political and economic conditions at that time.

One of Salim’s efforts in this context was to establish environmental study centers (*Pusat Studi Lingkungan*) at all state universities in collaboration with the Education Ministry. (While this effort started in 1979, Padjadjaran University in Bandung established the Institute of Ecology as early as 1972, which can be regarded as the first environmental study center.) Together with the ones attached to private universities, the number of environmental study centers now exceeds 100, and they engage in education and training, research, and community services (Soetaryono 2005). Several environmental study centers provide interdisciplinary master and doctor courses in environmental studies. In terms of training, major centers such as the ones at UGM, University of Indonesia (UI), Bandung Institute of Technology (ITB), Bogor Agricultural Institute (IPB), and Padjadjaran University (UNPAD), have had an important role in providing Environmental Impact Analysis (EIA) training in addition to such courses as wastewater, solid waste, forests, cleaner production, and environmental auditing (Soetaryono 2005). The centers now have a nation-wide network.

Education in environmental sciences and environmental and natural resource management is now increasingly offered in various departments at the undergraduate level. Some leading universities, such as UI, UGM, ITB, IPB, UNPAD and Diponegoro University, provide postgraduate programs in such areas as human ecology, environmental planning and management, biodiversity, environmental laws, environmental toxicology, engineering, natural resources management, geographic information systems, and rural community development (Soetaryono 2005). Related departments such as faculties of forestry have also offered courses in conservation and environmental education (Hermawan 2005). Teacher education institutions such as State University of Yogyakarta and State University of Malang now provide courses related to environmental education in relation with developmental issues such as population growth. (Environmental education in primary and secondary education in Indonesia started in 1978 in relation to the issue of

over-population, which had long been considered as the major cause of poverty in Indonesia, particularly in Java. See Nomura 2009). Institutions such as State University of Jakarta provide postgraduate program on environmental education as well.

The above mentioned efforts emphasize community or social services. One can say that it has made environmental education and research at HEIs in Indonesia practical and comprehensive, including socio-economic issues as they are inseparable from environmental degradation at the community level. The environmental study centers engage themselves in community empowerment on environmental management campaigns for environmental awareness, action research of farmers in rural areas, scavengers in urban areas, and other areas (Hadi 2004; Babcock et al. 2003). EIA and other training courses are provided not only for university members but also for government officers, business and the private sector, consultants and NGOs (Soetaryono 2005). They also carry out EIA projects; in fact, it is a significant source of income for the centers, since they are basically self-financing institutes (Babcock et al. 2003).

Other centers/departments of Indonesian universities have also been involved in social/community services. Several universities such as IPB, UGM, State University of Yogyakarta, and State University of Malang have developed various training programs, seminars, workshops and guidance for teachers and practitioners of environmental education in such fields as national resources management and environmental conservation (Hermawan 2005). These efforts are often made in collaboration with NGOs.

There seem to be two major driving factors for their community and social services. One is the principle of Indonesian universities called *Tri Dharma*. *Tri Dharma* or *Tridharma Perguruan Tinggi* is the term popularly used to refer to the three obligations of universities in Indonesia, namely, “education”, “research”, and “community service”. It was institutionalized in 1961 by the Higher Education Law so as to orient HEI activities to social welfare without being ivory towers in a country where nation building and economic development were urgently needed; *Tri Dharma* has served as a basis of higher education policies in Indonesia since then (e.g. Buchori and Malik 2004). Based on *Tri Dharma*, government policies have been made to promote community services by HEIs, resulting in the emphasis on the needs of local communities in each HEI’s focal areas of activity (*pola ilmiah pokok*; Buchori and Malik 2004). The role of universities in the efforts towards environmental conservation in Indonesia can be understood in this context. In fact, when the Environment and the Education Ministers agreed on the development of environmental study centers in 1979 (mentioned above), they also agreed to build the capacity of the centers as universities’ executing units to implement the *Tri Dharma* missions (Soetaryono 2005).

Another driving factor is the role of student activism. It has a long history since the independent movement, contributed to raising the awareness of the students towards political and social issues (e.g. Buchori and Malik 2004). In the field of the environment, student actions started in the 1960s as nature lover groups at some universities such as UI, and spread widely (Nomura 2007, 2009). Although they had

been primarily groups of students from wealthier families who simply wanted to explore nature, the development of the environmental and the democratization movements sensitized them to the social and political issues in the 1980s (Nomura 2007, 2009). There are many other environmental groups formed after the 1980s, which also worked with and for local communities. Some of the HEIs such as IPB and ITB became “home” to environmental activists (Hermawan 2005).

This kind of student activism was promoted by university staff members, who studied abroad, often with support from the Minister Salim and his colleagues at leading universities and the government. Experiencing Western activism in the 1970s and later, many of them were favorable to student activism, and served as “some of the few main gateways for international-level environmental science and technology” (Hermawan 2005, p. 77).

The Case of Gadjah Mada University (UGM)

UGM has been a leading research university in Indonesia since its establishment in 1949. The university has been active in efforts towards environmental conservation in such areas as environmental law and forestry. Now there are undergraduate and graduate programs that focus on environmental issues, such as environmental science (*ilmu lingkungan*), environmental chemistry, environmental engineering, environmental biology, and environmental geography. UGM also runs courses in relation to environmental issues in all departments (social sciences, engineering sciences, natural sciences, medical sciences, agricultural sciences).

Environmental research is also actively conducted at UGM. In addition to its environmental study centre (*Pusat Studi Lingkungan Hidup*), centres such as the natural disaster study centre (*Pusat Studi Bencana Alam*), the biological resources management study centre (*Pusat Studi Pengelolaan Sumber Daya Hayati*), and the marine technology study center (*Pusat Studi Teknologi Kelautan*) conduct environmental research in collaboration with other institutions. In addition, various activities have been conducted inside the campus by students and lectures, such as tree-planting, green campus competition, cycling campaign, efforts on the 3Rs (reduce, reuse, recycle) and energy efficiency.

Like the national level development, student activism pushed the university’s endeavors on environmental conservation in the context of community service. Environment-related studies and practices at the university resulted in the establishment and development of environmental groups inside and outside of the campus by students, graduates and lectures, sometimes in a collaborative manner (e.g. Nomura 2008, for the case of an NGO which is active in the forest policy process). For example, students, graduates and lecturers of the Forestry faculty set up Kulitan Organization, an NGO which has been actively providing environmental education activities outside of the campus for schoolchildren and others (Hermawan 2005). The Green Environmental Education Movement, which was a group started by students from the Faculty of Cultural Studies, has provided environmental education

programs and technical assistance at some schools in Yogyakarta with members of other universities as well as ones from other faculties of the university (Hermawan 2005). In addition to NGOs, UGM has actively worked with other stakeholders such as local/national governments and private companies with regard to environmental issues that communities in Yogyakarta and Central Java are facing.

Echoing the national level trend mentioned above, the university's commitment to community service reflects *Tri Dharma*, the higher education principle of the country. For example, the university started a Student Community Service Program in 1971 with the aim of realizing the *Tri Dharma* principle, following a pioneering student outreach program conducted between 1951 and 1962. (During this pioneering period, the university sent students to be teachers outside of Java Island where the lack of secondary teachers was very serious.) Environmental efforts at the university are also argued in the context of *Tri Dharma* by faculty members of the university (e.g. Hermawan 2005).

The program started in 1971 was a part of a national-level pilot project initiated by the then-Director of Higher Education of the Ministry of Education and Culture Professor Koensadi Hardjosoemantri. A renowned law professor at UGM, his expertise includes environmental laws. He proposed the program as an in-curricular optional course. In addition to UGM, this program was introduced at two other universities in western and eastern parts of Indonesia: Andalas University in West Sumatra and Hasanuddin University in South Sulawesi. Then, in the following year, this program was spread to ten other universities stretching from the East to the West of the archipelago: Syiah Kuala University (Banda Aceh), North Sumatra University (Medan), Sriwijaya University (Palembang), UNPAD (Bandung), Diponegoro University (Semarang), Brawijaya University (Malang), Udayana University (Denpasar), Lambung Mangkurat University (Banjarmasin), Sam Ratulangi University (Manado) and Pattimura University (Ambon).

Since then, UGM has been active in the field of community service. It made the program a compulsory subject for all the undergraduate students in 1979, and the subject has remained compulsory until now. Since 2006, the program has been renamed as the Student Community Service- Community Empowerment Learning (SCS-CEL) or *Kuliah Kerja Nyata-Pembelajaran Pemberdayaan Masyarakat* (see below for the recent development of the program).

Sustainability and Universities

Sustainability and Education: A Brief Review

While environmental education and research has its long history in Indonesia, including the higher education sector, the government and education institutions had been inactive in the area of ESD or sustainability until recently, except for several initiatives taken by the Ministry of the Environment, which include making

strategies for the decade of ESD. (The Environment Ministry involved NGOs and universities in the making process. See Hendarti 2012.) However, the Education Ministry and the UNESCO National Commission has gradually stepped up their efforts in this area since 2009 when the responsibility for planning and implementation of ESD was transferred to them from the Ministry of the Environment (Sudiby 2010), while the Environment Ministry has taken leadership in the area of environmental education as we have seen above. As a start, in 2009 the Indonesian National Commission for UNESCO appointed the Senior Vice Rector for Education, Research and Community Services of UGM as the National Coordinator of ESD Implementation (NCESDI).

The NCESDI participates in various meetings at the Ministry of National Education, and contributes to the dissemination of the concept of ESD in collaboration with the four Directorate Generals of the Ministry as well as various Directors who work under them. Many kinds of ESD workshops, trainings, and training of trainers have been provided to all levels of education according to these four Directorate Generals; namely Directorate Generals of Higher Education, Primary and Secondary Education, Non-formal and Informal Education, and Quality Improvement of Teachers and Education Personnel. Also the NCESDI works with the Ministry of National Education in revising the national education expenditure, which resulted in the allocation of budget for ESD implementation and promotion starting in 2010.

The policy research center (*Pusat Penelitian Kebijakan*), which is attached to the Agency of Educational Research and Development (*Badan Penelitian dan Pengembangan*) of the Ministry of National Education, has conducted ESD research for effective policy development and implementation. The center published several practical papers and reports for teachers, policy makers and other stakeholders regarding how to integrate the concept and the components of sustainable development into in-curricular and extra-curricular activities, in addition to more policy-oriented documents. (Major reports are downloadable from its website at <http://puslitjak.org/laporan.htm>.) The National Education Strategic Plan for 2010–2014, which was made by the Ministry of National Education as guideline for central government's education policies, reflects various international conventions related to education, and situates sustainable development as one of the key issues during the period (Hendarti 2012).

In this context, some policies and decrees have been improved to support ESD implementations. They include a new decree for a National Scouting Program (*Rencana Undang-undang Kepramukaan*) and the expansion of "Adiwiyata" (Green Schools Awards), which are given to primary and secondary schools with good environmental performances in areas such as curriculum, community involvement and school facilities. This was initiated by the Ministry of Environment in 2006 as an "environmental education" program in collaboration with other ministries; however, this was later reconceptualized as one of the government's responses on ESD (Sudiby et al. 2011, p. 15). Among 251,415 primary and secondary schools in Indonesia, 1,351 of them have participated in this Adiwiyata program since 2006, and 272 schools have received the Adiwiyata Award (Hendarti 2012).

In addition to working with the Ministry of National Education, the NCESDI is also in charge of coordination among various government institutions, which is an important role because ESD is, by nature, related to many policy areas. The NCESDI has held meetings with ministries of Health, Environment, Agriculture, Forestry, Marine and Fishery, Research and Technology, Home Affairs, Industry, State Ministry of Women's Empowerment, State Ministry of Remote Regions, and Foreign Affairs, as well as the Indonesia Institute for Science and NGOs.

As we can see, ESD in formal education in Indonesia seems to have been based on the traditions of environmental education such as Scouting and Adiwiyata. Or, it is simply renaming of existing environmental education activities with a bit of additional flavor based on recent policy trends. The same can also be seen from an international initiative to which the Indonesian government has linked its policies, namely the initiative taken by the Association of Southeast Asian Nations (ASEAN). The ASEAN Environmental Education Action Plan (ASEAN EEAP) 2008–2012, which is ASEAN's environmental education policy framework, emphasizes the contribution to the UN decade of ESD (2005–2014) with its subtitle "Environmental Education for Sustainable Development", without major changes in the direction of the former EEAP 2000–2005. ASEAN has held several meetings since the start of the new EEAP to share information and experiences of developing ESD in each ASEAN member state.

This is also the case for NGOs. NGOs have also started a multi-stakeholder forum with government and funding agencies on ESD. Organizations such as PPLH-Seloliman, De Tara Foundation, Benih Matahari, WWF-Indonesia, Yayasan Pembangunan Berkelanjutan (Sustainable Development Foundation) are actively providing ESD-related programs (Hendarti 2012; see also Nomura 2009 for the analysis of the recent development of ESD by NGOs). However, as Nomura (2009) notes, environmental education by NGOs has developed "ESD-ish" in Indonesia by expanding its coverage in topical terms in an inter-related manner in the 1990s and 2000s, and it must be noted that the line between environmental education and ESD at the practical level is so blurred to be insignificant. In fact, most educators involved in the groups mentioned above have provided similar (if not the same) programs for decades.

Sustainability and Universities: Historical Development

With regard to ESD in higher education, the policies developed by the Education Ministry in collaboration with the UNESCO National Commission includes promoting the good practice by UGM in community services (Student Community Service Program; see below) to the other HEIs in Indonesia with financial supports. The government has been offering competitive block grants for community service programs (SCS-CEL) at HEIs for up to 30 winners per year. The first batch of the competition started in 2009, and this project is coordinated by UGM. They include, for example, a project by a private university in Surabaya called Universitas PGRI

Adi Buana to produce a bio-diesel fuel (*Jatropha curcas* oil, which is similar to castor oil) as an alternative energy for domestic use in East Java Province. Another example is a project to develop clean water supply technology and improve health conditions in a village in Central Java by a state university Universitas Jenderal Soedirman.

UGM also established an ESD team to support the implementation of ESD at the national level, based on the university's experiences in sustainability education, research and community service. Representatives from various faculties and study centers participate in the team to make ESD implementation guidelines describing the vision, missions, objectives, performance indicators, strategic activities, and quality assurance of ESD not only at UGM but also at other institutions in Indonesia.

Except for UGM, Indonesian HEIs that have been active in sustainability efforts include Mulawarman University in East Kalimantan, which is the coordinator of UNU's Regional Centre of Expertise (RCE) of ESD in East Kalimantan. (In addition to Yogyakarta and East Kalimantan, Bogor is another UNU-RCE in Indonesia. Its coordinator is SEAMEO BIOTROP, or Southeast Asian Ministers of Education Organization-Regional Centre for Tropical Biology, an international organization located in Bogor.) The activity of this East Kalimantan RCE is currently focusing on kindergarten and primary-level education in collaboration with private companies. Other examples of ESD by HEIs include Sampoerna School of Education, which is a new teacher education institute established in 2009. The school incorporated elements of environmental education and ESD in its curriculum. When it comes to teacher education, four out of 12 National Centers for Teacher and Education Personnel Development and Empowerment (*Pusat Pengembangan dan Pemberdayaan Pendidik dan Tenaga Kependidikan*) in the country include environmental education and ESD in its teacher training courses, such as the one for Kindergarten and Special Need Education (Hendarti 2012).

At other universities, subjects of sustainability are slowly being incorporated in the university curriculum, such as the Master's Program in Corporate Social Responsibility at Trisakti University. However, by and large, the tempo is far from remarkable. Murti Laksono and Hidayat (2009) note that at IPB, another leading university in Indonesia, teaching and research subjects that are explicitly labeled as, and deal with, sustainable development in a comprehensive manner are still significantly small in number, compared with environmental subjects.

The fact that the initiative has been taken by the Education Ministry and the UNESCO National Commission, instead of the Environment Ministry which has rich experiences in the field of environmental education, seems to suggest that sustainability efforts in the Indonesian higher education sector have not evolved domestically. Sustainability education and research were rather a response to international policy discourses and initiatives such those of UNESCO and UNU. In other words, the development of sustainability efforts by Indonesian HEIs is in a separate stream from the development of environmental efforts.

At the same time, as we have noted earlier, environmental education in general has developed in an "ESD-ish" fashion in Indonesia, reflecting local social, economic and environmental needs. This is also true in the higher education sector.

As one will not see significant differences between ESD and environmental education in practice regardless of how they are called, it is clear that newly-initiated ESD projects should in many cases be based on or linked with the long-standing local tradition of environmental education and research.

The Case of Gadjah Mada University (UGM)

Efforts on sustainability or ESD are mainly interpreted in the context of community service at UGM. The university established the Institute for Research and Community Services (known by its Indonesian acronym, LPPM) in 2007, by uniting the Institute for Research and the Institute for Community Service. This new institute facilitates, coordinates and conducts multi-disciplinary and/or collaborative research and community services at the university, under the supervision of the Senior Vice Rector for Education, Research and Community Services (i.e. NCESDI). LPPM is the proponent and coordinator of one of the UNU's three RCEs of ESD in Indonesia. The Senior Vice Rector emphasizes that the keys to success of ESD are raising people's awareness and capacity building of communities with reference the efforts by UGM (Sudibyso et al. 2011, p. 10). UGM also participates in UNU's ProSPER.Net (Promotion of Sustainability in Postgraduate Education and Research), a network of several leading higher education institutions in Asia and the Pacific. (UGM has been a member of ProSPER.Net since its start in 2008. Technically, activities related to ProSPER.Net at UGM are attached to the Master Program of Management.)

LPPM features the university's long-standing Student Community Service Program as the university's main effort on sustainability, which was renamed in 2005/2006 as the "Student Community Service-Community Empowerment Learning Program," emphasizing the elements of community empowerment and a bottom-up approach (Sudibyso 2010). The program is an obligatory activity of all the university's 7,000 undergraduate final year students, and three credits are given to students who successfully complete it. In addition to raising awareness among communities and providing a direct contribution to addressing their problems, the program aims at being a medium for students to apply their knowledge to the real world outside the campus in order to gain experience and get sensitized to social issues. This program is also in line with UGM's orientation to becoming a research university. Outcomes of community service activities provide feedback for future research conducted at the university. Examples include an activity to supply clean water to villagers who are short of it for their everyday life by pumping up deep groundwater using solar power. Another is an activity to take a simple biodigester developed by UGM researchers and spread it to the villages in order to support local cattle farmers by turning animal waste into biogas bio-fertilizer. An illiteracy eradication project using local languages and a project to develop landslide early warning system are also included here. Among 100 topics selected for this program each year, currently all of them are considered as ESD-related topics. Each topic usually

runs more than 1 year, and hence more than one batch of students are engaged in the same topic in general.

For the success of this program, the Directorate General of Higher Education of the Indonesian Government appointed the university to be the organizer of a national grant to spread similar activities to other universities nationwide, as mentioned above. The then-Minister of National Education, Bambang Sudibyo, who held the position between 2004 and 2009, had a strong interest in UGM's achievements in community services and encouraged the dissemination of the experiences to other universities in and out of Indonesia. His interest was also an important factor in strengthening the relationship between UGM and the Ministry, and their collaboration in promoting ESD based on UGM's experiences. Currently, due to its reputation, several universities in other countries (Japan, South Korea, Malaysia and Norway) have taken part in the program.

In an effort to further integrate ESD into the curriculum and/or specific programs, UGM is funded by the World Bank through its I-MHERE Project (Indonesia-Managing Higher Education for Relevance and Efficiency) during 2010–2012. Three faculties were selected for this project – the Faculties of Biology, Forestry, and Pharmacy. Since each faculty has different interests, scientific backgrounds, academic conditions and approaches, each of them has created and developed ESD activities based on its capacity, research fields, experiences, and collaboration partners. The aims of the project are: (a) for the Faculty of Biology, to strengthen the International Education Network for Sustainable Development on Biodiversity Research and Community Empowerment; (b) for the Faculty of Forestry, to be a Centre of Excellence for Emission Reduction through Tropical Forest Management based on the principles of Sustainable Development; (c) for Faculty of Pharmacy, to be a Centre of Excellence for Herbal Medicines and Supplements Development. The expected outcome after this 3 year project is for UGM to strengthen research and learning activities based on local capacity and ESD.

The major drivers for the university's efforts on sustainability research include its vision to be a world class research university, which was declared in 2007. The vision was not developed exclusively for sustainability research, but the re-structuring to set up an institute combining community service and research was done in this context. Since UGM often refers to worldwide university rankings in this regard, its endeavor on sustainability research may be related to the internationalization of higher education. In fact, the recognition of UNU's RCE and the participation in ProSPER.Net are considered to have encouraged and supported the university to develop their activities.

While the impact of international initiatives has been significant, one needs to note that these activities are still in the scope of *Tri Dharma*, orienting them to meet the needs of the nation, particularly at the community level (Sudibyo 2010). In addition, UGM has been given the task of leading national development as one of the top HEIs in Indonesia ever since the independence of Indonesia, and local society (including Sultan Yogyakarta) has strongly supported UGM since its establishment. Accordingly, UGM has had a strong tie with local communities and wished to be a "*universitas kerakyatan*" (people's university), or a university to work *with* (rather

than work *for*) local communities to move forward together. In other words, UGM's emphasis on communities in its ESD efforts cannot be understood well without putting them in the context of higher education policies in Indonesia (e.g. *Tri Dharma*) and its traditions of working with communities. ESD, like environmental education, has been shaped by reflecting the local socio-economic and political conditions, and they look quite alike in practice.

Conclusion

The purpose of this chapter was to understand the development and the shape of environmental and sustainability efforts by educational institutions in Indonesia, and those by HEIs in particular, with reference to the environment-sustainability nexus. This chapter has found that the sustainability efforts by Indonesian HEIs have developed in a rather separate stream from long-standing environmental efforts, and they have yet to link up in many cases. The former, which was not an evolutionary form of the latter, is associated more with the initiatives at the national and international levels, instead of local demands.

However, at the same time, this is not to imply that sustainability education and research in Indonesia (including at the higher education level) are far from the existing environmental education and research. Rather, they share a lot in common, and one may find it difficult to see their differences. As we have seen, environmental education and research have developed in an "ESD-ish" fashion by incorporating various social and economic elements, partly due to an emphasis on community-level activities. The case study of IPB by Murtalaksono and Hidayat (2009) endorses this view, although environmental subjects incorporating social or economic aspects are not labeled as sustainability education and research. The similarities are seen from the fact that what the government presents as sustainability efforts by HEIs at the national policy level are mostly their existing environmental activities (Sudibyo 2010).

This similarity in practice but the difference in labels may echo the question by Jickling (2005) and Nomura (2009) about the rationale of following international initiatives and imposing the novel concept of ESD or sustainability education/research, when there is a received concept (i.e. environmental education/research). At the practical level, one problem here is the risk of overlooking the long history of rich experiences in the environmental field, while confusing educators in the field. Importantly, these rich environmental experiences are not always shared with the institutes that are in charge of sustainability efforts, and thus they may not be utilized well. In the case of UGM, which is a best practice in Indonesia, the top management of the university took the initiative to establish LPPM to develop sustainability education and research. This has helped, to some extent, to utilize relevant resources and experiences (e.g. those of environmental education) accumulated across faculties. However, other universities may not have the same resources for such institutional restructuring as UGM, a leading university in Indonesia. Considering the current situation, in which environmental education and ESD do

not have significant differences in practice, one of the ideas to develop ESD at other universities may be to make the most of existing institutions, such as the environmental study centers. In fact, the importance of utilizing environmental study centers is also recognized and mentioned by policy makers. (For example, see a comment by the Director of Research and Community Services at the Ministry of National Education. Sudibyo et al. 2011, p. 22, p. 23.)

One of the reasons to legitimate the use of the term “sustainability” may be its potential for mobilizing resources. The term sustainability or sustainable development may attract more resources (particularly from businesses) than environmental conservation, as the latter may imply restrictions on business activities. However, one may also question if there are many HEIs in Indonesia that can attract business resources like UGM, which is a leading HEI in Indonesia. Accordingly, the policies of the governments and funding agencies will play a critical role in influencing, developing and synergizing HEI’s environmental and sustainability practices in the future.

As we have seen with the case of environmental study centers, many institutes at Indonesian universities are self-funded, which means they are susceptible to the policies of the funding agencies (Murtlaksono and Hidayat 2009; Babcock et al. 2003). This is also true in the field of sustainability, as this chapter has illustrated. This point is especially significant when one looks at the on-going privatization and marketization of the higher education sector in Indonesia. This implies that strategic funding and fund-raising means a lot for structural changes at HEIs that facilitate and develop education and research for sustainability.

One of the hopes for “community service” is to serve as the common ground or the meeting point for existing environmental and sustainability efforts. In this context, it is significant to develop an organization such as UGM’s LPPM, or to strengthen the existing centers such as the environmental study center, and orient it to bridge the fields of environment and sustainability.

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Chapter 9

“Green Universities” in China: Concepts and Actions

Yu Huang and John Chi-Kin Lee

Introduction: The International Context of Green Universities in China

Education is an important component for sustainability. Education for sustainable development has been advocated not only at the primary and secondary school levels but also in the tertiary sector and universities. In the higher education sector, emphasis on environmental and sustainability education can be traced back to the Stockholm Declaration in 1972. In 1990, under the auspices of Tufts University in the United States, the Talloires Declaration was signed by more than 70 U.S. college and university presidents. To date, the Talloires Declaration includes over 440 signatory institutions in over 50 countries (Association of University Leaders for a Sustainable Future 2012a). The Association of University Leaders for a Sustainable Future was then formed in 1992 to serve as the secretariat for the signatories of the Talloires Declaration. The association’s interpretation of sustainability holds that “The critical activities of a higher education institution are ecologically sound, socially just, and economically viable, and that they will continue to be so for future generations. A truly sustainable college or university would emphasize these concepts in its curriculum and research, preparing students to contribute as working citizens to an environmentally healthy and equitable society. The institution would function as a sustainable community, embodying responsible consumption of energy, water, and food, and supporting sustainable development in its local community and region” (Association of University Leaders for a Sustainable Future 2012b). The Talloires

Y. Huang (✉)
School of Geography, Beijing Normal University,
Beijing, China
e-mail: huangyu@bnu.edu.cn

J.C.-K. Lee
Asia-Pacific Institute of Curriculum and Teaching Studies (APICTS),
Faculty of Education, Southwest University, Chongqing, China

Declaration is a ten-point action plan for promoting sustainability practices and environmental literacy in teaching, research, operations, and outreach at colleges and universities. These action plans include the following goals: “increase awareness of environmentally sustainable development; create an institutional culture of sustainability; educate for environmentally responsible citizenship; foster environmental literacy for all; practice institutional ecology; involve all stakeholders; collaborate for interdisciplinary approaches; enhance capacity for primary and secondary schools; broaden service and outreach nationally and internationally; and maintain the movement” (Association of University Leaders for a Sustainable Future 2012c).

Similarly, several related declarations on the role of universities were promulgated in different parts of the world. In 1991, the specific challenge of environmentally sustainable development was addressed at the Conference on University Action for Sustainable Development in Halifax, Canada by the presidents of universities from Brazil, Canada, Indonesia, and Zimbabwe, as well as by the senior representatives of the International Association of Universities, United Nations University, and the Association of Universities and Colleges of Canada. The Halifax declaration was announced at the end of the conference. In 1993, the Association of Commonwealth Universities (ACU) Fifteenth Quinquennial Conference announced the Swansea Declaration, which suggested the following actions:

1. To urge the universities of the ACU to seek, establish, and disseminate a clearer understanding of sustainable development, that is, “development that meets the needs of the present without compromising the needs of future generations,” and to encourage more appropriate sustainable development principles and practices at the local, national, and global levels, in ways consistent with their missions.
2. To utilize university resources to encourage better understanding on the part of governments and the public at large regarding the inter-related physical, biological, and social dangers facing the planet Earth, as well as to recognize the significant interdependence and international dimensions of sustainable development.
3. To emphasize the ethical obligation of the present generation to overcome these practices of resource utilization and the widespread circumstances of intolerable human disparity that lie at the root of environmental unsustainability.
4. To increase the capacity of universities to teach and undertake research in sustainable development principles, improve environmental literacy, as well as enhance the understanding of environmental ethics within the university and of the public at large.
5. To cooperate with one another and with all segments of the society in the pursuit of practical and policy measures to achieve sustainable development, and thereby safeguard the interests of future generations.
6. To encourage universities to review their own operations to reflect the best sustainable development practices.
7. To request the ACU council to urgently consider and implement the ways and means to give life to this declaration in the mission of each of its members and through the common enterprise of the ACU.

(Association of Commonwealth Universities’ Fifteenth Quinquennial Conference 1993)

Other examples of declarations include the Kyoto Declaration (November 1993) that emphasizes ethical issues; the Swansea Declaration (1993) that stresses equality of countries in achieving sustainability; the University Charter for Sustainable Development (1994) (COPERNICUS 1994) that was established by COPERNICUS, an inter-university cooperation program on the environment under the Association of European Universities (CRE) that promotes environmental literacy; and the Declaration of Thessaloniki (1997) (Wright 2004). These declarations share two common themes, namely “the moral obligation of universities to become sustainable institutions” and “the need for public outreach activities” (Wright 2004, p. 13).

In this new century, the Lüneburg Declaration on Higher Education for Sustainable Development, which focuses on globalization, was issued in 2001 as an address to the World Summit for Sustainable Development in Johannesburg to mobilize the international higher education community around the theme of sustainability (Haigh 2009, pp. 28–29; Lüneburg Declaration on Higher Education for Sustainable Development, 2001).

Another notable example is the Sapporo Sustainability Declaration that was produced during the G8 university summit in 2008. Regarding the responsibility of universities, the declaration proclaims:

“...collaboration with a range of stakeholders including civil society and the private sector is also important to ensure such solutions are practically applicable and appropriate to build a sustainable society. Universities must work together in the areas of sustainability research and policy analysis toward this end. At the same time, the academic objectivity of universities is a key strength which should not be sacrificed” and “Activities already being undertaken by the participating universities, such as the development of ‘sustainable’ or ‘green’ campuses, and the issuance of action statements in response to climate change, are examples of how to showcase a sustainable society. By serving as test models for the society at large, universities help foster in their students the attitudes and skills necessary to achieve a sustainable society in the future. Thus, the sustainable campus can serve as both an experiment in progress and an ideal tool for educating future generations” (G8 University Summit 2008).

Haigh (2009, p. 30) pointed out that “the pattern of international agreements has evolved from general concerns about environmental sustainability...to the notion that every educated person should possess ‘environmental literacy,’ and that HEIs should provide good role models for sustainable development. Later documents stress the ethics of environmental sustainability and increased emphasis on the interactive nature of the relationships between society and environment.” Although different kinds of declarations have been established to promote sustainability in universities, the question remains as to what has been actually implemented and achieved thus far. Following the Halifax Conference and Declaration, signatory universities were provided with an Action Plan that covers public outreach measures, inter-university cooperation, and partnerships with governments, non-government organizations, and industries, as well as programs for enhancing the ecological literacy of the university community. Wright (2003, p. 241) conducted a review of the activities implemented in the 16 signatory universities. The results showed that 9–10 signatory universities implemented the activities under the educational program category, such as “public forums for awareness and information exchange,

education, and public debate,” “programs and initiative related to sustainability education and/or environmental literacy,” and “collaborative environment and sustainable development research projects involving faculty and/or students.” Several problems have also been found regarding the implementation of the Halifax Declaration, such as lack of communication, leadership, and economic support.

Despite the fact that increasing attention and efforts have been devoted towards developing sustainability in higher education in the West, Corcoran and Wals (2004, p. 87) argue that “there is no one way of developing sustainability in higher education. There is not even one way of viewing sustainability...In a postmodern world, pathways towards sustainable universities are unlikely to develop without friction, controversy, and conflict.” Given this background, what has happened in China, one of the largest and fastest-growing countries in the East, in developing sustainability in higher education?

Green Universities in China: History and Context

The Chinese government began to pay more attention to environmental conservation and sustainable development after the Earth Summit in 1992. China’s Agenda 21 was then launched in 1994, and Chapter 6.19 “Education and Capacity Building for Sustainable Development” was implemented in The National Program for Educational Reform and Development. “In the national economic and social development plans, investment for education would be guaranteed and gradually increased with economic development. Significant efforts would be made to strengthen primary education as well as develop vocational, technical, adult, and higher education” (Executive Meeting of the State Council of the People’s Republic of China 1994). This premise suggests that, in addition to basic education, higher education would be given attention in the promotion of sustainable development. In 1996, the Administrative Center for China Agenda 21 (ACCA21) developed a priority program for China Agenda 21, and top priority was allocated to Capacity Building for Sustainable Development. Among the activities to be implemented by the State Education Commission, the training of qualified personnel for conducting research on sustainable development was strengthened through on-the-job training and specific extension activities that included (The administrative Centre for China’s Agenda 21): “testing of educational curricula and materials in ten universities and colleges (ranging from science, engineering, agricultural, medical, liberal arts, teachers’ colleges to universities; introduction of post-graduate courses on sustainable development in three to five qualified universities, the establishment of training centers for post-graduates and doctors as a pilot scheme for training advanced researchers on sustainable development; [and] compilation and publication of advanced teaching materials on sustainable development” (Niu et al. 2010, p. 154).

In 1999, the document entitled 2001–2005 National Environmental Publicity and Education Work was issued (Ministry of Environmental Protection 2001). Paragraph 18 of this document recommends that all national higher education institutions (HEIs)

gradually develop “green university” activities that aim to provide adequate instructional materials, information, teaching facilities and venues for environmental education. The green university activities are characterized by: environmental education becoming an essential part of the HEI curriculum; students mastering relevant knowledge of environmental protection and better environmental consciousness of teachers and students; development and participation in society-oriented environmental monitoring, publicity, and educational activities; environmental culture becoming an important part of campus culture; and building up a clean and beautiful campus environment.

In 2011, the Program of Action for National Environmental Publicity and Education (2011–2015) was jointly issued by six ministries and commissions, including the Ministry of Environmental Protection, CCCPC Publicity Department, Civilization Office of the Central Communist Party Committee, Ministry of Education, Central Committee of the Chinese Communist Youth League, and the All-China Women’s Federation. Under the section of “Carrying out environmental education actions for all,” it specifies that this program is designed to promote HEIs, incorporate environmental education into teaching plans as an important part of quality education for students of HEIs, and organize activities to construct “green universities.”

Wang et al. (2010, p. 44) reviewed the construction of green universities in China, and found that a number of universities were conferred the title of green universities based on joint efforts between local government bureaus and universities, such as Xinjiang University (named by the city-level environmental protection and education bureaus [Municipal Commission of Education]), Tsinghua University (named by the former Ministry of Environmental Protection), Shanxi Agricultural University (named by the Department of Education of Shanxi Province), and Dalian University of Technology (named by the city).

In 2011, the China Green University Network was established, with more than ten universities and institutions, including: Tongji University, Tianjin University, Zhejiang University, Hong Kong Polytechnic University, South China University of Technology, Chongqing University, Shaodong Jianzhu University, and Jiangnan University (China Green University Network 2011). In the same year, the Chinese University of Hong Kong also launched a Cross-strait Green University Consortium with Nanjing University in the Chinese Mainland and the Central University in Taiwan to promote sustainable development (Chinese University of Hong Kong 2011).

Higher Education as a Change Agent for Sustainability

Some scholars, such as Martin and Jucker (2009, pp. 15–16), argue that universities have certain roles in sustainability because universities nurture, educate, and train tomorrow’s leaders, who can make a difference and manage future governments and institutions in order to produce major positive impacts on future sustainability. In addition, universities are seen as centers of innovations and advanced knowledge,

(including those related to sustainability and education for sustainable development) which could serve as models and provide solutions for society. Nevertheless, universities as educational institutions still encounter challenges in integrating sustainability concepts and engaging in practices such as rethinking the institution's mission and integrate sustainability as a purpose, engaging in dialogue on implications for curriculum and pedagogy (because sustainability is complex and interdisciplinary in nature), rethinking the role of university teachers in ESD and their teacher development, and rethinking the communicative process for institutional and curriculum reforms (Martin and Jucker 2009, p. 20).

In order to address the promotion of education for sustainability, Sterling (2001) advocated a shift towards an ecological paradigm for education that is compatible with the ecological integration orientation and transformation position in curriculum studies (Jewett and Ennis 1990; Lee 2011; Miller and Seller 1985). Sterling (2004, p. 64) proposes an “iceberg” metaphor and a system-based staged approach for higher education that consists of 4 “Ps”: *Paradigm*, which involves “holism, systemism, and critical subjectivity”; *Purpose*, which is related to “broader education for a sustainable society/communities, [and] sustainable economy, sustainable ecology”; *Policy*, which includes “a process of developing potential and capacity through life, at individual, and community levels, through continuous learning”; and *Practice*, which entails “a participative, dynamic, active learning process based on generating knowledge and meaning in context, as well as on real-world/situated problem-solving.” In a similar vein, Tilbury (2004) has suggested that environmental education for sustainability needs to adopt the notion of “thinking critically, thinking culturally” (p. 99) and incorporate core components such as “critical reflection”, “values clarification”, and “participatory action research” (p. 101). Tilbury similarly viewed “higher education as the subject of change” (p. 109), because all stakeholders engage in multi-level and multi-dimensional changes that lead to a sustainable world.

Concepts Behind “Green Universities”

According to Savelyeva and McKenna (2011, p. 56), academic institutions such as universities have two main approaches to enhance sustainability: “going green and promoting EfS [education for sustainability].” Campus greening is an action-oriented approach that pertains to the incorporation of environmentally friendly practices in all aspects of university infrastructure and operations, whereas promoting EfS is a broader and holistic approach that relates to the adoption of ethical standards to make universities sustainable. Nonetheless, several universities tend to support campus greening without examining and infusing the ethical standards of EfS that are narrowly applied to disciplinary fields, such as the natural sciences and environmental education.

Tilbury and her team (2005) conducted a comprehensive review of environmental education and its contribution to sustainability in Australia. The review has generated

the following interrelated themes (p. 7): learning from campus greening; learning for sustainability in the curriculum; declarations of commitment to sustainability; institutional learning for change; changing the nature of work; generic skills; and competency-based training. For campus greening, examples include tree planting, waste recycling, water recycling and retention, stormwater management, energy and greenhouse gas emission reduction, as well as awareness raising campaigns (p. 8). Contreras (2003) has suggested that universities could conduct ecological footprint analysis and address sustainability issues through operations, such as efficient water use, energy efficiency, natural and cultural heritage protection, sustainable use of transportation, waste management, as well as green procurement (Ciegis and Gineitiene 2006, p. 502).

Regarding learning for sustainability in the curriculum, curriculum change which is conducive to learning about and for sustainability is necessary, either through innovation or integration. Staff development is likewise required through, for example, action research for curriculum change and for grooming champions of sustainability. Institutional learning for change touches upon issues such as participation in sustainability programs and planning for change, as well as organizational and transformative learning. More importantly, how all the aforementioned components systematically and synergistically link together is a critical issue (Tilbury et al. 2005, p. 18).

In addition, Calder and Dautremont-Smith (2009) have evaluated sustainability in higher education from the following aspects (pp. 93–94): curriculum; research; operations; community outreach and service; student life; and institutional mission, policy, and planning. These aspects are also partly related to the support of external stakeholders.

In China, different scholars have offered different interpretations of “green universities.” Some scholars consider “green universities” as an extension of “green schools” from primary and secondary schools to higher education institutions; whereas others regard “green universities” as universities promoting “green education” without clearly defining the meaning of “green education” (Wang 2006, p. 21).

Regarding the means of building “green universities,” Li and Xie (2003, p. 26) have suggested the principles of “wholeness” (using evaluation index system as a basis to cover various aspects), “all staff” (involving staff in participation decision-making), “whole journey” (including short-term and long-term plans), and “characteristics” (containing distinguished features). From a systems perspective, Ye (2006) viewed “green universities” as consisting of four sub-systems: green human groups, green campus, green education, and green technology.

Kuang (2006, p. 54) considers the theoretical bases of “green universities” to be related to the notions of harmony, interdependence, and sustainable development between people and the environment. He proposes that the common compulsory “green” courses of universities could be “Ecological/environmental ethics” for arts and humanities students, “Environment and sustainable development” for science students, and “Scientific technology and sustainable development” for engineering students. In addition, arts and humanities students can choose “environmental aesthetics” and “human ecology” as elective courses, whereas science and

engineering students could opt for “resources, environmental laws” and “ecological economics” (pp. 55–56).

Different evaluation index systems have been proposed for green universities. Zhang (2000) suggests two-tier evaluation indicators. The first tier comprises university missions of sustainable development, green research, green practice and process, green education content, campus construction, and enhancement of societal sustainable development by the institution. Wang (2011, pp. 8–9) has summarized and proposed an evaluation index system for green universities in China that comprises two main categories: green education and green culture. For green education, the evaluation system consists of “green concepts” (such as dissemination of sustainable development concepts), “green curriculum” (such as courses on environmental protection and environmental ethics), and “professional teacher qualification” (such as provision of a teaching force with professional qualification), as sub-categories. For green culture, this category includes “green campus” (such as prevention of pollution and campus greening), “green management” (such as a management system and decision making in planning that reflect the principles of sustainable development), “green research” (such as knowledge transfer of green technology and green projects), and “green practices” (such as green consumerism and organization, as well as the impact of green activities).

Regarding the criteria for the evaluation of green universities in practice, Xinjiang University has adopted a set of evaluation criteria or standards for trial implementation (Wang et al. 2010, p. 46). These criteria cover the following seven aspects (scores in brackets): organization and management (12); environmental publicity (8); environmental education (14); public participation (20); campus environment (140); educational outcomes (5); and pollution control (27). Dalian University in Liaoning Province has developed evaluation standards for green universities (Dalian-shi lüse daxue pinggu biaozhun). The scheme contains six categories and sub-categories (scores in brackets): (a) organization and management (20), leadership emphasis (8), full documentation (4), publicity education (6), and environmental training (2); (b) environmental education (12), curriculum provision (12); (c) extra-curricular activities (20), community organization related activities (17), and special theme education (3); (d) educational effects (16), environmental common knowledge (2), environmental behavior (11), and environmental effects (5); (e) environmental construction (32), campus environment (5), environmental management (13), and pollution control (14); and (f) uniqueness as bonus points (15) (Dalian Environmental Protection Bureau 2012). Liu Jing Ting et al. (2010, p. 50) refer to the evaluation index system of Nankai University as containing six aspects: environmental quality (drinking water, surface water, noise); environmental greening; environmental education (coverage of common and elective courses, classroom infusion, special theme activities, and environmental consciousness); basic infrastructure; energy and resource utilization (water consumption per capita, non-traditional water resource usage, pollution treatment technology, and use of clean energy); as well as environmental management (information platform and sustainable whole planning).

Tsinghua University as an Example of a “Green University”

The former President of Tsinghua University, Wang Dazhong (1998), has written that “green universities should comprise three main aspects: “green education;” “green technology;” and “green campus” (p. 7). Tsinghua University, for instance, provided “Environmental Protection and Sustainable Development” as a common foundation course for all undergraduates, as well as two courses—environmental studies” and “introduction to sustainable development”—as restricted electives for postgraduate students. In addition, “green education” includes extra-curricular practical activities and environmental research activities, as well as the provision of training for government bureaus and enterprises through a Training Center for Environmental Protection and Sustainable Development (p. 8).

“Green technology” covers “dark green research” in eradicating environmental pollution and improving environmental quality, as well as the “light green research” that studies and develops a set of new technologies and techniques under clean production principles. In addition, Tsinghua University treated environmental protection industries as a priority. For a “green campus”, Tsinghua University strengthened the comprehensive control of environmental pollution on campus, and set up the “green campus project,” which covered the construction of green belts, open spaces, courtyards, gardens, and surrounding buffers (Green University Office of Tsinghua University 2010).

Xu (2011), in his discussion of the updates at Tsinghua University, mentions that the university has offered more than 270 courses related to sustainable development since 1998, and that on average, about 4,000–6,000 students enroll in these courses each year. Among these courses, 42 were chosen as basic courses for undergraduate students as part of the “Green Curriculum Division,” which is one of the eight curriculum divisions of cultural quality education. Students Research Training (SRT) was also an outstanding feature of Tsinghua, and more than 500 SRT programs related to sustainable development have been established with the involvement of over 1,100 students. Other green education activities include environment-friendly competition, students’ social practices, and green forums. The “green campus” aspect adopted a “behavior framework” that included a public management system covering components such as overall planning, energy saving and emission, environmental protection management, power, water supply, as well as heating and recycled water systems management measures. In addition, the system included a code of personal conduct.

Actions and Practices of Other Green Universities in China

In addition to Tsinghua University, another good example of a green university in China is Tongji University in Shanghai. In 2002, the United Nations Environment Program (UNEP) and Tongji University (Tongji) jointly established the

UNEP-Tongji Institute of Environment for Sustainable Development (IESD). In 2006, the IESD developed an international Master's degree program in Environmental Management and Sustainable Development that comprises a range of fundamental courses related to environmental science and technology, planning, management, and development. The program emphasizes problem-based learning, field-based learning, and a systems approach to sustainability and interdisciplinary study. Professional courses were provided to students with core courses on environmental ethics, environmental sociology, environmental science, environmental and circular economy, framework and tools for sustainable development as well as environmental management and policy. Elective courses on global environmental changes, environmental project management, atmospheric science and climate change, as well as environmental ecology were likewise provided (Choi et al. 2009, p. 42; UNEP-Tongji Institute of Environment for Sustainable Development, n.d.). Regarding green campus development, Tongji University adopted the slogan "thrift is virtue, thrift is wisdom, thrift is quality, thrift is responsibility," with the aim of achieving a resource-saving and resource-efficient campus. Three priorities were set to "develop conservation awareness through educational activities; disseminat[e] training materials and media promotions; promote conservation efficiency through effective management; and realize maximum resource savings through technological innovation" (Niu et al. 2010, p. 157).

Compared with Tsinghua University, Peking University started rather late as a green university. Peking University does not have a green university office. Environment-related projects are mainly under the purview of the Environmental Protection Office and Campus Planning Office, which was renamed the Office of Campus Planning and Sustainable Development in April 2009. In October 2009, Peking University, as a member of IARU (International Alliance of Research Universities), held a conference on sustainable development (Peking University 2009) and published the "Principal Declaration of a Sustainable Campus."

Peking University likewise pledged to reduce carbon emission per floor area by 15 % below their 2005 levels by 2010 as well as reduce water and energy consumption per capita by 5 % in 5 years based on 2008 levels. During the 2010 IARU Presidents' Meeting in 2010, Academician Zhou Qifeng, President of Peking University, highlighted that the university has been driven towards achieving both the "Low-Carbon Campus" and "Green Campus" statuses (Peking University 2010). Peking University put forward a "sustainable development campus" plan with three main objectives: rational use of the limited space of Peking University to ensure sustainable development of teaching and research; inheriting the historical milieu of Yenching University campus, known as "Yan Yuan" (the garden of Yan), for enhancing the preservation and sustainable use of cultural heritage; and establishing a green, low-carbon campus. In terms of campus space planning, Peking University is located in the Haidian District in the western suburb of Beijing. Since the 1920s the university population has grown 30 times larger and there are 20 times more built area. In 2006, the revised plan for campus development considered the conservation of heritage buildings (e.g., Boya Tower) around the garden of Yan and Weiming Lake as well as the impact of campus development on transport.

Since 1970, Peking University has conducted research on environmental issues with the establishment of the College of Environmental Sciences and Engineering, College of Urban and Environmental Sciences, as well as other related faculties and departments, such as town planning, life science, economics, law, chemistry, physics, and international relations, which contributed courses for understanding sustainable development issues. Peking University also offered elective courses related to “social and sustainable development” as one of the basic areas of university-wide General Education courses, with emphasis on cultivating students’ civic responsibilities and awareness of social services to build a backbone for social prosperity.

For campus culture construction, Peking University has garnered numerous achievements in student-centered environmental protection and education activities. The university has six environment-related societies/clubs/associations (Peking University 2012a) and 16 other comprehensive societies/clubs/associations engaged in environmental protection activities. These associations organize activities that allow students to engage in propaganda, surveys, and research on environmental and ecological issues. For example, the Clean Development Mechanism Club (CDM Club) that was formed in 2006 provides “a platform for young people who are concerned about environmental protection, energy crisis, climate change, low carbon economy, and sustainable development for knowledge learning, capacity building, and foreign exchange” (Yang 2012b, p. 2). Recently, two core sustainable development projects were launched, namely the Low Carbon Campus Pioneer Project (2006–present) and the International Youth Summit on Energy and Climate Change (2009, 2010, 2011, and 2012). For the low-carbon project, a 2009 and 2010 greenhouse gas inventory for Peking University was published and “low-carbon campus implementation manuals” were produced (Yang 2012b, p. 3). Meanwhile, the youth summit is the first international youth forum of China, and was co-sponsored by the CDM Club of Peking University, Tsinghua University Student Green Association, and the Youth Climate Action Network (Yang 2012b, p. 4). In 2006, an “Environmental Education base for Chinese university students” was established to arrange activities in four areas, such as scientific research and innovations, green campus, educational dissemination, and international exchange. In 2009, the Declaration on Building up a Sustainable Campus was announced.

For the construction of a low-carbon university campus, Peking University reconstructed and refined its energy conservation facilities and technologies. With an active approach to using green energy, two geothermal wells were built using geothermal energy to provide heat. A centralized monitoring system for heating was established, with a target of saving 400,000 m³ of natural gas and 1,600 tons of coal. By the end of 2005, several student dorms, classrooms, and street lighting systems have been installed with “electricity-saving lighting” machines, thereby reducing electricity by an average of 20 % (Peking University 2012b).

In addition to Tsinghua University and Peking University, other green universities are emerging. For example, Beijing Forestry University promotes the integrated four components of green education and teaching, green scientific research, green cultural dissemination, and green campus.

Conclusion

Tian and her team (2011) investigated the status of “green universities” and universities promoting ESD by using a questionnaire survey of 16 universities located in different parts of China. The results revealed that 63 % of about 1,500 university student respondents stated that their universities provided environmental education (EE) or ESD common elective courses for first- and second-year students, while 11 % replied that the courses were compulsory. Nonetheless, only 15 % of the respondents mentioned that their universities had a mission statement related to EE or ESD, and only 21 % stated that their universities had specific units in charge of EE or ESD, reflecting a moderate degree of institutional commitment. Overall, adequate top-down efforts (which depend on bottom-up initiatives) are still lacking. As to the reasons for not paying enough attention to EE or ESD, university student responses tended to focus on four aspects: lack of people to coordinate and promote university research on sustainable development; lack of a well-constructed curriculum; low university recognition of the importance of research on sustainable development; and heavy student workloads and feelings of disinterest (p. 234). These four aspects are related to institutional commitment as well as teacher and student factors. For teaching strategies, the dominant methods, in descending order, include classroom lectures, textbook content learning, group activities, community service, and case studies (p. 235). Tian and her team (2011, pp. 242–3) suggests that further study could focus on how administrative interventions are introduced, and holds that the development of “green universities” involves not only technical issues but also necessitates a new “green cultural revolution.” Yang (2012a) reports a similar survey of four universities in Beijing which derived broadly similar results to those reported by Tian and her team (2011). Beijing respondents reported that their universities saw matters related to sustainable development as “important” (*yibanxing zhongshi*, 41 %) or “rather important” (*bijiao zhongshi*, 31 %). Approximately 20 % of the respondents stated that their universities provided environmental education (EE) or ESD as compulsory courses for the first and second-year undergraduate students, while 20 % replied that related EE/ESD courses were not available. In addition, approximately 47 % of the respondents did not know whether or not universities held discussions of strategic development related to sustainable development. However, 26 % felt their universities included sustainable development in their mission statements. Regarding teaching strategies, the dominant methods were classroom lectures, group activities, and textbook content learning (Yang 2012a, p. 17).

Although this chapter highlights the successes and efforts of Tsinghua University and Peking University as examples of green universities in China, there remain a number of significant challenges for promoting ESD and developing green universities. First, universities with good reputations and successful experiences in ESD are unevenly distributed, and many tend to be key universities located in large cities in the coastal and middle parts of China. As such, the central and provincial governments need to address the issue of reducing regional disparity by helping

build more green universities in the middle and western regions of China. This observation is partly reflected in the comparative study by He, Hong, Liu, and Tiefenbacher (2011, p. 101), which shows that coastal Shanghai students tend to have higher levels of environmental knowledge and more positive environmental attitudes and environmental behaviors than their western, Gansu counterparts.

Second, gaps exist between current ESD activities and societal requirements: updated training materials that reflect local contexts and socio-economic development in different regions of China must be increased. Third, there are concerns about the longevity and continuity of sustainability initiatives and practices, which depend on the ongoing commitment of university senior management and governmental support (Niu et al. 2010, p. 160).

From the American perspective and experiences, Calder and Dautremont-Smith (2009, p. 103–105) put forward the following recommendations for enhancing sustainability in higher education:

- **Curriculum:** To ensure that all students achieve basic sustainability literacy, institutions need to create graduation requirements or core courses focused on sustainability.
- **Research:** To help meet the vast research needs for advancing sustainability and to capitalize on increasing demand for sustainability-related research, institutions should increase the support for existing research centers and institutions related to sustainability, as well as consider establishing new ones.
- **Operations:** Institutions should expand efforts to become more sustainable in their operations.
- **Outreach and Service:** Institutions should partner with their local communities and regions to promote sustainable development.
- **Student Life:** Sustainability can be made an integral part of campus culture through various new programs.
- **Institutional Mission, Policy, and Planning:** Sustainability initiatives need upper-level support to flourish.
- **External Stakeholders:** (a) Nonprofit organizations should continue supporting sustainability in higher education by providing resources on best practices, facilitating information sharing between campuses, and improving the ability of schools to assess their progress. (b) Business has a critical role in supporting sustainability in higher education. Government should work on creating the regulatory conditions that would promote the growth of sustainability in higher education.

In addition to conceptual, operational, and multi-dimensional changes towards building “green universities”, the enactment of environmental education legislation may help the promotion of ESD across all educational sectors. In 2008, the Ningxia Legislation Office and the State Environmental Protection Bureau jointly established the Environmental Education Ordinance of Ningxia Hui Autonomous Region (Revised). Other provinces/special economic zones/municipalities directly under the central government, such as Tianjin, Shandong, Shenzhen of Guangdong, Heilongjiang, Gansu, and Chongqing, are actively exploring environmental education

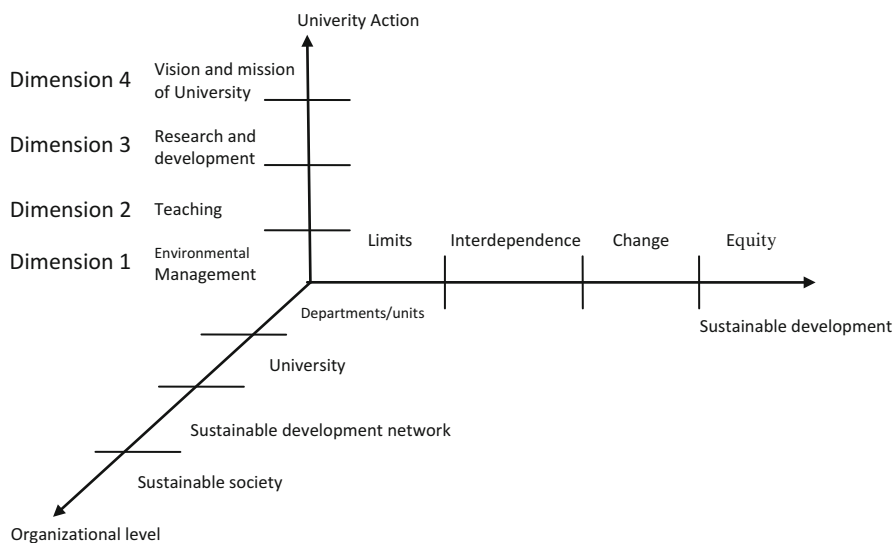


Fig. 9.1 A framework of “green universities”

legislation (Wang 2012). The progress of environmental education legislation and its possible impact on the future development of “green universities” remains to be explored.

According to Wang, Wei, and He (2010, p. 47), many of the criteria of green universities are adopted from the model of Tsinghua University. Although Tsinghua University’s as model of a green university has significant merits for adaptation by other Chinese universities, other universities should be encouraged to develop their own models of, or approach to, green universities by enlisting the support of other universities, NGOs, and local governments. The existing situation of green universities in China likewise suggests the advantages of more international or regional collaboration with other green universities, and the potential for Chinese universities to become signatory institutions of the Talloires Declaration. Refining the criteria of green universities is a challenging issue for universities in China because of the disparities in resources between key and local universities, diversity in university orientation (research-oriented versus teaching-oriented and comprehensive versus specialized), and uniqueness due to regional differences. Future discussion can focus on whether university evaluation ought to be based on different scores on common criteria or the assignment of different weightings to selected criteria based on different types of universities.

In conclusion, we propose a framework of “green universities” that consists of three major dimensions (Fig. 9.1). The first dimension is related to actions and practices of “green universities” that cover different sub-dimensions or levels, such as the vision and mission of university, environmental management with environmental impact assessments, recycling, green purchasing, office and saving policies, research and development related to sustainability science, sustainable development, curriculum

with interdisciplinary perspectives, and teaching for nurturing future eco-literate and environmentally responsible citizens/leaders with global and local perspectives. The second dimension refers to the components of sustainable development, such as interdependence, limits, change, and equity. The final dimension is related to organizational levels and includes departments/units, university management, a sustainable development network with student bodies, external stakeholders, experts, government bureaus, as well as NGOs and sustainable communities. Spaces for dialogue, deliberation, and collective decision-making on issues related to sustainability among different stakeholders are urgently needed. This condition exactly echoes Wals and Corcoran’s (2004, p. 224) argument that what “education for sustainability above all means is the creation of space for social learning. Such space includes: space for alternative paths of development; space for new ways of thinking, valuing, and doing; space for participation minimally distorted by power relations; space for pluralism, diversity, and minority perspectives; space for deep consensus, but also for respectful disagreement...and differences; space for autonomous and deviant thinking; space for self-determination; and finally, space for contextual differences.”

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Chapter 10

The Sustainable Development of Indigenous Peoples' Education in Taiwan

Shih-Tsen (Nike) Liu, Yu-Ling Hsu, and Wen-Hui Lin

The indigenous peoples of Taiwan have been recognized around the world since they sang the theme song of the 1996 Olympics in Atlanta, *Return to Innocence*. The beautiful voices of the Amis were highly praised by the international community, yet their success was followed by the controversial issue of indigenous peoples' copyright. The Amis wished to be treated with the respect they deserved from foreign music companies, a goal that indigenous peoples in Taiwan have been yearning for during hundreds of years of mistreatment experienced through different periods of colonial culture.

The Amis are gifted singers and dancers who are well-known for their oceanic culture. In addition to Amis, there are 13 other recognized indigenous tribes in Taiwan. These include the Bunun people, who regard themselves as guardians of the Central Mountain Range. The Tami (or the Tao) have resided on Lanyu (Orchid Island) for centuries and have always shown great respect for the ocean. The Sedig people, most of whom live in Nantou County, were officially recognized as the fourteenth tribe in Taiwan in 2008, and they are famous for delicate facial tattoos, skillful weaving, and excellent hunting skills. In addition to the existing 14 official aboriginal tribes on the island, there are still a great number of tribes waiting to be recognized by the government.

Taiwan is a melting pot of various peoples. Due to its unique history, Taiwan is not only home to indigenous peoples, but also to Taiwanese and Hakka who were early immigrants from China, Mainlanders who retreated to Taiwan with the KMT government, and newer immigrants who married Taiwanese spouses and moved here from Southeast Asian countries. Obviously, Taiwan is an island full of rich and diverse cultures.

Since the twentieth century, the world has been concerned with several vital issues like human rights, social justice, multicultural education and sustainable development. Furthermore, one can tell from several conventions of United Nations

S.-T. (Nike) Liu (✉) • Y.-L. Hsu • W.-H. Lin
Graduate Institute of Environmental Education and Management,
National Taichung University of Education, Taichung, Taiwan
e-mail: liunike@ms3.ntcu.edu.tw

that the protection of aboriginal wisdom is crucial to sustainable development. It's not only an issue of preserving cultural diversity but is also related to indigenous people's survival. People can also adopt aboriginal wisdom while we design environmental education curricula.

Affected by such trends, many controversial but largely ignored issues regarding the indigenous peoples of Taiwan are still being disputed on the island. This chapter aims at first analyzing the difficulties encountered by the indigenous peoples in Taiwan in terms of economy, environment, and cultural education. Furthermore, this study will compare the education they formally receive at school to the informal education engaged in by organizations outside of schools. In addition, this study will focus on introducing the educational activities developed by these aboriginal tribes based on various local cases. Lastly, this study adopts the concept of the "learning tribe," which emphasizes local participation, in order to discover the most appropriate educational model for indigenous peoples to develop sustainability in the future.

Issues Encountered by Taiwanese Indigenous Peoples

On this beautiful island, indigenous peoples have largely existed in harmony with nature. Like many other aboriginal tribes around the world, many indigenous people view the earth as their Mother and other creatures as their brothers, and they respect nature with gratitude and awe. However, as Taiwan has experienced various colonial periods for more than four centuries, the life of the island's indigenous peoples has been greatly altered due to its various ruling empires' diverse policies. Because of this, a great number of tribes are currently on the verge of collapse. In order to make a living, indigenous peoples are forced to leave their birthplace and seek employment as laborers in the city, where their children often have difficulty adjusting. Without the protection of the indigenous peoples, nature may lose its balance; similarly, indigenous peoples cannot support themselves without the resources of nature. In this situation, issues start to appear one after another concerning the sustainability of aboriginal tribes in Taiwan in terms of "economy," "environment," and "cultural education."

First, this chapter will examine issues regarding the "economy" of indigenous peoples. In the 1960s and 1970s, Taiwan primarily focused on export-oriented industrial development, attracting a great number of indigenous people to work in the city. However, in order to meet the huge demand for laborers, Southeast Asian workers were also introduced, thus severely depriving indigenous people of employment opportunities. Some of the indigenous people then went back to their tribes to make a living. In the 1990s, the government began to promote tourism to bridge the gap between the urban and rural areas in terms of economy and life. Formosan Aboriginal Culture Village, a major amusement park in Taiwan, is one example: its buildings feature the architecture of nine of the aboriginal tribes on the island. Moreover, this amusement park arranges dancers from various tribes to regularly

perform in the plaza and invites the elders of indigenous tribes to show their traditional craftsmanship skills, such as sculpture, ritual, and weaving. Since the Formosan Aboriginal Culture Village is a commercial business venture, it had to introduce entertainment facilities to attract customers and the aboriginal dancers had to modify their performances to please the audience. In this case, these indigenous employees may experience a deep conflict between tradition and innovation.

In addition to the aforementioned economic development based on performances and displays, more and more indigenous peoples have decided to go back to their hometown to run eco-tourism ventures. Tanayiku of Mt. Ali Township is one example in which the construction of roads destroyed the local environment. Fortunately, a group of indigenous people volunteered to restore populations of the fish *onychostoma barbatula* and establish the first private tribal nature reserve in Taiwan. Furthermore, the revenue of this nature reserve is constantly increasing (Ji 2005). Nonetheless, as the number of tourists increases, local residents must change their lifestyle in regards to such things as caring for the environment, reconstruction after typhoons, the need for guest houses, and food sources. Therefore, it is necessary to take the impact of eco-tourism into consideration in order to achieve the sustainable development of indigenous peoples on the island (Yang and Ye 1996; Ji 2005).

From an “environmental” perspective, indigenous peoples’ ecological wisdom is quite in line with the concept of sustainable management. For instance, indigenous peoples believe in animism and that humans are a part of nature (Suzuki 1999). While making a living by collecting food and hunting, their behavior is strictly regulated by traditions, taboos, and the instructions of priests, which are beneficial in avoiding the excessive use of natural resources (Zhuang 2006).

However, the population of indigenous peoples is small. They belong to a great variety of tribes distributed throughout different areas. Though the government has designated some reserves for indigenous peoples, they overlap with lands classified as nature or wildlife reserves. Take national parks as an example; activities prohibited in the National Park Act, like hunting, may have an impact on indigenous peoples’ survival (Yang and Huang 2002). Furthermore, Taiwan has disposed of its nuclear waste on Orchid Island for 30 years and the canisters have now begun to rust (Zhuang 2006), potentially jeopardizing the lives of indigenous people on the island.

As for “cultural education,” the culture of indigenous peoples is primarily passed down verbally while written records are very rare. Education was traditionally received in the tribal assembly hall, where children would learn all sorts of knowledge and skills from their elders (Yang 2007). However, the colonial history of Taiwan has deeply affected indigenous peoples’ culture and religion. When the National Government fled to Taiwan and settled down on the island between 1945 and 1962, it adopted the policy of “making the mountains like the plains,” forcing aborigines to migrate from mountain areas to plains regions. Moreover, it focused on promoting the culture of the Han people, causing those cultures of indigenous peoples to fade away. From 1963 to 1987, the Taiwanese government placed more emphasis on national consciousness and persisted in promoting the education of teaching Mandarin, resulting in the disappearance of indigenous peoples’ native languages and culture. Activists of the aboriginal movement did not organize any

groups until Martial Law was abolished in 1987. Since then, aboriginal movements have been booming, calling for indigenous peoples' self-identity and the right to education, and thus indigenous education may continue to develop (Chen 2004).

Taiwan issued the Education Act for Indigenous Peoples in 1998, which provided indigenous peoples with schooling, curricula, teachers, and social education with funds and relevant resources. However, there are still many issues waiting to be solved. For example, finding enough qualified teachers is difficult and most of the substitute teachers in elementary schools or kindergartens cannot understand the local culture and are thus unable to offer suitable teaching methods and materials. Regarding the issues of indigenous education, the government has focused on policies of compensation, such as supplementing test scores, lowering standards, and providing funding; however, indigenous peoples wish for a multicultural education in order to eliminate racial discrimination through educational reform (Lee 2000).

Indigenous Peoples' Education in Taiwan

For nearly two decades, Taiwan has been launching various projects to promote indigenous peoples' education. Moreover, the Ministry of Education (MOE) and the Council of Indigenous Peoples of the Executive Yuan discussed and established regulations and projects for local education authorities to implement. In order to improve the education of indigenous peoples, the government gives indigenous students the privilege to study at schools and sponsors their tuition. In addition, the government provides indigenous students with extra opportunities to study abroad at public expense and encourages domestic colleges to establish departments and curriculums related to indigenous peoples.

In the process of socialization, the education of ethnic minorities may face a transitional dilemma. If they persist in their traditional viewpoints, they may lose their competitiveness in modern society. On the other hand, if they accept the education developed by the ethnic majority, they may risk losing touch with their culture (Han 2005). According to Mr. Yohani, the former Chairperson of the Council of Indigenous Peoples, tribal language preservation is the key to indigenous peoples' sustainable development. For this reason, MOE has included local languages in the official curriculum for elementary schools since 2000 in order to integrate indigenous language education into the general educational system. By promoting the mother tongue of indigenous peoples, their culture may be passed down to future generations.

Unlike other types of education, indigenous education requires unique expertise. When teaching in a community of indigenous peoples, it is essential for teachers to equip themselves with the capability and comprehension of multicultural or indigenous education. Therefore, the government provides indigenous peoples with opportunities to be recommended for universities with teacher education programs and offers teachers working in indigenous communities various workshops to learn more about ethnic culture. Furthermore, the government has established regulations to certify teachers of traditional crafts and has requested local indigenous primary

and secondary schools to first consider employing indigenous teachers, department directors, and principals.

Though the Taiwanese government spares no effort to improve indigenous education, the delivery of hardware and software resources is extremely costly, since most of the indigenous schools are located in hard to reach mountainous areas. By the end of 2011, the enrollment rate in higher education for indigenous students was 45 %, which is far less than the rate of 85 % for non-indigenous students. Therefore, since the budget of the government and schools is finite, support and assistance from society are necessary in order to renew the resources of indigenous schools.

In 2009, typhoon Morakot brought severe damage to Taiwan, causing 12 schools to completely collapse. With the help of the private sector, the reconstruction of the schools was achieved. For example, Delta Electronic Foundation promised to sponsor the school reconstruction project, helping a school in Kaohsiung City to design green buildings that are likely to impact the environment less by being environmentally friendly. Moreover, the design of its buildings took the elements of local culture into consideration, integrating the myths and legends of the Bunun into the architecture.

Additionally, the Caring for Indigenous Children Project of the Hanguang Education Foundation sponsored the indigenous soccer team of National Hualien Agricultural Industrial High School to promote the athletics of indigenous adolescents. The Foundation wished to attract more indigenous students to study in vocational high schools so that they can acquire useful occupational skills.

There are many other examples of corporations in the private sector funding rural schools with books, medical treatment, and computers so that indigenous students may benefit from multiple learning platforms. Nevertheless, in addition to the devotion of the public and private sector, indigenous peoples have to develop their own self-identity so that their sustainable education can be truly achieved.

Self-Developed Education of Indigenous Peoples in Taiwan

Due to democratic trends and multicultural awareness, different groups of indigenous peoples on the island have started to unite to organize educational activities on their own. Below, we introduce several well-known examples, developed by indigenous peoples themselves, categorized by the ages of the education recipients.

Childhood Education

The childhood education of indigenous peoples is composed of diverse elements such as language, music, traditional plants, and art. The best-known example of aboriginal childhood education may be Mr. Sakuliu's tribal classroom. Since 1997, Mr. and Mrs. Sakuliu and their people have been establishing tribal classrooms

throughout the community of the Paiwan people in Pingtung County. In addition to art creation, they introduce the indigenous culture to local schools and teach young children annual ceremonies/rites, hunting culture, ethnobotany, and farming. Mr. Sakuliu wishes to see that each tribe will have a classroom of its own to serve as a platform for the elders to pass down their wisdom and experience of life and society (Sakuliu 1998; Lin 2006).

The second example concerns a child named Lumasán, whose amazingly beautiful voice won first place in the Solo Section of the 2003 National Traditional Folksongs Competition. Inspired by the child's singing talent, a young Paiwan teacher named Camake Valaule decided to organize a choir that recruits aboriginal children to perform traditional indigenous folksongs. After years of working hard, Mr. Camake Valaule's choir has been widely recognized and invited to perform in many major events. Furthermore, the choir has recorded several musical albums of its own. Most importantly, the cultural heritage of indigenous peoples can be preserved in this manner.

Another Paiwan teacher, named Luo Chunfang, established an indigenous kindergarten in the downtown of Taichung City. For years, Ms. Luo spared no effort to introduce the curriculum of indigenous culture into childhood education so that indigenous families working in the urban area could have an environment to educate their next generation on their tribal origins. Ms. Luo's teaching and practices are truly a role model for indigenous childhood education.

Adolescent Education

Compared to young children, what adolescents may need more is to build up an ethnic consciousness of their own and develop a self-identity in the group. For the time being, most indigenous people place great emphasis on the value of life and thus focus on organizing activities related to environmental education in different tribes.

The earliest example of this may be the Paiwan Hunter School, founded by Sakinu, a policeman, in Taitung. He and his people established a youth hostel and the Hunter School at their own expense in 1994, aimed at providing homeless Paiwan children a place to receive traditional education in the tribe so that they may learn to restore their ancestors' culture in the future (Fu 2006).

Recently, the Atayal people have begun to hold youth camps to teach adolescents about ecology and the environment. For example, Ashong has been cooperating with a mountain climbing club in Yilan County since 2011. During the 3-day camp, participants are taught skills needed by hunters, such as constructing simple shelters, collecting wild vegetables, building a fire, and setting traps. Participants have the opportunity to practice these skills on their own and discover how indigenous peoples get along with nature. Moreover, they will learn more about issues like eco-tourism, leave no trace (LNT) practices, and environmental ethics through different activities.

Adult Education

The main objective of indigenous adult education is to foster life skills. Indigenous adults have to learn how to make the most of natural resources within their traditional lifestyle while following the social regulations of their tribes. Moreover, they have to learn how to modify their cultural wisdom to also suit the needs of a modern society.

In the past, the general public used to misinterpret the hunting tradition of indigenous peoples, causing their hunting activities to be regulated by law. Not until recently have people started to understand and respect the traditional wisdom of indigenous peoples. For example, a large percentage of mountain guides and patrolling officers are indigenous peoples, and their tracking skills are always of great help in mountain rescue events. In other words, indigenous peoples' hunting skills can be extremely valuable to society. Therefore, indigenous adult education will help young aborigines to acquire these skills to become professional mountain guides in the future (*Common Wealth Magazine* 2012).

Dress-making can be considered another kind of indigenous adult education with both ethnic consciousness and cultural heritage. When it comes to indigenous dress-making, Yuma Taru may be the most renowned artist. Unlike most of her people, Yuma Taru has a college degree and a stable job in the public sector. However, in order to restore the traditional craft of weaving, this Atayal girl decided to give up her job and come back to her home town to establish Atayal Weaving Culture Park. Now, for over 20 years, she has been working with a large group of Atayal women to develop the community's industry through weaving. Furthermore, she wishes to establish the first domestic Atayal Weaving School within her tribe.

Elder Education

It is said that the elders are the treasure of a family. In a traditional indigenous tribe, the elders are often highly respected because their experience and wisdom of life keeps their people existing in harmony with the environment. Therefore, many decisions cannot be made until the tribal elders hold a meeting to discuss them thoroughly. The culture of indigenous peoples is often passed down by a tribe's elders in an oral manner. For this reason, the change of times and social structure may be causing a culture gap. Nevertheless, the elders have a lot of valuable cultural heritage stored in their memories. So far, so-called indigenous elder education has mainly concerned the teachings passed down by indigenous elders.

Worth mentioning is an example of the Amis in Taitung County. Since 1995, Panay and Kunui, the two Amis tribal chiefs, have attempted to produce Tapa cloth based merely on the memories of the elders. That is, by restoring the craft of making Tapa cloth, the Amis elders have this rare chance to pass down their skills and knowledge to the next generations, even after the culture gap occurs.

After the Kbaran was officially recognized as the 11th aboriginal tribe on the island in 2002, more and more people started to realize that there were still a number of Pinpu tribes waiting to be discovered. The Kbaran is working hard to preserve its unique craft of weaving banana stem fibers. For example, some elders of the Kbaran, like Ibay, established a workshop in Hualien County and taught their people how to produce cloth out of banana stem fibers. Their devotion has left the Kbaran with a priceless cultural heritage that deserves people's admiration and respect.

The Sustainable Education of Indigenous Tribes

Due to its unique history, the cultural education of Taiwan has been deeply affected by the Han people, the Japanese, western society, and modernization, and so the system of official education does not suit the needs of indigenous peoples' sustainable education. To achieve the sustainability of indigenous peoples' education, introducing the concept of "local participation" into the curriculum design and promoting the development of "learning tribes" is essential. In other words, the traditional wisdom of indigenous peoples has to be included as a vital element of their education.

A great number of aboriginal tribes have been developing various industrial activities of their own for the purpose of improving their living environment. In the operation of learning tribes, indigenous peoples and tourists have the chance to experience adventure education. The earliest and the most successful case of adventure education concerns "environmental conservation," such as fish restoration and recreational farms. In this case, tribes will have to establish self-regulated agreements to discuss issues of land ethics, culture and ecology, and tribal order. For example, the ownership of land must be shared by the tribe and all shops have to be run by residents of the tribe only. If any family cannot afford to send their children to school, the tribe should shoulder the responsibility for education together and establish a fund for their indigenous children to receive advanced education. Another example of eco-tourism is the adventure education of "tribal delicacies." Since Taiwan is promoting its culture of gourmet food, indigenous peoples may organize activities integrating collecting wild vegetables and making them into local delicacies. Tourists may learn to appreciate the lifestyle of indigenous peoples and the perspective of using natural resources in a sustainable way. In such a manner, the local culture of indigenous peoples may develop and prosper simultaneously with its economy (Wang 2001).

Due to poor resources, differing capabilities, and group consensus, not all aboriginal tribes in Taiwan can be transformed into "learning tribes" to create their own education for their traditional culture. Nevertheless, indigenous peoples have gradually accumulated their tribal experience of education to serve as a reference for other regions. Education requires the involvement of all tribal members, including young children, adolescents, adults, and elders, for they are all the carriers of traditional knowledge and culture. Like the fishing and agricultural villages of the Han people, aboriginal tribes are experiencing serious problems dealing with population loss.

Most tribal residents are old people or young children. In this case, intergenerational education will become the key to aboriginal tribes' sustainable development. Capable indigenous elders may be employed to teach young children and adolescents if they are willing to do so. In this way, the indigenous elders will be inspired to contribute to the community while the issue of the culture gap can be solved indirectly.

While facing the challenges of localization, reviving the knowledge and culture of indigenous peoples and improving their competitiveness is vital. In the past, tribes were closely connected with their lands, which was a key element for why they were able to develop an education of their own. Nevertheless, the aborigines conducting educational activities were those who had a stable, full-time job in their hometown. Nowadays, young indigenous people are forced to work in places other than their hometown, encountering the harsh reality that the knowledge and skills that they have received are often of little use in a modern society.

Asymmetric knowledge can upset the balance among different ethnic groups in terms of social status. Apparently, the issue of education imbalance still exists in mainstream society, and most of the government departments remain unaware of the unique knowledge system of the indigenous peoples on the island. Indigenous education does not share the same system of written language and textbooks of the modern society; instead, indigenous peoples receive their education with their tribes as the classroom and learn life skills from their elders as teachers. In other words, indigenous peoples carry on the objectives of education in their own way. However, since the government has tried to intervene but has ignored the differences in indigenous education, the knowledge system of indigenous peoples may be forced to fade away, and an education system that discriminates against indigenous culture may become dominant instead. What deserves people's thought and concern is that if the government of Taiwan places great emphasis on westernized education, it will certainly be unable to support the indigenous peoples in developing a sustainable cultural education of their own.

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Chapter 11

ESD Projects, Initiatives and Research in Hong Kong and Mainland China

Eric Po-Keung Tsang and John Chi-Kin Lee

From EE to ESD in Hong Kong: An Overview

Environmental education (EE) in Hong Kong has always existed in the margins (Gough et al. 2011), with environmental studies/science never studied as a formal subject in the primary or secondary curricula. Instead, environmental elements permeated various subjects such as General Studies in the primary curriculum and Geography and Science subjects in the secondary curriculum. This was supplemented by informal and non-formal means including purposeful field studies and visits to sites of environmental interest. In response to a call for EE and education for sustainable development (ESD) guidelines, the Hong Kong government/HKSAR published EE guidelines for schools in 1992 and 1999, respectively. In 2001 and 2002, the Education Department worked with other agencies to produce reference guides for life-long EE and ESD learning (Lee 2011). The major breakthrough for EE/ESD in schools, however, came in 1999 through the establishment of the Green School Award (GSA), organised by the Environmental Campaign Committee in collaboration with the then-Education and Manpower Bureau (EMB). The scheme has now reached its tenth anniversary and has already made a mark on the advancement of EE/ESD in Hong Kong. This chapter will concentrate on Hong Kong's flagship EE/ESD projects, comparing it with its analogue in mainland China.

E.P.-K. Tsang (✉)
Department of Science and Environmental Studies,
Hong Kong Institute of Education, Hong Kong, Hong Kong
e-mail: etsang@ied.edu.hk

J.C.-K. Lee
Department of Curriculum and Instruction, Faculty of Education
and Human Development, Hong Kong Institute of Education, Hong Kong
e-mail: jcklee@ied.edu.hk

EE in Hong Kong schools has been supported by the community-based Environmental Campaign Committee (ECC) and its core programs – particularly the Hong Kong Green School Awards (HKGSAs) and the Student Environmental Protection Ambassador Scheme (SEPAS) – which have been in place since at least 2000. Theoretically, it would seem likely that schools would be well placed to implement the New Secondary School Curriculum (NSSC), which requires that EE be included as a core Liberal Studies subject. However, research into these programs has revealed many unanswered questions about the readiness of schools to use this opportunity to optimum effect. Similar to many other countries, Hong Kong has struggled with EE development in schools. In the early 1990s the territory's Curriculum Development Council (1992) published non-mandatory *Guidelines on Environmental Education in Schools*, which marked the beginning of a new era. The community-based ECC was also established in 1990 to promote public awareness of environmental issues and to encourage the public to contribute actively towards a better environment. As Stimpson (1997, p.345) argued, “In the face of considerable air and water pollution problems, the territory has shifted from a largely technocentric, engineering/environmental health approach to solving environmental problems to one which stresses community education as a linchpin”. The ECC currently supports EE through its core programs: the GSA, the SEPAS, and the Waste Separation and Recycling Scheme in Schools. It also provides funding for minor works, such as the construction of “green roofs”, renewable energy schemes, and the provision of gardens. The flagship program is the GSA, which is designed to encourage schools to formulate a school environmental policy and management plan that works towards enhancing environmental awareness, developing environmentally responsible attitudes, and promoting green practices among school managers, teachers, non-teaching staff, students, and their parents. The Ambassador Scheme aims to enhance students' environmental awareness and develop their sense of responsibility towards the environment by means of student-directed training, activities, and awards.

English-language research on EE programs in Hong Kong is relatively sparse. Two studies in the late 1990s reported how schools were engaging with EE (Lee 1997) by encouraging receptive teachers to introduce EE as a curriculum change (Lee 2000). More recent work has generally focused on case studies of schools based on short-term EE/ESD projects (Lee 2009; Lee et al. 2009b) – there has been little overview research, apart from an earlier evaluation of the ECC's GSA program (Tsang 2006).

A significant curriculum change occurred in Hong Kong in the early twenty-first century. In September 2009, one of the four compulsory subjects in the New Senior Secondary Curriculum, containing a significant EE component, is Liberal Studies. This was an optional subject for nearly two decades, and by making it compulsory, the Curriculum Development Council (2007) aims to ensure that all students, as they complete their formal schooling, develop an understanding of the major issues confronting society and are equipped with the capabilities and thinking skills to make informed, critical judgments about these issues. Rather than the cross-curricular, whole-of-school approach of the earlier guidelines, the new approach

encompasses elements of science, the humanities, and the liberal arts to provide all students with some degree of breadth in their senior secondary studies.

In addition to the involvement of universities and tertiary institutions, many non-governmental organisations are promoting EE/ESD in Hong Kong schools. Among these is the recently established UNESCO Hong Kong Association Limited, which offers a review designed to help local schools join China's ESD Exemplary Schools. Four conditions must be fulfilled to become an exemplary school: the principal and the school management must command a good understanding of ESD concepts and adopt them in school operations; at least 60 % of the teaching staff must be able to demonstrate identifiable and typical experiences in areas such as curriculum and teaching; the school campus design must display adequate ecological awareness and a school culture conducive to ESD; and the school's education must serve society (http://www.unesco.hk/index_topic.php?did=192441&didpath=/192114/192118/192139/192441, accessed on 4th August 2012). In addition, the ESD Learning Program provides schools with a choice of themes including built environment, environment, tourism and hospitality, mental and behavioural health and life education (primary school groups only). (http://unesco.hk/index_topic.php?charset=eng&did=214853&didpath=/192114/192118/192136/214853, accessed on 4th August 2012).

This shift of environmental education concepts from the margins to the core curriculum of secondary school academics is a significant change for Hong Kong teachers and schools. How prepared are they for this change, given the two decades of ECC programs designed to support environmental education in schools? Beginning in the late 1990s, with the growing concern over sustainable development in Hong Kong and influenced by terminology shifts in other countries, Hong Kong's EE has slowly but surely moved towards ESD. Subsequently, the core EE projects have been modified to accommodate this change.

From EE to ESD in China: An Overview

Since the 1972 Stockholm Conference, China has been paying close attention to environmental education. After the 1992 Rio Earth Summit, the principle of ESD started to penetrate mainstream education in China. The term 'ESD' was first officially used in the white paper of China's Agenda 21 in 1994, 'Education and Capacity Building for Sustainable Development' (SPC and SSTC 1994).

The development of EE in China can be divided into four stages. The preliminary stage was from 1973 to 1983 (Wei 2003; Meng and Wei 2003). The second stage was from 1983 to 1992, when environmental protection laws and regulations were developed and basic EE programs and courses were established (Tian 2008). The third stage was from 1992 to 1996, at which time many began to integrate the concept of sustainable development into EE (Shen 2008). In the fourth stage, from 1997 to the present, EE has been practically extended to include ESD. Sustainable development concepts have been incorporated into formal and informal education to

ensure that both students and the public are educated. Since 1996, EE was upgraded to ESD in the continuing effort to educate students and the public (Propaganda Department of Communist Party of China 1996). The *Action Outline for Sustainable Development in China in the Early twenty-first Century* (State Council of China 2003) stated that sustainable development will be ingrained at all educational levels to strengthen student and public awareness of the scientific concepts and cultural capacities related to sustainable development in China. In 2003, the Ministry of Education of China (MoE) issued two official documents on implementing environmental education in primary and secondary schools. The first was *Special Curriculum Outline for Environmental Education in Primary and Secondary Schools* (Ministry of Education 2003a). Primary students to seniors in high school were separated into four categories: primary grades 1–3, primary grades 4–6, high school juniors and high school seniors. Students were to receive specific knowledge about environmental issues based on their levels. The second official document was the *Implementation Guidelines for Environmental Education for Primary and Secondary Schools* (Ministry of Education 2003b), published with the support of WWF-China and British Petroleum (BP). Students are encouraged to understand the advantages of sustainable development for population, the environment and social development. China's EE/ESD policies began with these documents.

Numerous programs and projects have been implemented to promote ESD in China. The first is 'Project Hope', initiated by the China Youth Development Foundation (CYDF) in 1989. It provided support and funding for students who live in rural areas and assisted in the building of schools and the training of teachers. By the end of 2008, Project Hope had assisted about 3.5 million children from rural areas and built over 15,000 Hope primary schools (CYDF 2008). Despite being successful for more than 15 years, some Project Hope schools have been withdrawn due to limited teacher supply, improper locations and a lack of overall planning (Choi et al. 2009, p. 30).

The second project is the Environmental Educators' Initiative (EEI), which began in 1997 among a network of 21 EE/ESD centres in key normal universities across China over three phases until 2007, involving three parties: the Ministry of Education, WWF and BP. These EE/ESD centres helped establish pilot schools that launched school-based curriculum development and green school projects, reinforced research on ESD in higher education institutions and promoted the training and implementation of National Environmental Education Guideline (NEEG) (Lee 2010b).

The third project was the United Nations Educational, Scientific and Cultural Organization's (UNESCO's) China ESD project – formerly known as the China Education for Environment, Population and Development project (EPD). The EPD project was initiated in 1998 and in a number of provinces that were under the supervision of the Chinese National Commission for UNESCO (NatCom China). In 2005, the EPD project was renamed the ESD project (also known as the ESD-EPD project) by NatCom China (Wang 2007) to promote the UN Decade of Education for Sustainable Development (DESD). The ESD project focused on the overall development of students and promoted quality- rather than examination-oriented education. Quality education emphasises moral, physical, psychological,

intellectual and technological education. Its target is similar to that of ESD, which led to the combined promotion of quality education and ESD. As of 2008, over 500,000 students had participated in this project in 14 provinces (Wang 2007).

The fourth project was the 1996 SEPA Green School Program. It was initiated by the Propaganda Department of the Communist Party of China (PDCPC), the MoE and China's State Environmental Protection Administration (SEPA) (now the Ministry of Environmental Protection or MOEP). SEPA was a key program promoting science, education and sustainable development on a national level. A number of activities have been implemented, such as green journalism and campus environmental building and management, which aimed to increase teachers' and students' environmental awareness. Moreover, the activities helped in promoting the concepts of sustainable development and green school management. As of 2009, over 40,000 schools and kindergartens had participated in this program, with 705 institutions awarded 'Green School' status. Today, this program has become a model EE project for students.

Implementation and Administration of ESD Projects

Regarding other ESD projects, the availability of adequate resources is the key to success. In Hong Kong, a partnership model was adopted, as described by Tsang (2009). The major organiser was the Environmental Campaign Committee (ECC), established in 1990 and funded by the Environment and Conservation Fund (ECF). The flagship projects – the GSAs and SEPASs – are administered by the ECC, whereas the training programs are provided by environmental non-governmental organisations (NGOs) and academic institutes. This holds true for the monitoring and assessment processes involved. According to Tsang's review, this arrangement was well-received by the participants in both programs. In contrast, China's Green Schools Project – an initiative of the MoE funded by SEPA – started in 1996 and is based on the international environmental management concept, ISO 14000, as well as being informed by European 'eco-schools'. Since 2000, the project has been run by the Centre for Environmental Education and Communications (CEEC) and their local networks. Its key focus areas include whole-school environmental management and protection, EE curricula and professional development and the greening of school grounds. Schools must undertake a series of steps before applying for Green School awards, which are categorised through a staged development process from municipal, to provincial and then national levels. To date, more than 15,000 schools have received one or more award levels as part of this program.

EE/ESD in Hong Kong and China: Contextual Influences

We would like to note that there are three major sources of contextual influence on EE/ESD in Hong Kong and China: NGOs, the basic curriculum reform and the Confucian cultural heritage.

In Hong Kong, apart from the efforts of the ECC and the government bureau, the NGOs – “green groups” such as Green Power, WWF and the Conservancy Association – have played an important role in EE promotion through non-formal activities in schools and communities. While these environmental NGOs might share the broad vision of promoting conservation and sustainability, they may differ slightly in their ethical positions with regard to environmental issues. Lam and Lee (2006) undertook an analysis of the ethical positions reflected in a selection of the publications of green organisations. Taking the issue of wildlife and the wilderness as an example, the Conservancy Association highlighted the importance of the Deep Bay wetland as home to “wild animals”, “environmental conservation” efforts and “sources of food and raw materials”, but the underlying arguments and their inter-relationships appeared to be neglected (pp. 138–139). The discussion of possible conflicts between living and non-living components in the instructional package for the Mai Po Wetland, published by WWF, was also essentially weak. Regarding animal rights, Green Power highlighted the importance of the wilderness in relation to animal rights. Nonetheless, as Lam and Lee (2006, pp. 148–149) argued, “There is the tendency to take it for granted that it must be right to protect animal rights... and so forth. However, such standpoints are debatable when one questions if human rights are respected too, what good qualities are associated with the rare species and why should one care more for the future than the present generation”. This raises the importance of addressing environmental ethics in EE/ESD project activities. In China, NGOs also exert some influence on the development of EE/ESD project initiatives. The Nature Conservancy and Rare Conservation (RARE) have introduced EE ‘Pride’ projects, and Hong Kong’s Partnership for Community Development has focused on ‘affective nature education’ while other international environmental NGOs, such as WWF, have brought in resources and innovative EE concepts and strategies (Li and Dong 2010, pp. 11–12). Despite these achievements, the quality of EE must be improved by enriching cultural and ethical perspectives and enhancing its impact through “spiritual environmental protection” (Li and Dong 2010, p.15). Moreover, an international NGO has registered the Environmental Education Media Project for China (EEMPC) (<http://eempc.org/all-projects/index.html> accessed on 5th August 2012), which aims to arouse public environmental awareness and access to EE materials (Sayers 2003).

A study of the significant life experiences of fourteen environmental educators in EEI revealed three dominant themes: serendipity, an attitude or mentality of “making peace with the situation” and a strong sense of responsibility for the environment and for carrying out EE work (Ji 2011). As Ji (2011, pp. 116–117) noted, China’s basic educational reform was “a significant context [from which] to understand these educators’ involvement in [EE] work. It provided these participants a platform for action in [EE]; offered a way to formalise [EE]; provided a foundation from which people could apply EE theories of sustainability, pedagogies/methods for teaching (such as inquiry learning, critical thinking, cooperative learning and experiential learning) and approaches to informal settings; and finally helped to sustain [EE] in schools”. This echoes the influence of the curriculum reform in the early new century in both Hong Kong and China. Some schools have been involved

in EE/ESD and green school development through a platform of school-based curriculum development means such as project learning, life events, life-wide learning, service learning and activity teaching (Lee 2010a; Lee et al. 2010).

The societies and culture of China and Hong Kong – similar to other Chinese communities, despite their different historical paths of development – have been shaped by the Confucian cultural heritage. Regarding the values pertaining to EE and ESD, the Confucian concept of “harmony”, which underpins the practices of “acceptance, tolerance, mutual respect, equality and patience”, has been given “great importance by the Chinese government in its attempts to promote the stability and sustainability of the country”. This could, in turn, have implications for sustainability education (Feng and Newton 2012, p. 341). In Hong Kong, the 2005 Policy Address was titled “Working Together for Economic Development and Social Harmony” (<http://www.policyaddress.gov.hk/2005/eng/pdf/speech.pdf> accessed on 5th August 2012) and in the same year, Chinese President Hu Jintao advocated the concept of “building a harmonious society” and shifted “China’s focus from economic growth to overall societal balance and harmony” (From the socially critical perspective of ESD, the emphasis on harmony could be somewhat conservative and ineffective in that it cannot realise the political ideals of the three 3Rs: “refusal, reconstruction, redirection” (Gough 1997, p. 154). Nonetheless, the Chinese notion of “harmony” carries an implicit collectivism based on the moral consideration of individuals who can provide potential pragmatic and participatory decision-making and collective action that allow Chinese educators and learners to create a sustainable society as a public good (Feng and Newton 2012, p. 350).

Relevant Research on EE in Hong Kong Schools

Research on EE programs in Hong Kong schools is relatively sparse. This brief review of select English-language research focuses on relatively recent (i.e. chiefly since 2000) relevant examples. Some of this literature deals directly with EE in Hong Kong schools, whereas other examples refer to the broader institutional climate in which school-focused curriculum reforms are expected to take place, and which might affect schools’ uptake of ECC programs. Before 2000, a number of survey, questionnaire and case studies conducted by John Chi-Kin Lee (1996a, b, 1997, 1999, 2000) demonstrated the difficulties experienced by both primary and secondary schools that attempted to implement the Hong Kong Curriculum Development Council’s (1992, 1999) *Guidelines on Environmental Education in Schools*. Lee (1997) drew particular attention to the need for improved resource provision and inservice education and, later, to the significance of teachers’ receptivity to the curriculum changes embodied in the *Guidelines* (Lee 2000). He found that variables such as the perceived non-monetary cost-benefit of implementing the guidelines, their perceived practicality and perceptions concerning the levels of school and other support were predictors of teachers’ dispositions towards promoting EE. He also found that internal school organisational factors were significant in

shaping teachers' receptivity to the *Guidelines*. Lee's conclusions were supported by Philip Stimpson (1997, 2000), who also drew attention to the situation in teacher education, which to a large degree paralleled that in schools and seemed to be ineffective in promoting or facilitating change.

Eric Tsang (2003) described the self-assessment criteria required by the ECC for Green School Award applicants, and Benjamin Leung (2003) provided a reasonably detailed account of one school's experience of participating in this scheme. Tsang's (2006) evaluation of the Green School Award program drew attention to many of the same difficulties identified in earlier studies of attempts to implement EE in schools, such as increased teacher workloads, resource provision issues and the specific need for in-service education. Tsang also recommended that longitudinal research be conducted on the environmental achievements of students over time.

Alice Tang's (2004) doctoral research investigated the development of environmental citizenship in Hong Kong students from senior primary to university levels, including the motivations and constraints affecting their commitment. Tang conducted questionnaire surveys with students and teachers, together with telephone interviews with people known for their strong environmental commitments. Among the propositions that Tang's research appears to support are:

- Most students exhibit low levels of interest in 'green behaviour' and participating in voluntary environmental activities.
- Limited commitment is related to social mistrust: students do not believe that others will have environmental commitments, and are thus reluctant to sacrifice self-interest and act for the public good.
- The main source of environmental knowledge is the media rather than school, but schools with a strong green culture can nevertheless reduce the impact of the social mistrust that deters environmental commitment.

Tang's last proposition converges with some of the findings from Lee et al. (2006) comparative studies of EE trends and issues regarding sustainability in Hong Kong and China, particularly Lee's (2009) case studies of four Green (primary) Schools in Hong Kong. One of Lee's findings deserves closer consideration by the ECC; specifically, the differences between principals', teachers' and students' perceptions of a Green School, with particular reference to students' roles in and their contributions to improving the environment and the community. For example, some principals and senior teachers saw Green Schools as being not only concerned with the environment, but also with spiritual health, suggesting that EE could be integrated with religious, life and health education. However, many Student Environmental Protection Ambassadors (SEPAs) saw their roles in more technical terms, such as patrolling the school gardens to clear weeds, or raising other students' environmental awareness by reminding them to recycle their plastic bottles and aluminium cans or use fewer plastic bags. This suggests that, at the school level, more attention should be given to constructing a *shared vision* of a Green School among administrative staff, teachers, students, parents and the wider community.

Tang explicitly draws on ‘significant life experiences’ EE research without acknowledging the numerous critical commentaries on this approach (e.g., Dillon et al. 1999; Gough 1999a, b, c; Payne 1999). The effect of Hong Kong’s broader educational reforms on the development of Green Schools is obvious. For example, EE could be promoted as a vehicle for realising the learner-centred approaches espoused in the educational reforms. If the concept of sustainable development or some of the goals of EE could be enlisted as core educational goals, then EE and the development of Green Schools would be more promising. Such a socially critical change, however, should be conceived not only as an exclusive EE agenda, but also as a broader social agenda in which different parties – government, NGOs, teacher education institutions, parent-teacher associations, universities and businesses – work together to realise this vision. The latter point emphasises the need to consider some of the research on the practical implementation of Hong Kong’s broader educational reforms. For example, Yuk-Fan Ho and Wing-Kwong Tsang (2008) suggested that Hong Kong’s education reforms are producing a “besieged” teaching profession and “corroded teachers’ selves” that create further conditions for teachers’ resistance to curriculum developments and innovations. Similarly, Yin Cheong Cheng (2009) analysed what he calls the “reform syndrome”, “bottle-neck effects” and the ways in which they have influenced teachers and school education in the last 10 years. From this he derives a number of key issues for policy-makers, educators and stakeholders in Hong Kong to address if the reforms are to be sustained.

Ping-Man Wong and Alan Chi-Keung Cheung’s (2009) study of school heads’ support for Hong Kong’s curriculum reforms provided evidence that, although the reforms are supported among school heads, senior teachers and teachers, there is a gap between the views of senior management teams and ‘frontier’ teachers. This gap is clearly worth probing in the case of the ECC’s agendas, as this may be the most obstructive factor to the implementation of their programs. Shun Wing Ng’s (2009b) research addressed this gap directly in asking why principals and teachers respond differently to Hong Kong’s curriculum reforms. Ng’s data, produced from focus group interviews, help to explain the discrepancy in attitudes about these two stakeholder groups through reference to insufficient knowledge, lack of support and consensus and the top-down initiation of the reforms. Ng’s recommendations for strengthening professional development programs and developing a culture of collegiality and collaboration are strategies that are clearly adaptable to ECC programs. However, these recommendations must also be interpreted in light of Lee et al. (2009a) research on the differences between principals’ influences on curriculum, teaching and learning in primary and secondary schools. Edmund Law’s various studies on the effect of school-based curriculum development on teacher development, school management and policy making are similarly valuable for anticipating the adoption of curriculum initiatives (e.g., Law and Galton 2004; Law et al. 2010; Law and Wan 2009). Another relevant line of research for the ECC is exemplified by Ng’s (2009a) exploratory study of how young people are transformed into active and participatory citizens. Such studies illuminate the ways in which students might develop a strong sense of environmental responsibility and competence through social inquiry and political action.

Selected Recent Research on ESD in Hong Kong

The projects, particularly those based in formal education, draw mainly on the works of Cogan and Derricot (1998), Scott (2007), Webster (2004) and Gough and Gough (2004), have also attempted to adopt the multidimensional citizenship model (Tsang 2003). The capital-based descriptors (natural and built, human and social) and leadership, together with the steps on the journey (*initial exploration, some assimilation, more strategy and towards restorative*) outlined by Scott (2010) provide “a set of ideas for schools (with others) to think about and use in their own planning and development – in their own way” (Scott 2010, p. 15). In this case, the “others” are the researchers and the ECC, who will work with the schools to further develop EE and sustainability. The Green School project, upon its inception in 1999, was based on the modified multi-dimension citizenship model suggested by Tsang (2003). The initial assessment criteria were based on Tsang’s model (2003), but after a 2010 evaluation by Tsang and Gough, the recommendation was made to shift the framework towards the Australian sustainable schools model to provide more flexibility for participating schools.

As previously noted, little research on EE programs in Hong Kong has been reviewed, and all of it pre-dates the shift from EE being governed by non-mandatory guidelines to it being part of the core curriculum of secondary schools. Thus, the study by Tsang and Gough provides significant new data for scholarship in the field of EE in Hong Kong, and informs teachers and schools that are readying to adopt the innovation with regard to the aspects that are pivotal in successfully implementing the new subject with its EE core. Although the ECC programs have been available to support teachers for over a decade, teachers currently do not feel well supported in implementing the Liberal Studies curriculum, and the ECC programs do not currently meet the needs of many schools due to a lack of information and/or information in languages other than Cantonese. Many believe that the programs are competitions rather than awards, and that there is insufficient time and/or resources for teachers to properly engage.

Finally, the findings of this study provide significant comparative information for scholars in other countries where EE is also being incorporated (or considered for incorporation) into schools’ core curricula. Programs such as Green Schools are seen as an important part of EE support (Tsang et al. 2010).

Tsang and Gough’s qualitative study involved the following: surveys conducted in all of Hong Kong’s primary and secondary schools; focus groups and individual interviews with over 200 key stakeholders including principals, teachers, students, members of the ECC and other significant individuals; and a content analysis of school curriculum documents and ECC program materials. Unlike previous EE research studies conducted in Hong Kong, the surveys and interviews in this study were conducted in both Cantonese and English.

The project was executed in six overlapping stages:

- an online survey was designed to gather information and identify schools and individuals to participate in this study.
- questionnaires and interview questions were developed for the focus groups. These were then tested and refined to improve validity and reliability.

- interviews were conducted at the schools while a supplementary survey was faxed to secondary schools to elicit additional schools that might participate in focus group interviews.
- the interview and survey data were analysed to determine which themes were predominant and to identify common areas where the ECC projects can assist schools in meeting the NSS curriculum.
- an implementation plan for modifications to the SEPAS and HKGSA was developed to tailor these schemes to schools' requirements for assistance in teaching the NSS curriculum.
- recommendations were provided to the ECC based on the findings of this study. This includes proposals for revising existing educational materials and the production of supplementary materials for the SEPAS and HKGSA.

The major data sources for this study were generated between December 2009 and June 2010. They include the responses to the school surveys, the transcripts from focus groups and individual interviews and the findings of the document analysis.

The findings from previous research studies indicate that Hong Kong's experiences with the implementation of EE programs are similar to those reported elsewhere (e.g., Gough 2006; Henderson and Tilbury 2004; Scott 2008). The implementation of EE in school curricula is usually voluntary. Even with the support of projects such as Green School Awards and Student Ambassador programs (which are almost invariably run by environmental rather than educational organisations), much relies on the enthusiasm of individuals. However, more broadly-based support is needed within schools if such initiatives are to be sustained. Many of the findings from this study are congruent with those of earlier studies. Schools, both primary and secondary, are generally very enthusiastic about engaging in a wide range of environmental activities – through ECC programs, other organisations and self-generated events – and many already consider themselves to be well on the way to being “green campuses”. In terms of Scott's leadership (2010) descriptors – the respondents ranged from “initial exploration” through “some assimilation” to “more strategy” with probably only one or two respondent schools approaching “towards restorative”.

The teachers noted that they face and forecast a number of difficulties in implementing EE, particularly under the NSS curriculum. While some teachers were of the opinion that the environmental components of the NSS curriculum would not be difficult to teach because so much material was already available in the media, others expressed concerns about the accuracy and depth of this information for teaching purposes. In addition, teachers also expressed concern that the environmentally related subjects would be taught solely with the intention of passing public exams, and that the students' attitudes and behaviour would not change without a strong practical element to the courses. This is proving a challenge for teachers, students and the examination writers.

Other difficulties named by the teachers include:

- an insufficient number of programs to support teachers and students,
- lack of sufficient background information to support the teachers,
- a lack of coordination and cooperation between the teachers of the different KLAS and OLE within the schools,

- lack of resources,
- inadequate funding and
- not enough time for students and staff to participate in programs, or for staff to prepare new teaching materials.

The schools tended to work in isolation and many expressed interest in more opportunities for sharing experiences between schools and exchanging information about how to organise ECC programs and other activities. Language emerged as a significant barrier to participation in ECC programs for some schools. Some participants mentioned being excluded because information is only made available in Cantonese and activities are only for Cantonese speakers. Indeed, the SEPAS activities information on the ECC website is only in Cantonese, as is the information for preschools regarding the HKGSA.

With respect to the HKGSA, there is still support for encouraging schools to formulate a school environmental policy and environmental management plan towards a greener school. However, many teachers would prefer that it were more of an award scheme than a competition, where schools would have to re-earn their status as a Green School every 3 years (as in the UNESCO China ESD award scheme). Many schools are more concerned about the quality of student experiences, attitudes and behaviours than about the physical appearance of the school; that is, using Scott's (2010) descriptors, human and social capital is seen as more important than natural and built capital, although most are still in the "initial exploration" stage.

Schools are also requesting support from the ECC in achieving their goals, rather than simply being rewarded at the end of the process. As one school leader commented, "it is not easy for a school to handle 'partially' funded projects as it minimises the effectiveness of the final products. Sometimes teachers decide to give up if the school has no other source to cover the shortened budget. Also flexibility is important in shifting the expenses within a project for different purposes". With respect to SEPAS, schools are requesting more support for both teachers and students, including regular training and activities, in addition to assistance organising the student activities at the school level and more clarity about the purpose and expectations of participation in SEPAS.

This study has also confirmed the importance of support from schools' leadership teams, and is recommending that the ECC take a leadership role in providing training for principals and other members of the school leadership team regarding how to lead EE programs, such as those provided by the ECC. Such programs could also encourage the principals to appoint an Environmental Coordinator in each school (who would be funded or supplemented by the ECC).

Relevant Research on EE in China's Schools

In 2000, a detailed evaluation of Green Schools in China was prepared by the SEPA's Department of Education and Communications using the criteria from the "Joint Commendation of 'Green Schools'" released by SEPA and the Ministry of

Education. According to these criteria, the characteristics of a “Green School” are as follows:

- able to organise and operate based on the concept of sustainable development,
- open enough to promote the concept of sustainable development in the local community,
- in possession of a site to support its students in their education about sustainable development and
- possessing a staff that can work under sustainable development principles.

The evaluation reviewed and recorded information on 117 recommended Green Schools and a series of site visits were conducted in Tianjin, Yunnan, Sichuan, Qinghai, Gansu, Liaoning, Jilin and Xinjiang by the SEPA’s Department of Education and Communications and the CEEC (Jiao and Zeng 2004).

The results showed that most schools had established EE leadership bodies. Parents, teachers, students and education bureau representatives were all actively involved. EE action plans were well-prepared and EE elements were integrated into the school curriculum. Moreover, most provided EE-related extracurricular activities to students, and organised environmental activities for the students. Sometimes, the schools invited experts to share their professional experience and provide advice on environmental policies. Some schools provided EE-related resources to students, such as books and teaching materials. Many schools employed professional gardeners to manage the greened campus areas being cultivated to receive an awarded title, such as that of ‘Garden School’. Teachers and students alike were encouraged to become actively involved in environmental activities and work hard to create a green school culture (Jiao and Zeng 2004).

However, the concept of environmental management has not been established in relation to EE management systems or networks. Many schools focused on constructing a green campus and neglected the concept of EE management, confusing “Green School” with “Green Campus”. Other schools did not establish a documentation system to summarise the EE work being performed. All EE-related documentation must be recorded to evaluate the effectiveness for further improvement. Nevertheless, some “Green Schools” at the city level were declared provincial “Green Schools” without detailed evidence and evaluation (Jiao and Zeng 2004). Moreover, there were schools that did not have systemic measures on campus to monitor air, water and solid waste pollution, energy and water saving, or recycling. The majority of the supervision and decision-making for EE-related matters fell to schools and teachers rather than students and parents, who were typically not invited to participate in the relevant processes (Tian 2008). In addition, only a small portion of teachers were trained for EE, and there was a lack of inter-regional EE exchange.

Presently, some Beijing universities offer sustainable development courses. The government is implementing programs to alleviate climate change issues. However, it is not an easy job to promote ESD in China. The population growth, rapid urbanisation, industrialisation, pollution, focus on economic development and the uneven progress between provinces have become obstructions to ESD development.

The level of ESD development in China varies by region (Li and Wang 2005). The eastern regions, such as Beijing and Shanghai, are more developed and people exhibit stronger environmental awareness. Much of the western regions are low-income, rural areas that are more likely to focus on economic development for a better living environment than on concerns about the pollution issues. The western local government and residents generally display low environmental awareness. Some of the cities in the western regions are the most polluted cities in the world, and the poverty means that children have little access to education. Thus it is difficult to promote the concept of sustainable development in these areas. Even in the more developed eastern regions, there are challenges in promoting ESD, such as insufficient financial support (Chen 1998), lack of teaching staff and a preoccupation with examination-based education.

Future research on ESD should include:

- the development of ESD policies and strategies within the existing educational systems, such as EE for SD and the national curriculum a narrowing of the gaps between regions, such as the eastern and western regions of China; and
- the establishment of a practical framework that enables practitioners to implement ESD policies.

Conclusion: The Way Forward and Future Developments

Efforts have been made in Hong Kong to revamp the major ESD programs in schools after a rigorous review study, in which a thorough examination of the sustainable school initiatives in the UK and Australia has inspired the framework and the implementation of China's programs. According to Scott, a sustainable school will:

- manage its use of *natural capital* to minimise its depletion;
- feature buildings and equipment that fit their purpose and operate as efficiently as possible;
- maximise *human capital* by educating people and developing the capacity for social action and further learning;
- maximise *social capital* by cultivating social cohesion, well-being and mutual understanding, both locally and globally; and
- follow the four capitals of sustainable schools in the UK

Natural: Energy sources, raw materials, biodiversity and ecological systems.

Manufactured: Buildings and equipment that must be maintained and replaced.

Human: People's knowledge, skills and capabilities.

Social: Human relationships and connections to the wider society.

In Hong Kong, a move towards encouraging a sustainable school program would lead to real benefits in terms of a reduction in resource use and waste generation while encouraging environmental responsibility in students. Schools would gain respect and an enhanced reputation within the community for their responsible

practices, and there would be real financial savings for schools in terms of lower energy and water bills. Initially, it may appear that the suggested changes to the HKGSA mean that schools will have to do more to participate, despite teachers' concerns that there is already too much to do. However, the suggested changes (Tsang et al. 2010) to the Green School project in Hong Kong would make the entry level easier to achieve while allowing schools to progress to full accreditation at their own pace.

Assigning a facilitator to each school, undertaking an initial review and answering questions about what implementation the scheme requires would provide useful support to schools that may not have previously considered participating or had any interaction with other schools or teachers familiar with the scheme. The facilitator can suggest which areas of the SAM the school already has in place, and which areas will require further work or commitments on the part of school management. Inevitably, the recruitment of facilitators for the first year of change will be difficult. However, it is proposed that teachers should be contacted directly and a workshop organised to brief them on what is expected from the role. The outcome of the workshop would be developed into an information pack or online information service so that in subsequent years, future facilitators would not have to attend a workshop. The new revised scheme will come into operation in September 2013 to lead Hong Kong into a new era in the Green School initiative. Further research into the effectiveness of this new scheme will also be conducted by the same investigators who proposed the changes in the original scheme.

In China, the future development of green schools could be linked with green communities. In an interview regarding green communities that was published in *Urban China* (Shi and Rudyk 2012), Researcher Zhu Jian'gang remarked that:

Based on my research and experience in other contexts, changes in household practice can be linked to the actions of children, be it by their asking questions or bringing in new ideas they learn about at school. However, whether this translates into actions organized at the scale of communities – that is another issue, depending as it does on the 'social infrastructure' of communities that might support activities happening outside the household.

In a recent study of 15- to 16-year-old green school students in the Beijing area, many seemed to perceive environmental problems as inevitable. Nature was viewed as a 'box' of resources, and economic development was essential to sustain and even enhance nature. In students' minds, there seemed to exist no contradiction between economic development and environmental protection (Sternäng and Lundholm 2012). It seems there is still much to be done to explore ways of nurturing students' environmental knowledge and cultivating their positive environmental attitudes.

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Chapter 12

Education for Sustainable Development in Macao Secondary Schools: Issues and Challenges

William Hing-Tong Ma and John Chi-Kin Lee

Introduction

Macao, a former Portuguese colony, has operated under the principle of “One country two systems” since her return to Chinese sovereignty in 1999. Economically, Macao is well known as the “Eastern Monte Carlo” and in the last 10 years, gambling, tourist and hotel industries have boomed. Culturally, Macao could be said to be “a historical meeting point of East and West” and has been referred to as “the City of God” (Vong 2008, p. 142): influenced by religious pluralism evident by the first diocese of the Roman Catholic Church, the worship of Buddhist Guanyin (Goddess of Mercy) and other religions, local residents observe both Chinese and Portuguese religions. As regards the environmental conditions, there has been an increasing consumption of electricity as well as production of liquid and solid wastes, largely because of the tourist development (Anon 2009). Recently, the Macao Environmental Protection Bureau (DSPA) announced that formulating environmental policies for the future 10-year—“To develop into a green, low carbon city suitable for living, business and tourism” (DSPA 2010 Preface). The planning based on four core concepts, namely, sustainable development, low carbon development, public participation and regional cooperation, with improving the living environment and ensuring people’s health as the important goal (DSPA 2010 chapter 1 Sections 4.1–4.4). It adhered firmly to the sustainable development concept that the economic and social development should not sacrifice the environment (DSPA 2010).

W.H.-T. Ma (✉)

The Hong Kong Institute of Educational Research,
The Chinese University of Hong Kong, Hong Kong, China
e-mail: williamhtma@gmail.com

J.C.-K. Lee

Department of Curriculum and Instruction, Faculty of Education
and Human Development, Hong Kong Institute of Education, Hong Kong
e-mail: jcklee@ied.edu.hk

Table 12.1 Macao school characteristics 2011–2012

Sponsor	No. of schools	Level			Secondary school			
		Secondary	Primary and secondary	Pre-school, primary and secondary	Students		Teachers	Class size
					Junior section	Senior section		
Government	3	3	–	–	695	907	147	19.8
Private schools with free education	32	2	4	26	14,067	14,265	1,959	34.6
Private schools without free education	8	–	3	5	3,041	2,751	374	32.0
Total	43	5	7	31	17,803	17,923	2,480	33.0

Source: Macau, DSEJ (2011–2012, p. 15)

Notes:

1. Excluding special schools
2. Two government schools are vocational and technical schools, the other one is in Luso-Chinese medium

Numbers of Secondary Schools by Sponsor and by Level, number of secondary Students, teachers and class size, 2011/2012

The history of education in Macao is based on a laissez-faire operation and a diversified education system inherited from Portugal, the People's Republic of China (PRC), Taiwan and Hong Kong (Koo and Ma 1994; Adamson and Li 2004). Up to the present, it has a collection of different systems with different traditions, curricula and media of instruction. The government has established a system of grants to provide 15 years of fee-paying and free education from early childhood to senior secondary stage, which is primarily privately run. By 2012, 85 % of private schools had joined the free-education scheme (Macao, DSEJ 2011–2012, p. 15). In 2011–2012, there were 35,726 secondary students and 2,480 secondary teachers in Macao (Macao, DSEJ 2011–2012, p. 15) (See Table 12.1).

Among the 43 secondary schools in Macao, only 3 (7 %) are run by the government, half are run by religious bodies, and the remaining ones by trade unions, cultural associations, societies and cooperatives. Most of the secondary schools follow the 3+3 system except a few English language religious schools. The Macao government has recently lowered secondary school standard class size to 35 students to facilitate small class teaching, though the figures of government and private schools have varied enormously since the 1990s. Compared to the statistics in the late 1990s, the class size has reduced greatly from 60 to the present figure (Lee et al. 2009). These improvements, including an increase in various new school buildings and development projects in education through public funding are due to the rapid economic growth, most notably in the reform of the gambling industry, and the development of Macao's tourist appeal (Ma 2004).

The gender ratio of secondary teachers in Macao reveals that there are more female than male teachers (M:F=1:1.43). In private schools, a large proportion of the young teachers entered the profession in the past 5 years (around 40 % of the

secondary teachers have less than 5 years of teaching experience). In 2011–2012, around 90 % of the secondary teachers received a monthly salary of about MOP\$ 13,000 (about US\$1,600). All teachers were granted an extra allowance by the government according to their qualifications, and this extra allowance is worth up to MOP\$ 4,000 (about US\$500) per month with teacher training and university degree qualifications (DSEJ 2011/2012).

Recent Progress in Education for Sustainable Development in Macao

In 1999, Macao became a Special Administrative Region (SAR) of China and its government has devoted sustained efforts to develop the school-based curricula. The Macao SAR government, for example, has provided subsidies to schools for implementing curriculum related innovations such as small class teaching, life education, moral education and reading. According to Vong and Wu (2010, pp. 80–83), “school-based curriculum development” (SBCD) in Macao could be interpreted as “resistance and pluralism”, “promotion of the central curriculum” through the university-school partnership scheme and “governmental participation” through governmental financial and resource support. These orientations suggest that the Macao SAR government and the public would like to maintain a flexible and diversified education system and a school curriculum in which schools have their autonomy and discretion while participating in government-driven initiatives. In 1999, the Education and Youth Affairs Bureau published a set of curricular guidelines for pre-primary to senior secondary education (Curricular Reform and Development Committee, Education and Youth Affairs Bureau 1999). For example, in subjects like geography, biology, chemistry and moral and civic education in junior and senior secondary education, the environment-related objectives or topics were:

- to know the relationships between people and the environment and to develop an attitude to protect the environment (junior geography);
- to understand the inter-relationship between individuals and society and highlight a sustainable ecosystem, based on a harmonious and dynamic interaction of people, plants, animals and the atmosphere, for building up the sense of responsibility for environmental protection (senior geography);
- to possess a sense of environmental protection (junior physics and natural sciences);
- to utilize biological and environmental knowledge to improve the individual and family environment, to respect and care for beings in nature (senior biology);
- to appropriately treat the relationships between people and the environment, between people and resources (senior chemistry); and
- to understand the fair trade of goods and services and the relationships between the economy and environmental protection and war, poverty and the environment in order to create/maintain jobs (senior moral and civic education).

It is apparent that the school curriculum involves some infusion of sustainable development-related concepts into different traditional subjects but for actual implementation, the teaching of the sustainable development concept still largely depends on the wish and will of individual subject teachers.

The above secondary curriculum had been contextualized with reference to Macao's society. However, the secondary curriculum's treatment of the sustainable development concept was not well coordinated, or was incorporated into many subjects without any linkage. Further questions can be raised about whether it is possible to develop a systematic teacher training in teaching strategies for education for sustainable development.

From earlier questionnaire surveys and interviews with primary and secondary school teachers about the implementation of environmental education in Macao (Lee and Ma 1996; Lee et al. 2009), findings revealed that the teachers tended to support the promotion of environmental education (EE) in weighing the balance between the work generated by the implementation of EE and benefits, including personal satisfaction with EE, personal growth with environmental knowledge, enhancement of students' environmental learning, increased commitment to environmental protection by the students, better environmental quality in schools and local communities, and personal contribution to Macao's sustainable development. The findings also noted the disappointment about lacking adequate support from the government, the Education and Youth Affairs Bureau, environmental protection organisations and local community organisations in promoting EE in their schools. As regards the barriers to teaching EE, teacher felt that major hindrances to classroom teaching included a lack of class time, instructional materials and funding; class size being too big; no natural environment readily available; a lack of lesson preparation time and lack of knowledge about teaching EE and about environmental issues.

In 2006, a new education system was formed by enacting the Fundamental Law of Non-tertiary Education System for Macao schools. Lee et al. (2009) have pointed out that environmental awareness continues to play an important role in the new system and the EE-related objectives can be identified throughout the secondary curriculum. Before 2009, the Environmental Council (EC) was another government arm that helped to provide environmental protection-related activities to schools. In 2009, according to the Fundamental Law noted above and Executive Order Number 14/2009, the government formally established the Environmental Protection Bureau (DSPA) to replace the EC and take charge of environmental policies. One of the DSPA's duties is to suggest, organise and implement promotions, training and information activities related to environmental education. A new Advisory Council on the Environment was established to collect opinions from different sectors about environmental protection in Macao. One of the foci of the DSPA was to boost the awareness and sense of responsibility for the environment of parents and students by organising various promotional and educational activities including talks, training programs and activities for school students and parents. In 2010, the DSPA held a drawing campaign in promoting nature tourism, a tree planting

activity to commemorate the International Day for Biological Diversity and to promote urban greening, low-carbon life and the partner program of Green Schools (Macao Yearbook 2011, p. 504).

To safeguard sustainable development of the economy, society and environment of Macao, the DSPA conducted the Environmental Planning Research in April 2010 to gather views and opinions from the public in formulating a long-term environmental policy in Macao for realizing the vision of “Building a Low Carbon Macao and Embracing a Green Life.” In 2011, the Macao SAR government established a MOP\$ 200 million (about US\$25 million) Environmental Protection and Energy Conservation Fund to support purchasing green technology products and equipment (Lages 2007).

The Green Schools Partner Program in Macao

The Green Schools program was initiated by the Environmental Protection Bureau (DSPA) in 2010 to promote a network in providing an open platform to share and exchange knowledge, experience and resources. It also raises the sense of mission and social responsibility of the partner schools to engage in environmental protection and environmentally friendly practices in their daily operations so as to create a green school environment. In 2012, there were 41 schools (kindergarten, primary and secondary) participating in this program with an emphasis on four aspects: school environmental policy and administration, school space and architecture, teaching plan of environmental issues, and school, parental and community life. Each of the participating schools can select its own issues to develop an action plan and take actions accordingly. Then, the school undergoes a self-goal setting and self-evaluation processes to connect its planning with activities related to learning and teaching. This is a self-managing and self-improving school program applied in a green school setting, but it relies on voluntary participation based on the willingness of school leaders and associated members. The core concepts of the teaching and learning activities are applied in each of the four areas of the green school vision:

1. School environment policy and administration
 - to formulate school environmental policy
 - to evaluate the effectiveness and implementation of environmental practice
 - to train the staff in environmental awareness
 - to spread information on environmental issues
2. School space and architecture
 - school greening
 - environmental facilities (e.g. collection of recycled materials, recycling wastewater to flush toilets and irrigate gardens and landscape features)

Table 12.2 Number of institutions with awards from “Environmental teaching plan competition” program

Chinese school	English school	Luso-Chinese school	University	Other organisation	Total
20	4	2	1	3	30

Sources: Website of Environmental Protection Bureau (DSPA). Retrieved September 7, 2012, from <http://www.dspa.gov.mo/>

- energy saving (e.g. energy-saving fluorescent light bulbs)
 - the efficient use of resources (e.g. taps that are water efficient, dual-flush toilets, solar heaters to capture solar energy to heat water)
 - renewable energy systems
3. Teaching plan of environmental issues
 - school-based environmental education instructional materials
 - integrated environmental issues across different subjects
 - provision of teaching aids for environmental education
 4. School, parental and community activities
 - school-based environmental workshops/seminars/meetings/activities
 - student-parent environmental activities
 - community-based environmental activities

Since 2010, the program has organised an annual “Environmental teaching plan competition” to encourage the partner green schools in promoting environmental education in school. The competition selection board chose the first three schools as the recipients of first, second and third prizes, and these schools were awarded from MOP\$ 4,000 (about US\$500) to \$8,000 (about US\$1,000) respectively. The rest (15 in the first year and 5 in the second year) receive merit awards. Over the past 2 years, there have been a total of 30 participating institutions from different sectors that have been honoured with awards, as Table 12.2 above shows.

Based on interviews with teachers from the selected green schools and observations of the program website, there were three major difficulties of the partnership program in Macao schools. The first difficulty was the voluntary participation of schools, some of which might only have a low spirit and few teachers as team members for launching EE/ESD activities in the school. The second barrier was a lack of professional on-site support for teachers to work out how sustainable development or environmental education practices could be incorporated into their own subjects or the informal curriculum and teaching. The third difficulty was that they had no additional support on the evaluation of the action plan from an external expert or professional. In terms of platform sharing, the DSPA website is expected to assist the participating green schools in sharing their deliverables, e.g. teaching plans, programs and activity plans, in order to enhance partner schools’ interaction. However, such a platform does not exist on the present website. Such a databank

for the Partner Program of Green Schools in Macao, if developed in the future, may be used to recognise the partner schools' efforts and may serve as an environmental education knowledge bank for local teachers.

Curriculum of Sustainable Development Education

Geography in the senior secondary form is one of the principal subjects for teaching sustainable development education in Macao's formal curriculum. This is evident in geography's official curriculum document (Curricular Reform and Development Committee, Education and Youth Affairs Bureau 1999, Geography in Senior Form, p. 6):

- Chapter 1 Natural environment
- Chapter 2 Natural resources
- Chapter 3 Human productive activities
- Chapter 4 Cities
- Chapter 5 Humans vs. environment
- Chapter 6 Sustainable development

In matching the requirements of the official curriculum document, the newly published textbook (*Macao Geography*) has added a chapter about sustainable development in the contents, (Tang and Wong 2012, pp. IV–V) as shown in the following content page of the textbook:

Chapter 10 Development and Environment

1. Influence of Macao's development on the geographical environment
 - (a) Geographical location
 - (b) Natural environment
 - (c) Natural resources—land and fresh water
2. Influence of geographical environment on Macao's development
 - (a) Land reclamation
 - (b) Change of ecological environment and the landscape
 - (c) Management of air quality and coastal water
3. Steps in moving towards sustainability
 - (a) The concept of sustainable development
 - (b) Cycling economy, green production and green life
 - (c) Harmonious co-ordination of development and environment

The topics and teaching content in this chapter pay more attention to sustainable development in areas such as management of land and the coastal environment, human productive activities and the ecological environment, local environmental problems confronted by humans and sustainable development, population and environment, the zonal structure of cities, and the global trend of sustainable

Table 12.3 Selected topics related to sustainable development or environmental education in different subjects**Physics and the natural sciences**

Junior 1

Earth science—Properties of water, the water cycle, air and water pollution

Junior 3

Energy—Energy and energy-efficient appliances and systems

Earth science—properties and distribution of natural resources in different cores of the earth

Chemistry

Senior 2

Knowing that burning coal, oil and gas for energy will increase the amount of carbon dioxide in the atmosphere—greenhouse effect

Knowing the polluting properties of plastic bags, detergents and second hand cigarette smoke

Senior 3

Management of water pollution

Biology

Senior 1

Causes of global environmental degradation

The inter-relationship of human and living animals and plants, food chain

Senior 3

Ecological systems—carbon cycle, water cycle, coastal habitat, mangrove ecosystem

Influence of human activities on the environment, growth of population size

Waste management—recycling of water, monitoring air quality, managing Macao's land, plastic and paper recycling, radioactive waste and managing the coastal environment

Moral and civic education

Senior 1

Fair trade of goods and services

Economy and environmental protection

Senior 2

Poverty and war—wages to maintain or improve the living standard

development. In addition to geography, some of the contents in the subjects of physics and the natural sciences, biology, chemistry and moral and civil education are related to sustainable development or environmental education, as shown in Table 12.3.

Recently, the Office for the Development of the Energy Sector has published a book in which many chapters were written by secondary school teachers from different schools. The book is primarily intended as a supplementary teaching material for the science curriculum about energy education at the junior secondary level (Office for the Development of the Energy Sector 2011). In the preface, it is noted that increasing the awareness of students concerning the fulfillment of their needs should create a new culture of concern about the sustainability of their consumption habits and daily living styles. The most important concept is of the promotion of energy conservation by providing information and numerous facts on energy conservation and renewable energy alternatives, as well as everyday opportunities to connect to the three 'pillars' of sustainability—environment, economics and society.

The book contains five chapters including an introduction to energy, overviews of different types of energy (fossil fuel energy, nuclear energy, solar energy, and green energy), applications of energy in our daily lives, energy saving and the efficient use of energy, and energy and sustainable development. The book chapters address energy conservation as a means to reduce the quantity of energy used for different purposes, and emphasizes that individuals and organisations that are direct consumers of energy may want to conserve energy in order to reduce energy costs and promote economic, political and environmental sustainability, while industrial and commercial users may also want to increase efficiency. The book notes that energy conservation reduces energy consumption and energy demand, which in turn reduces the rise in energy costs, and can reduce the need for new power plants and energy imports. The reduced energy demand can provide more flexibility in choosing the most preferred methods of energy production, and in developing energy production methods that involve fewer greenhouse gas emissions, energy conservation is an important method to prevent climate change. The book also notes that energy conservation makes it easier to replace non-renewable resources with renewable energy, and is often the most economical solution to energy shortages. In the last chapter, it encourages students to envisage how Macao can become a sustainable city of the not-so-distant future by reconsidering mass consumption habits and how we make our living, enjoy recreation, and govern ourselves.

Although the book attempts to present the facts of present energy resources and the statistics of energy consumption, no “perspectives” are offered. While there are a lot of discussions about the merits of different forms of energy use, there is not much discussion of the negative side of excessive energy consumption habits. Indeed, there is little room for teaching environmental sustainability and energy conservation as controversial issues. In spite of these impediments to addressing controversial issues, the fact remains that contemporary teaching presents challenges, not the least of which is relevance. The value of sustainable development education is increasingly measured according to the degree that it is future-oriented and helps students think critically about and act upon social issues in local contexts. Furthermore, there is a growing concern that a good contemporary education is “global education”—that is, an education that helps students develop an awareness of planetary conditions, understand global linkages and interdependence, and take action as responsible citizens in a complex world. Thus the book should provide more space to develop a roadmap for a sustainable future. For instance, an integrated science curriculum may develop skills for reducing our impact on the environment through activities. Skills provide the contexts for science learning by emphasizing stewardship, creating a common vision, thinking outside the box and mobilising resources for change. The goal is to implement such ideas in the schoolyard and lead students to move towards thinking about how we can support ourselves with the limited resources and energy available.

In addition to the teaching of sustainable development education through the formal curriculum, teachers are encouraged to use a range of teaching techniques to ensure that students are given a variety of learning opportunities that match their needs and interests (Curricular Reform and Development Committee, Education and

Table 12.4 Teaching strategies of sustainable development education in different subjects

Subject	Form	Teaching topics	Teaching strategies
Geography	Senior 1–3	Deep green experience	Photography Journalism Powerpoint creation Questionnaire survey
Biology	Senior 1–3	Healthy green life	Group discussion Implementation of action plans Community service
Visual Arts	Junior 3	Macao's heritage buildings	3D photo production Information search Field trips
English	Junior 2	Think green, act green	Library search Video creation Powerpoint presentation Demonstration of green products

Youth Affairs Bureau 1999). For example, teachers can organise activities such as visits to natural parks, cultivation of school or neighborhood gardens, tree planting, independent projects, visual presentations (photography, production of Powerpoint slides/presentations, video making etc.), and exhibitions. In some teachers' teaching plans, it is evident that Macao secondary subject teachers used different teaching strategies to facilitate students' learning about sustainable development education at the secondary level (DSEJ 2010/2011, Award Scheme on Instructional Design) (See Table 12.4).

A Survey of Teachers' Perceptions Concerning Education for Sustainable Development in Macao

A questionnaire survey was conducted in August and September, 2012 to study secondary teachers' beliefs about education for sustainable development in Macao. There were two parts to the questionnaire: the first asked personal information about the teacher (sex, education level, rank, teaching experience, subject teaching and residential area), and the second part consisted of five sub-parts: the New Environmental Paradigm (NEP) (Dunlap et al. 2000), education for sustainable development (ESD) beliefs (Yang et al. 2010), self-efficacy in teaching (Ko and Lee 2003), perception in gaining knowledge, and attitudes and skills of students and the teaching of ESD lectures (Lee et al. 2009). Some of the items were modified or added to suit the context of Macao.

Table 12.5 presents a summary of the second part of the survey instrument. The table lists the number of items of the factor structure of the questionnaire in using a 5-point Likert scale (1 means strongly disagree and 5 means strongly agree).

The questionnaires were distributed to 4 Macao secondary schools and a total of 225 teachers, panel heads and principals completed the questionnaires. The schools

Table 12.5 Factor structure of questionnaire of NEP, ESD beliefs, self-efficacy in teaching and current emphasis and styles (teaching methods) of implementing ESD

Factor structure	No. of items in the questionnaire
1. New environmental paradigm	
The reality of limits to growth	3
Anti-anthropocentrism	3
The fragility of nature's balance	3
Rejection of exceptionalism	3
The possibility of an eco-crisis	3
2. Beliefs about ESD	
Values of ESD belief dimensions	
Respect and care for the community of life	1
Ecological integrity in Macao's local context	2
Social and economic justice	2
Items of local environmental problem	3
Teaching beliefs of ESD	
Relevance to daily life	6
Students' needs in the future	4
Integrated teaching	3
3. Self-efficacy in teaching education for sustainable development	8
4. Perceived gains of knowledge, attitudes and skills in students	9
5. Teaching methods in the ESD lecture	13

Table 12.6 Survey sample characteristics

	No. of secondary schools	No. of teachers	Gender	
			Male	Female
Macao	43	2,480	1,020(41.1 %)	1,460 (58.9 %)
Survey sample	4	225	83 (36.9 %)	142 (63.1 %)
%	9.3	9.1	–	–

were chosen to represent a combination of different types of schools in different districts, religious versus non-religious schools. The numbers of the teacher respondents varied according to the size of the school, ranging from 36 to 67. Of the 225 teachers who identified their gender, 36.9 % were male and 63.1 % were female, which is very similar to the sex distribution of secondary teachers of the Macao district (see Table 12.6).

Demographic Characteristics of the Survey Teachers

Most of the secondary teachers had attained university education (more than 99 %) and nearly one-third had a higher degree. Regarding their teaching experiences, around one-fifth of the teachers have taught for less than 5 years, approximately

Table 12.7 Demographic characteristics of the secondary teacher respondents

		N	%
1. Education level	Secondary	2	0.89
	University-bachelor's degree	147	65.33
	University-higher degree	76	33.78
2. Rank	Principal	1	0.45
	Vice-principal	1	0.45
	Panel head	27	12.16
	Teacher	192	86.49
	Others	1	0.45
3. Teaching experience	Under 5 years (0–4)	49	21.68
	5–9 years	65	28.76
	10–19 years	86	38.05
	20 years or over	26	11.50
4. Major teaching subjects (top ten)			
Chinese		46	
Mathematics		44	
General English/English		40	
Civic education		15	
Geography		14	
Physics		12	
Chemistry		11	
Computer		11	
History		10	
Biology		9	
5. Residential area	Macao peninsula	203	90.22
	Taipa	21	9.33
	Coloane	1	0.44

29 % of the respondents have taught for 5–9 years, 38 % “ten to nineteen years”, and 11.5 % “more than twenty years”. Of the top five major teaching subjects, many of the teachers taught Chinese, Mathematics, English, Civic Education and Geography. More than 90 % of the teacher respondents lived in the urban area of the Macao peninsula, the other 9 % lived in Taipa and only one lived in Coloane (see Table 12.7). This is due to the fact that the four participating schools are located in the downtown urban district of the Macao peninsula.

The teachers' responses on the New Environmental Paradigm Scale from the survey are treated as measures of environmental attitudes, beliefs and values (Dunlap et al. 2000). The results show that they were aware of human domination of nature and the reality of limits to growth. Teachers did not agree that there was an imminent possibility of an eco-crisis or that humans' interference of nature would have disastrous consequences. They also did not agree that the balance of nature was delicate and not strong enough to cope with the impacts of modern industrial nations (see Table 12.8). They treated the sustainable state for human life as a distant goal and were unlikely to see it as a pressing problem or as an urgent one.

Table 12.8 Teachers' new environmental paradigm

Subscales	Mean	S.D.
Rejection of exceptionalism	3.1064	1.3111
The reality of limits to growth	2.3935	0.9216
Anti-anthropocentrism	2.3609	1.0470
The possibility of an eco-crisis	2.0607	0.8855
The fragility of nature's balance	1.9822	0.8775

N = 226; Mean = 2.3809; S.D. = 1.0956

Table 12.9 Teachers' values of education for sustainable development and teaching beliefs of ESD

Subscales	Mean	S.D.
1. Values of sustainable development	2.2692	1.0605
Social and economic justice	3.0874	0.9759
Democracy, non-violence and peace	1.9027	0.5492
Respect and care for the community of life	1.6327	0.5518
Ecological integrity	1.5487	0.6455
2. Teaching of education for sustainable development	1.9864	0.5916
Students' needs in the future	2.1798	0.6573
Integrated teaching	1.9600	0.5419
Relevance to daily life	1.8708	0.5342

N = 226; Mean = 2.0854; S.D. = 0.7995

The two key dimensions of ESD for teachers are the values of ESD (values of education for sustainable development [VSD]) and teaching beliefs of ESD (teaching beliefs of education for sustainable development [TESD]). As regards ESD for Macao secondary teachers, the dimension of social and economic justice is regarded as the most important principle for achieving sustainable development in society. In other words, economic growth is regarded as of utmost importance, even overwhelming the social problems brought about by tourism and gambling (mean score of social and economic justice—3.0874). In teachers' ranking of reasons for visiting Macao, gambling was ranked highest (32.56 %), followed by the holiday travel (31.01 %). The second most important principle expressed by the secondary teachers in this dimension of solving social problems is to actively participate in the democratic processes, about which one should be well-informed. The second dimension deals with teachers' beliefs towards ESD, e.g. curriculum content, pedagogy and learning. The Macao secondary teachers believed that equipping students with lifelong learning abilities essential for solving problems in the future (mean score of students' needs in the future—2.1798) is the most important method. The next important factor is the choice of teaching method (mean score of integrated teaching— 1.9600) (See Table 12.9).

The questionnaire also asked teachers to identify the serious environmental problems in Macao and their living areas. All of them reported that traffic was the most serious, followed by air pollution and garbage (see Table 12.10).

In our study, self-efficacy measured the secondary teachers' perceived competence in teaching sustainable development. Our findings showed that the Macao secondary

Table 12.10 Serious environmental problems in Macao and the neighboring areas (%)

Environmental problems	Macao	Neighboring area
Traffic	33.28	31.10
Air	26.40	25.53
Garbage	23.30	23.73

Table 12.11 Self-efficacy in teaching education for sustainable development and the perceived gain of knowledge, attitudes and skills of students in EE and ESD

	N	Mean	S.D.
1. Self-efficacy in teaching education for sustainable development	224	2.8732	0.8360
2. Perceived gain of knowledge, attitudes and skills of students in EE and ESD	88	2.3598	0.6484
Skills		2.6416	0.7225
Attitudes		2.4183	0.6453
Knowledge		2.0927	0.4813

Table 12.12 Teaching methods (Total number of respondents = 86)

	N	%
1. Lectures	69	17.83 %
2. Independent or group projects	46	11.89 %
3. Critical thinking activities	37	9.56 %
4. Audiovisual aids	36	9.30 %
5. Guided discovery	35	9.04 %
6. Computer-assisted learning activities	34	8.79 %
7. Problem-solving	32	8.27 %
8. Indoctrination	25	6.46 %
9. Role-playing	21	5.43 %
10. Field trips/outdoor activities	19	4.91 %
Value judgment activities		
11. Experiments	14	3.62 %

teachers' self-efficacy in teaching ESD tended to be rather low (mean—2.8932) and the teachers were not confident in having enough knowledge and skills to conduct effective classroom teaching. More than half of the teachers agreed that they did not have the necessary skills to teach ESD and felt they were not able to answer students' ESD questions (50.9 % and 55.8 %). As the survey results revealed, secondary teachers perceived that the students' gain of knowledge, attitudes and skills in EE and ESD was only 2.3598 less than one-half of the mean in the five-point scale. As shown in Table 12.11, perceived gains of students in EE and ESD were highest in skills, lower on attitudes and least on knowledge. More than 80 % of the teachers perceived that their students did not have enough knowledge of environmental concepts, issues and problems, ecological foundations and the impacts of their behaviour on the environment (from 80 to 88.5 %) after classroom teaching.

With regard to teaching methods, lecturing and group projects were most frequently used by teachers in the ESD classroom (see Table 12.12). The low frequency teaching methods were field trips or outdoor activities and value judgment activities. It is

Table 12.13 English version of the brief interview guide for panel teachers in charge of environmental education, or science or geography teachers

-
1. Teachers' conception of sustainable development
 2. Effects of the required changes to our life style
 3. Role of science and technology for sustainable development
 4. The ecological state of the planet
 5. Teachers and sustainable development
 6. Obstacles to schooling for sustainable development
 7. Classroom opportunities in changing values
-

noteworthy that secondary teachers primarily relied upon traditional ways of teaching and made less frequent use of field trips, outdoor activities and value judgment activities in the teaching of environmental education.

Selected Brief Case Studies

Interviews with teachers in charge of the environmental education panel and focus groups with science teachers or geography teachers in groups of 2–3 teachers were conducted at the end of August 2012 in the teachers' own schools to investigate secondary teachers' views on sustainability. Teachers were chosen by the principals of the schools that had participated in the questionnaire survey. The interviews were conducted in Cantonese (for the English version of the brief interview guide, please refer to Table 12.13).

PC Secondary School

This faith-based (Christian) school was founded in the late 1930s. There were about 1,300 secondary students and 90 full-time secondary teachers in the school year 2012/2013. The school is located in a residential area surrounded by residential buildings. There is a large sports ground in the central part of the school.

The new school building was opened in June 2009. To reduce energy consumption, the school chose energy-saving fluorescent tubes to save on electricity bills and reduce the emission of greenhouse gas over the tube's life. During the construction of the new school building, the school tried to work with the architect to choose ecologically sustainable building and furnishing materials. These include water-based paints and materials that are recycled or are able to be recycled. The school has replaced its old water taps with water-saving taps, and students are advised to turn off all the lights and air-conditioners when they leave the classroom during the breaks and at lunch time. As a result, the monthly saving was up to MOP\$ 20,000 (about US\$2,500). When communicating with parents, the school sent notices to parents via SMS or e-mail instead of traditional notices on papers.

One of the teacher interviewees claimed that very often geography was regarded as the subject in the school with the greatest contribution to ESD. Analysis of the textbook at the senior secondary level suggests that the topics in geography incorporate ESD to a certain extent within and across different levels. For example, the textbook of senior secondary geography contains a designated chapter—Steps in Moving Towards Sustainability—with a focus on the concept of sustainable development, green life and environmental change. In addition, it tries to inform students about (i) the greenhouse effect and the climate change, (ii) the ways in which our actions change the atmosphere (iii) the consequences of global warming, (iv) what actions can we take to reduce global warming, and so on. As follow-up, the teachers would ask students to form groups to investigate environmental topics on their own. They then targeted environmental issues of importance to students and encouraged students to generate ideas, and formulate and execute a successful action plan for environmental improvement. The resulting project outcome could be presented in a 15 min video-clip or group presentation. The teacher acted as a facilitator, guiding the process and allowing students to formulate and develop their own ideas. Eventually, the teachers guided the students to put their ideas into action and thus became “doers”. For example, the human activities are enhancing the greenhouse effect, particularly through increased levels of carbon dioxide, which is contributing to global warming. Eating less meat can reduce amounts of energy with associated greenhouse gas emissions in fertilisers and animal feed production, and less extensive use of machinery and transport systems. The students were stimulated to think whether they would eat less meat in their meals, and some of the students would bring their own bottles for water and their own forks and spoons for their lunches.

A biology teacher said that the subject of biology could also contribute to ESD, such as the concept of biodiversity through the food webs. All parts of an ecosystem are interdependent through feeding relationships and the “web of lives”, which is illustrated through food webs, where damage to one part causes changes to all other parts: when the relationships are strong the whole web is maintained, but damage to the parts can threaten the whole structure.

With respect to support for ESD beyond the school, one teacher claimed that there was no pedagogical support for ESD from the University of Macau because geography studies are not offered by the Faculty of Education. He told the interviewer that some seminars sponsored by the Science Museum were useful to their teaching, such as the ratio of green areas in the urban planning.

As regard the environmental problems of the local district, one teacher pointed out that the current noise emissions exceeded noise limits and have worsened due to greater frequency of vehicles. The teacher also mentioned that the water quality of the coasts and the marine environment was deteriorating, and felt that the marine and estuarine areas of high conservation significance and habitats important for the production of fisheries resources and wetlands should be set aside as protected areas.

Teachers also mentioned that the school’s linked secondary and primary divisions had frequent formal and informal contacts to communicate and coordinate among different subject panels for curriculum alignment in environmental education. The teachers of both levels could design the continuity in the curriculum as a coherent,

progressive and continuous process across the transition period between the senior primary and junior secondary classes. At the senior primary level, teachers guided students to discuss and analyse hot environmental issues from different perspectives. This way of discussion would lead students to think about and analyse environmental problems from a wider perspective and would link their discussion with the deep learning strategies and exploratory science experiments of the secondary level.

CN Secondary School

This secondary school (founded in 1956) had 997 students and 70 teachers in the secondary section in the year 2011/2012. The school is located in a residential area very near to the border of Macao and surrounded by high-rise residential buildings. The school was completely renovated and there is a sports ground in the central part of the school.

In the interview, the biology and chemistry teachers mentioned that their concept of sustainable development implied the management of resources so that there would not be any depletion, at the same time the people on earth would be able to harvest from resources and improve the quality of their life, as the overall quality of life of an average person in the world continues to improve year by year. They felt that people could solve the environmental crisis that has occurred. In the long term, people should change their lifestyle, i.e. to reduce pollution and use fewer resources, and, most crucially, to rethink of what we value in life. People have to make value judgments about their use—how to use resources in a way that maximizes their effect and minimizes the use of scarce resources while emphasizing recycling and conservation. People have to find alternatives that improve quality of life and standard of living without harming the environment.

Regarding the ecological state of Macao and the local district, teachers clearly believe that environmental problems have arisen that are going to be irreversible, and they should pay for that. Air/noise/traffic/wetland crises occur in lots of places. They agreed that the current situation is not good and they need to explore some possibilities for action.

Turning to the promotion of sustainable development in school, the teaching objectives of ESD through different subjects are primarily to transmit the values of sustainable development from the lower level of schooling and increase students' awareness of environmental concern, beginning with connections to daily life, then proceeding to a focus on local society and finally considering wider global phenomena. There is a need not only at school but also at home (with parents' cooperation) to sort food waste after meals. The school has installed a waste treatment machine to treat food waste after lunch in order to reduce the amount of waste for disposal, and food waste could be recycled to produce compost or fish feed. Other than school-based activities, the school could arrange visits and seminars about sustainable development for students to attend in order to increase their awareness and knowledge on this issue. The school has built a roof-top garden with

plants, flowers, hydroponic vegetables and agricultural crops. The garden can be used to treat lunch food waste and also as living laboratories for hands-on learning. As a demonstrative function, indoor living systems become the heart and lungs of the school building, regulating indoor climate by moderating temperature, improving air quality and maintaining a comfortable humidity.

The teachers regarded traffic noise and air pollution as the most serious environmental problems in Macao and the local district. They were also concerned about the bad odors and the hygiene of night time garbage collection.

Teachers are also concerned about the influence of the gambling industry on society and the environment, such as the mass influx of tourists and their connection to traffic and noise, and the high pay that attracts youngsters to work for gambling-related industries and lowers their motivation to pursue further study.

Conclusion and Final Remarks

The findings of the NEP scale revealed that Macao secondary teachers regarded sustainability as a distant goal and were unlikely to see it as an urgent problem. If they see it as a pressing problem, they may be more willing to address the importance of environmental conservation in their teaching. The interview findings also showed that the major concerns of the teachers seemed to be pollution, population and resource consumption. There was an apparent lack of a general recognition of the complexity of the sustainable development concept. As teachers play key roles in advancing ESD efforts and the ESD literacy of our future generations, adequate ESD teacher preparation in teacher-training programs is essential, and these programs should foster an understanding of sustainable development concepts and values.

Responses to questions concerning values of ESD and teaching beliefs about ESD indicated that the teaching of ESD could put more emphasis on connections with other peoples and nature as well as with the community. Connecting us to other peoples, nature and other lands through the food we eat, the clothes we wear, and the materials we use daily is important because if we understand these real-world phenomena are interdependent, we are more likely to take steps to reduce social inequalities, preserve biodiversity, protect the local environment and work together to find ways of reducing our impact on the Earth's life support system.

Turning to the questions of curriculum content, pedagogy and learning, more hands-on activities could be provided and subject disciplines could be integrated to help students shift from awareness to knowledge to action. With regard to the teaching methods, more opportunities could be provided for students to develop and reflect on their values and to consider how they might play an active role in solving environmental problems both locally and globally.

The surveys and follow-up interviews have revealed that Macao schools have made some progress in promoting EE/ESD but there are still areas for improvement. One area is related to pre-service and in-service teacher education for ESD which should aim to provide some substantial training in aspects ranging from

environmental knowledge and skills to enhancement of environmental attitudes and self-efficacy in implementing EE/ESD in the school setting. The Macao SAR government could establish partnerships with local and overseas universities, institutions, NGOs and primary and secondary schools in launching new initiatives.

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Chapter 13

Programmatic Implementation of Environmental Education in an Elementary Educator Preparation Program: A Case Study

Christine Moseley, Blanche Desjean-Perrotta, and Courtney Crim

At a conference of the North American Association for Environmental Education, a woman came through the lobby selling T-shirts that read: “Ask your teacher to take you outside.” The quote on the shirt raised some interesting questions. What if teachers are seldom outdoors themselves and do not value the outdoor experience for students? How will children come to appreciate their role in the environment? Most importantly, if children have to ask their teachers to take them outside, then what perceptions or understandings about the environment are being transmitted from the teachers to their students in the classroom? These questions raised our curiosity about our preservice teachers’ perceptions of the environment, resulting in on-going research in environmental education (EE) and programmatic changes to an educator preparation program.

This chapter provides an overview of our research on preservice teachers’ perceptions and beliefs about the environment and describes one approach to engaging future teachers in environmental education within our educator preparation program curriculum. We discuss the successes and challenges of retooling our educator preparation program to include EE. We also report findings of a national survey conducted to determine the extent of the inclusion of EE in educator preparation programs. Our goal in sharing this information is to “increase and enhance teacher education to better be able to create the necessary interdisciplinary thinking critical to transform learners for the next millennium” (Mortensen 2000, p. 27).

C. Moseley (✉) • B. Desjean-Perrotta
Department of Interdisciplinary Learning and Teaching,
University of Texas at San Antonio, San Antonio, TX, USA
e-mail: christine.moseley@utsa.edu; blanche.perrotta@utsa.edu

C. Crim
Department of Education, Trinity University, San Antonio, TX, USA
e-mail: clambert@trinity.edu

Teachers, Schooling, and Environmental Education

Jane Goodall discovered that children all over the country evidence a deep care and concern for our planet. A survey conducted by Goodall and Weekly Reader Research with over 20,000 children across the United States revealed that they are “very worried about environmental issues, particularly pollution, global warming, and the loss of natural habitat” (Goodall and McCarthy 2010, p. 11). Yet it seems children today are being educated about the environment as if there were no pressing issues related to sustainability (Orr 1995). Even though teachers have a unique opportunity to play a role in reversing these trends by nurturing in their students a disposition towards sustaining our environment, the tendency towards a reductionist approach to sustainability seems to be the norm (Fien 1995). Teachers tend to function almost exclusively from an object view of the world, embodied in isolated, stand alone activities such as Earth Day celebrations, recycling programs, and campus beautification projects. The connections between the natural environment and the larger sociopolitical issues are often neglected, resulting in teachers, and, ultimately, children, who do not understand their role as environmental stewards. As a result, children tend to see the environment as a place housing plants and animals but separated from themselves (Alerby 2000; Hicks and Holden 1995; Loughland et al. 2003; Payne 1998; Shepardson 2005). These findings suggest important implications for the future of our environment and raise questions about the most effective strategies for eliminating these misconceptions. Merely taking children outdoors does not answer all of these questions. Children also need teachers who are knowledgeable about local resources and environmental issues and have the personal commitment to apply this knowledge towards responsible actions to ensure environmental quality and quality of life.

Research in EE indicates that teachers play a critical role in advancing environmental education in schools (Rickinson 2001; Ekborg and Areskoug 2006; Powers 2004; Hestness et al. 2011). However, research also reveals that teachers hold many misconceptions about the environment (Dove 1996; Groves and Pugh 1999; Khalid 2003; Papadimitriou 2004; Moseley et al. 2010a), and, as a result, there is a greater risk that these misinformed teachers will perpetuate these misconceptions in their students. How can we expect schools to develop an environmentally literate citizenry, capable of creating positive solutions to environmental issues, if teachers’ perceptions of the world and its environment remain flawed? Our recommendation is that teacher educators systematically prepare future teachers in EE before they enter the classroom.

Most research in EE focuses on children’s understandings of the environment (Hicks and Holden 1995; Loughland et al. 2003). A few researchers have focused on examining how to change preservice teachers’ understandings about the environment and EE as they prepare to enter the classroom (Lang 1999/2000; Matkins and Bell 2007; Moseley et al. 2010b; Hestness et al. 2011; Desjean-Perrotta 2013). Given the fact that, as citizens, our perceptions of the world and the environment appear to be “fragmented and superficial” at best and inconsistent with scientifically

accepted understandings (Gil-Perez et al. 2003, p. 68), teacher preparation in environmental education should be a high priority. We agree with Forbes and Davis (2008) who stress the need to understand preservice teachers' perceptions of the environment and related socio-scientific issues and help teacher candidates understand how their perceptions will influence their future teaching. Teacher educators have the potential to help preservice teachers make a paradigm shift in their perceptions about the environment and related issues. This would provide an exponential influence impacting the environmental literacy of not only the preservice teachers but the hundreds of children in these preservice teachers' future classrooms.

Theoretical Framework

Our research as discussed in this chapter is grounded in mental model theory and is the basis for the analysis of preservice teachers' belief systems about the environment. The mental models held by a preservice teacher "reflects his/her belief system, acquired through observation, instruction, and cultural influence" (Libarkin et al. 2003, p. 123). Mental models are based on prior knowledge, existing ideas, and past experiences and used by individuals to guide their thoughts and actions and make meaning of the world around them (Coll and Treagust 2003; Johnson-Laird 1983). These mental images cause individuals to behave in certain ways and form beliefs that are stronger factors in impacting behavioral change than knowledge (Nespor 1987; Pajares 1992; Anderson and Holt-Reynolds 1995; Järvelin and Wilson 2003). The influence that mental models have on preservice teachers' belief systems is especially important to our research, as these mental images influence how these future teachers learn and how they interpret and apply what is learned.

Systematic Implementation of EE Across One Educator Preparation Program

The University of Texas at San Antonio (UTSA) is a federally designated Hispanic-serving institution with an enrollment of over 35,000 undergraduate and graduate students in a large urban setting. The educator preparation program (EPP) in the College of Education and Human Development educates over 2,000 students annually in a variety of professional teacher certification areas from elementary through secondary education. Historically, environmental education in and of itself has not been a part of either the university's strategic plan or the EPP. The state of Texas does not require EPPs to incorporate EE or practicing teachers to be certified in this discipline. Within this context, however, there were several education faculty at UTSA who were interested in integrating EE into the EPP and began gathering data about the teacher candidates' perceptions and beliefs about the environment.

Results of these data gathering efforts and subsequent research formed the basis for programmatic changes in the EPP to include EE. What follows is a description and explanation of these programmatic changes and their impact on the preservice teachers' perceptions about the environment.

Initial Assessment of EE in an Educator Preparation Program

Almost a decade ago, the North American Association for Environmental Education (NAAEE) developed a series of documents as part of the National Project for Excellence in Environmental Education. The goal of this project is to establish an educational process that leads to environmentally literate citizens who can make informed decisions and are responsible members of the global community. The *Guidelines for the Preparation and Professional Development of Environmental Educators* (herein referred to as *Guidelines*) (NAAEE 2004) were developed out of this national project as a set of recommendations regarding the basic knowledge and skills educators need in order to provide high-quality environmental education. The *Guidelines* are designed to be applied: (a) within the context of preservice teacher education programs; (b) to the professional development of educators in both formal and nonformal educational settings; and, (c) to all educators who are responsible for the integration of environmental education into curricula and programs (NAAEE 2004). These *Guidelines* became the foundation for our research in EE with our elementary preservice teachers.

According to Rickinson (2001), the classroom teacher can be one of the most influential environmental educators of young children. Thus, it is important that teachers understand the factors that shape their own perceptions and beliefs about the environment. Educator preparation programs need to assist preservice teachers in identifying these factors and recognizing the potential effects their perceptions may have on young children. Therefore, as a baseline study, we assessed the perceptions about the environment held by the elementary preservice teachers in our EPP using the Draw-an-Environment Test (DAET), a draw and explain protocol (White and Gunstone 1992). The DAET consists of a single page with space to draw and explain two prompts: 'My drawing of the environment is...' and 'My definition of the environment is....' (Moseley et al. 2010a) (Appendix 13.1). The *Guidelines for the Preparation and Professional Development of Environmental Educators* (NAAEE 2004) state that educators should be able to "describe the broad view that environmental education takes of 'environment,' incorporating concepts such as systems, interdependence, and interactions among humans, other living organisms, the physical environment, and the built or designed environment" (p. 9). We used this stated definition of environment to develop the Draw-an-Environment-Rubric (DAET-R), incorporating each of the four identified factors – humans, other living organisms (biotic), physical environment (abiotic), and the built or designed environment – as rubric categories for scoring the drawings (Appendix 13.2).

Results of this initial study with 118 elementary preservice teachers revealed their perceptions, or mental models, of the environment were not consistent with those expected of educators as stated in the NAAEE *Guidelines*. Almost 60 % of the preservice teachers surveyed did not include humans in their drawings. Thirty-one percent drew humans with no obvious interaction with other factors and only 9 % drew humans interacting with another factor. Only one drawing evidenced an understanding of a systems approach to the environment with interactions among two or more factors. Analysis of the sentence completion portion of the DAET survey was consistent with results from the drawings where few of the preservice teachers surveyed described their actions integrating with the environment (Desjean-Perrotta et al. 2007).

Introduction of EE into the Educator Preparation Program

Based on our initial research findings, it became evident that preservice teachers lack an awareness of the interconnectedness of the environment and their role within this system. This became the impetus for the implementation of an EE field experience with our elementary preservice teachers. As a component of a specific course, preservice teachers were required to attend a full day of professional development in Project WILD, a recognized exemplary EE curricula (Council for Environmental Education 2004). The original 6-hour workshop sessions were held in one of the city's six natural areas and facilitated by university faculty certified in Project WILD.

With over 200 preservice teachers participating in the workshops every semester, it became necessary to expand the facilitator base and utilize partnerships around the city in order to facilitate the Project WILD workshops. Therefore, the Strengthening Awareness and Valuing the Environment (SAVE) partnership was established. Early partners included faculty from the University of Texas at San Antonio and staff from the Texas Parks and Wildlife Department and San Antonio Parks and Recreation Department. The goals of this partnership are to increase the preservice teachers' knowledge of, and interaction with, the local natural areas and influence their perceptions of the environment using systematic, hands-on professional development experiences in environmental education (Crim et al. 2008).

Assessing the Impact of Initial Implementation of EE

In order to develop a preliminary baseline of data related to the effectiveness of the initial EE experience being provided to our preservice teachers, we assessed the initial group participating in the Project WILD workshops. These preservice teachers had not participated in any other EE experiences in their educator preparation program. A questionnaire completed by these preservice teachers indicated that the Project WILD workshops did increase their knowledge about the local natural areas,

meeting the first goal of SAVE. Many indicated that these local natural areas were places they would use in the future for exercise, recreation, and personal connection to nature. They also reported their intent to take their future students and their own children to the areas for learning opportunities about nature and wildlife (Crim et al. 2008).

The preservice teachers were also surveyed using the Draw-an-Environment Test before and after they participated in the workshop. Using the DAET-R for data analysis of the pre/post drawing surveys, the results revealed limited change in the preservice teachers' perceptions of the environment following the workshop. Results from the post-survey drawings indicated only a 1 % increase in preservice teachers who evidenced a systems understanding of the environment as compared to their initial drawings (pre-survey). There was no increase in the percentage of preservice teachers who included humans in their drawings. Despite our efforts to immerse the preservice teachers in an outdoor setting, the one-time EE workshop experience would not be enough to help us reach SAVE's second goal of influencing the preservice teachers' perceptions about the environment. We had predicted that providing an activity-based workshop in a natural setting would increase the effectiveness of the EE training and result in changed perceptions about the environment. However, the survey results reflected the findings of other researchers that changing deep-seated beliefs and related behaviors about a complex topic like EE is not accomplished through short-term interventions (Little 1993; Garet et al. 2001; Ko and Lee 2003). Thus, we decided to revisit the elementary educator preparation curriculum and determine where more EE could be integrated without negatively impacting an already overloaded program.

Further Implementation of EE into the Educator Preparation Program

We next expanded the SAVE partnership in order to systematically integrate a sequence of EE professional development experiences required of all elementary preservice teachers across the educator preparation program. These EE experiences and curricula, as listed below, provide the preservice teachers with inquiry-based activity guides, materials, and resources to use in their future classrooms (Table 13.1). As a culminating activity, during the student teaching semester, the preservice teachers are expected to incorporate the EE curricula and resources into their lessons and teaching activities. The SAVE partnership now includes additional community participants from Trinity University, San Antonio River Authority, Texas Wildlife Association, Cibolo Nature Center, Mitchell Lake National Audubon Center, Texas Forest Service and Texas Forestry Association.

Powers (2004) has outlined four necessary components that must be present in university programs to effectively integrate EE into their educational programs. These include the opportunities for: (1) teaching and learning outdoors, (2) sharing

Table 13.1 EE curricula implementation

EE curricula	Description	Course connection	Setting
Global Learning and Observations to Benefit the Environment (GLOBE 2011)	Targets math, science and technology in study of earth systems science	Earth Systems Science lecture and lab (sophomore/junior year)	Field data collection and investigations
Project Learning Tree (American Forest Foundation 2008)	K-12 curriculum developed by the American Forest Foundation. Use of forest ecology as conceptual framework	Science and Humanities course (junior year)	Indoor and outdoor activities within the course
Project learning tree: Environmental experiences for early childhood. (American Forest Foundation 2010)	preK-3 curriculum developed by the American Forest Foundation. Use of forest ecology as conceptual framework	Science and Humanities course (junior year)	Indoor and outdoor activities within the course
Elementary GLOBE (GLOBE 2011)	Integration of GLOBE protocols with elementary (EC-4) activities and literature	Approaches to Teaching Science and Approaches to Teaching Social Studies courses (senior year)	Teaching of lessons with elementary children
Wildlife in Learning Design (WILD) (Council for Environmental Education 2004)	K-12 Curriculum developed by Council for Environmental Education (CEE). Use of wildlife as conceptual framework	Approaches to Teaching Science course (senior year)	Teaching of WILD lessons in assigned elementary classrooms
Growing Up WILD (Council for Environmental Education 2009)	EC-3 curriculum developed by Council for Environmental Education (CEE). Use of wildlife as conceptual framework	Approaches to Teaching Science (senior year)	Teaching of GUV lessons in assigned elementary classrooms

EE resources, (3) modeling effective EE strategies, and (4) involving the local community. The SAVE partnership has emerged as a way to meet all of these components in our elementary educator preparation program. The SAVE partnership also has a potential capacity building component that could have an impact beyond the university classes and upon the public school system. By ensuring exposure to EE curricula and experiences for elementary preservice teachers who will ultimately be teaching young children in our schools and childcare centers, SAVE ultimately strives to create environmentally aware citizens across generations.

Although SAVE was originally developed to foster EE training in our EPP, the SAVE partnership has created opportunities for further collaboration among partners. For example, higher education faculty have participated with San Antonio Parks and Recreation staff to deliver workshops for homeschool groups and have collaborated on state initiatives such as the Texas Children in Nature Network and the Texas Environmental Literacy Plan. Additionally, when Growing Up WILD, Project WILD's early childhood curriculum guide, was first published, members of SAVE were on the state team for creating a workshop model. SAVE members also designed the first combined Project WILD and Growing Up WILD workshop and the first bilingual (Spanish/English) workshop in the state – both models which have been replicated by other Project WILD facilitators in the state. Several SAVE members were also asked to participate in the review of a national guide entitled *Project Learning Tree: Environmental Experiences for Early Childhood* (2010). The SAVE partnership has created and fostered a web of knowledgeable, passionate, and connected EE professionals within our local community.

Assessing the Impact of Systematic EE Implementation

Through the efforts of SAVE, we attained the first goal of this partnership, which was to introduce our elementary preservice teachers to the city's natural resources that are available to them as future educators. What was not so readily apparent was whether the multiple and diverse experiences in EE that we added to the educator preparation curriculum had any impact influencing the preservice teachers' fundamental beliefs about the environment. We were particularly concerned about the reconceptualization of their role and responsibilities as humans within the ecological system. We framed our research question as follows: To what degree does the level of curriculum intervention impact preservice teachers' perceptions about the environment as they complete the teacher education program?

In order to ascertain the impact of the revised EE curriculum on our preservice teachers' perceptions of the environment, we surveyed a group of elementary student teachers who had completed the sequence of EE experiences. We administered the DAET survey at the end of the student teaching semester. Using the results from the DAET-R, we compared the scores of the DAET survey from the initial study to those of the student teachers. No significant differences were found between preservice teachers who had experienced only the Project WILD workshop and the

preservice teachers who had participated in multiple EE experiences and curricula. It appeared in the drawings that the preservice teachers still did not include humans as an integral part of the environment. The student teacher drawings mirrored the drawings of the initial group surveyed.

One positive notable difference in the student teacher data was in the sentence completion portion of the DAET surveys. Even though the student teachers did not draw a systems portrayal of the environment that included humans, more of these students explained in words the interrelationship among factors than did the initial students surveyed. Only 1 % of the preservice teachers in the Project WILD workshop-only group surveyed mentioned a systems approach to the environment, whereas 15 % of the student teachers surveyed explained the interrelationships of the four major factors in the environment as identified in the NAAEE *Guidelines*. A suggestion for future usage of the DAET-R would be to consider the sentence completions along with the drawings in completion of the rubric.

National Assessment of the State of EE in Educator Preparation Programs

Faced with the ongoing challenges of developing an EPP that effectively addresses the role of EE, we found our discussions and questions mirrored by colleagues in higher education across the country. It is from this context that we broadened our inquiry and implemented a national survey study to report on the state of environmental education in EPPs across the United States. The three research questions that framed our national study are as follows.

1. To what extent is environmental education included in educator preparation programs across the U.S.?
2. What are the supports and barriers experienced across programs when making programmatic changes to infuse environmental education into educator preparation programs?
3. How are the NAAEE *Guidelines* used in educator preparation programs across the U.S.?

In total, participants from 211 institutions of higher education responded to the survey representing 37 states and 2 territories (28 % return rate). While a full report is being written, the following is a brief summary of the results. When reporting about state certification or endorsement opportunities, few respondents reported that their states offer this recognition in EE. We found that over 85 % of the respondents represented states that do not require any coursework in EE and, subsequently, over 80 % of the institutions represented do not require EE in coursework. One participant explains the situation very clearly: “Environmental Education is not listed in the state standards and thus we do not need to offer EE as a part of our program for all students.” Another respondent replied: “I wish we could do more. As it is, I sneak in EE in my courses.”

When identifying supports for, and barriers to, including EE in their EPPs, participants were asked to rank provided factors on a 5-point Likert Scale ranging from strong support to strong barrier. Aggregate percentages reflect how each factor was perceived by respondents across the response options. Overall, fewer supports than barriers were clearly indicated for including EE in EPPs, with the most prevalent support being the collaboration between formal and non-formal education agencies and organizations (42 %). Additional factors noted most frequently as supports were student interest (42 %), the availability of curriculum materials in EE (40 %), the institutional mission and vision (34 %), and the collaboration between teacher preparation faculty and faculty in other departments or colleges (34 %).

When identifying the perceived barriers to including EE in the EPPs, 80 % of the respondents indicated that allocated course time, or lack thereof, was a barrier to including EE into their EPP. Other barriers that were identified included the lack of: (a) funding for an EE program (67 %); (b) state certificates or degrees in EE (53 %); (c) faculty interest in EE (53 %); and, (d) a systematic approach involving all stakeholders to infuse EE into the educator preparation program (52 %). The results clearly indicate that participants had an easier time identifying barriers over supports when implementing (or not implementing) EE in EPPs. According to the survey results, partnerships between formal and non-formal educators, such as SAVE, can contribute significant support for including EE in EPPs.

The last research question specifically focused on the NAAEE *Guidelines*. Using a sample population of higher education institutions affiliated with NAAEE and the National Council for Accreditation of Teacher Education (NCATE), 43 % of the respondents indicated they had never heard of the NAAEE *Guidelines*, 32 % were somewhat familiar with them, and 24 % were very familiar. Eighty percent of the respondents indicated that their students had never heard of the *Guidelines* and only 2 % indicated student familiarity. When asked about the extent to which the *Guidelines* were integrated into their EPPs, 62 % did not use them for program development. While 6 % indicated full integration of the *Guidelines* in program development, only 3 % use the *Guidelines* for programmatic assessment. Clearly, the minimal role of the *Guidelines* in higher education reflects the lack of emphasis of EE in EPPs. Combining the absence of state policies for teacher certification or preparation in EE, perceived emphasis on barriers over supports, and the limited knowledge and usage of the *Guidelines*, initial analysis of survey results suggest EPPs may not be equipped to effectively include EE in their curriculum.

Where Do We Go from Here?

Like many of the researchers in EE, we have concluded from our own research with preservice teachers that many come to the university with simplistic mental models of the environment, what Nicholls (1999) calls cognitive illusions (p. 1386). These mental models may be influenced in a number of ways as a result of an individual's schooling, the media, and personal, everyday experiences. Environmental education

is a complex issue involving more than just scientific facts. Substantial and effective EE should be approached from a cross-curricular perspective (e.g. philosophy, psychology, sociology, science, mathematics). However, as in most higher education settings, this interdisciplinary approach poses pedagogical challenges, especially for teacher educators. In addition, state policies and budget constraints unintentionally create additional barriers to the integration of EE into an EPP. Often, therefore, educator preparation programs are left with limited options for infusing EE into the curriculum.

As teacher educators, we understand that mental models can sometimes be difficult (though not impossible) to change. In the case of EE, it is even more challenging given the interdisciplinary nature of the topic. Furthermore, we are aware of the research in effective teacher professional development that suggests that the most effective ways to deepen teacher knowledge and skills include strategies such as long-term, regular, structured and collaborative study groups, coaching, and immersion in inquiry (Wilson and Berne 1999; Boyle et al. 2004). However, these strategies can sometimes be difficult for educator preparation programs to implement. So the question is, within the limitations of an educator preparation program, can a short-term intervention for EE as we have implemented in our curriculum have a significant impact on changing elementary preservice teachers' perceptions of the environment (the second goal of SAVE)? Based on our research, we recommend as initial steps that EPPs tap into the greatest identified supports for inclusion of EE, namely collaboration between formal and non-formal education agencies and organizations, student interest, and available curriculum materials.

The foundation of our EE program rests on the belief that environmental knowledge alone is not sufficient. In order to bring about behavior change, individuals also need to have a variety of experiences outdoors over the course of time in order to become environmentally sensitive. In addition, they need opportunities within the higher education setting where they can be engaged in focused and reflective explorations of environmental issues as they prepare to enter the classroom. Our research suggests that the majority of our teacher candidates continue to adhere to an object conception of the environment and environmental issues despite the increasing exposure to EE we provide throughout their program. Therefore, we continue to investigate more effective means of developing our students' environmental knowledge and challenging their assumptions and beliefs. How to include an interdisciplinary approach to environmental education in programs that may conflict with state policies is another critical area needing further research.

Another issue we face is related to the delivery of our EE curriculum. One of the essentials for effective teacher professional development is coherence or the extent to which professional development activities are perceived to be part of a strategically planned curriculum for learning (Garet et al. 2001). Upon reflection, although our teacher candidates participate in a variety of EE curricula programs, these experiences are disconnected from one another. We need to address this issue so that the comprehensive goals of SAVE are made clearer to our students. We also agree that there is a need to provide more time for reflection and discussion around EE issues as the preservice teachers progress through the program. This will support them in

making personal connections between the science content, the EE experiences, and the related social issues.

Research indicates that teachers who hold negative attitudes toward science based on stereotypical mental models tend to pass these attitudes on to their students (Beardslee and O’Down 1961; Chambers 1983; Smith and Erb 1986; Mason et al. 1991). Teacher professional development programs can have a positive impact on teacher attitudes related to science (Barraza 1999). We believe the same holds true about the potential for teachers to relay negative attitudes about the environment to their students. Because the classroom teacher is one of the primary environmental educators for young children, it is imperative that educator preparation programs prepare preservice teachers for this important role.

Papadimitriou (2004) points out, “educating students about such issues [like EE] is also a challenge for educators because the traditional didactic strategies are inappropriate and so new innovative instructional strategies and techniques should be invented which means that a vast area for research is opened” (p. 306). This applies to teacher educators as well. We invite our colleagues in higher education to join in furthering the research about the most effective means of preparing preservice teachers for the important role of developing an environmentally literate citizenry. We hope that our preservice teachers leave our programs empowered as agents of change for the sustainability of our environment.

Appendices

Appendix 13.1. Draw an Environment Test (DAET)

Date: _____

ID# _____

In the space below draw a picture of what you think the environment is. Below that, please provide your definition of the environment (in words).

My drawing of the environment is:

My definition of the environment is:

Appendix 13.2. Draw an Environment Test – Rubric (DAET-R)

Date: _____		ID# _____		Score
Factor	Present	Interactions with other Factors	System interactions made explicit	
Human	<p>0 Points Drawing does not contain pictures of humans.</p> <p>1 Point Human(s) drawn without any apparent interaction with other factors.</p>	<p>2 Points Human(s) drawn interacting with other humans and/or another factor (e.g. human fishing or walking on a bridge), but without special emphasis placed on the influence of the interaction on the environment.</p>	<p>3 Points Humans drawn with obvious deliberate emphasis placed on interaction with one or more factors and the influence of that interaction on the environment through the use of special indicators such as conceptual labels and/or arrows.</p>	
Living	<p>Drawing does not contain pictures of living organisms.</p> <p>Living organisms (e.g. plants and animals) drawn without any apparent interaction with other factors.</p>	<p>Living organisms drawn interacting with other living organisms and/or another factor (e.g. animals grazing), but without special emphasis placed on the influence of the interaction on the environment.</p>	<p>Living organisms drawn with obvious deliberate emphasis placed on interaction with one or more factors and the influence of that interaction on the environment through the use of special indicators such as conceptual labels and/or arrows.</p>	
Abiotic	<p>Drawing does not contain pictures of abiotic factors.</p> <p>Abiotic items (e.g. mountains, rivers, Sun, or clouds) drawn without any apparent interaction with other factors.</p>	<p>Abiotic items drawn interacting with other abiotic items and/or another factor (e.g. wind blowing a palm tree), but without special emphasis placed on the influence of the interaction on the environment.</p>	<p>Abiotic items drawn with obvious deliberate emphasis placed on interaction with one or more factors and the influence of that interaction on the environment through the use of special indicators such as conceptual labels and/or arrows.</p>	

(continued)

(continued)

Human Built or Designed	Drawing does not contain pictures of human built factors.	Human built or designed items (e.g. buildings, automobiles, and bridges) drawn without any apparent interaction with other factors.	Human Built items drawn interacting with other human built items and/or another factor (e.g. smokestack emitting smoke into the air), but without special emphasis placed on the influence of the interaction on the environment.	Human Built items drawn with obvious deliberate emphasis placed on interaction with one or more factors and the influence of that interaction on the environment through the use of special indicators such as conceptual labels and/or arrows.
Total possible points: 12				
Total Points				

Directions for Completing the DAET-R

1. Assign points for each Factor—Human, Living, Abiotic, Built—based on whether it is Not Present or Cannot be Determined (0 Points), merely Present (1 Point), Interacting with other Factors (2 Points), or Interacting with other Factors with special **additional** emphasis placed on the interaction and its influence on the environment (3 Points). For example, if a drawing contains the presence of a human that is fishing, but there is no special **additional** emphasis placed on the fishing activity to indicate deliberate acknowledgment of systemic awareness, the participant would receive a score of 2 for the Human Factors category.
2. Factors **MUST** be drawn, not implied, to be considered. The use of just words or labels to indicate a factor with no drawings should receive 0 points.
3. **Conceptual Labels**: a label that depicts interactions between two or more factors **AND** the influence of that interaction on the environment. For example, a cloud labeled as ‘Water Cycle’ instead of just cloud, indicates interaction between abiotic and living factors. Human and Human Built waste by-products indicate interactions between two or more factors **AND** the influence of that interaction such as smog, garbage, or trash. A label that only classifies or identifies an object such as tree, bird, house, or ocean is not considered a Conceptual Label.

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Chapter 14

Making the Transition to Sustainability: Marshaling the Contributions of the Many

Gregory Smith

One of the challenges in considering the topic of educating for sustainable development is that no one knows what sustainable development will actually entail. The very idea of sustainable development has been considered an oxymoron, a combination of contradictory concepts that can't in reality stand together—like the etymology of *oxymoron*, itself: sharp dull. Over and beyond the difficulty of combining these two terms, each word separately is problematic.

Sustainability has become so widely used that it has come to mean nearly whatever a speaker or writer wishes, although the idea of persistence over time generally underlies most uses. Recently, politicians in the United States have adopted the concept of sustainability when they speak about cutting the budgets of programs for the least advantaged citizens; what they are referring to in this instance has more to do with sustaining or reducing current levels of government expenditures rather than raising revenues needed to sustain the well-being of communities.

Development can also mean many things. Most commonly associated with the economic growth central to capitalism in its Western and Eastern forms, development can also refer to the development of human capacities for creativity, understanding, and collaboration. When used in the second way, the idea of sustainable development seems potentially achievable; when used in the first, less so. What all of this suggests is the need to be circumspect and potentially more open-ended about the role education might play in moving twenty-first century societies in directions more likely to assure their perpetuation, resilience, and capacity for self-renewal—three terms I have come to associate with the concept of sustainability.

Numerous observers have suggested that human beings are now facing a set of circumstances that could potentially result in changes as deep and extensive as those

G. Smith (✉)
Graduate School of Education and Counseling,
Lewis and Clark College, Portland, OR, USA
e-mail: gasmith@lclark.edu

that accompanied the agricultural and industrial revolutions. Theologian Thomas Berry (2000), looking at humanity's current dilemmas, imagined the emergence of what he called a new "ecozoic age," during which our species would learn to partner with rather than dominate the natural world. He encouraged his readers to become part of this "great work." Historian of science, Carolyn Merchant (2005), has suggested the same thing when she urges her readers to adopt a partnership ethic rather than ethics that privilege only the self, humanity, or the earth.

How our species can make the transition to this new orientation toward the planet and one another remains the central conundrum (Owens 2012) of our time. There is no game plan, however, no guidebook for making our way into whatever future lies past the challenges of climate change, resource exhaustion, water shortages, overpopulation, and the growing division between the rich and the poor. But make this transition we must if our descendants are to experience lives characterized by something other than the deprivation, insecurity, and fear that seem likely to be their lot unless people are able to adopt other patterns of behavior toward each other and the Earth.

If this is to happen, humanity will need the contributions of as many people as can be marshaled. The way through the passage that currently confronts us has a better chance of being achieved through the imagination and efforts of many rather than fewer individuals; it thus seems imperative that adults find ways to enlist the commitment of children and youth throughout society to this process. Their success in this endeavor will depend upon the depth of their connection to their places and their communities, the connections that generally underlie human action for the good of all. It will also depend upon their capacity to problem solve, organize, and interact with others in ways that result in positive action on the ground. It is this orientation and this set of abilities that educators could strive to cultivate and that for me lies at the heart of education for sustainable development. Humanity may not know exactly where we need to go or how to get there, but we do need people willing to embark on the journey and willing to take on the alternating roles of leaders and followers as we negotiate the future.

In the pages that follow, I will begin with a brief discussion of my own understanding about the nature of sustainability and then move on to a consideration of an approach to teaching and learning aimed at drawing the young into experiences of connection and competence aimed at preparing them to become participants in what authors like Joanne Macy (2007) and David Korten (2007) have called the "great turning." I will then present examples of educators and schools in the United States that have begun to teach in this way. The work of such teachers is as fragile as the blooms of daffodils and crocuses currently flowering in my yard despite the wind and snow and heavy rains of early March. Some of these projects have been able to persist over time; others have faded with the parting of inspired teachers or changing conditions. But all suggest possibilities that if pursued hold the promise of inducting children into the process of collectively participating in the transition to sustainability our era demands.

What Is Sustainability?

To my mind, there are three fundamental principles or rules that must undergird efforts to create a more sustainable society. These principles can be simply stated:

You don't eat your seed corn or turn your forests into deserts.

You don't pump wastes into your drinking water.

You don't let some people have so much that others are unable to live secure and meaningful lives.

The problem is that industrial societies break all of these rules. As Natural Step founder Karl-Henrik Robert (2008) noted nearly two decades ago, people during the modern era have on a scale unmatched during previous eras mined and created toxic materials and then released them into the environment, destroyed habitats across the planet, and failed to distribute natural resources in ways that benefit the majority rather than a minority. Creating a more sustainable society will require recognizing what humanity is doing and changing the behaviors of people in the developed and developing world in fundamental ways.

Environmental educator and activist David Orr describes sustainability in more formal terms in a recent article focused on the relationship between sustainability and national security. There he writes that

[Sustainability] implies many things including a rapid transition to energy efficiency and renewable energy sources as well as management of soils and forests for long-term health; elimination of waste; and changes in economic accounting necessary to preserve "natural capital" so that each generation leaves "as much and as good" for succeeding generations. Sustainability requires that we (a) see the world in all of its social, economic, and ecological complexity as one interactive system and (b) extend our time horizons sufficiently far into the future to foresee and forestall outcomes that would otherwise compromise the well-being of future generations. In other words, the adoption and development of a sustainable society requires that we apply the science of systems thinking to governance, infrastructure, economy, and natural resources over the long haul. (Orr 2012, paragraph 10)

In a talk given at my institution, Lewis & Clark College, in the mid-1990s, Orr observed that what humanity is now facing is equivalent to a heart attack. Our response needs to be similar. When someone is experiencing cardiac arrest, emergency medical technicians and physicians will draw on every technology available to stabilize the situation. But once that has happened, victims need to begin changing their lives—shifting the way they eat, exercise, and deal with stressful situations.

Something similar needs to happen with industrial growth societies. A part of this transformation will be tied to the introduction of new technologies—like solar panels, wind power, or green architecture—to provide some immediate stability. Another part will require the development of new institutions—like farmers markets and Community Supported Agriculture (CSAs). A final part will be based on changes in our behaviors and ways of thinking and understanding about humanity's relationship to the planet and to one another. For example, in a world of limits we

may need to redefine what wealth is—rather than seeing wealth in terms of material goods and money, we might need to see it in terms of strong communities and healthy environments.

What can educators contribute to this process? To begin with, teachers can't simply present the problems and leave it that—although it is important that as students get older, they become knowledgeable about the challenges now facing modern civilizations. A diet of only problems, however, is likely to lead to fear, despair, and apathy. This is exactly what we don't need. David Sobel (1999) has written about the danger of inducing ecophobia, or a fear of nature, in the young and the importance of establishing at the outset a deep sense of affiliation and at-homeness in the world. Following this, students should be given the opportunity to identify and then act upon issues in their own school and community that would benefit from their energy and intelligence. The transition to sustainability requires the nurturing of courageous and imaginative people committed to working for the betterment of their communities and the health of natural systems. How might we support the development of such people?

Place- and Community-Based Education

Concern about this issue has led me and a number of colleagues around the United States and elsewhere to become advocates for what is called place- and community-based education. This approach to teaching and learning focuses on integrating local issues into the school experience of children and youth and providing opportunities for them to apply what they are learning in ways that are valued by others.

Here is one definition of place- and community-based education developed by a group of researchers and educators in 2007 as part of a grant proposal to the U.S. Environmental Protection Agency to study whether environmental education has ever had a positive impact on environmental quality.

Place and community-based education 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 both to boost student achievement and to improve community health and vitality—environmental, social, and economic. (Johnson et al. 2012, 610)

What is important to recognize in this definition is the way that place- and community-based education is closely tied to economic development activities as well as environmental stewardship. Schooling becomes important as it makes real contributions to the life of the community.

The Rural School and Community Trust, a national organization that has been an early proponent of place-based education as a means for helping schools and communities get better together defines this approach as follows:

Place-based education is learning that is rooted in what is local—the unique history, environment, culture, economy, literature, and art of a particular place. The community provides the context for learning, student work focuses on community needs and interests, and

community members serve as resources and partners in every aspect of teaching and learning. This local focus has the power to engage students academically, pairing real-world relevance with intellectual rigor, while promoting genuine citizenship and preparing people to respect and live well in any community they choose. (Rural School and Community Trust 2003)

This definition points to the fact that successful place- and community-based education requires the participation of people from outside the school. If students are to have an impact on their communities, they must be integrated into that community in ways that give them the ability to inquire, gain access to information, and act. Doing so necessitates reducing the boundaries that generally exist between classrooms and the communities that support them, allowing children to learn outside the school and inviting community members into the school to share their knowledge and experience with students. When this happens, schools stop being age-based ghettos that separate the young from everyone else and become more similar to the cross-generational social and natural settings that once were the sites in which children learned about the world. Educational experiences like these provide a vehicle for addressing a number of factors I believe can make a significant contribution to education for sustainability.

First, students who have an opportunity to learn within the context of their communities and regions have a better chance of developing a deep sense of connection to the people around them and to nature. When students spend the majority of their time in classrooms learning about non-local issues and phenomena and then go home to computers and televisions, they have few opportunities to establish the relationships that lead to a sense of affiliation and commitment. In the absence of connection, there is little reason for young people to develop the sense of responsibility that underlies citizen participation or environmental stewardship. From this standpoint, the alienation and anomie seen to characterize modernizing societies as long ago as the late-nineteenth century (Durkheim 1951) become fundamental impediments to the forms of social involvement needed if people are to imagine and implement the initiatives required to deal with contemporary social and environmental challenges. Overcoming that alienation requires something more than detached academic learning. It requires contact and involvement and a testing out of one's ideas and skills through learning opportunities grounded in near-at-hand school or community issues.

Second, experiences in particular communities and places if studied and reflected upon can help young people begin to understand the nature of the human and natural systems that support them. When education focuses more on abstractions than direct experiences of the world, it is possible to overlook the consequences of our actions or inaction and fail to see the degree to which human welfare is tied into the welfare of everything around us. Why is it, for example, that people in industrial societies have forgotten to protect freshwater sources in ways that would be unlikely to happen in a community that depends upon a single spring for its drinking water? Or why is it that we sanction fishing practices that exhaust resources in ways that would have been unconscionable to Native Americans who knew the importance of letting the first salmon escape their traps so they could spawn further upstream?

Part of the answer can be found in the fact that when learning is confined to abstract concepts, students can easily fail to connect lessons to their experience of the world. Misconceptions about physical phenomena, for example, remain in place for even the most successful students, preventing them from truly grasping the nature of reality. In contrast, in a traditional hunting and fishing community, over-fishing or over-trapping 1 year will quickly result in a declining resource base the next. This will lead to a lesson felt as much in one's gut as in one's mind. Humans live our systemic relationships as much as we think about them. Educators need to help young people grasp the meaning of this fact by situating learning in ways that make these relationships clear.

Third, when place- and community-based educators direct their attention to important community issues and invite an exploration of potential solutions, students begin to see themselves as problem solvers. Too often, schools focus on identifying problems but not showing young people that they have the capacity to make a difference. Well-established research findings in the field of environmental education demonstrate that an education that consists only of information about environmental problems rarely alters behavior (Hungerford and Volk 1990). What does alter behavior is the opportunity to be engaged in activities that confirm for children their own capacity to make positive and life-enhancing change. One of the challenges for educators seeking to work in this way lies in helping students choose projects that have the potential for being successful. Starting small can be critical, but even small projects—if acknowledged by others—can lead students to believe that they are capable of making positive contributions to the lives of those around them. Such experiences then become attractive and meaningful, resulting in a desire to seek out more opportunities for service in the future.

Fourth, when students have an opportunity to participate in projects that are of genuine value to their communities, adults realize that even though children may not be able to vote, they can lead efforts that result in significant benefits for others. Acknowledged in this way, the young can take on tasks like restoring watersheds or organizing meetings about difficult topics, activities that too often are either ignored or avoided by adults. Such experiences provide young people with the opportunity to take on the role of citizen stewards in ways that enable them to gain the skills needed to participate effectively as democratic decision-makers and activists. As the institutions that have supported people in the developed and developing world become less able to meet human needs—something that has become all too apparent in the aftermath of the 2008 economic downturn as well as following major natural catastrophes in places as different as Haiti and Japan—people will become more and more dependent on the ability of their fellows to respond with intelligence and compassion at the local level. The wide distribution of such leaders could well make the difference between humanity's capacity to create more life-protecting and sustainable institutions and practices and our failure to do so.

Fortunately, educators across the United States are experimenting with the possibilities of place- and community-based education in ways that are benefitting both students and their communities. In the remainder of this chapter, I will provide

examples of how teachers are connecting children to their places, helping them grasp the nature of systems, engaging them in problem solving as well as problem identification, and providing them with opportunities to take on leadership roles.

Connection

Sunnyside Environmental School

The Sunnyside Environmental School, created in the mid-1990s as a special focus public school, is located in Portland, Oregon. As a kindergarten-through-eighth-grade school, it has taken upon itself the task of encouraging its over 600 students to care about their community and begin to see themselves as social actors. In the primary grades, teachers take their students on daily walks around the neighborhood just to observe what is happening and changes that take place over the course of the year. When students become older, they participate in a range of field study and service projects made possible by a weekly schedule that allocates 1 day for learning in the community.

Using local public transportation, Sunnyside students travel to a variety of sites around the city where they are able to couple their own observations and activities to content learned in the classroom. For example, when they study the vulcanism responsible for the Cascade Range, the most prominent mountains in the Pacific Northwest, they take a class trip to the cinder cone of Mt. Tabor, Portland's extinct urban volcano. A few weeks later, they travel to Mt. St. Helens to investigate the impact of a major eruption that occurred in 1980. During other days away from school they can be found at Forest Park removing English ivy, at Brookside Wetlands sampling water or observing birds, at Jean's Farm preparing the garden for summer vegetable starts, or at Portland's Vietnam Memorial pulling weeds and spreading compost. The day devoted to work in the community is not limited to environmental projects. Students also go to the Blanchet House where they serve lunch to the homeless or the Oregon Food Bank where they bag and box food to be distributed to low-income citizens in Portland. All of these activities help them become comfortable in nature and the city and demonstrate to them that there is much to learn about in their own community as well as people and places that can benefit from their help.

Students' connection to place is nurtured during their classroom studies, as well. Primary students, for example, create their own version of Portland's City Council, electing representatives and studying issues of importance such as transportation policies aimed at reducing greenhouse gases. One spring, for example, third-grade students interviewed people about their bike riding habits and concerns and then presented information they'd gathered to Portland's actual City Council. At the middle school level, students are assigned to a core class that includes sixth- through eighth-graders. Each year the curriculum focuses on a central natural feature of the

Pacific Northwest: mountains, rivers, or forests. Instruction in language arts, social studies, and science starts with close-at-hand phenomena like Mt. Tabor or the Willamette and Columbia Rivers, and then directs students' attention to rivers or mountains or forests around the United States and the rest of the planet. Students at the Sunnyside Environmental School are often surprised that their peers in other schools don't have the same opportunity to become acquainted with local flora and fauna and contemporary human needs and activities in the way they do.

As children in pre-industrial societies learned about the world through their own activities and senses, so students at the Sunnyside Environmental School are learning about their community and nearby natural resources through their own investigations and ongoing opportunities to interact with people and with nature. Such experiences deepen their relationship with their own life worlds, relationships that can serve as a strong antidote to the forms of disaffection and alienation that can accompany school and (often solitary) leisure activities that direct children's attention away from where they are to more distant or virtual landscapes.

Libby High School

In addition to learning about what's currently happening in their home places, learning about the past can also deepen students' relationship to their communities. From 1995 to 2006, the Montana Heritage Project provided students in this state with ways to investigate the stories of their own communities, turning them into historians and archivists. In Libby, a social studies teacher named Jeff Gruber took on these learning possibilities in ways that were especially powerful. Libby was going through economic shifts away from a resource-based economy that were especially unsettling. It was difficult for adults to talk about these issues, so one of Gruber's assignments to students was to go to the local historical society and select photos they believed well-represented Libby over time. They assembled several hundred of these images and invited the community to participate in a conversation about what the images said about the community and its role in peoples' lives.

Students next interviewed people who worked in the local plywood mill, collecting their stories and then publishing a pamphlet describing what they learned. Just as they were finishing this project in 2003, the mill was closed by non-local corporate executives. After having learned as much as they had about Libby, students felt they needed to do something. So they prepared a presentation to share with the CEOs of Stimson and Plum Creek Lumber in Portland, letting them know what impact their decisions were having on their families and neighbors. During this presentation, one of the young men said he had gone into this project hoping to find answers from what people had done in the past. He said that what he'd learned is that his grandparents and great-grandparents had faced similar struggles. What allowed them to persist was their willingness to work with others. He concluded by saying that he and his fellow students understood they could do the same thing. What is especially powerful about the surfacing of local histories in this way is

that it allows students to connect their own personal narratives with the narrative of their community, enhancing their sense of identity and linking their lives to the lives of others.

There are an infinite number of ways to develop this sense of connection and the kind of care and participation associated with it. In some communities, teachers engage students in the collection and distribution of oral histories on the Internet; in others, students work with adults to paint murals depicting important historic or contemporary events and people; in still others, students take photographs of cultural traditions or places of beauty which when later displayed or made available in publications celebrate the human and natural resources that make their homes special and worth preserving and enhancing. At issue for educators is simply seeing the cultivation of connection as something worth doing and then providing experiences likely to engender it.

Systems Thinking

Aka'ula School

Helping students learn how to think systemically is more challenging but just as important as connecting them to their places. A program that is addressing this issue can be found on the island of Molokai in Hawaii. For nearly two decades, two middle school educators have been teaching their students about environmental issues by immersing them in the study of important local concerns. In the mid-1990s, Vicki Newberry and Dara Lukonen started a program they call Promoting Resolutions with Integrity for a Sustainable Molokai, or PRISM. Molokai is home to around 8,000 people, most of whom are of Hawaiian or Polynesian descent. Newberry and Lukonen saw Molokai beginning to fall under the same development pressures as other Hawaiian islands and believed that the resident population needed to have a say in what happens there. So they began with their students.

Each fall, they ask students about topics they are interested in investigating. Over the years, they have looked into issues such as solid waste disposal at the school and then the island, the impact on native habitat of ecotourism development, the relationship between ballast water releases and invasive species, the restoration of traditional Hawaiian fishponds, and emergency preparedness. Students then spend several months reading technical reports, interviewing resource professionals, and talking with other island residents.

Early on Newberry and Lukonen decided to draw on a process called Investigating and Evaluating Environmental Issues and Actions (IEEIA) developed by environmental educators at the University of Southern Illinois (Ramsey et al. 1989). This process is aimed at surfacing all of the people who have a stake in a particular issue and learning about their perspectives. Through this extended activity, students develop a deep sense about the way that activities in one place in an ecosystem

influence activities in other places. IEEIA leads them to explore a problem, issues tied into that problem, the players associated with the problem and their attitudes, beliefs, and values. Finally, students identify the solutions that these players propose to address the problem and come up with their own recommendations. Every spring, they present their findings and solutions at a 1- or 2-day long symposium to which their parents and other island residents are invited. Researchers Trudi Volk and Marie Cheak observe about these symposia that they have had impacts that go far beyond student learning.

Everyone can express his or her viewpoints and consider others' viewpoints surrounding issues of local significance. This participation is evidently infectious. When adults become more knowledgeable of the issues through students' presentations, they become more than spectators. They become participants themselves. This in turn has enormous impact on the motivation of the students to thoroughly investigate the issues they choose. Publication of the students' findings place demands on their communicative skills and fuels their drive to refine and polish their products and presentations. (Volk and Cheak 2003, 23)

Students' work has brought recognition from the Environmental Protection Agency as well as the Governor of Hawaii. Parents, too, are deeply impressed with the impact that these learning experiences have had on their children. "I see these kids and the ones that have graduated and gone on and they've learned how to learn. They're not afraid. They're not afraid to ask questions" (in Cheak et al. 2002, 38).

This kind of work immerses students in their community, and through that immersion gives them an opportunity to begin to reflect upon and understand the complex relationships among people and between people and the natural world.

Real Life Problem Solving

Shelley Middle and High Schools

About the same time the PRISM project began on Molokai, a similar project started in Shelley, Idaho. After having learned from community adults that what they most wanted to see in high school graduates was the ability to solve problems, work in teams, and communicate, teacher Mike Winston created a class called Science Solutions. In addition to learning about problems and the broader systems in which they were occurring, students were also asked to take steps to use what they had learned to effect change. One fall, a team of students decided to investigate the declining populations of Yellowstone cutthroat trout in local streams and rivers. They learned that one approach to increasing survival rates of young trout was to install a hatch box. This way more eggs would yield young fish.

The hatch box worked, but as they progressed in their research, students discovered that the real problem was the way area waterways were silting up because invasive species like leafy spurge, knapweed, and star thistle don't hold the soil as

well as native short grasses. Their next task was to figure out how to address the invasives. They discovered that cashmere goats can provide an effective biological control. They purchased some goats and found that they devoured the weeds. When I spoke with Winston in 2008, I asked about what had happened with this project. He said there were now herds that totaled 5,000 cashmere goats in the county and that students had formed a small business mapping the location of invasive species with GIS equipment. This information was then provided to the sole county employee charged with weed control.

A more recent initiative has involved the collection and distribution of another biological agent, a species of beetle that feeds on leafy spurge. Using mapmaking and observational skills learned during a high school capstone project, one of Winston's students has played a leading role in the Holding the Line project, a multi-agency effort aimed at keeping leafy spurge out of the Yellowstone National Park. Examples of other problem-solving projects include a year-long study of the feasibility of raising tropical fish in waste geothermal water at the Lave Hot Springs, student participation in the redistricting of school board zones, and mapping the location of fire hydrants in the city of Shelley. Winston and his students have also been involved in the creation of the North Bingham County Historical Park that includes a renovated school building from the nineteenth century, a general store, a six-stall barn, and an experimental farm. In addition to the exhibits, park visitors can take lessons from volunteers about traditional craft skills in an effort to preserve important cultural traditions from this earlier era.

Winston's work in Shelley embodies many elements of place- and community-based education, focusing as it does on natural and cultural resources. Students, as well, have been given opportunities to learn entrepreneurial skills, another critical aspect of sustainability. Much of this initiative is tied to a single teacher's energy and commitment, pointing to the importance of individuals in advancing education for sustainable development. Winston's success, however, has been tied into his ability to work with businesses and agencies willing to support his projects. In personally bridging the gap between the school and the community, Winston embodies and models the practice of an effective place- and community-based educator.

Students as Leaders

Greater Egleston Square Community High School

The Greater Egleston Community High School in Roxbury, Massachusetts was established in the early 1990s by parents who wanted to create an educational program aimed at preparing children to become community leaders. They did so hoping that this kind of opportunity would be powerful enough to draw the school's primarily Black and Latino students away from gang membership and the streets.

When Elaine Senechal, a science teacher, came to the school a few years after its inauguration, she wanted to find ways to link her discipline to the school's mission. In an effort to acquaint herself with community concerns, she started attending meetings of local environmental non-profit organizations. Two of these, REEP (Roxbury Environmental Empowerment Program) and ACE (Alternatives for Community and Environment) were then focusing on the increasing rates of asthma among residents of the neighborhoods around the school. People in these organizations were also interested in working with youth.

Senechal took up the offer of two women from ACE who were willing to come in on Friday afternoons to her new environmental justice class and teach students how to be community organizers. The first task they took on was the need for on-the-ground air monitoring equipment in Roxbury. The Environmental Protection Agency was monitoring airborne particulates in downtown Boston, but not where they lived. Data revealed that Roxbury had the highest level of diesel pollution in the entire state of Massachusetts. Daily monitoring of the pollution led to the creation of an online service called AirBeat that let people know whether the air was safe or not as well as a student-created signaling system that used different colored flags at the school. In addition, students wrote and distributed a survey about people's knowledge regarding the relationship between air quality and asthma.

Shortly after the completion of this phase of what has become a long-term organizing effort, people at ACE discovered that a Massachusetts statute governed the amount of time that vehicles can idle at a single location—5 min. The statute, however, was not being enforced. The bus lot of the Massachusetts Bay Transit Authority was located a half dozen blocks away from the school, and it was not uncommon for buses to idle for more than 30 min each morning, especially in the winter. ACE and the students started an anti-idling campaign that 6 years later resulted in a ruling against the transit authority that required it to obey the idling laws and convert its buses to natural gas. The law is now being enforced for vehicles throughout the city.

A change in administration a few years later resulted in less emphasis on this kind of community involvement at the Greater Egleston Community High School. Other schools in the Boston area, however, began to work closely with Alternatives for Community and the Environment, giving more students the chance to participate in efforts to reduce diesel pollution even further. In addition to buses and trucks, another source of diesel pollution in urban areas is heavy construction. In the summer of 2010, students at the Mission Hill School investigated this issue and developed presentations and skits that they then shared with decision-makers at institutions like the Brigham and Women's Hospital and Northeastern University, sites of extensive new building projects. The students' aim was to encourage these organizations to enter into contracts only with construction firms that used vehicles retrofitted with pollution-reducing devices. Although students' work that year did not result in a change in policy or practice at Northeastern University, Brigham and Women's Hospital was willing to screen contracts with construction firms according to this criteria.

Students who have the chance to become leaders in efforts like these gain a new sense of their own capacity to generate change. A young woman who was a student in Elaine Senechal's environmental justice class spoke of the way this kind of work had affected her.

I am proud of my accomplishments in environmental justice this trimester. Most importantly, I have been able to gain confidence to speak in front of large groups of people. Before presenting to the City Council I was very nervous. But after watching them and my classmates somewhat debate I realized they are regular people just like my family, my teachers, and my friends, and I should not be nervous when it comes to speaking my mind. (in Senechal 2008, 100–101)

In this instance, young people are learning that through their collective effort they have the capacity to make a far-reaching contribution to the improved health not only of their own families and neighbors but to everyone throughout the region where they live. Having become aware of the impact of their own ability to act and lead, it seems likely that many will continue such activism into their adulthood and become more willing to speak their minds when this is called for.

Bringing All of the Elements Together

Each of the preceding schools has developed specific courses or programs that have provided their students with the opportunity to explore in depth important aspects of community and environmental health and the kinds of human activities that can help sustain these. To conclude, I will describe one more school that has chosen to make sustainability the platform on which it constructs all of its educational offerings. In doing so, it is providing varied opportunities for students to develop a deeper sense of connectedness to their place and community, begin to think systemically, become involved in the solving of compelling local problems, and encounter opportunities to take on the role of leader. Called the Al Kennedy High School, it serves students, many of whom have struggled academically in the former lumber town of Cottage Grove, Oregon. Five years ago, a recently licensed school administrator named Tom Horn was persuaded by the district's superintendent—the nation's superintendent of the year in 2007—to become its principal. Horn found a school in disarray. In the first month, he dealt with four drug overdoses. Five years later, there is no drug use at the school and students are graduating and going on to post-secondary education. Horn thinks that part of the transformation is due to the fact that he visits the homes of every student, actively knitting a strong connection between the school and students' families. He also ascribes it to the way that his decision to focus on local sustainability issues is bringing his students into the public eye in ways that are positive and confirming rather than debilitating. Students have been drawn into projects that are meaningful and that make a genuine contribution to their community and the lives of their families; in the process they are coming to be seen and to see themselves as young people worth paying attention to.

Horn has chosen to focus the school's curriculum around the topics of agriculture, forestry, energy, architecture, and water. Work in these areas is aimed at helping students learn how to:

- Evaluate, discuss, question, analyze, and apply
- Understand that knowledge and intellect should accompany goodness and commitment to community
- Develop the intellectual and physical capacity that ensures a love of learning (<http://blogs.slane.k12.or.us/kennedy/about/> retrieved on June 29, 2012)

Central to the accomplishment of these goals is the formation of partnerships with local agencies, businesses, and funders. The school, for example, collaborates with the planning department of the City of Cottage Grove on a long-term wetlands mitigation project. Students initially cleared invasive species and planted native trees, and the school was paid as a result. Horn sees this as an 80-year project—with students returning to maintain the site on a regular basis. Additional income brought into the school from these projects is used to pay for field trips to places many of the school's low-income students may have only dreamed of going. Students are also encouraged to locate landowners with property adjoining the Coast Fork of the Willamette River. Small grants are available for people interested in removing Scotch broom and Himalayan blackberries. Students volunteer to write the grants and not infrequently are then asked to form the crews who then do the labor—providing students with a source of income as well as the satisfaction of knowing that they're bettering the local environment.

Three years ago, Horn decided to take the school's nursery and garden projects to another level. Students were already involved in maintaining a garden at the school. Produce from this was distributed to the local food bank as well as to the school's primarily low-income students. Horn realized that many of the district's other schools sat on large pieces of property that could serve as the site for "victory gardens" for nearby residents. He approached a local seed company that was willing to supply the school with as many seeds as students could plant and started what he hopes will become a community-wide effort to help economically challenged families to raise more of their own food. Students have so far helped to create school-community gardens on the grounds of three of the district's elementary schools.

Visits to the trailer parks also shocked Horn into awareness of the poverty faced by many residents of Cottage Grove. He saw trailers that in his words were sinking into the ground. He found himself wondering about alternatives and whether it would be possible to design and then construct housing kits—like the Katrina Cottages sold by a building supply chain store that were affordable and environmentally friendly—that could be outfitted with solar panels, rainwater catchment systems, and composting toilets. He found architects in nearby Eugene and the University of Oregon interested in the idea and wrote a grant to come up with a prototype design. City planners in Springfield, a working-class town adjacent to Eugene, have expressed interest in incorporating these designs in a new public housing project. Horn is also pursuing grants to begin constructing kits with the help of staff at Aprovecho, a nearby sustainability education center.

Horn is committed to making sure that the work students encounter at the school is both academic and physical. He wants his students to be thinkers as well as doers, leaders as well as followers. To this end, he seeks grants that engage students in scientific analysis as well. A \$30,000+ grant from the Weyerhaeuser Foundation is supporting an investigation of microbial organisms in local forest soils over a 5-year period. Such experiences give students the opportunity to learn how to engage in on-the-ground scientific research that can potentially contribute to the development of more sustainable forestry practices.

A similar project has engaged students in the process of developing a 75-year forestry plan for a local landowner interested in restoring an oak savannah on property not far from Cottage Grove. Before being settled by EuroAmericans, the Willamette Valley was regularly burned by native tribes who lived there. The burning removed brush and kept out the now ubiquitous Douglas firs, but oak trees were able to withstand the flames. Oaks provided rich habitat for a wide range of species as well as acorns for meal and flour. Hunting was also a much easier task in the park-like landscape. Restoring the property to its earlier form has required students to become problem solvers able to think systemically. Overgrown as the land has been with blackberries, Scotch broom, and Douglas fir, students have had to experiment with different strategies for eliminating the invasives and dominant firs. They have had to track their progress and imagine what their counterparts in 15–20 years will need to be doing to realize the vision they and the property owner are creating now.

Horn says that all of the learning at the Al Kennedy School is grounded in place and community. By making his school a model of sustainability education, he hopes to prepare his students to become leaders in the region's effort to implement projects and practices central to enhancing its environmental and social health. Through his efforts, young people who had been shunted to the margins of the community's life are being given the opportunity to become responsible and active citizens in the same way that students at the Greater Egleston Community High School led efforts there to make Roxbury a better place to live for everyone. In doing so, young people whose previous lives had been characterized by alienation and social anomie are coming to see themselves as community members who have a stake in maintaining their connection to other people and the place where they live. Working with principals in two other schools for struggling students in the region, Horn intends with his fellow educators to imagine, design, and then implement a set of educational practices that in time will no longer be seen as "alternative" but "mainstream," practices that will be made available to an ever-growing number of students interested themselves in becoming leaders in the emerging sustainability movement.

Inviting the Young to Participate in the Creation of Sustainable Societies

The co-creation of post-modern societies able to persist over time in ways that support both people and the ecosystems that support them is likely to be one of the most significant challenges our species has ever encountered. There is no playbook

for accomplishing this task, just as there was no playbook for our ancestors five centuries and ten millennia ago. Despite this, human beings are beginning to engage in a process of experimentation and invention and collaboration that may allow us to pass through the eye of a needle that at times seems impossibly small. In *Blessed Unrest*, social and economic entrepreneur Paul Hawken (2007) describes what he believes is the largest social movement in history, a social movement aimed at restoring the health of natural and human systems by both resisting their destruction and finding ways to restore what we know is good for people and the planet. This movement is arising on its own through the agency of individuals and groups who profess no common ideology and subscribe to no common leader. They are now coming together on a regular basis through the World Social Forum and their national offshoots, encouraging one another and sharing ideas.

A similar self-organizing effort can be seen in the Transition Town Network (Hopkins 2008) which arose in the small town of Totnes, England only 8 years ago. Transition Town Initiatives can now be found in Europe, Asia, Australia, Africa, and North and South America. These groups have formed in over 1,200 communities and provide forums in which local residents can begin to reshape the way they use and produce energy, husband resources, interact with one another economically, and strengthen their communities. Examples of initiatives include the creation of small businesses in English villages, the development of community-built and controlled green energy systems, the use of digital currencies by local merchants and consumers in Brixton, a suburb of London, disaster relief in Japan following the 2010 earthquake and tsunami, and the planting of organic kitchen gardens among low-income peasants in rural India (Goude 2012). It remains uncertain as to whether or not this already vast and growing network will be able to provide its members with the forms of resilience and local self-sufficiency they are striving to create, but their work seems fundamental to the creation of the sustainable societies needed to replace the industrial growth societies that now dominate the planet.

Educators at this point on the clock of the world need to consider seriously their role in this process. Will they be primarily involved in the transmission of a set of cultural understandings and traditions no longer able to fulfill human needs because these very understandings and traditions are unraveling the natural and social systems required to meet those needs? Or will they become agents of change able to help children and youth gain the skills, insights, and confidence required to participate in the vast project of cultural and institutional transformation now confronting humankind? Making the transition to sustainable and just societies will require as many people as possible to protect and preserve natural environments and human lifeways that have proven their value and sustainability, to resist forces that threaten the health of these environments and lifeways, to restore processes and systems weakened over five centuries of exploitation and unlimited growth, and to invent new ways of interacting and producing that respect the fundamental interdependence shared by all life forms on our small planet. There can be no throwaway people as humanity takes up the work of coming decades. Drawing as many of the young as possible into this transformational movement seems increasingly imperative.

Teachers like those in the schools described in this chapter have begun to embrace this responsibility. They stand as demonstrations of the possible, acting for the future despite the constraints imposed by an educational system preoccupied with preparing children for a society that is proving itself unable or often unwilling to respond effectively to the vast challenges now facing our species. By engaging the young in learning activities aimed at deepening their affiliation with their home places and helping them gain the ability to make those places environmentally and socially sound, such educators are preparing their students to join in the movements and networks that are already beginning to transform our societies. They will be able to do this not by presenting set answers—as has been the common tendency of earlier cultures—but by inviting the young to participate physically, socially, intellectually, and spiritually in the development of ways of being with one another and the earth that are just, democratic, equitable, and environmentally prudent. In this way, schools across the planet might be able to contribute to the creation of truly sustainable societies.

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Chapter 15

Closing the Green Gap: Policy and Practice in Chinese Environmental Education

Rob Efird

Environmental education...emphasizes students' first-hand experience and stresses everyday practice.

- Special Topic Education Outline for Primary and Secondary Schoolchildren's Environmental Education (*zhongxiaoxuesheng huanjing jiaoyu zhuanli jiaoyu dagang*) (Ministry of Education 2003b)

Research in education has long emphasized the value of learning by doing. In environmental education, the virtue of hands-on, practical learning is stressed not only by scholars, but by policymakers as well. This is clear in the Chinese Ministry of Education's policy on environmental education quoted above, which goes on to explicitly recommend that "practical activities" (*shijian huodong*) constitute a full quarter of the total class time devoted to environmental education. An emphasis on experiential learning is also a hallmark of the environmental education policies of many other countries, and a centerpiece of the United Nations' Education for Sustainable Development guidelines. Yet for a variety of reasons, such policies often conflict with the priorities of teachers, administrators and parents, leaving a pronounced and enduring gap between environmental education policy and classroom practice (Gruenewald and Manteaw 2007; Stevenson 2007). In order to explain (and close) this "green gap", we need to better understand why policy fails to become practice at the local level of individual schools. I approach this question by drawing upon 10 months of ethnographic fieldwork in China's southwestern province of Yunnan, primarily in the provincial capital of Kunming. While volunteering for a local environmental NGO there, I conducted interviews with teachers and administrators at ten Kunming primary schools in order to assess their practice of environmental education. All of these schools are officially designated "green schools"

R. Efird (✉)

Department of Anthropology, Sociology and Social Work,
Seattle University, Seattle, WA, USA
e-mail: efirdr@seattleu.edu

(*lǚse xuexiao*) that ostensibly emphasize environmental education (Wu 2002; Zeng et al 2009). I found, however, that even teachers who are motivated to teach environmental education struggle to find time for it and face formidable challenges to using class time for experiential learning. In particular, the widely shared preoccupation among teachers and parents with exam preparation and student safety complicate attempts to take students out of the classroom for the kind of hands-on learning that China's Ministry of Education is seeking to promote (Efird 2010; Ma 2007, 2010; Ministry of Education 2003a, b). Nevertheless, while my interviews illustrate these obstacles, they also suggest untapped opportunities for collaboration with non-school partners to make environmental education more engaging and meaningful for young learners.

China's Green Schools and the Environmental Educators' Initiative

The Chinese government has been formulating policy on environmental protection and environmental education for nearly four decades (Lee and Tilbury 1998; Lee and Williams 2009; Ma 2007). One early move to enhance environmental education in China's schools was the nationwide certification of "green schools". In 1996 the National Environmental Protection General Bureau (now the Ministry of Environment) and the former National Commission on Education (now the Ministry of Education) jointly issued the Outline for National Environmental Education Actions which called for the nationwide establishment of "green schools" beginning in 2000. Schools that satisfied specific criteria in the areas of pedagogy, administration and school environment would receive designation as a green school and would be subject to periodic re-evaluations to ensure continued compliance with green school standards. The establishment of green schools in China was an ambitious and progressive move: it predated the designation of green schools in the United States, for example, by over a decade. However, many green schools have yet to fulfill the program's original intent. As Lin and Ross (2005) note, significant barriers to green school success include "indifference or resistance to environmental education" by teachers and the misunderstanding of many school leaders that the green school concept meant simply "greening" the campus with more trees and grass. But the most serious challenges they identify are the widespread lack of pre-service or in-service training for teachers and the intense focus on exam preparation: "Many secondary school teachers are reluctant to accept the burden of squeezing into their class schedules 'another subject' when they are rewarded primarily for their students' achievement on high stakes examinations, the contents of which do not yet include substantial environmental education knowledge. The pressure placed on secondary school teachers, often by parents, to 'measure up effectively' (e.g., produce high test scores) ensures that environmental education in many schools is just 'for show'." (2005: 76–77). Zeng et al. (2009) note a similar formalism and superficiality to green schools' environmental education, and describe local government fanfare over green schools and their environmental education activities

as “loud thunder but small raindrops.” (155) Nevertheless, the requirement that green schools participate in environment-themed activities represents a justification and a motivation for teachers to engage their students in various forms of environmental learning.

As a means of further enhancing and affirming environmental education in public schooling, in 2003 the Ministry of Education issued a requirement that all of China’s primary and secondary schools “infuse” their curricula with environmental education. The specific goals and guidelines take the form of two documents (Ministry of Education 2003a, b), the Guide to Implementing Environmental Education in Primary and Secondary Schools (Trial) (*Zhongxiaoxue huanjing jiaoyu shishi zhinan [shixing]*) and the Special Topic Education Outline for Primary and Secondary School Students’ Environmental Education (*Zhong xiaoxuesheng huanjing jiaoyu zhuanli jiaoyu dagang*). The content of these documents is very much in keeping with widely accepted international standards, goals and best practices in environmental education. In part this is because both documents are direct outcomes of the Environmental Educators’ Initiative (EEI), a large-scale, 10-year partnership between the Ministry of Education, the international environmental NGO Worldwide Fund for Nature (WWF), and British Petroleum (BP) (Lee 2010; Lee and Huang 2009). Indeed, the guidelines were honored by WWF-China with a “Gift to the Earth” award in recognition of their significance (Lin and Ross 2005). In addition to producing these guidelines, the EEI also established environmental education teacher training centers at 21 major teacher training universities around China, which served as incubators for the diffusion of EE methods and concepts to local schools. According to Lee and Huang (2009), over 10 years the project trained some 5,000 teacher advisors and supervisors and offered courses in environmental education/education for sustainable development to some 10,000 university students, while engaging 86 primary and middle schools around China in the implementation of EEI projects with their students. Despite these promising statistics, however, the EEI also provided vivid illustrations of the challenges to effective environmental education in China (Lee 2007; Lee and Huang 2009). These include an acute shortage of trained professionals with environmental education experience, a resistance to curriculum change based on heavy teaching loads, insufficient incentives, the low prioritization of environmental education in schools, and the competing demands of exam preparation (particularly in senior high school). As Lee and Huang note, “perhaps the biggest hurdle was to find ways of sustaining the project once all the funding and training support had dried up,” perhaps by creating a local NGO to “sustain the [EEI’s] vision, resources and network.” (2009: 121–2). Such an NGO has yet to be created.

Other studies of Chinese environmental education report similar challenges. In the absence of any specific environmental education class, the teaching of environmental content is often concentrated in science classes (for primary schoolers) and geography classes (for secondary students). One study of Beijing geography teachers found that “teachers saw their ESD [Education for Sustainable Development] work as constrained by the pressure to prepare students for public examinations; moreover, concerns for students’ safety prevented them from carrying out fieldwork

beyond the school context...[T]he prime consideration in teachers' curriculum and pedagogical planning is preparing their students for public examinations, and because ESD is not a core examination subject it is regarded as an 'extra.'" (Guang and Lam 2009: 26)

These concerns are broadly echoed by Ma Guixin, a prominent Chinese professor of environmental education and author of a widely used text for instructing future primary and secondary teachers in EE (Ma 2007). Ma notes three crucial difficulties in the acceptance of environmental education. In the first place, she laments the fact that environmental education lacks the weight and authority of more established academic disciplines. The consequence, she writes, is widespread indifference to the lack of formal EE training among the primary and secondary school teachers charged with conveying EE content. Secondly, Ma feels that the real-world impact (*shixiao*) of environmental education is very much in doubt. Despite the lip service paid to environmental education and the emphasis on transmitting environmental "information," Ma remains pessimistic about the degree to which EE is actually affecting people's values and daily behavior. Most importantly, "because environmental education has not yet been included in the domain of official examinations, and because the focus of its own assessments is centered on changes in attitude and behavioral objectives rather than on knowledge, and also because assessments of awareness, values, and behavior are hardly quantifiable by means of numerical gradations, it is difficult to set up or implement a scientific system of assessment indices...In other words, teachers' achievements in conducting environmental education may not gain as much attention from the schools as do rates of admissions to higher schools, nor may strong environmental awareness and active environmental behavior in students receive as much attention in society as do high academic marks. The result is that research in and implementation of assessments in environmental education are not being given due attention."(Ma 2010: 61–2)

The fate of the teacher training initiatives established by the Environmental Educators' Initiative described above is also in question. Some of the 21 environmental education training centers established by the EEI in Chinese normal universities have since closed. Discussions with faculty and students at these schools reveal structural obstacles to the study of environmental education, beginning with the fact that there are few if any job prospects for professional environmental educators. The situation in the mainland therefore makes for an instructive contrast with Taiwan, where governmental emphasis on environmental education led to the 2011 implementation of an environmental education law mandating 4 h a year of EE for students and government employees. This and other government support for environmental learning has led to many new job prospects for environmental educators in nature centers, for example. In mainland China these positions are rare: environmental education may be studied at normal universities by teachers preparing to teach geography or science at the primary or secondary level, but it remains secondary to their pre-professional subject focus.

Despite these challenges, there have been distinct improvements in several areas of the environmental education that is available to China's primary and secondary students. These include increases in the number and variety of extracurricular activities and environmental education teaching materials, changes that have been partially driven by the activities of China's environmental NGOs.

Environmental NGOs and China's Environmental Education

Environmental NGOs have played an influential role in the development of Chinese environmental education, including WWF's aforementioned high-profile role in the Environmental Educators' Initiative as well as the many smaller initiatives taken by Chinese environmental NGOs, which are estimated to number around 3,000. For many of these NGOs, environmental education and collaboration with schools is part of their organizational mission. This is certainly true of such prominent Chinese environmental NGOs such as Friends of Nature (*Ziran zhi you*). In addition to supplementing the public school curriculum by providing extracurricular opportunities for "nature experience" (*ziran tiyan*) and other forms of environmental learning, Friends of Nature has also produced Chinese translations of two key environmental education texts for a wide Chinese readership: Joseph Cornell's *Sharing Nature with Children* and Richard Louv's *Last Child in the Woods*. Indeed, Chinese environmental NGOs have been described as "cultural translators" (Yang 2009) that introduce and adapt environmental language, ideas and models from abroad. This has certainly been true in the area of environmental education.

In 2007 I began studying the environmental education activities of NGOs in Yunnan Province by working with the Yunnan Eco-Network (YEN), a Chinese NGO devoted to environmental education and the promotion of biogas. Not far from the tourist mecca of Lijiang, the organization works out of a two-storey traditional courtyard farmhouse in a Naxi nationality village on the shores of beautiful Lashihai Lake. Lashihai is one of Yunnan's nine high-altitude lakes, or "highland pearls" (*gaoyuan mingzhu*), and its wetlands are a key wintering site for migratory birds. YEN has focused on education concerning the lake's ecology and the potential of biogas as a clean, sustainable source of fuel and a sustainable alternative to the deforestation that threatens the lake. As I have discussed at length elsewhere (Efirid 2011, 2012), YEN's environmental education outreach to local schools provides children with hands-on learning opportunities in the local environment, in line with the Ministry of Education's policy guidelines cited above.

In the same region served by YEN, the Ministry of Education's call for locally based environmental education teaching materials has been fulfilled in the form of a primary school text entitled *I Love Lashihai*, created by a Beijing-based NGO in consultation with local teachers. The text is one in a series of over a dozen textbooks developed by the Beijing Brooks Education Consulting Center, or *Tianxiayi* (<http://www.brooks.ngo.cn/>). The organization's founder, former journalist Hao Bing, is a

longtime environmental educator who also co-translated the Chinese-language edition of Louv's *Last Child in the Woods*. *Tianxiayi's* texts typically include essays and activities that teach children about the local environment and traditional culture, and there is often a strong emphasis on conservation of biodiversity and natural resources. These elements are all present in *I Love Lashihai*, which includes detailed discussions of Lashihai Lake's environmental features. Lashihai's case is unusual, however: most rural Chinese communities lack the resources to publish local teaching materials, and instead use the generic teaching materials from central publishing houses which prepare students to take similarly generic entrance exams for high school and college.

Although rural schools often lacked the resources of urban Chinese schools, in Lashihai and other areas that I visited in Yunnan teachers often found ways to get children out of the classrooms to learn hands-on in the surrounding natural environment. By contrast, urban schools in Kunming offered perhaps one or two organized outings a year, and even these were often cancelled due to extra exam preparation demands or safety concerns. Working within these constraints, NGOs in China's big cities have struggled to enhance students' limited environmental education opportunities. During the 2011–2012 school year, while serving as a volunteer with the environmental NGO Green Kunming, I was able to witness and assess an example of this type of school-NGO partnership for environmental education.

Green Kunming's Environmental Education

Yunnan Province has been described as China's "cradle of NGOs" due to the large number of both foreign and domestic NGOs there. The presence in Yunnan of both prominent international NGOs (including WWF-China and The Nature Conservancy) as well as many smaller Chinese NGOs is in turn the result of the province's spectacular biodiversity and the willingness of many local officials to work with NGOs. Among Kunming's most active and prominent local NGOs, Green Kunming (*lüse Kunming*, www.greenkm.org) pursues a variety of initiatives that are designed to enhance local schoolchildren's environmental knowledge and stewardship. One of their key organizational goals is to "help primary- and middle-school students acquire the skills and knowledge necessary for the friendly co-existence of humans and nature, foster their environmentally beneficial sentiments, attitudes and values, and help them become a caring and active new generation." Their environmental education programs include weekend "nature experience" (*ziran tiyan*) activities for children at the local botanical garden and zoo, and fieldtrips to measure and document environmental problems like water pollution and environmental features such as old-growth trees. Beginning in 2008 and continuing for a year and a half, Green Kunming partnered with eight Kunming elementary and middle schools to offer a series of environmental education lectures and in-class activities led by college student volunteers who had been trained

by Green Kunming staff. On the basis of this effort, the organization produced two handbooks for teaching environmental education, a *Guidebook for Newcomers to Environmental Education* (*Huanjing jiaoyu xinshou zhidao shouce*) and a *Compilation of the Green Kunming Environmental Education Project's Teaching Experience and Lesson Plans* (*Lüse Kunming huanjing jiaoyu xiangmu jiaoan ji jiaoxue shijian jicui*).

Also in 2008, Green Kunming began using the internationally-known Green Map system as a way to encourage local schoolchildren to focus on environmental issues and features in their communities. The registered green map system used by Green Kunming was originally developed by Wendy Brawer in New York City, and has since spread worldwide. The common platform (including special map icons) allows the work of mappers around the world to be mutually intelligible, but the core concept is straightforward and simple: the creation of a community map that highlights sites of environmental significance. The model has been widely adopted in China (examples of which are visible on the Green Map system's official website) and Green Kunming pays for the right to use it. In response to local priorities, Green Kunming has adapted the green map system to the format of a competition, for which teacher-led student research on the map site might take place over several weeks prior to the competition. Green Kunming's director and founder, Mei Nianshu, explained to me that the adoption of a competitive format was intended to appeal to school principals who favored activities that awarded prizes, but it also matches well with the stress on competition that is endemic to the test-based Chinese educational system. Green Kunming has managed to have the competition included in activities held during the annual Science and Technology Week's Creativity Competition (*kejizhou chuangyi dasai*) that is organized for schoolchildren by local education officials. This official venue likely affirms the activity's legitimacy in the eyes of school leaders and therefore increases the likelihood that students will be allowed to participate.

Over the 4 years that Green Kunming has organized these competitions, they have been especially successful in partnering with official green schools. In 2012 there were some 1,760 officially certified green schools in Kunming, and a new form of international accreditation—the ecoschool (*shengtai xuexiao*)—was just beginning to spread. In addition to encouraging schools to engage in environmental education, green school accreditation and periodic reassessment requires such schools to engage in environmental learning activities. This helps to explain the relative openness of these schools to their students' participation in environmental education events, which might otherwise be frowned upon for reasons discussed below. Green schools are thus potential key partners for the environmental education outreach of NGOs. The requirements of green school accreditation also present opportunities for teachers wishing to do hands-on environmental learning since it gives them a pretext for taking students out of schools and into the community.

At the time I joined Green Kunming as a volunteer in late 2011, the previous 3 years of their green map competitions had attracted a growing number of participating schools. However, the organization had not conducted a comprehensive and

systematic qualitative assessment of the program's success and its perception among participating teachers. With their support, I embarked on just such an evaluation.

Assessing the Green Map Program and Environmental Education in Kunming's Schools

On the face of it, student creation of green maps appears to be an excellent opportunity to fulfill the Ministry of Education's environmental education guidelines and their emphasis upon locally based, "first-hand experience" (*qinshen tiyan*). Those guidelines specifically encourage students to gather information on their surrounding environments through observation, surveys and other means, and, on the basis of this information, to "attempt to resolve simple environmental problems." The practice of researching and creating green maps could conceivably serve as an important step in this process.

In order to evaluate the program's effectiveness, I proposed interviewing teachers in schools that had participated in Green Kunming's green map competition. Green Kunming agreed to this proposal and helped me arrange interviews at ten participating primary and middle schools. My subsequent interviews involved more than a month of traveling on Kunming's bus network, crisscrossing the growing city from the multiplying high-rises of its urban core to newly developed low-rise neighborhoods built on former farmland at the city's fringes. I ended up speaking with more than 30 teachers and administrators, who—despite their busy schedules—answered my questions with patience, candor and questions of their own regarding environmental education outside of China. During these conversations I was repeatedly struck by the severe structural challenges teachers face when trying to conduct the type of hands-on experiential education promoted in their own Ministry of Education's guidelines. In particular, two obstacles to environmental education were raised by a majority of my interviewees: student safety and the priority of test preparation.

Before discussing these obstacles, it is important to remember what teachers are being asked to do. In keeping with internationally established best practices in environmental learning, the Ministry of Education's guidelines for environmental education encourage teachers to take their students out of the classroom for hands-on learning and investigation of their local environments. In the Ministry's guidelines, schools are explicitly encouraged to devote a full 25 % of their environmental education time to "practical activities" (*shijian huodong*) as a complement to in-class learning (*ketang jiaoxue*). In fact, this rarely happens. Without exception, every single interviewee in this survey—and every teacher I spoke with in China—cited concerns for student safety (and by extension, the school's liability) as **the** key obstacle to taking students out of the classroom. Such concerns have even led to the cancellation of many schools' annual Fall and Spring Trips (*qiuyou, chunyou*), which are in many cases the last remaining school-organized off-campus excursions

for urban students. As one primary school teacher explained to me, “China’s planned birth policy only allows you to have one child, and parents are really doting. They’re afraid the child will get hurt—all Chinese kids are protected. If a child gets hurt the parents will come to the school and make trouble. They feel like ‘my child can’t get injured.’” Comments by another primary school teacher offered more specifics on the constraints teachers deal with, as well as the institutional support for such restrictions: “If you want to take kids to a place with water, the school won’t permit it, out of consideration for the safety issue. And the [municipal] bureau of education issued a document forbidding teachers to take students [near water].”

Test preparation was the other major obstacle to environmental education. As one teacher put it, “there’s a lot of talk about ‘quality education’ (*suzhi jiaoyu*), there are reforms, and they promote this and that, but in the end, we’re still stuck with the focus on exam scores.” Teachers repeatedly cited the pressures of standardized exam preparation as constraining their freedom and willingness to introduce environmental content in their lectures and assignments. As one primary school teacher put it, “If the tests don’t include it, well, then we teachers of core subjects [*zhuke*] won’t make a special effort to explain it.” Since environmental content is scarce or absent in these all-important exams (the results of which may even influence a teacher’s compensation), there is an understandable reluctance to sacrifice time that might otherwise be spent drilling students in core test subjects such as math and English. Indeed, students have little time as it is: “In addition to [entering] the school gate, students these days also need to enter cram schools and get tutoring,” explained one teacher. “They are unable to develop their individual interests and hobbies.” “But that’s a problem with the education system,” she added, with the expression of helplessness that I would hear again and again: “there’s nothing we can do about that” (*women meiyou banfa*).

This twin preoccupation with exam preparation and student safety is broadly shared throughout the country. In his recent study of educational desire in Shandong Province, for example, Kipnis describes education in the schools he visited as “an intense and intensely competitive experience. Middle school students are pressed to the limits of human endurance for the digestion of information. Students’ lives are arranged so that they can do little else than study, and participation in competitive activities is introduced from a very early age.” (2011: 46–7) Every middle school student he spoke with “complained about being tired from the overload of study. Clearly this is a system that pushes students to the edge of what is humanly possible” (2011: 43). Kipnis also found that the planned birth policy—which limited most families to one child—not only increased parental ambitions for their children but also led to “excessive” fears that their sole child might be injured at school. “We live in constant fear of the children having an accident,” one kindergarten teacher told him. “If one of the little darlings does so much as skin a knee or get stung by a bee then someone from the family will be in here haranguing us for hours... Grandma or grandpa often picks up the children before lunch or after school, and the first thing they do is inspect the child from head to toe and look for the slightest bump or scratch. They are even more careful than when picking through produce at the market!” (61) At three of the urban primary schools Kipnis visited, children were

even prohibited from chasing one another for fear that they might be injured. Principals at boarding schools that he visited explained their constant surveillance of students as an effort to prevent injuries.

In addition to the obstacles posed by safety concerns and exam preparation, a number of other issues came up in the interviews that I conducted. Several teachers mentioned a lack of formal training and preparation in environmental education as an impediment, for example. Most schools also lack compelling, up-to-date environmental education teaching materials, forcing teachers who wish to discuss issues such as climate change or local ecology to spend their scarce time developing their own lesson plans and materials from scratch. Indeed, time itself is a significant constraint: primary and middle-school teachers are extremely busy just meeting their core teaching requirements in classes that average over 50 students; they typically have little time, not to mention incentive, to devote their energies to teaching about the environment. Even at Kunming's green schools, environmental education usually takes the form of one-off campaigns, scattered assignments and/or stand-alone activities, and is rarely taught in an extended, systematic way. "To tell you the truth," said the principal of a green primary school, "we don't have an environmental education class. And as far as having environmental information infused throughout the curriculum [as required by Ministry guidelines]—that's not happening. Has environmental education been given an important place in the curriculum?" she asked rhetorically. "It really hasn't." Instead, environmental education was often haphazardly incorporated in the curriculum of unrelated classes—if at all.

Following the completion of this initial survey and my submission of the results to Green Kunming, I spent several more months in primary schools both in Kunming and other parts of Yunnan, and spoke with many more primary and middle school teachers. My experiences led me to believe that the obstacles faced by green schools in Kunming are shared widely among urban and rural schools in Yunnan, and the evidence offered by Kipnis and others (such as Fong 2006) suggest similar pressures constrain educators throughout China.

Building Capacity: NGO Support for Environmental Education in Schools

Green Kunming's director Mei Nianshu told me that she thought up the green map competition as a way to get children outside of schools. The prizes for the competition—the Chinese translation of Louv's *Last Child in the Woods*—reinforced Mei's emphasis on children experiencing and investigating nature. Yet there are significant obstacles to this, as we have discussed above. How can NGOs such as Green Kunming better enable teachers to meet these challenges? As part of my interviews, I asked teachers how Green Kunming could improve the green map activity and better support schools' efforts to teach environmental education.

First of all, it should be noted that a number of the teachers at participating schools were also registered as Green Kunming volunteers, and had taken part in

their activities. These teachers led the way for their schools to participate in the competition. Organizations that can attract teachers as volunteers or members lay an excellent foundation for working with students and other teachers. For example, teachers I interviewed said they would be happy to pass along news of Green Kunming's environmental education activities to students' parents, and this is one way that environmental NGOs can build participation. I found all of the teachers to be very forthcoming with suggestions for ways to improve the green map competition, many that would actually involve increasing their own time commitment and participation if NGO support was forthcoming. This willingness to invest their scarce time in an unremunerated activity—and one not necessarily valued by their school—suggested a genuine commitment to environmental education and the likelihood that NGO support would be welcomed and productive.

In terms of specific suggestions, several teachers felt that there was not enough time before the green map competition to become properly trained in the green map technique and to arrange for students to do research on the site that they were mapping. Others recommended more time for follow-up (*houxu*) after the competition, either to address environmental issues identified in the maps or to meet with other teachers and exchange ideas regarding such things as mapping technique and the competition outcomes. Without this extra time for student research, training and teacher exchange, there was a sense of unfulfilled potential, and some regretted that the green map competition ended up being little more than an “art contest.”

Several primary schools that I visited had experience working with local university students, including some from student groups focused on environmental protection who were trained by Green Kunming to give talks on environmental education. Teacher impressions of these student educators were mixed, but suggestive. One teacher mentioned that they lacked the lecturing skills needed to hold the attention of 50-plus primary school children. But the principal at a different primary school spoke enthusiastically of their past partnership with local college students who came to the primary school not to lecture but to engage students in a more playful and casual way through games and interactive activities. The principal spoke highly of this partnership, noting that “the students loved it! And they got a lot out of it” (*shouhuo hen da*). Her response echoed my own experience observing interactions between university students and primary schoolers in the Lashihai area (Efrid 2011, 2012), and reaffirmed for me the potential for college students to serve as influential role models in environmental stewardship. This model of university students serving as older peers to guide interactive environmental education in primary- and middle schools is a practice that warrants greater attention by both university student groups and environmental NGOs.

Despite the test-focused, safety-obsessed, indoor orientation of Chinese schooling, NGOs can help teachers to offer their students the kind of environmental education envisioned in the Ministry of Education's guidelines. In addition to the activities mentioned above, there are other potential openings for NGOs to integrate experiential environmental learning in the curriculum. One teacher suggested that since schools are increasingly employing tour companies to conduct their annual fall and spring student outings, an NGO could offer a similar service and focus the outing on

environmental education. More ambitiously, NGOs with sufficient resources could also establish summer camps, for which there is a growing market due to the rise in two-income, single-child households. In camps and other contexts, NGOs could try pairing environmental learning with instruction in English or science, subjects that appeal to parents and students concerned with exam preparation subjects. In fact, Green Kunming has considered the possibility of holding a camp, but at the moment they lack the location, start-up funding and qualified staff to make it feasible. But grassroots NGOs like Green Kunming typically face significant challenges in fundraising, staffing and program execution and assessment. In particular, the precariousness of year-to-year funding applications can compromise the quality and continuity of their work. I learned this first-hand in 2012 when I was asked to serve as a judge for the green map competition. That year there was no funding to support schoolteacher training (*peixun*) in the green map method, or to engage in follow-up with schools after students submitted their maps in order to address environmental issues that the mapping project had raised. Dependence on short-term, project-based funding often complicates the crucial task of long-term program assessment, whereby NGOs repeatedly work with community partners to evaluate the program. This type of periodic reflection can help NGOs better target their efforts while encouraging community partners to feel more invested in the program's success. In order for groups like Green Kunming to enhance the environmental education that schoolchildren receive, these organizations need support to resolve their own challenges.

I grew up in nature. My students are growing up in the classroom

Richard Louv's bestselling *Last Child in the Woods* (2005) resonates with many parents and educators in the United States who are deeply concerned about the health and environmental consequences of the growing disconnect between youth and their natural environments, a phenomenon that Louv terms "nature deficit disorder." His book has inspired the formation of a national organization (the Children and Nature Network, www.childrenandnature.org) and has motivated state- and federal-level policy initiatives to provide more funding for environmental education. Now translated into 11 languages, the book has also struck a chord with readers in China, where the children may face even greater challenges in connecting with nature. I asked a young member of Green Kunming's environmental education staff how she felt after reading the Chinese translation. "I'm more optimistic about America," she replied. "China's worse."

In urban China, students' contact with both nature and their local communities appears to be withering. As one veteran Kunming teacher put it flatly, "I grew up in nature. My students are growing up in the classroom." The causes of students' increasingly interior life are many. In addition to time-consuming test preparation and fears about safety and liability, there is the lure of indoor, often electronic,

entertainment in the form of TVs, games and computers. Particularly for urban children, their surrounding environments offer fewer and fewer opportunities for play in nature, as China's urbanization has routinely diminished and degraded access to natural spaces. Under such circumstances, where will China's youth acquire the knowledge, skills and motivations to meet their nation's daunting environmental challenges (Shapiro 2012; Watts 2010)? Where, if not in the context of their formal schooling? In order for this to happen, however, there is a pressing need to close the gap between policy and practice. As we have seen, there are structural features of Chinese law (in the form of the planned birth policy) and Chinese schooling (in the form of high stakes exam preparation) that compel schools and parents to prioritize safety and test preparation and complicate the kind of hands-on, community-based learning that motivates and enables environmental stewardship (Smith and Sobel 2010). Given such obstacles, it is unsurprising that the Ministry of Education's explicit policy to encourage "first-hand, experiential learning" in local communities remains widely unfulfilled.

The findings presented here should not obscure the fact that there has been clear progress in Kunming's primary school environmental education. The proliferation of green schools alone and their mandated attention to environmental issues (however superficial they may sometimes seem) certainly represent a trend of improvement in local environmental education over the past decade. There are examples of resourceful and motivated teachers who organize weekend activities in order to avoid conflict with regular classes, and enlist parent participation in order to resolve the question of student safety. Where we see such successes, it is imperative that we identify and celebrate them, because changes in behavior due to environmental education are sometimes difficult to track and may not materialize immediately. As one primary school teacher put it, "The biggest problem with environmental education is that society nowadays wants to see immediate results. But environmental education isn't like that. It's not like the stock market, where you immediately know if you make money or not."

In particular, given the common prioritization of test preparation, we need research on the impact of environmental education on test scores. Although there is a widespread assumption that experiential environmental education conflicts with test preparation, teachers are also aware that first-hand experience can be a powerful learning tool. One primary school teacher told me that she "always felt that [students] will remember what they personally experience for a lifetime. A teacher saying it 100 times isn't as good as a student experiencing it once." But the power and the profit of this method must be documented in the currency of the system, namely exam scores and admission to desirable schools. There is evidence from North American studies that students engaged in community-based learning activities do no worse than their peers on standardized tests, and may do better (Smith and Sobel 2010). Proof of similar outcomes in China may be helpful in persuading schools to engage in more hands-on learning, thereby narrowing the gap between Ministry of Education policy and classroom practice.

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