UNESCO Publishing

United Nations
Educational, Scientific and
Cultural Organization

Issues and trends in Education for Sustainable Development

EDUCATION ON THE MOVE

Education 2030

UNESCO Publishing

United Nations
Educational, Scientific and
Cultural Organization

Issues and trends in Education for Sustainable Development

A. Leicht, J. Heiss and W. J. Byun (eds)

UNESCO Education Sector

Education is UNESCO's top priority because it is a basic human right and the foundation on which to build peace and drive sustainable development. UNESCO is the United Nations' specialized agency for education and the Education Sector provides global and regional leadership in education, strengthens national education systems and responds to contemporary global challenges through education with a special focus on gender equality and Africa.

The Global Education 2030 Agenda

UNESCO, as the United Nations' specialized agency for education, is entrusted to lead and coordinate the Education 2030 Agenda, which is part of a global movement to eradicate poverty through 17 Sustainable Development Goals by 2030. Education, essential to achieve all of these goals, has its own dedicated Goal 4, which aims to ***"ensure inclusive and equitable quality education and promote lifelong learning opportunities for all."*** The Education 2030 Framework for Action provides guidance for the implementation of this ambitious goal and commitments.

United Nations Educational, Scientific and Cultural Organization

Education Sector

Education 2030

Published in 2018 by the United Nations Educational, Scientific and Cultural Organization, 7, place de Fontenoy, 75352 Paris 07 SP, France

ISBN 978-92-3-100244-1

Cover design: Corinne Hayworth
Cover credit: © Peter Jurik / Panther Media / GraphicObsession
Design and printing: UNESCO

Printed in France with the generous support of the Japanese Funds-in-Trust (JFIT)

United Nations Educational, Scientific and Cultural Organization

From the People of Japan

CLD 2933.17

Foreword

Issues and trends in Education for Sustainable Development is the fifth in UNESCO's Education on the Move series, which reviews trends in education today and challenges for tomorrow. The series is aimed at providing policy-makers, educators and other stakeholders with state-of-the-art analyses of topical issues. As the world's leading agency on education, UNESCO seeks to promote and stimulate this key intellectual debate on the future of education.

The present volume addresses Education for Sustainable Development (ESD), which empowers learners to take informed decisions and responsible actions for environmental integrity, economic viability and a just society, for present and future generations, while respecting cultural diversity. ESD promotes holistic and transformational education. This type of education addresses learning content and outcomes, innovative pedagogy and 'learning by doing', and uses a whole-school approach to engage communities in achieving sustainable change.

This publication comes at a time of heightened global interest in efforts to address sustainability challenges through education. ESD is placed at the centre of the 2030 Sustainable Development Agenda and has been widely recognized as a key enabler of sustainable development and an integral element of quality education. It forms part of Target 4.7 of Sustainable Development Goal 4, which by 2030, seeks to 'ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles…' as well as cutting across all the other Sustainable Development Goals (SDGs).

UNESCO is the lead agency on ESD, as recognized in the 2015 UN General Assembly Resolution 70/209. The resolution invites the Organization to continue to provide coordination for the implementation of the Global Action Programme (GAP) on ESD in cooperation with partners, advocate for adequate resources for ESD; support Member States in building capacity, promote the sharing of knowledge and best practices; and assess progress towards the achievement of ESD.

As the lead for the UN Decade on Education for Sustainable Development (2005-2014), the Organization has laid the foundations for ESD

implementation around the world. The extensive partnerships and networks and strong political commitments built throughout the Decade have created a broad consensus that quality education in the twenty-first century means learning how to live and work sustainably. This leadership role was also recognized in the declaration adopted in 2014 at the UNESCO World Conference on ESD at Aichi-Nagoya, Japan.

The Global Action Programme (GAP), the follow up to the Decade, aims to generate and scale-up ESD actions at all levels and in all areas of education, training and learning. There is also growing interest in inter-SDG collaboration with ESD. Through this publication, UNESCO aims to contribute to accelerating the reorientation of education towards achieving a sustainable and resilient world.

This publication presents an overview of ESD and highlights key issues related to ESD policy and practice. Topics include key ESD competencies and themes, policy, changes in the learning environment, teacher training, youth as lead actors, scaling-up action, and the monitoring of progress towards Target 4.7.

UNESCO is very grateful to the authors who contributed to this important volume. We also extend our sincere appreciation to the following peer reviewers for their kind efforts in providing invaluable insights and ideas: Daniel Abreu, Bianca Bilgram, Matthew Cocks, Brid Conneely, Bernard Combes, Sabine Detzel, Robert Didham, Zinaida Fadeeva, Charles Hopkins, Deepika Joon, Alexa Joyce, Livleen Kahlon, Kate Keough, Miki Konishi, Ragini Kumar, Taru Mehta, Martin Mickelsson, Yoko Mochizuki, Prithi Nambiar, Juan Carlos A. Sandoval Rivera, Bedoshruti Sadhukhan, Julie Saito, Daniel Schaffer, Pramod Sharma, Cara Smith, Shepherd Urenje, Wilma Van Staden, Arjen Wals, Jonathan Yee and Daniela Zallocco.

I also wish to express my sincere gratitude to the Japanese Government for providing generous financial support for this publication through the Japanese Funds-in-Trust (JFIT) to UNESCO.

Qian Tang, Ph.D.
Assistant Director-General for Education
UNESCO

Table of contents

Introduction 7
Alexander Leicht, Julia Heiss, Won Jung Byun

Notes on contributors 17

Part I: Understanding ESD

Chapter 1 From Agenda 21 to Target 4.7: the development of ESD
Alexander Leicht, Bernard Combes, Won Jung Byun, Adesuwa Vanessa Agbedahin *25*

Chapter 2 Learning to transform the world: key competencies in ESD
Marco Rieckman *39*

Chapter 3 Key themes in education for sustainable development
Marco Rieckman *61*

Part II: Implementing ESD

Chapter 4 Advancing policy to achieve quality education for sustainable development
Robert J. Didham and Paul Ofei-Manu *87*

Chapter 5 How are learning and training environments transforming with ESD?
Rob O'Donoghue, Jim Taylor and Vivo Venter *111*

Chapter 6 Building capacities of educators and trainers
Ahmad Qablan *133*

Chapter 7 Youth on the move: intentions and tensions
Priya Vallabh *157*

Chapter 8 Accelerating sustainable solutions at the local level
Victor Tichaona Pesanayi and Chisala Lupele *177*

Chapter 9 Scaling ESD
Felix Spira and Sirkka Tshiningayamwe *197*

Chapter 10 Monitoring ESD: lessons learned and ways forward
Ashley Stepanek Lockhart *215*

Acronyms 233

References 235

Introduction

Alexander Leicht, Julia Heiss, Won Jung Byun

Education for Sustainable Development (ESD) is commonly understood as education that encourages changes in knowledge, skills, values and attitudes to enable a more sustainable and just society for all. ESD aims to empower and equip current and future generations to meet their needs using a balanced and integrated approach to the economic, social and environmental dimensions of sustainable development.

The concept of ESD was born from the need for education to address the growing environmental challenges facing the planet. In order to do this, education must change to provide the knowledge, skills, values and attitudes that empower learners to contribute to sustainable development. At the same time, education must be strengthened in all agendas, programmes and activities that promote sustainable development. In short, sustainable development must be integrated into education and education must be integrated into sustainable development. ESD is holistic and transformational education and concerns learning content and outcomes, pedagogy and the learning environment (UNESCO, 2014).

With regards to learning content such as curricula, the complex sustainability challenges facing societies cut across boundaries and multiple thematic areas. Education must therefore address key issues such as climate change, poverty and sustainable production. ESD promotes the integration of these critical sustainability issues in local and global contexts into the curriculum to prepare learners to understand and respond to the changing world. ESD aims to produce learning outcomes that include core competencies such as critical and systemic thinking, collaborative decision-making, and taking responsibility for present and future generations.

In order to deliver such diverse and evolving issues, ESD uses innovative pedagogy, encouraging teaching and learning in an interactive, learner-centred way that enables exploratory, action-oriented and transformative learning. Learners are enabled to think critically and systematically develop values and attitudes for a sustainable future.

Since traditional single-directional delivery of knowledge is no longer sufficient to inspire learners to take action as responsible citizens, ESD entails rethinking the learning environment, physical and virtual. ESD is not confined to schools but applies to all levels of formal, non-formal and informal education as an integral part of lifelong learning. The learning environment itself must adapt and apply a whole-institution approach to embed the philosophy of sustainable development. Building the capacity of educators and policy support at international, regional, national and local levels will help drive these changes in learning institutions. Empowered youth and local communities interacting with education institutions become key actors in advancing sustainable development.

The launch of the UN Decade of Education for Sustainable Development (2005-2014) triggered a global movement to reorient education to address the challenges of sustainable development. Building on the achievement of the Decade, stated in the Aichi-Nagoya Declaration on ESD, UNESCO endorsed the Global Action Programme on ESD (GAP) in the 37th session of its General Conference. Acknowledged by UN General Assembly Resolution A/RES/69/211 and launched at the UNESCO World Conference on ESD in 2014, the GAP aims to scale-up actions and good practices. As the lead agency for the UN Decade and the GAP, UNESCO has a major role, along with its partners, in bringing about key achievements to ensure the principles of ESD are promoted through formal, non-formal and informal education.

International recognition of ESD as the key enabler for sustainable development is growing steadily. The role of ESD was recognized in three major UN summits on sustainable development: the 1992 UN Conference on Environment and Development (UNCED) in Rio de Janeiro, Brazil; the 2002 World Summit on Sustainable Development (WSSD) in Johannesburg, South Africa; and the 2012 UN Conference on Sustainable Development (UNCSD) in Rio de Janeiro. Other key global agreements such as the Paris Agreement (Article 12) also recognize the importance of ESD.

Today, ESD is arguably at the heart of the 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals (SDGs) (United Nations, 2015). The SDGs recognize that all countries must stimulate action in the following key areas - people, planet, prosperity, peace and partnership - in order to tackle the global challenges that are crucial for the survival of humanity. Achieving these goals requires a profound transformation in the way we think and act.

ESD is explicitly mentioned in Target 4.7 of SDG4, which aims to ensure that all learners acquire the knowledge and skills needed to promote sustainable development and is understood as an important means to achieve all the other 16 SDGs (UNESCO, 2017).

In order to do justice to the richness and complexity of the ESD concept and ESD practices, this publication is divided into two parts: Understanding Education for Sustainable Development and Implementing Education for Sustainable Development. The first part provides an overview of how the concept of ESD has evolved over the years with a focus on the key competencies and thematic areas. The second part explores how ESD is implemented in the five Priority Action Areas of the GAP and how efforts are being scaled-up and monitored in the context of the 2030 Sustainable Development Agenda.

In compiling this volume, we have deliberately also included, among others, more 'junior' researchers on ESD in order to reflect the breadth of ESD discourse.

The volume provides, nevertheless, a selective rather than exhaustive view of ESD, which we hope provides clear insight into key elements of the global discussion.

What is ESD?

Part I: Understanding Education for Sustainable Development comprises three chapters on past and present definitions of the concept.

ESD has a long history and emerged out of a number of global discourses aimed at addressing the key sustainability challenges of the time. Chapter 1, From Agenda 21 to Target 4.7: the development of ESD, by Alexander Leicht, Bernard Combes, Won Jung Byun and Adesuwa Vanessa Agbedahin, provides an account of this emergence and the development of the concept of ESD. The chapter highlights the two flows of change: the development of ESD examining both the integration of sustainable development into education systems and how education has been embedded in the discourse of sustainable development. It addresses certain international processes that supported the emergence of ESD and shows how these two flows of change laid strong grounds for ESD over the years. Among other things, the chapter addresses the increasing centrality of ESD to the global education discourse, as reflected in the Education 2030 Agenda, and the relevance of education and particularly ESD in relation to the achievement of all the SDGs.

Key areas of ESD

The concept of ESD has evolved around key competencies and themes. In Chapter 2 *Learning to transform the world: key competencies in ESD, Marco Rieckmann* provides an overview of some competencies that are of particular importance in order to think and act in favour of sustainable development: systems thinking competency, anticipatory competency, normative competency, strategic competency, collaboration competency, critical thinking competency, self-awareness competency, and integrated problem-solving competency. In order to contribute to sustainable development, individuals must learn to understand the complexities, uncertainties, trade-offs and risks related to global and local sustainability challenges. They must become "sustainability citizens". This is why ESD also aims to develop competencies that enable individuals to participate in socio-political processes, moving their societies towards sustainable development. The author notes that the performance of sustainability citizens depends on these competencies and on their interplay with values, motivational drivers and opportunities. The author also notes that because ESD is both holistic and transformational, it demands an action-oriented transformative pedagogy. This is characterized by aspects such as self-directed learning, participation

and collaboration, problem-orientation, and inter and transdisciplinarity. Such pedagogical approaches are essential to the development of the competencies needed to promote sustainable development.

The SDGs and the UNESCO Roadmap for Implementing the Global Action Programme on ESD have identified several of the key themes of ESD including climate change, biodiversity, sustainable production and consumption, global justice and reduction of poverty. In Chapter 3 *Key themes in education for sustainable development, Marco Rieckman* explains the relevance of these themes for ESD and their linkages with the SDGs. Additionally, the chapter details the main aspects that learners need in order to understand these key themes, relate to them individually and in groups, and to engage and to take action in promoting sustainable development in these areas.

Five Priority Action Areas for ESD: progress and challenges

Part II: Implementing Education for Sustainable Development in Practice focuses on current ESD practices implemented as part of the Global Action Programme on ESD (GAP). Chapters 4 to 8 are dedicated to the five Priority Action Areas of the GAP: advancing policy; transforming learning and training environments; building capacities of educators and trainers; empowering and mobilizing youth; and accelerating sustainable solutions at local level. The final chapters, 9 and 10, reflect on the key issues of ESD today: scaling-up good practices and monitoring progress, particularly against Target 4.7 of the SDGs.

The GAP Priority Action Area on Advancing Policy emphasizes the need to increase the number of countries that have integrated ESD into education and sustainable development policies and strategies. In Chapter 4, *Advancing policy to achieve quality education for sustainable development, Robert Didham and Paul Ofei-Manu* examine developments in ESD-related policy and identify ESD as a key means to implement the SDGs as well as the Paris Agreement on climate change. To catalyse ESD's capacity to help achieve these global commitments, countries must consider educational policy of primary importance to ensure the inclusion and uptake of ESD in education systems. This chapter reviews a number of existing policy frameworks for ESD that are supporting the practice of ESD in many countries around the world. ESD requires far-reaching changes in the education system, which has major implications for policy. These changes include strengthening curricula, innovating pedagogies and teacher training, transforming learning

environments, building diverse partnerships, and creating local learning opportunities. This process can be undertaken in a holistic manner – rather than advancing ESD by adding more topics and content to an already overcrowded curriculum, it can serve as a model for transforming education systems, with the result that the entire system serves as a practical learning model for sustainable development. National education strategies can be aligned with the SDGs by defining clear learning objectives with relevance to the targets of each goal and systematically mainstreaming ESD into educational policy.

In order to implement ESD, it is important to review learning environments and encourage the whole-school approach. In Chapter 5, *How are learning and training environments transforming with ESD?, Rob O'Donoghue, Jim Taylor and Vivo Venter* examine recent transformations in learning and training environments across school, community and other institutional contexts of ESD. The chapter reports how concerns for 'awareness creation' and for 'getting the message across to others' are no longer as prevalent and how while the importance of co-engaged learning is increasing, the previous specification of formal and non-formal and informal education is disappearing. The study examines the emergence of learning environments that are more participatory, reflexive and learner-led. The whole-school approach includes school governance, teaching content and methodology, campus and facilities management as well as cooperation with partners and the broader communities. A simple Action Learning process model scopes how learning-led change is now an imperative especially in the context of the SDGs. Seven illustrative cases of changing learning environments are then provided. These are examined to probe how ESD learning environments are developing as sites of deliberative linked learning. Six patterns of expansion and integration are identified for the analysis of changing environments in the illustrative cases. Here a whole institution approach is notable as it widens practical engagement and includes mainstreaming, inclusive participation, critical review, re-visioning and practical change projects. Co-engaged learning environments like this are enabling participants to tune-in and explore shared matters of concern and to deliberate better ways of knowing and doing things together.

ESD calls for more focus on the integration of the pedagogies and thematic areas of ESD into training of teachers and trainers. In Chapter 6, *Ahmad Qablan takes on Priority Action Area 3 of the Global Action Programme on ESD: Building Capacities of Educators and Trainers.* The international community has placed a tremendous amount of faith in the ability of education to attain the goals of ESD. This chapter highlights the importance of building the capacities of

educators so as to enable them to implement transformative pedagogies in their teaching of ESD. It begins by introducing recent theories and trends in transformative pedagogies that promote a sustainable future and then introduces current models and initiatives for integrating ESD into teacher training programmes. The chapter also tries to shed light on the challenges facing teacher education for ESD through a discussion of recent approaches to mainstream learning for sustainability in teacher education.

Young people have been engaged in environmental, sustainable development and justice movements for decades. Today, as the key stakeholder of sustainable development, they are increasingly voicing their concerns and leading the transformative action for a more environmentally sound, socially equitable and economically just future. Chapter 7, *Empowering and Mobilizing Youth by Priya Vallabh* examines diverse opportunities for youth engagement in ESD. Young people are especially vulnerable to the impacts of environmental degradation, social injustice and economic privation. Accordingly, recent trends point towards an increasing focus on and efforts for youth-related ESD. This chapter provides an orientation to ESD work for, by and with youth. As a way to describe and track the range of activities, it differentiates between programmes developed for youth and those developed by youth. The chapter also highlights that how adults and youth choose to work together will shape the extent to which youth contributions can be leveraged and built upon. The author recognizes that youth are not a group that can be disconnected from their roles and social positions in their communities. Nor are they a uniform group sharing a single set of characteristics, challenges and priorities. Through articulating the relationships between various intentions framed within international guidelines and goals, and the tensions arising from these ways of working, the chapter considers more engaged, reflexive pedagogies and interactions through which to frame ESD movements involving youth.

Local communities, both urban and rural, are one of the critical drivers for sustainable development. In Chapter 8, *Victor Tichaona Pesanayi and Chisala Lupele explore the Acceleration of Sustainable Solutions at the Local Level.* It is a key endeavour for national and local governments, non-governmental organizations, and other organizations and insitutions acting at the local level to strengthen learning opportunities to empower stakeholders to resolve sustainable challenges facing their communities. Ordinary people in rural and urban settings are implementing diverse local level actions to accelerate various sustainable solutions relevant for specific contexts, as demonstrated by the concrete examples presented in this chapter from the five geographic regions. The role of ESD in accelerating sustainable solutions at the local level

is highlighted using examples illustrating formal, non-formal and informal approaches. The chapter sets out and analyses four characteristics of ESD that advance sustainable development at the local level namely: relevance to local context, contribution to the common good through co-engagement and the development of skills and competencies for sustainability, inter-sectoral cooperation and cultivation of hope.

Scaling ESD and monitoring progress

While there is a growing body of literature on scaling the impact of development projects, social enterprises and non-profit organizations, the topic of scaling ESD initiatives and their impacts has received only limited attention. In Chapter 9, therefore, *Felix Spira and Sirkka Tshiningayamwe* examine how to scale ESD actions in the areas of policy, education institutions, educators, youth and local communities. The chapter sets out to answer four questions: What is scaling? What should be scaled? Who should be involved in the scaling process? Through what pathways and strategies do ESD initiatives scale impact? The chapter begins by reviewing the existing research literature on scaling the impact of education initiatives, providing a selection of perspectives on the topic. It then presents four case studies to illustrate successful examples of scaling impact.

Measuring the progress and success of ESD interventions has long been recognized as crucially important. It is also a particularly challenging area of work, due to the transformative ambition of ESD. In Chapter 10, *Monitoring ESD, Ashley Stepanek Lockhart* explores the monitoring of ESD progress, examines past and current developments in the context of the GAP and the SDG framework, and discusses ways to improve the monitoring of ESD going forward. The first section establishes a definition of monitoring as a way to track and improve progress towards greater sustainability in education, and examines how this is done in terms of inputs (policies), throughputs (provision) and outcomes (assessments). The second section provides a historical review of ESD monitoring through the UN Decade of Education for Sustainable Development (DESD). It includes lessons learned about indicator development from the DESD Monitoring and Evaluation Expert Group (MEEG) in the Asia-Pacific Region particularly with regard to balancing global priorities against those that are national and those determined by context. It also raises the issue of a data gap and missing analysis in country monitoring of ESD. In the third section, the chapter reviews monitoring related to the GAP and the SDGs, specifically goals and targets 4.7, 12.8 and 13.3, and their indicators. The final section brings together analysis from the different sections to examine

monitoring as a means ultimately to improve ESD learning and generate wider sustainable impact. It emphasizes the need for more creative ways to monitor ESD processes in context; in particular, monitoring needs to become more explorative and inclusive – especially of out-of-school children, youth and adults. Additionally, more qualitative approaches are needed to identify and understand emergent ideas and new answers provided by learners, an aspect that is crucial to the dynamic and transformative aspects of ESD.

The future of ESD

It is hoped that the contributions in this volume give an insight into the great advances ESD has made since its emergence, into the richness and variety of the ESD concept and its implementation, and also into some of the challenges ESD is facing, which are mostly related to its far-ranging transformational ambition.

ESD will need to continue to evolve. UNESCO is currently engaged in a process – through expert symposia and other consultations – to explore and define the future of ESD and make sure it is responsive to changing global, national and local contexts. Among other things, ESD will have to be responsive to changing contexts and emerging trends such as the recognition of sustainable development as a chosen lifestyle among the young generation rather than a series of environmental or related challenges. It is becoming clear that ESD should go beyond a focus on knowledge and skills to promote values and attitudes conducive to promoting sustainable development, and empower responsible citizens to take action for change. In an increasingly interconnected world, technological advances are transforming the role of formal education from knowledge delivery to the development of critical thinking. Technological solutions to the 'old' issues of sustainable development are expected to surpass education's impact on simple behaviour changes such as 'turning off the light'. Instead, in many parts of the world, ESD is linked with citizenship actions, and the belief that the community is an important place of transformation is growing. Sufficient reflection having been made on the achievements and shortcomings of ESD so far, the contextual relevance of ESD in developing and developed countries should be further taken into account. Most of all, the window of opportunity presented by the 2030 Sustainable Development Agenda should be taken advantage of to scale-up ESD and to broaden perspectives to recognize its role as the cross-cutting tool for all Sustainable Development Goals.

At the mid-point of the Global Action Programme, ESD is gaining momentum and calls are growing for education to foster the transition necessary to achieve a more sustainable world. Stakeholders across the world are committed to enhancing the role of education, and more specifically of ESD, in the pursuit of sustainable development. There is reason to be confident that the future of ESD will be as rich as its present and past.

Notes on contributors

Adesuwa Vanessa Agbedahin is currently a Post-Doctoral Research Fellow at the Centre for Research on Higher Education and Development (CRHED) at the University of the Free State, South Africa. She is also involved in a research project focusing on undergraduate students' decision-making processes, choices and access to higher education, and is a consultant for the tracking study of Ford Foundation Alumni in South Africa. Vanessa obtained her PhD and Master's degrees from Rhodes University, South Africa. Her PhD presented a morphogenic explanation of the influence of position-practice systems and professional development training on mainstreaming ESD in development in higher education. Her Master's research in environmental education sought to create opportunities for learning and change processes within the University Food Services Sector, in order to reduce food waste production in dining halls.

Won-Jung Byun is senior project officer in the Section of Education for Sustainable Development and Global Citizenship at UNESCO. Her work at UNESCO includes coordination of the work on the post-GAP future of ESD and monitoring of the progress towards SDG Target 4.7. Before joining UNESCO, she worked for 12 years in the United Nations University's Regional Centre of Expertise on Education for Sustainable Development (RCE) Tongyeong, Republic of Korea to promote ESD at local, regional and national level. Her work was focused on engagement of local stakeholders, mobilization of schools and young people. She co-founded Tongyeong Education Foundation for Sustainable Development(2011) and Sejahtera Centre for RCEs in the Asia-Pacific (2015). Won also served as Asia-Pacific RCEs Regional Coordinator between 2009-2014, to promote ESD among the RCEs in the region.

Bernard Combes supports UNESCO's activities on Education for Sustainable Development (ESD). He is in charge of advocacy and communication, including publications and internet activities, public relations and learning materials development. He also coordinates the implementation of the Global Action Programme on ESD priority action area on Accelerating sustainable solutions at local level through partnership building and exchange of experiences. He is the Education Sector focal point for biodiversity and UNESCO focal point for the Earth Charter, and among other things, works to reinforce cooperation with other agencies and stakeholders, in regards to Communication, Education and Public Awareness in the areas of biodiversity,

water, oceans and sustainable lifestyles. Prior to this, he worked on UNESCO's early childhood programmes, where he dealt with issues related to early childhood information/documentation, partnership, networking and advocacy throughout the world.

Robert J. Didham (PhD) is the Deputy Director of the Centre for Collaborative Learning for Sustainable Development and an associate professor at Inland Norway University. With a background in community-based sustainable development, public participation and social learning, he has extensive experience in interdisciplinary research and capacity-building projects. He has coordinated multi-country research on education for sustainable development, sustainable consumption and adaptation planning, and has led policy support projects for several national governments. Previously, he was the Senior Coordinator for Capacity Development and Education at the Institute for Global Environmental Strategies (IGES), based in Japan, where he worked extensively throughout the Asia-Pacific region. At the Centre for Collaborative Learning, he oversees action research projects on participatory planning and local implementation of the SDGs, and on integrating transformative learning approaches into formal and non-formal education.

Julia Heiss is a social anthropologist and education planner with extensive experience in design and implementation of education programmes in the area of science education, technical and vocational education, girl's education, education for sustainable development, education for sustainable consumption and climate change and DRR education. She has worked for the UNESCO for 20 years in Kenya and France and coordinated programmes in several other countries in Africa, Asia and Latin America. She also worked for the Global Monitoring Report for Education For All. She is currently the team leader of the Education for Sustainable Development programme at UNESCO.

Alexander Leicht is Chief of the Section of Education for Sustainable Development and Global Citizenship Education at UNESCO. Before joining UNESCO in 2011, Alexander Leicht was Head of the German Secretariat for the UN Decade of Education for Sustainable Development at the German Commission for UNESCO in Bonn since 2004. His priorities include coordinating the implementation of the Global Action Programme on Education for Sustainable Development (ESD), the follow-up to the UN Decade of ESD, in its five Priority Action Areas policy, education institutions, educators, youth, and local communities (which includes climate change education, education for disaster risk reduction and education to promote

sustainable consumption, among others); and supporting countries to develop, strengthen and mainstream Global Citizenship Education (GCED), including peace and human rights education and the prevention of violent extremism through education.

Chisala Lupele is a member of the Environmental Education Association of Southern Africa (EEASA), and a 2016 award-winning member of a university student research team promoting local action on sustainable agricultural water among rural smallholder farmers. She is a recent Master of Education (Environmental Education) graduate from Rhodes University in South Africa. Her research thesis was based on social learning using radio as a tool in promoting sustainable agricultural practices among smallholder farmers in a rural community context of the Eastern Cape Province, South Africa., part of the Amanzi for Food programme. Her interests lie around the field of Environmental Communication for transformative educational purposes. She is currently a columnist at The Globe newspaper in Zambia where she writes on ESD, communication for development and environment. Chisala is also a member of the Environmental Education Association of Southern Africa (EEASA), a member of the UNESCO GAP Partner Network 3 on Capacity Building.

Rob O'Donoghue is Professor Emeritus of the Environmental Learning Research Centre at Rhodes University. He has worked on action learning and social learning in environment and sustainability education as an evaluative process of co-engaged change in school and community contexts across southern Africa. He developed the 5T process model from early work with Tim Wright at the Umgeni Valley Centre and much of his current research focuses on the inclusion of indigenous knowledge practices in nexus learning work with new environmental knowledge and the challenges of future sustainability.

Paul Ofei-Manu (PhD) is Senior Policy Researcher and Manager for Education at the Institute for Global Environmental Strategies, Japan. He was previously a researcher and adjunct lecturer at Miyagi University of Education, Japan. His current research areas include quality education and the SDGs, social learning, capacity development and assessment, governance, Disaster Risk Reduction (DRR) education and learning, and DRR-CCA (Climate Change Adaptation) linkages. He has published several academic papers and environmental policy publications. He is a Practitioner Member of IEMA (UK) and a sustainability consultant, and acted as the external evaluator of UNESCO's Japanese Funds-in-Trust ESD Project. He is also a member of the Global Environmental Education Partnership Advisory Group.

Ahmad Qablan is currently a visiting professor of science education at the University of Alberta, Canada. He holds a PhD in science and sustainability education and worked for more than a decade at the college of educational science at the Hashemite University Jordan, and as a Senior Program Manager at Queen Rania Teacher Academy, Jordan. He has worked in the field of ESD and global citizenship for over a decade. He has conducted several education research projects with UNESCO, UNICEF, EU and USAID, and has published more than 65 books, chapters and journal articles.

Marco Rieckmann is Professor of Higher Education Development at the University of Vechta, Germany, and holds a doctoral degree in educational research. His major research and teaching interests are higher education, competence development and assessment, (higher) education for sustainable development and global education. He is the Speaker of the German-speaking network 'Teacher Education for Sustainable Development', Vice-President of the 'Education for Sustainable Development' Commission of the German Educational Research Association (GERA), the Representative of GERA on the Council of the European Educational Research Association (EERA), and a Member of the Convenors' Group of the EERA Network 'Environmental and Sustainability Education Research'. He was the lead author of the 2017 UNESCO publication Education for Sustainable Development Goals: Learning Objectives.

Felix Spira is one of the co-founders of Maastricht University Green Office and rootAbility. He has delivered over 150 workshops and talks in 11 countries on sustainability in higher education, organizational change and sustainability assessment. He was one of 50 young people selected to attend the UNESCO Education for Sustainable Development World Conference in Japan. He studied at University College London, University College Maastricht, and at Hobart and William Smith Colleges. As a researcher at the Dutch Research Institute for Transitions, he developed a framework to better understand how sustainability initiatives scale their impact.

Ashley Stepanek Lockhart is a consultant for UN organizations and international non-profit organizations specializing in the areas of global education research, monitoring and evaluation, policy analysis and programmatic review. She has contributed to several projects focusing on education and learning for social justice and transformation, including issues related to global citizenship, sustainable development, lifelong learning, literacy for marginalized adults and youth. Her recent work includes coding research and reporting for UNESCO's ESD and Intangible Cultural Heritage teams, country profile research and reporting for SEAMEO CELLL,

and a background paper for the Global Education Monitoring Report. She is a tertiary educator, a former academic manager of a graduate school of International Relations, and is currently finishing a second Master's at the UCL Institute of Education.

Jim Taylor is the Director of Environmental Education for the Wildlife and Environment Society of South Africa (WESSA). His work focuses on environmental education, ESD and social change processes. He is a member and partner network Co-Chair of the UNESCO Global Action Programme. He is also a member of the GIZ Expert-Net which supports ESD in Germany, India, Mexico and South Africa. He has a particular interest in education and sustainable water management through citizen science and participatory action research approaches. He received a Human Rights award in 1997 and is a founding member and past president of the Environmental Education Association of Southern Africa (EEASA). He is also a founding member of Eco-Schools in South Africa and the SADC Regional Environmental Education Programme, which supports networking, training, resource materials development, research and evaluation and policy work in 15 southern African countries. He has worked to support environmental education in countries such as Brazil, India, Indonesia, Malawi, Sweden, Tanzania and Zimbabwe. He holds a PhD in Environmental Education from Rhodes University and a Master's degree in Environmental Psychology awarded through the University of Surrey.

Victor Tichaona Pesanayi is Secretary-General of the Environmental Education Association of Southern Africa (EEASA), a member of the UNESCO GAP Partner Network 3 on Capacity Building. EEASA is a regional membership-based association guided by a constitution and governed by a voluntary elected council. The association was founded in September 1982. It is a multidisciplinary association concerned with quality education processes that lead to transformative change towards the environment and life support systems. He has a developmental work research interest in boundary crossing contexts involving sustainable agricultural water, and social justice involving farmers, agricultural educators, extension officers and local municipality. He also has research, education and development interests in sustainable rural and urban community development, water for food and agro-ecological farming systems as co-engaged and networked systems.

Sirkka Tshiningayamwe is currently a lecturer at the International University of Management, Namibia. She completed her Doctoral studies in 2016 and her Post-doctoral research in 2017 at the Environmental Learning and Research Center, Rhodes University. Her Post-doctoral research explores ways

to scale-up ESD in teacher education in southern Africa. She has presented her research at conferences organized by the Education Association of South Africa (EASA), the South African Education Research Association (SAERA) and the Environmental Education Association of Southern Africa (EEASA). She has published in the Southern African Journal of Environmental Education and is a contributing author to the 2017 publication Schooling for Sustainable Development in Africa.

Priya Vallabh is a lecturer and PhD scholar at the Environmental Learning Research Centre (ELRC) at Rhodes University, South Africa. She is involved in a wide range of research and teaching and learning initiatives in the arena of ESD and EE, including work related to youth and the theorizing of learning. Her research is concerned with the potential of networked technologies to support wider social learning and environmental action-taking. Her current focus is citizen science models within South Africa, in particular how different models of citizen science support multiply forms of social learning and action-taking. Underpinning this focus is an interest in the way different learning cultures of citizen science programmes enable epistemic access to science disciplines.

Vivo Venter is the Education Manager at the WESSA-uMngeni Valley Nature Reserve and Education Centre in Howick, South Africa. Her work has a strong focus on integrating sustainability practices into education programmes. She is particularly interested in transforming training and teaching practices to make them more participatory and inclusive. She has substantial experience of teaching environmental education in both formal and outdoor settings, and has facilitated courses on environmental education and training development practices for youth groups to help them obtain work skills in the green economy. She holds a Master's degree from the University of Antwerp in Biology: Biodiversity, Conservation and Restoration.

Part I

Understanding Education for Sustainable Development

Chapter 1

From Agenda 21 to Target 4.7: the development of Education for Sustainable Development

Alexander Leicht, Bernard Combes, Won Jung Byun, Adesuwa Vanessa Agbedahin

The adoption of the 2030 Agenda for Sustainable Development has provided fresh impetus for Education for Sustainable Development (ESD) and a very favourable environment in which to scale up the implementation of ESD. The Agenda sets an ambitious universal education programme with the adoption of Sustainable Development Goal 4, which aims to 'Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all' (UN 2015). Under Goal 4, it is widely recognized that one of the most ambitious, interesting and challenging targets is Target 4.7, which aims to:

> "By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through Education for Sustainable Development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and nonviolence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development"

In addition, ESD can serve as a means to pursue the achievement of all the Sustainable Development Goals (SDGs). In support of this perspective, during its 74th session, the Second Committee of the UN General Assembly adopted a resolution on ESD in the framework of the SDGs (A/C.2/72/L.45) in which ESD's role as 'an integral element of the SDG on quality education and a key enabler of all other sustainable development goals' was explicitly affirmed .

Looking back from the currently favourable global policy environment for ESD, this chapter details the development of ESD by examining two strands that have been equally important for ESD: the efforts by sustainable development stakeholders to use education as an instrument to achieve sustainable development, and the efforts by education stakeholders to integrate sustainable development principles into education systems. It is thanks to the convergence of these two strands that strong support for ESD has emerged over the years.

Integrating education into sustainable development

With the adoption of the SDGs, the role of education as instrument within the global debate on sustainable development has been given renewed attention. However, education as a means to achieve sustainable development is not a new idea.

UNESCO's involvement in environmental awareness and education goes back to the very beginnings of the Organization, with the creation in 1948 of the IUCN (International Union for the Conservation of Nature, now the World Conservation Union), the first major NGO mandated to help preserve the natural environment. UNESCO was also closely involved in convening the UN International Conference on the Human Environment in Stockholm, Sweden in 1972, which led to the setting up of the United Nations Environment Programme (UNEP).

Subsequently, for two decades, UNESCO and UNEP led the International Environmental Education Programme (1975-1995), which set out a vision for, and gave practical guidance on how to mobilize education for environmental awareness. In 1976, UNESCO launched an environmental education newsletter 'Connect' as the official organ of the UNESCO-UNEP International

Environmental Education Programme (IEEP). It served as a clearinghouse to exchange information on Environmental Education (EE) in general and to promote the aims and activities of the IEEP in particular, as well as being a network for institutions and individuals interested and active in environment education until 2007.

The long standing cooperation between UNESCO and UNEP on environmental education (and later ESD) also led to the co-organization of four major international conferences on environmental education since 1977: the First Intergovernmental Conference on Environmental Education in Tbilisi, Georgia (October 1977); the Conference "International Strategy for Action in the Field of Environmental Education and Training for the 1990s" in Moscow, Russian Federation (August 1987); the third International Conference "Environment and Society: Education and Public Awareness for Sustainability" at Thessaloniki, Greece (December 1997); and the Fourth International Conference on Environmental Education towards a Sustainable Future in Ahmedabad, India (November 2007).

These meetings highlighted the pivotal role education plays in sustainable development. It was at the Tbilisi conference in 1977 that the essential role of 'education in environmental matters' (as stated in the recommendations of the 1972 Stockholm Conference) was fully explored. Organized by UNESCO in cooperation with UNEP, this was the world's first intergovernmental conference on environmental education. In the subsequent Tbilisi Declaration, environment was interpreted in its 'totality—natural and built, technological and social (economic, political, cultural-historical, ethical, aesthetic)' (UNESCO-UNEP, 1977, point 3). The goals formulated for environmental education went far beyond ecology in the curriculum and included development of a 'clear awareness of, and concern about, economic, social, political, and ecological interdependence in urban and rural areas' (ibid, point 2) which became one of the major bases of ESD.

The declaration had 41 recommendations covering three key areas: role, objectives and guiding principles of environmental education; strategies for environmental education development at national level; and international and regional cooperation. Governments came together to agree on the guiding principle that environmental education encompasses a broad spectrum of environmental, social, ethical, and cultural dimensions. However, this forward-looking vision was never fully implemented: international, and many national efforts, focused more on environmental concerns than on integrated human, social or economic development.

Nonetheless, by the fourth conference in India in 2007, the role of education to promote all three pillars of sustainable development was widely shared internationally. The meeting examined the status of environmental education and its development to meet the challenges of sustainability and the objectives of the UN Decade of Education for Sustainable Development. In 2012, to commemorate 35 years of global education efforts since the first Tbilisi Conference, an Intergovernmental Conference (Tibilisi+35) yet again reaffirmed the global appeal for environmental education as a means for achieving sustainable development.

In 1992 the Earth Summit was held in Rio de Janeiro. At the summit, an action plan, Agenda 21, was drawn up. UNESCO was designated as Task Manager for Chapter 36 of the agenda which related to education. Chapter 36 of Agenda 21 clearly states that 'promoting education, public awareness and training are linked to virtually all areas in Agenda 21.' This signalled an important change in thinking related to environmental education and the start of merging various forms of education (i.e. environment, population, development, etc.) into a single, unifying concept, that of education for sustainable development.

In 1994, the Environmental and Population Education and Information for Human Development project (EPD) was launched. The project was designed to achieve 'people-centred equitable and sustainable development through an integrated approach to environment, population and development issues' (UNESCO, 1994). As an interdisciplinary, inter-institution (UNESCO, UNEP and UNFPA in particular) project which merged different specific issues within a single, unifying concept - education for sustainable development - EPD went beyond formal teaching to propose education via a number of channels (schools, business, the media, community organizations and associations). EPD was, thus, situated within a general perspective of educational re-orientation, or even educational reform, in direct keeping with the principles of lifelong education.

Twenty years after the Rio Summit, the follow-up conference, the Earth Summit 2012 or Rio+20 was held.

The 2012 United Nations Conference on Sustainable Development highlighted the commitment of governments to the mainstreaming of sustainable development by promoting ESD in accordance with the goals of the Decade (2005-2014) (United Nations, 2012). In the lead-up to this summit (and continued in subsequent policy discussions) awareness was growing that, as UNESCO outlined in its main input document for the summit, 'Sustainable development cannot be achieved by technological

solutions, political regulation or financial instruments alone. Achieving sustainable development requires a change in the way we think and act, and consequently a transition to sustainable lifestyles, consumption and production patterns. Only education and learning at all levels and in all social contexts can bring about this critical change' (UNESCO 2012a: 13). The Rio+20 outcome document The Future We Want subsequently contained strong commitments to education as important for a green economy, for work and social protection, and for sustainability generally.

Since 2012 the role of education for sustainable development has been further recognized by global consultations organized by the United Nations around a number of specific themes taking stock of the implementation of the Millennium Development Goals and in preparation for the SDGs. Issues tackled in one of these consultations included environmental sustainability and a number of specific environmental challenges. Although the participants in this consultation came mainly from the environment rather than the education sector, education was singled out as one of the most important drivers of change. As noted in the consultation report 'Education was deemed to be one of the most powerful tools at hand to drive the transformational changes necessary for sustainable development, but to realize this potential, education systems need to be flexible, culturally sensitive, relevant and suited to changing people's values and behaviours' (World We Want 2013: iv). This also explicitly underlines that, in order to act as a driver for change, education itself needs to change, to become transformative, to change values and behaviours (UNESCO/UNICEF 2013: 14).

The lead-up to the adoption of the SDGs in 2015 involved diverse discussions on the importance of education for achieving sustainable development. One of the most important stages in that process, the intergovernmental consultations through the Open Working Group on SDGs, discussed the topic of the role of education for the achievement of sustainable development. The UN Secretary-General presented the results of a questionnaire to Member States regarding the key elements of a sustainable development agenda as initial input into the discussions of the Open Working Group. Education was ranked among the top four (after food, water and energy) (United Nations General Assembly 2012). The progress report of the Open Working Group to the UN General Assembly in 2013 states: 'Education is absolutely central to any sustainable development agenda' (United Nations General Assembly 2013). In their summary to the fourth session of the group, dedicated to education, the co-chairs spoke of the relevance of education for 'the transformative shifts required for sustainable development' and emphasized that 'a holistic education can shape societal values that are supportive of sustainable

development' (Open Working Group 2013). These key discussions on the role of education for the success of the SDGs led to the creation of a single goal, SDG4, dedicated to education and the integration of education into other development goals to support their implementation (UNESCO 2013a). The global association of teachers' unions, Education International, echoed this stance in a position paper for education post-2015: 'Hence, quality education is fundamental to the achievement of all other development goals, including gender equality, health, nutrition and environmental sustainability' (Education International). The 2013-2014 edition of the Education for All Global Monitoring Report provides strong evidence that 'education transforms lives' through teaching the transferrable skills necessary for global citizenship and changing attitudes and behaviours needed to mitigate and adapt to climate change (UNESCO 2014b).

As a consequence, the 2030 Agenda for Sustainable Development adopted in 2015 fully recognizes the critical role of education. In 2016, the Global Education Monitoring Report (GEM report) stressed the importance of education in achieving all the SDGs over the next fifteen years.

> "The SDGs, targets and means of implementation are thought of as universal, indivisible and interlinked. Each of the 17 goals has a set of targets. In each set, at least one target involves learning, training, educating or at the very least raising awareness of core sustainable development issues. Education has long been recognized as a critical factor in addressing environmental and sustainability issues and ensuring human well-being." (GEM report 2016: p.9, UNESCO, 2016a)

In particular, the report highlighted the urgent need for new approaches, the importance of long-term commitments to SDG4, and the need for radical change in ways of thinking about education as a force for human well-being and global development (UNESCO, 2016a). This suggests that the potential of education to transform our world cannot be realized unless education systems embrace sustainable development.

Table 1: How education is related to other SDG targets

Goal 1	Education is critical to lifting people out of poverty.
Goal 2	Education plays a key role in helping people move towards more sustainable farming methods, and in understanding nutrition.
Goal 3	Education can make a critical difference to a range of health issues, including early mortality, reproductive health, spread of disease, healthy lifestyles and well-being.

Goal 5	Education for women and girls is particularly important to achieve basic literacy, improve participative skills and abilities, and improve life chances.
Goal 6	Education and training increase skills and the capacity to use natural resources more sustainably and can promote hygiene.
Goal 7	Educational programmes, particularly non-formal and informal, can promote better energy conservation and uptake of renewable energy sources.
Goal 8	There is a direct link among such areas as economic vitality, entrepreneurship, job market skills and levels of education.
Goal 9	Education is necessary to develop the skills required to build more resilient infrastructure and more sustainable industrialization.
Goal 10	Where equally accessible, education makes a proven difference to social and economic inequality.
Goal 11	Education can give people the skills to participate in shaping and maintaining more sustainable cities, and to achieve resilience in disaster situations.
Goal 12	Education can make a critical difference to production patterns (e.g. with regard to the circular economy) and to consumer understanding of more sustainably produced goods and prevention of waste.
Goal 13	Education is key to mass understanding of the impact of climate change and to adaptation and mitigation, particularly at the local level.
Goal 14	Education is important in developing awareness of the marine environment and building proactive consensus regarding wise and sustainable use.
Goal 15	Education and training increase skills and capacity to underpin sustainable livelihoods and to conserve natural resources and biodiversity, particularly in threatened environments.
Goal 16	Social learning is vital to facilitate and ensure participative, inclusive and just societies, as well as social coherence.
Goal 17	Lifelong learning builds capacity to understand and promote sustainable development policies and practices.

Source: ICSU and ISSC (2015)

To date, ESD has been integrated into many global frameworks and conventions on key sustainable development topics. For example, Article 13 of the Convention on Biological Diversity, and its work programmes; the Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters and the subsequent Sendai Framework for Disaster Risk Reduction 2015-2030; Sustainable Lifestyles and Education Programme of the 10-Year Framework of Programmes on Sustainable Consumption and Production 2012-2021; Article 6 of the United Nations Framework Convention on Climate Change and Articles 11 and 12 of the Paris Agreement.

Integrating sustainable development into education

The increasingly strong policy support for ESD is also the result of increased attention paid by education stakeholders to sustainable development issues in education. This is in line with an overall trend to go beyond a simple focus on access to education and basic skills and move toward relevant educational content that addresses contemporary challenges.

For many years, the focus of global development on education was the provision of basic education for all. United Nations Millennium Development Goal 2 on universal primary education and the Education for All movement (2000-2015) were geared towards this aim (UN 2015). Based on the principle that education is a fundamental and enabling human right, affirmed in key international agreements such as the Universal Declaration of Human Rights, access to basic literacy and numeracy has been at the centre of international educational efforts and will continue to be crucially important.

However, in an increasingly complex and interconnected world with a very real existential threat such as climate change, there is a growing demand for education that goes beyond acquiring knowledge and skills to find jobs. It has become clear that education is not only an instrument to sustainable development but that the concept of teaching and learning must be transformed to enable individuals to lead sustainable development as agents of change. Earlier thoughts on this can be traced to Goal 6 of the *Dakar Framework for Action on Education for All* (2000) on improving all aspects of quality education (UNESCO, 2000). These commitments to EFA identified important links with the ESD agenda, especially strengthened by the 2002 World Summit on Sustainable Development. As the 2002 Summit discussions led to the launch of the UN Decade of Education for Sustainable Development (2005-2014), reorientation of existing educational programmes to address sustainability was named as one of the four major thrusts of ESD (UNESCO 2005). By this time, it was increasingly understood that the connections between EFA and ESD include commitment to quality education; understanding of education as a human right; and promotion of quality of life through education. Moreover, the progressive move towards issues of quality, relevance and content of learning became more evident (UNESCO, 2008).

As UNESCO put it in a position paper submitted to its General Conference in 2013: 'UNESCO reaffirms a humanistic and holistic vision of education as fundamental to personal and socio-economic development. The objective

of such education must be envisaged in a broad perspective that aims at enabling and empowering people to meet their basic individual needs, fulfil their personal expectations and contribute to the achievement of their communities and countries' socio-economic development objectives' (UNESCO 2013a).

One of the key indications of the shift towards more relevant educational content was the Global Education First Initiative launched by the UN Secretary-General in 2012. This initiative with its three priorities - putting every child in school, improving the quality of learning, and fostering global citizenship - recognized that 'access to education is critical. But it is not enough.' As the follow-up to the initiative, UNESCO spelled out the outline of an education that promotes global citizenship (UNESCO 2013b; UNESCO 2014a).

One example of the increased emphasis on relevant education content is the attention being given to transferrable or transversal skills. For example, the Learning Metrics Task Force, a global consultation convened by the Brookings Institution and the UNESCO Institute of Statistics in 2015, speaks of the need for an 'adaptable, flexible skill set to meet the demands of the 21st century.' According to a Task Force report such skills may include, alongside the obvious contenders such as managing information and communication technologies, new skills like 'collaborative problem-solving' (Learning Metrics Task Force 2013). Another encouraging example of the attention given to transversal skills is the research conducted by the OECD on socio-emotional skills and the Education 2030 Learning Framework (OECD 2015; 2016). Evidence shows a growing trend away from basic access to education issues towards emphasis on the socio-emotional skills for achieving positive life outcomes and reducing educational and social disparities – something that sits very well with the overall goal to achieve sustainable development.

In 2015, at the 70th Session of the UN General Assembly, Member States adopted a new global development agenda entitled 'Transforming our World: the 2030 Agenda for Sustainable Development (Sustainable Development Goals)'. The SDGs were designed to replace the Millennium Development Goals (MDGs), a set of global, regional and national goals with an explicit path towards sustainability. Although considerable progress was made towards achieving the MDGs, recorded progress was dependent on the specific region, country and goal (Sachs, 2012). Experiences and lessons learned in implementing the MDGs have been harnessed by the UN Member States and inform the post-2015 development agenda and the SDGs (UN, 2014).

The adoption of a stand-alone goal on education, SDG 4, reaffirmed the critical role of education in accelerating progress towards sustainable development. The Incheon Declaration on Education 2030 states: 'Our vision is to transform lives through education, recognizing the important role of education as a main driver of development and in achieving the other proposed SDGs' (The Incheon Declaration, 2015).

The seven targets and three enabling targets of SDG 4 are manifestations of the shift towards quality, relevance and content of education. Consequently, while the Incheon Declaration reaffirmed that SDG 4 is 'inspired by a humanistic vision of education and development', it clearly places ESD as a key part of quality education:

> Quality education fosters creativity and knowledge, and ensures the acquisition of the foundational skills of literacy and numeracy as well as analytical, problem-solving and other high-level cognitive, interpersonal and social skills. It also develops the skills, values and attitudes that enable citizens to lead healthy and fulfilled lives, make informed decisions, and respond to local and global challenges through Education for Sustainable Development (ESD) and global citizenship education (GCED) In this regard, we strongly support the implementation of the Global Action Programme on ESD launched at the UNESCO World Conference on ESD in Aichi-Nagoya in 2014. We also stress the importance of human rights education and training in order to achieve the post-2015 sustainable development agenda (World Education Forum, 2015: para 9).

The UN Decade of ESD and the Global Action Programme on ESD

The roots of ESD lie in the two processes discussed above; of integration of education into sustainable development and of sustainable development into education. The primary goal for the UN Decade of Education for Sustainable Development (2005-2014, DESD) was laid out in the United Nations General Assembly resolution 59/237 in which the General Assembly recognized 'the internationally agreed development goal of achieving universal primary education'. It also welcomed 'the fact that the Commission on Sustainable

Development, at its eleventh session, identified education as one of the cross-cutting issues of its multi-year programme of work', and thus reaffirmed that 'education for sustainable development is critical for promoting sustainable development' (UNESCO, 2005).

ESD is understood as an education that 'allows every human being to acquire the knowledge, skills, attitudes and values necessary to shape a sustainable future.' Among other things, this means 'including key sustainable development issues into teaching and learning; for example, climate change, disaster risk reduction, biodiversity, poverty reduction, and sustainable consumption. [ESD] also requires participatory teaching and learning methods that motivate and empower learners to change their behaviour and take action for sustainable development. Education for Sustainable Development consequently promotes competencies like critical thinking, imagining future scenarios and making decisions in a collaborative way' (UNESCO 2011; cf., e.g., UNECE 2011; de Haan 2010). ESD is a dynamic concept and term that incorporates a new vision of education that seeks to empower people of all ages to take personal responsibility for creating a sustainable future (UNESCO, 2002, 2005, 2014a). It is interdisciplinary and transdisciplinary, meaning that no discipline can claim ESD as its own, but all disciplines can respond and contribute to ESD individually and/or collectively.

All major international development conferences[1] of the 1990s recognized and stressed the power of education to shape attitudes, values and behaviours, to develop capacities and skills and to build an understanding and commitment to development goals. The Earth Charter (2000), for example, stressed that civil society's call for sustainability incorporates the general principle of 'integrating into formal education and lifelong learning the knowledge, values and skills needed for a sustainable way of life'.

The 2002 Johannesburg World Summit on Sustainable Development (WSSD) recommended ESD as a key concept in its implementation plan, highlighting the critical role education plays in sustainable development. The WSSD Plan of Implementation suggested that sustainable development concepts, actions and principles should be integrated into all levels of education, in order to promote education as a key agent for change (United Nations, 2002).

1 Earth Summit 1992; Cairo Conference on Population and Development 1994, World Summit for Social Development 1995, Fourth World Conference on Women 1995, Second UN Conference on Human Settlement 1996

In response, the United Nations General Assembly adopted UN Resolution 57/254 in December 2002, designating 2005-2014 the United Nations Decade of Education for Sustainable Development (UNDESD) (United Nations, 2002). The overall goal of the Decade was to integrate the principles, values and practices of sustainable development into all aspects of education and learning, and to encourage changes in knowledge, values and attitudes with the vision of enabling a more sustainable and just society for all (UNESCO, 2005, 2014a, 2014b). Under the International Implementation Scheme (UNESCO, 2005a), the Decade was implemented in two distinct phases: The first phase (2005-2008) was invested in defining and promoting ESD, identifying actors and developing partnerships. During the second phase (2009-2014), the emphasis shifted towards advancing ESD in the context of quality education, with focus on three key issues of climate change, biodiversity and disaster risk reduction (UNESCO, 2014a).

The Bonn Declaration adopted in 2009 at the UNESCO World Conference on Education for Sustainable Development held in Bonn, Germany, represents a turning point in the visibility and understanding of ESD by ministers and provided the shift to the second phase. The Declaration emphasized the importance of investing in ESD, referring to it as a 'life-saving measure' for the future that empowers people for change (UNESCO, 2009: 1). While recognizing that 'education is a significant factor in improving human well-being', the Declaration recommended promoting ESD as 'an investment in the future', which is directly related to the two processes of linking education and sustainable development.

To mark the end of UNDESD, the World Conference on ESD in Aichi-Nagoya in 2014 produced the Aichi-Nagoya Declaration, which agreed to revisit the purpose of education systems with a view to adding a sustainable future as an overall purpose of education. The Aichi-Nagoya Declaration stresses that:

> 'ESD is an opportunity and a responsibility that should engage both developed and developing countries in intensifying efforts for poverty eradication, reduction of inequalities, environmental protection and economic growth, with a view to promoting equitable, more sustainable economies and societies benefiting all countries' (UNESCO, 2014e).

These processes, yet again, reaffirmed the relevance of education in key sustainable development issues as well as sustainable development in education.

As a follow-up to the UN Decade of ESD, the Global Action Programme (GAP) on Education for Sustainable Development (2015-2019) was launched at the World Conference on ESD in Aichi-Nagoya.

As endorsed by the UNESCO General Conference, the Global Action Programme on ESD has as its overall goal 'to generate and scale up action in all levels and areas of education and learning to accelerate progress towards sustainable development' (UNESCO 2014d). This translates into two objectives, the first directed at the education sector, which is called upon 'to reorient education and learning so that everyone has the opportunity to acquire the knowledge, skills, values and attitudes that empower them to contribute to sustainable development'. The second objective addresses all other sectors relevant to sustainable development and requests them 'to strengthen education and learning in all agendas, programmes and activities that promote sustainable development.' These two objectives build from the two processes examined earlier in the chapter and thus do justice to the fact that learning our way towards sustainable development requires the participation of all sectors of the society, and not merely the integration of sustainable development-related issues into education.

One of the key features of the future Global Action Programme on ESD is the concentration on five 'priority action areas': '1. Advancing policy, 2. Transforming learning and training environments, 3. Building capacities of educators and trainers, 4. Empowering and mobilizing youth, 5. Accelerating sustainable solutions at local level' (UNESCO 2014b: 15). Each of the five areas will be discussed in the following chapters of this volume.

Continued dialogue between education and sustainable development

The development of Education for Sustainable Development has been a dialogue between education and sustainable development, i.e. integration of education into sustainable development and integration of sustainable development into education.

As this chapter reviewed, over the years, growing importance has been placed on the role of education to successfully achieve the goals of sustainable development. The message is clear; if people around the world do not value and practice the principles of sustainable development in their daily choices,

we will never be able to create the future we want. As we build onto the achievements of Education for All, there has been strong recognition in the last decade of the crucial importance of the knowledge, skills, values and attitudes needed to address key issues of sustainable quality life.

To date, ESD has been promoting knowledge, skills, values and attitudes that empower learners to take informed decisions and responsible actions for environmental integrity, economic viability and a just society. Through the UN Decade and the Global Action Programme on ESD, efforts have been made to mainstream ESD in education policies, curricula, and teacher training. The need to continue this dialogue between sustainable development and education is greater than ever.

With the launch of the 17 Sustainable Development Goals, continents, regions, countries, institutions and individuals are committed to achieving progress for sustainable development. Intentional, strategic and continuous integration or mainstreaming of sustainable development into education at all levels is also in demand. Education for Sustainable Development is increasingly understood as the cross-cutting means for sustainable development and all areas of the SDGs. No doubt, the fruitful dialogue and cooperation between the education sector and sustainable development sectors will continue with ever more urgency.

Chapter 2

Learning to transform the world: key competencies in Education for Sustainable Development

Marco Rieckmann

Introduction

Education for Sustainable Development (ESD) aims to develop competencies that enable and empower individuals to reflect on their own actions by taking into account their current and future social, cultural, economic and environmental impacts from both a local and a global perspective. It requires individuals to act in complex situations in a sustainable manner – to explore new ideas and approaches and participate in socio-political processes, with the objective of moving their societies progressively towards sustainable development. ESD, understood in this way aims to enable learners to take responsible actions that contribute towards creating sustainable societies now and in the future. It 'develops the skills, values and attitudes that enable citizens to lead healthy and fulfilled lives, make informed decisions, and respond to local and global challenges' (UNESCO, 2016: IV).

ESD should be understood as an integral part of quality education and lifelong learning. All educational institutions ranging from preschool to tertiary education and including both non-formal and informal education should consider it their responsibility to address sustainable development

and to foster the development of key cross-cutting competencies related to sustainability. The development of these competencies is an essential contribution to efforts to achieve the Sustainable Development Goals (SDGs). ESD equips individuals not only with the knowledge to understand the SDGs, but also with the competencies to engage as informed citizens in promoting the transformation to a more sustainable society (UNESCO, 2017).

ESD consists of holistic and transformational education that addresses learning content and outcomes, pedagogy and the learning environment. In addition to including and prioritizing content on climate change, poverty and sustainable consumption in the curriculum, ESD also creates interactive, learner-centred teaching and learning settings. In essence, ESD requires a shift from teaching to learning. This takes the form of an action-oriented transformative pedagogy, characterized by elements such as self-directed learning, participation and collaboration, problem-orientation, and inter and transdisciplinarity, as well as the linking of formal and informal learning. Such pedagogical approaches are essential for the development of competencies vital for promoting sustainable development.

This chapter presents ESD as a form of transformative and competence-based education. It describes the competencies that ESD should develop and the action-oriented transformative pedagogy needed to facilitate this process. It also discusses the needs of educators in developing competencies for ESD.

ESD as transformative and competence-based education

Societies across the globe are facing new challenges arising from the pace of technological progress and globalization. These include growing complexity and uncertainty, increasing individualization and social diversity, expanding economic and cultural uniformity, degrading ecosystem services upon which societies depend, and heightened vulnerability and exposure to natural and technological hazards. Additionally, these societies now have a vast and continuous stream of information at their disposal. The complexity of these challenges – including the variety of actors involved, the situation and the courses of action – does not allow for straightforward problem-solving processes and instead necessitates creative and self-organized action.

In order to contribute to sustainable development, individuals need to learn how to understand the complex world in which they live, and how to deal with uncertainties, trade-offs, risks and the high velocity of societal (global) change. They need to be able to collaborate, speak up and act for positive change within the world (UNESCO, 2015a). These people might be called 'sustainability citizens' (Wals, 2015; Wals and Lenglet, 2016).

Since the late 1990s, the discourse on how to educate such sustainability citizens has shifted from an input orientation, focusing on lists of essential educational content, to an outcome-based competence approach (Adomßent and Hoffmann, 2013; Wiek, Withycombe and Redman, 2011). Such outcomes include enabling people to engage effectively in this increasingly complex world and contribute to transforming its structures. The competence approach is based on establishing which approaches work best in the real world and then identifying how to foster the necessary learning.

As noted above, in the context of current global challenges, it is argued that ESD should enable individuals to reflect on their own actions by taking into account their current and future social and environmental effects – from a global perspective. This then enables them to intervene productively in shaping them in a more sustainable manner. A competence-based approach can help here to bridge the gap between knowledge and action (see Figure 1).

Instead of promoting certain behaviours and ways of thinking ('ESD 1'/'instrumental approach'), an emancipatory concept of ESD focuses, in particular, on 'building capacity to think critically about [and beyond] what experts say and to test sustainable development ideas' and 'exploring the contradictions inherent in sustainable living' ('ESD 2')[1] (Vare and Scott, 2007: 194; cf. Wals, 2015). Against this background, ESD aims to develop competencies that enable individuals to participate in socio-political processes and, hence, to move their societies towards sustainable development (Rieckmann, 2012; Wiek, Withycombe and Redman, 2011). Approaching ESD from a competence point of view allows the exploration of key areas essential to success in the area of sustainability.

1 Vare and Scott (2007) distinguish between ESD with an instrumental approach ('ESD 1') and ESD with an emancipatory approach ('ESD 2').

Accordingly, the Global Action Programme (GAP) on ESD states that:

> ESD allows every human being to acquire the knowledge, skills, values and attitudes that empower them to contribute to sustainable development and take informed decisions and responsible actions for environmental integrity, economic viability, and a just society for present and future generations. […] ESD promotes skills like critical thinking, understanding complex systems, imagining future scenarios, and making decisions in a participatory and collaborative way (UNESCO, 2014b: 33).

Development of sustainability competencies

The emancipatory ESD approach aims to identify key competencies needed for learners to become sustainability citizens. Accordingly, the GAP highlights learning outcomes that stimulate learning and promote core competencies, such as 'critical and systemic thinking, collaborative decision-making, and taking responsibility for present and future generations' (UNESCO, 2014b: 12).

An increasing number of researchers are examining the many interconnecting aspects of ESD and their associated competencies (e.g. de Haan, 2010; Glasser and Hirsh, 2016; Rieckmann, 2012; Wiek, Withycombe and Redman, 2011; Wiek et al., 2016). Between them, they outline key competencies essential for individuals to transform their own lifestyles and to contribute to societal transformation towards sustainability:

- **OECD's key competencies:** The OECD project 'Definition and Selection of Competencies' (DeSeCo) classifies key competencies into three categories: Using tools interactively (the ability to use language, symbols and texts interactively, the ability to use knowledge and information interactively, and the ability to use technology interactively); *Interacting in heterogeneous groups* (the ability to relate well to others, the ability to cooperate, and the ability to manage and resolve conflicts); and Acting autonomously (the ability to act within the big picture; the ability to form and conduct life plans and personal projects; and the ability to defend and assert rights, interests, limits and needs) (Rychen, 2003).

- **Gestaltungskompetenz (shaping competencies):** This framework consists of the following key competencies for shaping or transforming the future: gather knowledge in a spirit of openness to the world, integrating to align with the other imperatives - think and act in a forward-looking manner; acquire knowledge and act in an interdisciplinary manner; deal with incomplete and overly complex information; cooperate in decision-making processes; cope with individual decision-making dilemmas; participate in collective decision-making processes; motivate oneself as well as others to become active; reflect upon one's own principles and those of others; refer to the idea of equity in decision-making and planning actions; plan and act autonomously; and show empathy for, and solidarity with, the disadvantaged (de Haan, 2010).

- **Key competencies for sustainable development:** The following list of key competencies was compiled as part of a Delphi study by ESD experts from Chile, Ecuador, Germany, Mexico and the United Kingdom: systemic thinking and handling of complexity, anticipatory thinking, critical thinking, acting fairly and ecologically, cooperation in (heterogeneous) groups, participation, empathy and change of perspective, interdisciplinary work, communication and use of media, planning and realizing innovative projects, evaluation, and ambiguity and frustration tolerance.[2]

- **Sustainability competencies:** Wals (2015) distinguishes the following competence-based dimensions of sustainability: the dynamics and content of sustainability, the critical dimension of sustainability, the change and innovation dimension of sustainability, and the existential and normative dimension of sustainability.

- **Key competencies in sustainability:** Wiek et al. have recently updated their framework, which comprised five key competencies, adding a sixth (problem-solving competence) in 2016: systems thinking competence, anticipatory competence, normative competence, strategic competence, interpersonal competence and integrated problem-solving competence. Their work has played an important role in drawing together many of these concepts and lists, and in providing a structure for facilitating discussion about the

2 The competency for ambiguity and frustration tolerance relates to coping with conflicts, competing objectives and interests, contradictions and setbacks (Rieckmann, 2012).

competencies considered critical for sustainability (Wiek, Withycombe and Redman, 2011, Wiek et al., 2016).

- **Sustainability core competencies:** Glasser and Hirsh (2016) identified five additional key competencies: affinity for life, knowledge about the state of the planet, wise decision- making, modelling sustainable behaviour and transformative social change.

While these lists exhibit certain differences, they also coincide with a number of key sustainability competencies. There is general agreement within the international ESD discourse that the following key sustainability competencies are of particular importance for thinking and acting in favour of sustainable development:

- *Systems thinking competency:* the ability to recognize and understand relationships, to analyse complex systems, to perceive the ways in which systems are embedded within different domains and different scales, and to deal with uncertainty;
- *Anticipatory competency:* the ability to understand and evaluate multiple futures – possible, probable and desirable – and to create one's own visions for the future, to apply the precautionary principle, to assess the consequences of actions, and to deal with risks and changes;
- *Normative competency:* the ability to understand and reflect on the norms and values that underlie one's actions and to negotiate sustainability values, principles, goals and targets, in a context of conflicts of interests and trade-offs, uncertain knowledge and contradictions;
- *Strategic competency:* the ability to collectively develop and implement innovative actions that further sustainability at the local level and further afield;
- *Collaboration competency:* the ability to learn from others; understand and respect the needs, perspectives and actions of others (empathy); understand, relate to and be sensitive to others (empathic leadership), deal with conflicts in a group; and facilitate collaborative and participatory problem-solving;
- *Critical thinking competency:* the ability to question norms, practices and opinions; reflect on own one's values, perceptions and actions; and take a position in the sustainability discourse;

- *Self-awareness competency:* the ability to reflect on one's own role in the local community and (global) society, continually evaluate and further motivate one's actions, and deal with one's feelings and desires;
- *Integrated problem-solving competency:* the overarching ability to apply different problem-solving frameworks to complex sustainability problems and develop viable, inclusive and equitable solution that promote sustainable development – integrating the above-mentioned competencies.

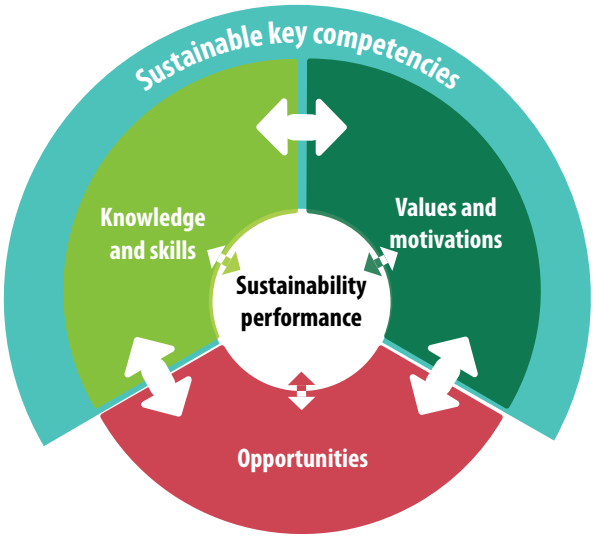
This list highlights competencies that are particularly essential for sustainability and which have not been the main focus of formal education. While each competency has its own qualities and areas of relevance, they are mutually interdependent. This is why the integrated problem-solving competency is of particular importance. In addition, basic competencies such as communication skills are crucial for dealing with sustainable development. Furthermore, these key sustainability competencies have to be developed in conjunction with basic competencies (Wiek, Withycombe and Redman, 2011).

However, while competencies describe the capacity or disposition to act to address complex challenges, they do not necessarily imply that an individual will act in a certain way in a specific situation. Hence, to transform capacities into real sustainable actions, individuals need corresponding values and motivational drivers.

Furthermore, sustainability performance is related to an individual's environment, understood as opportunities to perform that are beyond the individual's control. From this perspective, opportunities are environmental and contextual mechanisms that enable action. In other words, they are conditions that provide the necessary support and avenues for sustainability-driven action. Leaning on the capability approach, Nussbaum (2000) emphasizes the crucial importance of governance institutions in providing opportunity structures that give individuals the capability to act. In other words, 'capabilities could be understood as the set of real opportunities […] to be what they have reason to value' (Lozano et al., 2012: 4).

According to this approach, sustainability performance depends on the interplay of knowledge and skills, values and motivational drivers, and opportunities. The interrelation of these dimensions influences personal behaviour (Figure 1).

Figure 1: Key competencies and performance of sustainability citizens



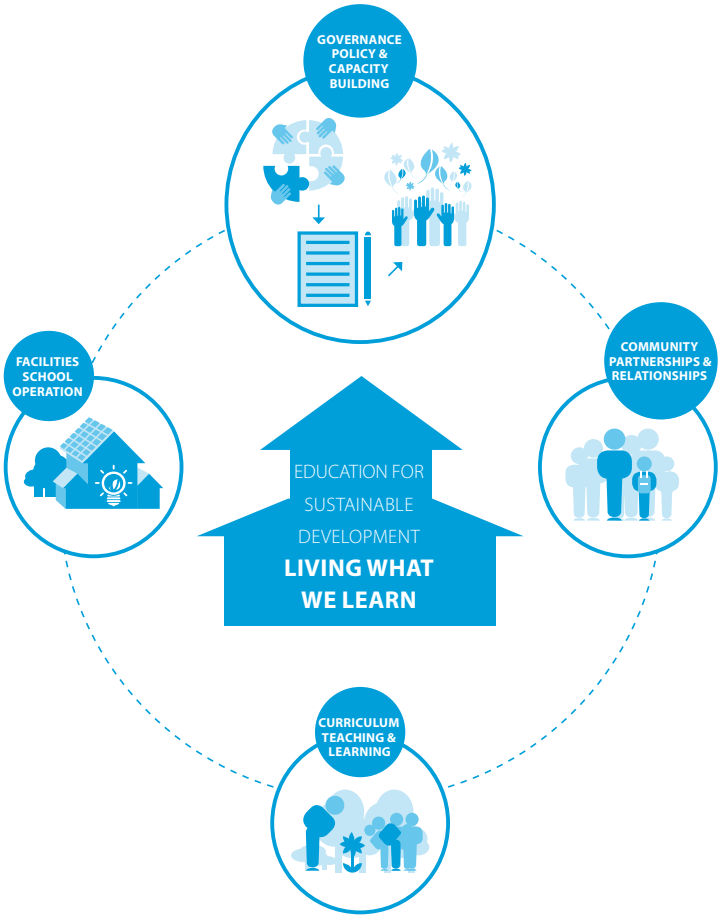
Source: Author

Main implications of ESD for the practice of education and pedagogy

Whole-institution approach

ESD is not just a matter of teaching sustainable development and adding new content to courses and trainings. Schools and universities, for instance, should see themselves as experiential places of learning for sustainable development, and should therefore orient all their processes towards principles of sustainability. For ESD to be more effective, the educational institution as a whole has to be transformed. Such a whole-institution approach aims to mainstream sustainability into all aspects of the educational institution. It involves rethinking the curriculum, campus operations, organizational culture, student participation, leadership and management, community relationships and research (UNESCO, 2014a). In this way, the institution itself functions as a role model for the learners. Sustainable learning environments, such as eco-schools or green campuses, allow educators and learners to integrate sustainability principles into their daily practices and facilitate capacity-building and competence development, and value education in a comprehensive manner.

Figure 2: The whole-institution approach



Source: UNESCO (2014a: 89).

Given the importance of transforming the whole educational institution, GAP Priority Action Area 2 ('Transforming learning and training environments: Integrate sustainability principles into education and training settings') calls for 'promoting whole-institution approaches to ESD in schools and all other learning and training settings' (UNESCO 2014b: 18). Thus, whole-institution approaches should be promoted at all levels and in all settings. Accordingly, schools and other educational institutions, and public and private sector organizations, are encouraged to implement sustainability plans or strategies.

Existing experiences with whole-institution approaches in the areas of higher education and secondary schools need to be scaled up and expanded to other levels and types of education, such as early childhood education, technical and vocational education and training (TVET), and non-formal education for youth and adults. Key elements for a whole-institution approach are summarized in Box 1.

Box 1: Key elements for whole-institution approaches

1. An institution-wide process is organized in a manner that enables all stakeholders – leadership, teachers, learners, administration – to jointly develop a vision and plan to implement ESD in the whole institution.
2. Technical and, where possible and appropriate, financial support is provided to the institution to support its reorientation. This can include the provision of relevant good practice examples, training for leadership and administration, the development of guidelines, as well as associated research.
3. Existing relevant inter-institutional networks are mobilized and enhanced in order to facilitate mutual support such as peer-to-peer learning on a whole-institution approach, and to increase the visibility of the approach to promote it as a model for adaptation.

Source: UNESCO (2014b).

While all elements of the whole-institution approach are important, interactive, integrative and critical forms of learning are at the core of delivering ESD in the classroom and other learning settings, making this approach an action-oriented transformative pedagogy.

Action-oriented transformative pedagogy

ESD is about developing sustainability competencies and, thus, empowering and motivating learners to become active and critical sustainability citizens able to participate in shaping a sustainable future. The pedagogical approaches needed to achieve this end should be learner-centred, action-oriented and transformative (see Box 2).

Box 2: Key pedagogical approaches in ESD

A learner-centred approach

Learner-centred pedagogy sees students as autonomous learners and emphasizes the active development of knowledge rather than its mere transfer and/or passive learning experiences. The learners' prior knowledge as well as their experiences in the social context are the starting points for stimulating learning processes in which the learners construct their own knowledge base. Learner-centred approaches require learners to reflect on their own knowledge and learning processes in order to manage and monitor them. Educators should stimulate and support those reflections. Learner-centred approaches change the role of an educator from that of an expert who transfers structured knowledge to that of a facilitator of learning processes (Barth, 2015).

Action-oriented learning

In action-oriented learning, learners engage in action and reflect on their experiences in relation to the intended learning process and personal development. The experience might come from a project (e.g. in-service learning), an internship, facilitation of a workshop, implementation of a campaign and so on. Action-learning draws on Kolb's learning cycle of experimental learning, which has the following stages: (i) having a concrete experience, (ii) observation and reflection, (iii) formation of abstract concepts for generalization and (iv) application in new situations (Kolb, 1984). Action-learning increases knowledge acquisition, competency development and values clarification by linking rather abstract concepts to personal experience and the learners' life. The role of the educator is to create a learning environment that prompts learners' experiences and reflexive thought processes.

Transformative learning

Transformative learning can be defined primarily by its aims and principles, not by a concrete teaching or learning strategy. It aims to empower learners to question and change their ways of seeing and thinking about the world, in order to further develop their understanding of it (Mezirow, 2000; Slavich and Zimbardo, 2012). The educator acts as a facilitator who empowers and challenges learners to change their worldviews. The related concept of transgressive learning (Lotz-Sisitka et al., 2015) goes one step further – it states that learning in ESD has to overcome the status quo and prepare the learner for disruptive thinking and the co-creation of new knowledge.

While such pedagogical approaches describe the general character or guiding principles for designing learning processes in ESD, specific methods in line with these principles are needed to facilitate the learning process. ESD favours methods that foster sustainability competencies through active learning. Some methods can be particularly recommended for ESD (see Box 3).

Box 3: Key methods in ESD

- Collaborative real-world projects such as a service-learning project and campaigns for different sustainability topics;
- Vision-building exercises such as future workshops, scenario analyses, utopian/dystopian story-telling, science-fiction thinking, and fore and back-casting;
- Analysis of complex systems including community-based research projects, case studies, stakeholder analysis, actor analysis, modelling and systems games;
- Critical and reflective thinking including through fish-bowl discussions and reflective journals.

These participatory teaching and learning methods empower learners to take action to promote sustainable development. When teaching and learning methods for a specific setting are chosen, they have to match the needs of the learner group (e.g. based on age, prior knowledge, interests and abilities), the context in which the learning takes place (e.g. space in the curriculum, pedagogical climate and cultural traditions), and the resources and support available (e.g. teacher competencies, teaching materials, technology and money).

In order to create diverse and cross-boundary learning settings and draw holistic, comprehensive pictures of global sustainability challenges (including the SDGs), educational institutions and educators should foster partnerships at the local, national and international level. While acknowledging that adequate responses to sustainability challenges cannot be limited to single perspectives, disciplines or ways of knowing, it is important that learning within partnerships (involving a range of societal actors, such as businesses, NGOs, public institutions and/or policy-makers) becomes a source of creativity and innovation. Such dialogues or projects enable students to learn about real-world challenges and from the partners' expertise and experiences. At the same time, they can be empowering for partners and can increase their capacity as critical agents of change. In addition, partnerships between learners from around the world foster the exchange of different perspectives and knowledge concerning similar topics. For example, virtual courses can provide an environment to initiate global dialogues and foster mutual respect and understanding.

Action-oriented transformative pedagogies also contribute to achieving the aims of GAP Priority Action Area 4 ('Empowering and mobilizing youth'), which calls for 'more quality e-learning opportunities for youth; youth participating in and contributing to ESD advocacy, policy development and implementation at local, national and international levels; and more youth-led ESD activities' (UNESCO, 2014b: 23).

Need for assessment of ESD learning outcomes

To date, little is known about the quality of ESD programmes, the extent of their implementation and their effectiveness in generating the desired changes in learning attainments (knowledge, competencies, attitudes, values and behaviour). Assessing both the outcomes of ESD and efforts that seek to reorient education systems is a challenge to be addressed (UNESCO, 2014a). ESD programmes and initiatives should be assessed at multiple levels, in particular: large-scale assessments for learning outcomes, assessment of learning outcomes at the individual level, national assessments more aligned with national educational priorities, contextualized school and institutional assessments to improve implementation and delivery, the development of formative assessment practices to empower teachers to gauge specific pedagogical practices in classrooms, and personal self-assessment of individual progress. ESD elements are already included in several large-scale assessments (see Box 4).

Box 4: Examples of large-scale assessments that include ESD elements

Assessing exposure to sustainable development

'International assessments of learning attainments are beginning to incorporate aspects of ESD. The PISA 2006 assessment focused on science literacy and, among other things, compiled information about the inclusion of environmental science topics in the school curriculum (OECD, 2009). PISA found that 98 per cent of students in OECD countries attend schools in which environmental topics (e.g. pollution, environmental degradation, relationships between organisms, biodiversity and conservation of resources) are taught. While the curricular locations of environmental science topics may differ from one system to the next, most (lower) secondary students in OECD countries have been exposed to, and are required to master, a set of key environmental themes. Among students in non-OECD countries, the opportunity to learn about the environment varies to a much greater extent.'

Assessing sustainability-related choices and actions

'Even more challenging to determine is whether knowledge and learning attainments are leading to sustainability-related choices and actions. There are some promising initiatives in this area: for example, the International Civics and Citizenship Study (ICCS) across thirty-eight countries in 2008 and 2009, sponsored by the International Association for the Evaluation of Educational Achievement, has found a positive correlation between citizenship education with engagement of students in active citizenship (Schulz et al., 2010).'

Source: UNESCO (2014a: 98).

In 2013, the PISA Governing Board decided to undertake an assessment of 'global competence' (OECD, 2016) as part of the 2018 PISA assessment. Global competence is defined by the OECD as

> the capacity to analyse global and intercultural issues critically and from multiple perspectives, to understand how differences affect perceptions, judgements, and ideas of self and others, and to engage in open, appropriate and effective interactions with others from different backgrounds on the basis of a shared respect for human dignity (OECD, 2016: 4).

The cognitive test, developed in consultation with OECD member countries and expert advisors, will assess young people's knowledge and understanding of global issues, intercultural knowledge and understanding, and analytical and critical thinking skills. Additionally, the student questionnaire will use self-reported data to analyse skills such as the ability to interact respectfully, appropriately and effectively, and demonstrate empathy and flexibility, as well as attitudes such as openness towards people from other cultures, respect for cultural otherness, global-mindedness and responsibility (OECD, 2016: 6). The test will 'offer the first, comprehensive overview of education systems' success

in equipping young people to support the development of peaceful, diverse communities' (OECD, 2016: 3). At a meeting of G7 education ministers held in Kurashiki, Japan, on 14 May 2016, ministers noted that the assessment may well provide a metric to measure progress in this area.

PISA and other large-scale assessments, such as the International Civic and Citizenship Education Study (ICCS) 2016,[3] can make important contributions to better understanding the development of ESD learning outcomes and to increasing the visibility of ESD's contributions to quality education. They can also provide the data needed to monitor thematic indicators 26 'Percentage of students by age group (or education level) showing adequate understanding of issues relating to global citizenship and sustainability' and 27 'Percentage of 15-year-old students showing proficiency in knowledge of environmental science and geoscience' of Target 4.7 of the SDGs (UNESCO, 2015b).

Assessment and evaluation can serve several purposes in ESD (see Box 5).

Box 5: Different purposes of assessment in ESD at the individual level

- Gather information and record learners' progress and achievement toward intended learning outcomes;
- Communicate progress to learners, identify strengths and areas for growth, and use this information to set learning goals;
- Provide feedback about the success of teaching and learning processes to help plan, implement and improve these processes;
- In formal education, guide decisions about learners' grading and academic and occupational choices.

There are many ways to assess learning outcomes. The approach taken will depend on the context (e.g. the characteristics of the education system) and on how ESD is delivered (e.g in formal education ESD is delivered across the curriculum or within a specific subject or other modality). Methods of assessment will need to be aligned with learning objectives and teaching and learning practices. Given the variety of learning objectives and competencies, assessment of ESD learning will most likely involve a range of methods.

It is crucial that the methods used to assess ESD extend beyond verifying knowledge of facts to also assess learners' competencies. Assessing

3 See http://iccs.iea.nl.

competence development in ESD remains a major challenge, as much remains to be done to operationalize and model sustainability competencies. Another challenge lies in assessing changes in competencies and other learning outcomes over time. Longitudinal studies are promising in this regard, and also appear useful for exploring the impact of whole institutional approaches to ESD.

As the transformative applications of ESD are wide-ranging, educators need to consider the broader purposes of assessment. They need to move beyond the exclusive use of *assessment of learning to forms of assessment for learning and assessment as learning*. Using a mix of traditional assessment methods and more reflective and performance-based approaches, such as self-assessment and peer assessment, enables educators to capture learners' insights regarding their personal transformation, their growing capacity for critical inquiry, and engagement and civic agency, among others. Feedback from educators, peer feedback and self-evaluation (e.g. through the use of reflective journals or portfolios) empower learners to monitor their own learning processes and identify possible areas for improvement.

In addition to assessing learning outcomes, it is important to undertake ongoing monitoring and assessment of the quality of ESD programmes. This can focus on programmatic aspects (e.g. learning expectations, resources, teaching competencies and the learning environment), processes (e.g. teaching practices, learning resources, learners' engagement), outcomes (e.g. knowledge, competencies, values and attitudes, and transformative effect) and contextual considerations.

Efforts to carry out an effective assessment of ESD programmes should be integrated where possible into existing assessment practices. Those involved must pay careful attention to a range of factors. Assessment purposes and indicators (e.g. status, facilitative and results) need to be clearly defined, the nature of the teaching/learning population and context need to be considered, and the kind of information that constitutes acceptable evidence and methods of collecting data need to be determined.

The results of a programme assessment can be used for various purposes (see Box 6).

Box 6: Different purposes of programme assessment

- Identifying programmatic limitations;
- Targeting specific areas for improvement;
- Reporting local, national and international trends and outcomes;
- Evaluating programme effectiveness;
- Promoting accountability and transparency.

Monitoring and evaluation must be improved to secure the evidence for continued and expanded investment in ESD, and for reflexive engagement with ESD as an emerging educational re-orientation process. Therefore, it is crucial to develop indicator frameworks that establish standards for ESD learning outcomes.

Key competencies for ESD educators

Educators are powerful change agents with the ability to deliver the educational response needed in the context of sustainable development. Their knowledge and competencies are crucial for restructuring educational processes and educational institutions towards sustainability.

Teacher education must meet this challenge by reorienting itself towards ESD, as demanded by international declarations such as the Strategy for Education for Sustainable Development (UNECE, 2005) and the Bonn Declaration (UNESCO, 2009), as well as various educational policy papers published at the national level. Monitoring and evaluation of the Decade of Education for Sustainable Development (DESD) has highlighted many good examples of how to integrate ESD into teacher education. It has also identified support for teachers as a key condition for the successful adoption and implementation of ESD (UNESCO, 2014a).

However, efforts to prepare teachers to implement ESD have not advanced sufficiently. More work is needed to reorient teacher education to approach ESD both in terms of content and teaching and learning methods. For this reason, Priority Action Area 3 of the GAP aims to build the capacities of educators. One proposed action is to integrate ESD into pre-service and in-service teacher education programmes (UNESCO, 2014b).

For teachers to be adequately prepared to facilitate ESD, they must develop key sustainability competencies, including knowledge, skills, attitudes, values, motivation and commitment. However, in addition to general sustainability

competencies, they also need ESD competencies, which can be described as a teacher's capacity to help people develop sustainability competencies through a range of innovative teaching and learning practices (see Box 7).

Box 7: Learning objectives for teachers to promote ESD

- Know about sustainable development and the related topics and challenges;
- Understand the discourse on, and the practice of ESD in the local, national and global context;
- Develop an integrative view of the key issues and challenges taking into account social, ecological, economic and cultural dimensions from the perspective of the principles and values of sustainable development;
- Develop disciplinary, interdisciplinary and transdisciplinary[5] perspectives on issues of global change and their local manifestations;
- Reflect on the challenges facing promotion of the concept of sustainable development and the importance of their field of expertise for facilitating sustainable development and their own role in this process;
- Reflect on the dynamics of formal, non-formal and informal learning for sustainable development, and apply this knowledge in their own professional work;
- Understand the ways in which cultural diversity, gender equality, social justice, environmental protection and personal development are integral elements of ESD and how they can be made a part of educational processes;
- Practise an action-oriented transformative pedagogy that engages learners in participative, systemic, creative and innovative thinking and acting processes in the context of local communities and learners' daily lives;
- Act as a change agent within a process of organizational learning to advance the school towards sustainable development;
- Identify local learning opportunities related to sustainable development and build cooperative relationships;
- Evaluate and assess learners' development of cross-cutting sustainability competencies and specific sustainability-related learning outcomes.

Source: UNESCO (2017).

For more information, please visit: https://www.leuphana.de/fileadmin/user_upload/portale/netzwerk-lena/Memorandum_LeNa_English_Stand_August_15.pdf

These objectives are described in more detail in a number of competency-based models for educators in the field of ESD. Key examples include the

4 Interdisciplinarity refers to cooperation among different scientific disciplines and the 'integration of different disciplinary perspectives, theories and methods.' Transdisciplinarity refers to 'cooperation with experts in possession of practical experience from outside the academic world' (Godemann, 2006: 52).

CSCT model (Sleurs, 2008), the UNECE model (UNECE, 2012), the KOM-BiNE model (Rauch and Steiner, 2013) and the approach devised by Bertschy, Künzli and Lehmann (2013). Teacher education programmes should be further developed to meet these standards.

The UNECE model (2012) concerns all educators in all education and learning settings and is divided into four areas: (i) Learning to know (the educator understands...), (ii) Learning to do (the educator is able to…), (iii) Learning to live together (the educator works with others in ways that...) and (iv) Learning to be (the educator is someone who...). The CSCT, UNECE and KOM-BiNE models are based on the relationship between teachers and society; their values, attitudes and behaviour with regard to sustainability; and their participation in the sustainable development of society. In comparison, the approach taken by Bertschy, Künzli and Lehmann (2013) focuses on the professional context, in particular the fundamental knowledge, competencies and skills teachers must possess in order to deliver ESD in the classroom. However, this approach raises the question of whether teachers who do not, to some extent, align their own values and behaviour with the idea of sustainable development, can work with students on sustainability issues.

To facilitate the development of ESD competencies in teacher education, changes need to be made to the content and structure of pre-service and in-service teacher education. ESD should provide the fundamental orientation for teacher education programmes. Subject disciplines, subject didactics, educational sciences and practice-oriented studies should include methodology principles and subject knowledge from ESD (see Box 8).

Box 8: Possible modules of a teacher education curriculum with ESD as a key element

- Basic concepts of sustainable development from a local, national and international perspective;
- ESD concepts from a local, national and international perspective;
- Disciplinary, interdisciplinary and transdisciplinary views of key examples of sustainability challenges;
- Project-oriented work on specific problems of local, national and global importance in cooperation with educational institutions and other (local) partners;
- Research-based analysis of ESD processes in different learning settings (e.g. schools, colleges or non-formal educational institutions);
- Practical experiences with ESD approaches and associated critical reflection.

Learning on the basis of real societal challenges in local contexts requires cooperation with external partners. Modules should thus enable access to external partners (e.g. communities, non-formal educational institutions and ESD networks) and include possibilities for project-oriented collaboration.

Additionally, ESD requires internationalization as an element of teacher education, in particular by making international debates about ESD and discussions about cultural diversity integral components of modules. This means that students should be given the opportunity to study abroad, in order to facilitate practical experiences.

To better integrate ESD into teacher education, development of the content and organization of teacher education programmes should involve the participation of key stakeholders such as students, teachers, local NGOs and ESD experts. To facilitate innovation, it is crucial that educational institutions have the necessary structural conditions as well as the freedom to engage in organizational learning processes.

As pre-service training still does not include a focus on ESD, many teachers need to have access to dedicated in-service training on the issue. This would open up opportunities to develop the necessary knowledge and competencies to participate in the sustainable development process. Furthermore, professional development is a prerequisite for reorienting educational processes and educational institutions. Accordingly, it is crucial that professional development for ESD is made available to more than just one teacher from the same institution and recognized by the educational systems with regard to applications, promotions and so on. National and Regional Centres of Expertise for ESD could also develop opportunities for professional development and advisory services, making use of the potential of government and non-governmental organizations, as well as universities and other institutions of higher education.

Conclusion

ESD can help to facilitate sustainable development by developing the cross-cutting sustainability competencies needed to deal with a wide range of sustainability challenges. To empower people worldwide to take action in favour of sustainable development, all educational institutions should undertake to deal intensively with sustainable development issues and foster the development of sustainability competencies. Therefore, it is crucial not only to include sustainability-related content in the curricula, but also to employ an action-oriented transformative pedagogy. To put this pedagogy into practice, educators are needed who not only know about ESD, but who also have developed teaching competencies related to ESD in their own education and training.

Chapter 3

Key themes in Education for Sustainable Development

Marco Rieckmann

Introduction

While the acquisition of sustainability competencies is at the core of Education for Sustainable Development (ESD), the choice of topics and content used for developing these competencies is not arbitrary. Key themes of ESD are crucial for sustainable development processes at the local and/or global level, and their selection has implications for the future. Differentiated knowledge about topics from different areas should also be available to learners to allow them to analyse this information from alternative perspectives. The potential for action by learners should also be implicit in the topics.

Fields of action essential for facilitating sustainable development have been identified by a range of scientific studies, societal experiences and related discourse. These fields of action are thematic priorities for ESD. The **Sustainable Development Goals (SDGs)** identify 17 such fields of action (see Figure 1).

Figure 1: The Sustainable Development Goals

The Roadmap for Implementing the Global Action Programme on ESD lists the following key areas of sustainable development: climate change, biodiversity, disaster risk reduction, and sustainable consumption and production (UNESCO, 2014: 12). The Bonn Declaration stresses the need to learn how to 'address different priorities and issues inter alia: water, energy, climate change, disaster and risk reduction, loss of biodiversity, food crises, health risks, social vulnerability and insecurity' (UNESCO, 2009: para. 7). Agreements and programmes such as Agenda 21, the United Nations Framework Convention on Climate Change, the Convention on Biological Diversity, the Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters, and the Sustainable Lifestyles and Education Programme of the 10-Year Framework of Programmes on Sustainable Consumption and Production 2012-2021 all provide further information on important topics for ESD.

These themes determine the daily lives of people of all ages living in different living conditions, many of whom have experience in these fields. The topics are complex and manifold in their interrelations. However, they represent an opportunity to work with individuals in such a way that the potential for transformation becomes a central object of ESD.

Selected key themes in ESD

This section of the chapter describes some selected key themes in ESD: climate change, biodiversity, sustainable production and consumption, global justice, disaster risk reduction, and poverty reduction. It presents their relevance for sustainable development and their linkages with the SDGs. Additionally, it describes the main learning objectives which will enable learners to understand the key themes, relate to them on an individual and group level, and play an active role in promoting sustainable development in these thematic areas.

Climate change

Relevance of the theme for sustainable development

There is a scientific and political consensus that most of the global warming observed over the last fifty years has been caused by human activities, mainly by the emission of greenhouse gases (IPCC, 2014). Greenhouse gas emissions from human activities are driving climate change as they continue to rise to their highest levels in history. Global emissions of carbon dioxide (CO2) have increased by almost 50 per cent since 1990, and grew more quickly between 2000 and 2010 than in each of the three previous decades. From 1880 to 2012, the average global temperature increased by 0.85°C. Oceans have warmed, the amounts of snow and ice have diminished, and the sea level has risen. From 1901 to 2010, the global average sea level rose by 19 cm as oceans expanded due to warming and melted ice. Given current concentrations and ongoing emissions, it is likely that by the end of the twenty-first century, the increase in global temperature will exceed 1.5°C compared to the years 1850 to 1900 for all but one scenario according to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. The world's oceans will warm and ice melt will continue with average sea level predicted to rise 24–30 cm by 2065 and 40–63 cm by 2100 (IPCC, 2014).

In the event that global warming increases by up to 2°C, climate experts from the Intergovernmental Panel on Climate Change (IPCC) expect natural, social and economic systems to adapt. An increase of more than 2°C is highly likely to exceed this capacity for adaptation and will have catastrophic consequences (IPCC, 2014).

Climate change and the resulting global warming have many consequences for ecosystems and human beings. The first effects of these changes are

already being felt today. For some regions, especially in Africa, this means a loss of biodiversity and a reduction in agricultural yields, as a result of the emerging shifts in vegetation zones, as well as changes in the distribution and migration behaviour of many animal species (IPCC, 2014).

Climate change is affecting every country on every continent. It is disrupting national economies and lives, costing people, communities and countries dearly. The main impacts of climate change include changing weather patterns, rising sea level and an increase in more extreme weather events. The poorest and most vulnerable people are being affected the most (IPCC, 2014).

Climate change is a global challenge that does not respect national borders. Emissions anywhere affect people everywhere. It is an issue that requires the coordination of solutions at the international level, as well as international cooperation to help developing countries move toward a low-carbon economy.

To address climate change, countries adopted the Paris Agreement at COP21 in Paris on 12 December 2015. The Agreement entered into force shortly thereafter on 4 November 2016. Under the agreement, all countries agree to work to limit the global temperature rise to well below 2°C, and, given the grave risks, to strive for 1.5°C (UN, 2015).

Linkages with the SDGs

Climate change is at the core of SDG 13: 'Climate Action – Take urgent action to combat climate change and its impacts'. This SDG aims to:

- Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries;
- Integrate climate change measures into national policies, strategies and planning;
- Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning;
- Implement the commitment undertaken by developed-country parties to the United Nations Framework Convention on Climate Change to a goal of mobilizing jointly US$100 billion annually by 2020 from all sources to address the needs of developing countries

in the context of meaningful mitigation actions and transparency on implementation and fully operationalize the Green Climate Fund through its capitalization as soon as possible;

- Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and Small Island Developing States (SIDS), including focusing on women, youth and local and marginalized communities.[1]

Learning objectives

In order to understand climate change and contribute to achieving SDG 13, learners should work towards the following objectives in the cognitive, socio-emotional and behavioural domain (see Table 1).

Table 1: Learning objectives for SDG 13 'Climate Action'

Cognitive learning objectives	1. The learner understands the greenhouse effect as a natural phenomenon caused by an insulating layer of greenhouse gases 2. The learner understands current climate change as an anthropogenic phenomenon resulting from increased greenhouse gas emissions 3. The learner knows which human activities – on a global, national, local and individual level – contribute most to climate change 4. The learner knows about the main ecological, social, cultural and economic consequences of climate change locally, nationally and globally and understands how these can themselves become catalysing, reinforcing factors for climate change 5. The learner knows about prevention, mitigation and adaptation strategies at different levels (global to individual) and for different contexts and their connections with disaster response and disaster risk reduction

1 See www.un.org/sustainabledevelopment/climate-change-2.

Socio-emotional learning objectives	1. The learner is able to explain ecosystem dynamics and the environmental, social, economic and ethical impact of climate change; 2. The learner is able to encourage others to protect the climate; 3. The learner is able to collaborate with others and to develop commonly agreed-upon strategies to deal with climate change; 4. The learner is able to understand their personal impact on the world's climate, from a local to a global perspective; 5. The learner is able to recognize that the protection of the global climate is an essential task for everyone and that we need to completely re-evaluate our worldview and everyday behaviours in light of this.
Behavioural learning objectives	1. The learner is able to evaluate whether their private and job activities are climate friendly and – where not – to revise them; 2. The learner is able to act in favour of people threatened by climate change; 3. The learner is able to anticipate, estimate and assess the impact of personal, local and national decisions or activities on other people and world regions; 4. The learner is able to promote climate-protecting public policies; 5. The learner is able to support climate-friendly economic activities.

Source: UNESCO (2017).

Integrating the theme into education programmes and practice

The following approaches and methods can be used to facilitate learning about climate change (Box 1).

Box 1: Examples of learning approaches and methods for SDG 13 'Climate Action'

- Perform a role-play to estimate and feel the impact of climate change related phenomena from different perspectives
- Analyse different climate change scenarios with regard to their assumptions, consequences and their preceding development paths
- Develop and run an action project or campaign related to climate protection
- Develop a web page or blog for group contributions related to climate change issues
- Develop climate friendly biographies
- Undertake a case study about how climate change could increase the risk of disasters in a local community
- Develop an enquiry-based project investigating the statement "Those who caused the most damage to the atmosphere should pay for it"

Source: UNESCO (2017).

Biodiversity

Relevance of the theme for sustainable development

One of the most significant consequences of human intervention in existing ecosystems is the loss of biodiversity. The worldwide Red List[2] contains more than 86,000 species of which about 5,200 are critically endangered. Of the 8,300 known animal breeds, 8 per cent are extinct and 22 per cent are at risk of extinction. Amphibians face the highest level of risk, with one-third being threatened with extinction.

Loss of biodiversity not only implies the loss of invaluable genetic resources, basic materials for medicine and recreational areas, but also threatens the overall existence and productivity of ecosystems as their regulation function is endangered by the loss of species. Human livelihoods depend significantly on biodiversity: for example, fish provide 20 per cent of animal protein to about 3 billion people. Ten species provide about 30 per cent of marine capture fisheries and another ten account for about 50 per cent of aquaculture production. Over 80 per cent of the human diet is provided by plants, while only three cereal crops – rice, maize and wheat – provide 60 per cent of

2 See www.iucnredlist.org.

energy intake. In addition, about 80 per cent of people living in rural areas in developing countries rely on traditional plant-based medicines for basic healthcare (FAO, 2016; TEEB, 2010).

To highlight this issue, the 65th session of the United Nations General Assembly declared the period 2011-2020, the United Nations Decade on Biodiversity: 'The goal of the United Nations Decade on Biodiversity is to support the implementation of the Strategic Plan for Biodiversity and to promote its overall vision of living in harmony with nature'.[3] The UN also established a Strategic Plan for Biodiversity, which envisions that: 'By 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people' (Secretariat of the Convention on Biological Diversity, 2010).

Linkages with the SDGs

Biodiversity is at the core of SDG14 'Life below Water – Conserve and sustainably use the oceans, seas and marine resources for sustainable development' and SDG15 'Life on Land – Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss'.

SDG14 aims, inter alia, to:

- By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution;
- By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans;
- Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels;
- By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices

3 See www.cbd.int/2011-2020.

and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics;

- By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information;

- By 2020, prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, eliminate subsidies that contribute to illegal, unreported and unregulated fishing and refrain from introducing new such subsidies, recognizing that appropriate and effective special and differential treatment for developing and least developed countries should be an integral part of the World Trade Organization fisheries subsidies negotiation;

- Enhance the conservation and sustainable use of oceans and their resources by implementing international law as reflected in UNCLOS, which provides the legal framework for the conservation and sustainable use of oceans and their resources, as recalled in paragraph 158 of The Future We Want.[4]

SDG15 aims to:

- By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements;

- By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally;

- By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world;

4 See www.un.org/sustainabledevelopment/oceans.

- By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development;

- Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species;

- Promote fair and equitable sharing of the benefits arising from the utilization of genetic resources and promote appropriate access to such resources, as internationally agreed;

- Take urgent action to end poaching and trafficking of protected species of flora and fauna and address both demand and supply of illegal wildlife products;

- By 2020, introduce measures to prevent the introduction, and significantly reduce the impact of invasive alien species on land and water ecosystems and control or eradicate the priority species;

- By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts;

- Mobilize and significantly increase financial resources from all sources to conserve and sustainably use biodiversity and ecosystems;

- Mobilize significant resources from all sources and at all levels to finance sustainable forest management and provide adequate incentives to developing countries to advance such management, including for conservation and reforestation;

- Enhance global support for efforts to combat poaching and trafficking of protected species, including by increasing the capacity of local communities to pursue sustainable livelihood opportunities.[5]

5 See www.un.org/sustainabledevelopment/biodiversity.

Learning objectives

In order to understand biodiversity and be able to contribute to achieving SDG14 and SDG15, learners should work towards the following objectives in the cognitive, socio-emotional and behavioural domain (see Table 2 and Table 3).

Table 2: Learning objectives for SDG14 'Life below Water'

Cognitive learning objectives	1. The learner understands basic marine ecology, ecosystems, predator-prey relationships, etc.; 2. The learner understands the connection of many people to the sea and the life it holds, including the sea's role as a provider of food, jobs and exciting opportunities; 3. The learner knows the basic premise of climate change and the role of the oceans in moderating our climate; 4. The learner understands threats to ocean systems such as pollution and overfishing and recognizes and can explain the relative fragility of many ocean ecosystems including coral reefs and hypoxic dead zones; 5. The learner knows about opportunities for the sustainable use of living marine resources.
Socio-emotional learning objectives	1. The learner is able to argue for sustainable fishing practices; 2. The learner is able to show people the impact humanity is having on the oceans (biomass loss, acidification, pollution, etc.) and the value of clean healthy oceans; 3. The learner is able to influence groups that engage in unsustainable production and consumption of ocean products; 4. The learner is able to reflect on their own dietary needs and question whether their dietary habits make sustainable use of limited resources of seafood; 5. The learner is able to empathize with people whose livelihoods are affected by changing fishing practices.
Behavioural learning objectives	1. The learner is able to research their country's dependence on the sea. 2. The learner is able to debate sustainable methods such as strict fishing quotas and moratoriums on species in danger of extinction. 3. The learner is able to identify, access and buy sustainably harvested marine life, e.g. ecolabel certified products. 4. The learner is able to contact their representatives to discuss overfishing as a threat to local livelihoods. 5. The learner is able to campaign for expanding no-fish zones and marine reserves and for their protection on a scientific basis.

Source: UNESCO (2017).

Table 3: Learning objectives for SDG15 'Life on Land'

Cognitive learning objectives	1. The learner understands basic ecology with reference to local and global ecosystems, identifying local species and understanding the measure of biodiversity. 2. The learner understands the manifold threats posed to biodiversity, including habitat loss, deforestation, fragmentation, overexploitation and invasive species, and can relate these threats to their local biodiversity. 3. The learner is able to classify the ecosystem services of local ecosystems including supporting, provisioning, regulating and cultural services and ecosystems services for disaster risk reduction. 4. The learner understands the slow regeneration of soil and the multiple threats that are destroying and removing it much faster than it can replenish itself, such as poor farming or forestry practice. 5. The learner understands that realistic conservation strategies work outside pure nature reserves to also improve legislation, restore degraded habitats and soils, connect wildlife corridors, sustainable agriculture and forestry, and redress humanity's relationship to wildlife.
Socio-emotional learning objectives	1. The learner is able to argue against destructive environmental practices that cause biodiversity loss. 2. The learner is able to argue for the conservation of biodiversity on multiple grounds including ecosystems services and intrinsic value. 3. The learner is able to connect with their local natural areas and feel empathy with non-human life on Earth. 4. The learner is able to question the dualism of human/nature and realizes that we are a part of nature and not apart from nature. 5. The learner is able to create a vision of a life in harmony with nature.
Behavioural learning objectives	1. The learner is able to connect with local groups working toward biodiversity conservation in their area. 2. The learner is able to effectively use their voice effectively in decision-making processes to help urban and rural areas become more permeable to wildlife through the establishment of wildlife corridors, agro-environmental schemes, restoration ecology and more. 3. The learner is able to work with policy-makers to improve legislation for biodiversity and nature conservation, and its implementation. 4. The learner is able to highlight the importance of soil as our growing material for all food and the importance of remediating or stopping the erosion of our soils. 5. The learner is able to campaign for international awareness of species exploitation and work for the implementation and development of CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) regulations.

Source: UNESCO (2017).

Integrating the theme into education programmes and practice

The following learning approaches and methods can be used to facilitate learning about biodiversity, (Box 2 and Box 3).

Box 2: Examples of learning approaches and methods for SDG14 'Life Below Water'

- Develop and run a (youth) action project related to life below water
- Undertake excursions to coastal sites
- Debate sustainable use and management of fishery resources in school
- Role-play islanders relocating from their country because of sea-level rise
- Conduct a case study about cultural and subsistent relationships with the sea in different countries
- Conduct lab experiments to provide students with evidence of ocean acidification
- Develop an enquiry-based project: "Do we need the ocean or does the ocean need us?"

Source: UNESCO (2017).

Box 3: Examples of learning approaches and methods for SDG15 'Life on Land'

- Map the local area, mark areas of various wildlife populations as well as barriers, such as dispersal barriers like roads and invasive species populations
- Perform a bioblitz – an annual day when the community comes together to map as many different species in their area as possible
- Run a composting workshop and show organic material formation
- Take an excursion to a nearby parkland for cultural purposes, e.g. recreation, meditation, art
- Plant a wildlife garden for wild animals, e.g. bee-friendly flowers, insect hotels, ponds, etc. in urban areas
- Celebrate Earth Day (April 22) and/or World Environment Day (June 5)
- Develop an enquiry-based project: "Why is biodiversity important?"

Source: UNESCO (2017).

Sustainable production and consumption

Relevance of the theme for sustainable development

Calculations of the ecological footprints[6] of nations show that global consumption of natural resources since the 1980s has far surpassed the productivity rate of the biosphere. By 2 August 2017, human beings had used more natural resources than the planet could renew in the whole year.[7] Humanity currently uses more ecological resources and services than nature can regenerate as a result of overfishing, overharvesting forests and emitting carbon dioxide into the atmosphere (Worldwatch Institute, 2004, 2010). If current trends persist, by 2050 the projected global population of about 9.6 billion will need, 'the equivalent of almost three planets … to provide the natural resources needed to sustain current lifestyles'.[8]

While agriculture and food processing produce substantial environmental impacts, households influence these impacts through their dietary choices and habits. Every year, 1.3 billion tonnes of food is wasted, while almost 1 billion people go undernourished and another 1 billion are hungry.[9] Land degradation, declining soil fertility, unsustainable water use, overfishing and marine environment degradation are all lessening the ability of the natural resource base to supply food (FAO, 2016). The food sector accounts for around 30 per cent of the world's total energy consumption and is responsible for around 22 per cent of total greenhouse gas emissions (IPCC, 2014).

Despite technological advances that have promoted energy efficiency gains, energy use in OECD countries will continue to grow another 35 per cent by 2020. Commercial and residential energy use is the second most rapidly growing area of global energy use after transport. Households consume 29 per cent of global energy and consequently contribute 21 per cent of the resulting CO2 emissions (IEA, 2016; IPCC, 2014).

Sustainable consumption and production is about increasing resource and energy efficiency, building sustainable infrastructure and providing access to a better quality of life for all. While increasing quality of life is important,

6 The ecological footprint is a measure of human impact on Earth's ecosystems. It measures the supply of and demand on nature and is measured in area of wilderness or amount of natural capital consumed each year (www.footprintnetwork.org).

7 See www.overshootday.org.

8 See www.un.org/sustainabledevelopment/wp-content/uploads/2016/08/16-00055L_Why-it-Matters_Goal-12_Consumption_2p.pdf.

9 See www.fao.org/save-food/resources/keyfindings/en.

reducing resource use, degradation and pollution along the whole lifecycle is crucial. Thus, sustainable consumption and production (SCP) aims to reduce poverty and future economic, environmental and social costs. The 1994 Oslo Symposium on Sustainable Consumption defines SCP as 'the use of services and related products which respond to basic needs and bring a better quality of life while minimizing the use of natural resources and toxic materials as well as emissions of waste and pollutants over the life cycle of the service or product so as not to jeopardize the needs of future generations' (Norwegian Ministry of the Environment, 1994).

Facilitating sustainable consumption and production requires cooperation among all actors operating in the supply chain – from producer to final consumer. Awareness-raising and education campaigns on sustainable consumption and lifestyles are also needed to provide consumers with information about strategies and practices of sustainable production and consumption, and teach them how to promote sustainable production patterns (Fischer and Barth, 2014; McGregor, 2011).

Linkages with the SDGs

Sustainable production and consumption is at the core of SDG 12 'Responsible Consumption and Production – Ensure sustainable consumption and production patterns'.

This SDG aims to:

- Implement the 10-year framework of programmes on sustainable consumption and production, all countries taking action, with developed countries taking the lead and taking into account their own level of development and capabilities;
- By 2030, achieve the sustainable management and efficient use of natural resources;
- By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses;
- By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release

to air, water and soil in order to minimize their adverse impacts on human health and the environment;

- By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse;
- Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle;
- Promote public procurement practices that are sustainable, in accordance with national policies and priorities;
- By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature;
- Support developing countries to strengthen their scientific and technological capacity to move towards more sustainable patterns of consumption and production;
- Develop and implement tools to monitor sustainable development impacts for tourism that creates jobs and promotes local culture and products;
- Rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and minimizing the possible adverse impacts on their development in a manner that protects the poor and affected communities.[10]

Learning objectives

In order to understand sustainable production and consumption and be able to contribute to achieving SDG12, learners should work towards the following

10 See www.un.org/sustainabledevelopment/sustainable-consumption-production.

objectives in the cognitive, socio-emotional and behavioural domain (see Table 4).

Table 4: Learning objectives for SDG12 'Responsible Consumption and Production'

Cognitive learning objectives	1. The learner understands how individual lifestyle choices influence social, economic and environmental development 2. The learner understands production and consumption patterns and value chains and the interrelatedness of production and consumption (supply and demand, toxics, CO2 emissions, waste generation, health, working conditions, poverty, etc.) 3. The learner knows the roles, rights and duties of different actors in production and consumption (media and advertising, enterprises, municipalities, legislation, consumers, etc.) 4. The learner knows about strategies and practices of sustainable production and consumption 5. The learner understands dilemmas/trade-offs related to and system changes necessary for achieving sustainable consumption and production
Socio-emotional learning objectives	1. The learner is able to communicate the need for sustainable practices in production and consumption 2. The learner is able to encourage others to engage in sustainable practices in consumption and production 3. The learner is able to differentiate between needs and wants and to reflect on their own individual consumer behaviour in light of the needs of the natural world, other people, cultures and countries, and future generations 4. The learner is able to envision sustainable lifestyles 5. The learner is able to feel responsible for the environmental and social impacts of their own individual behaviour as a producer or consumer
Behavioural learning objectives	1. The learner is able to plan, implement and evaluate consumption-related activities using existing sustainability criteria 2. The learner is able to evaluate, participate in and influence decision-making processes about acquisitions in the public sector 3. The learner is able to promote sustainable production patterns 4. The learner is able to act critically in their role as an active stakeholder in the market 5. The learner is able to challenge cultural and societal orientations in consumption and production

Source: UNESCO (2017).

Integrating the key theme into education programmes and practice

The following learning approaches and methods can be used to facilitate learning about sustainable production and consumption (Box 4).

Box 4: Examples of learning approaches and methods for SDG12 'Responsible Consumption and Production'

- Calculate and reflect on one's individual ecological footprint[11]
- Analyse different products (e.g. cell phones, computers, clothes) using Life Cycle Analysis (LCA)
- Run a student company producing and selling sustainable products
- Perform role plays dealing with different roles in a trading system (producer, advertiser, consumer, waste manager, etc.)
- Screen short films/documentaries to help learners understand production and consumption patterns (e.g. *Story of Stuff* by Annie Leonard)[12]
- Develop and run a (youth) action project related to production and consumption (e.g. fashion, technology, etc.)
- Develop an enquiry-based project: "Is sustainability about giving things up?"

Source: UNESCO (2017).

Reduction of poverty

Relevance of the theme for sustainable development

Remarkable progress has been made in human development over the past twenty-five years. Today, people live longer while more children attend school and more people have access to basic social services (UNDP, 2016). However, the gap between poor and rich countries has grown considerably. In 2010, the richest country in the world (Liechtenstein) was three times richer than the richest country in 1970. The poorest country today (Zimbabwe) is 25 per cent poorer than the poorest country in 1970 (also Zimbabwe) (UNDP, 2010).

11 See www.footprintnetwork.org/en/index.php/GFN/page/calculators.

12 See http://storyofstuff.org/movies/story-of-stuff.

The eradication of poverty in all its forms remains one of the greatest challenges for humanity. The number of people living in extreme poverty was reduced by more than half between 1990 and 2015 – from 1.9 billion to 836 million, but there are still too many people who cannot satisfy their most basic human needs. Worldwide, more than 800 million people still live with less than US$1.25 per day, many of whom do not have sufficient access to adequate food, clean drinking water and sanitation. About one in five persons in developing regions lives on less than US$1.25 per day. The overwhelming majority of these people belong to two regions: Southern Asia and sub-Saharan Africa. High poverty rates are often found in small, fragile and conflict-affected countries. Although in countries like China and India economic growth has resulted in better life conditions for millions, progress has been uneven. Due to unequal access to paid work, education and property, women more often live in poverty than men. New threats related to climate change, conflict and food insecurity make it even harder to eradicate poverty (UNDP, 2015).

However, differences have not only increased between the poor and rich countries, there has also been a growing difference in income inside countries. In most countries of the Global South, a relatively small group of rich people has emerged. In Brazil, for example, the top 5 per cent of the best earners earn over twenty-five times more than the bottom 5 per cent of the lowest wage earners. There is also a growing inequality of income in the countries of the Global North. Another imbalance is linked to the comparatively high rate of youth unemployment compared to adults (Jansen and Uexkull, 2010). This disproportionate development was further intensified in the course of the financial crisis. In 2009, the number of unemployed among young people worldwide rose by 1.5 percentage points to 13.4 per cent, while the number of adults rose by only 0.8 percentage points to 5 per cent. In Europe (EU27), youth unemployment in 2011 reached a historical high of 21.4 per cent (Eurostat, 2012).

Linkages with the SDGs

Reduction of poverty is at the core of SDG1 'No Poverty – End poverty in all its forms everywhere'.

This SDG aims to:

- By 2030, eradicate extreme poverty for all people everywhere, currently measured as people living on less than US$1.25 a day;

- By 2030, reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions;

- Implement nationally appropriate social protection systems and measures for all, including floors, and by 2030 achieve substantial coverage of the poor and the vulnerable;

- By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance;

- By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters;

- Ensure significant mobilization of resources from a variety of sources, including through enhanced development cooperation, in order to provide adequate and predictable means for developing countries, in particular least developed countries, to implement programmes and policies to end poverty in all its dimensions;

- Create sound policy frameworks at the national, regional and international levels, based on pro-poor and gender-sensitive development strategies, to support accelerated investment in poverty eradication actions.[13]

Learning objectives

In order to understand reduction of poverty and be able to contribute to achieving SDG1, learners should work towards the following objectives in the cognitive, socio-emotional and behavioural domain (see Table 5).

13 See www.un.org/sustainabledevelopment/poverty.

Table 5: Learning objectives for SDG1 'No Poverty'

Cognitive learning objectives	1. The learner understands the concepts of extreme and relative poverty and is able to critically reflect on their underlying cultural and normative assumptions and practices 2. The learner knows about the local, national and global distribution of extreme poverty and extreme wealth 3. The learner knows about causes and impacts of poverty such as unequal distribution of resources and power, colonization, conflicts, disasters caused by natural hazards and other climate change-induced impacts, environmental degradation and technological disasters, and the lack of social protection systems and measures 4. The learner understands how extremes of poverty and extremes of wealth affect basic human rights and needs 5. The learner knows about poverty reduction strategies and measures and is able to distinguish between deficit-based and strength-based approaches to addressing poverty
Socio-emotional learning objectives	1. The learner is able to collaborate with others to empower individuals and communities to affect change in the distribution of power and resources in the community and beyond 2. The learner is able to raise awareness about extremes of poverty and wealth and encourage dialogue about solutions 3. The learner is able to show sensitivity to the issues of poverty as well as empathy and solidarity with poor people and those in vulnerable situations 4. The learner is able to identify their personal experiences and biases with respect to poverty 5. The learner is able to reflect critically on their own role in maintaining global structures of inequality
Behavioural learning objectives	1. The learner is able to plan, implement, evaluate and replicate activities that contribute to poverty reduction 2. The learner is able to publicly demand and support the development and integration of policies that promote social and economic justice, risk reduction strategies and poverty eradication actions 3. The learner is able to evaluate, participate in and influence decision-making related to management strategies of local, national and international enterprises concerning poverty generation and eradication 4. The learner is able to include poverty reduction, social justice and anti-corruption considerations in their consumption activities 5. The learner is able to propose solutions to address systemic problems related to poverty

Source: UNESCO (2017).

Integrating the theme into education programmes and practice

The following learning approaches and methods can be used to facilitate learning about global justice and reduction of poverty (Box 5).

Box 5: Examples of learning approaches and methods for SDG1 'No Poverty'

- Develop partnerships between schools and universities in different regions of the world (South and North; South and South)
- Plan and run an awareness campaign about poverty locally and globally
- Plan and run a student company selling fair trade products
- Plan and implement local service-learning and/or engagement opportunities for empowering poor people, reducing their vulnerability to different hazards and increasing their resilience – in collaboration with NGOs, the private sector and/or community groups, etc.
- Conduct a case study on poverty and wealth in selected countries (through desktop research) or at the local level (through excursions, interviews, etc.)
- Provide internships within organizations addressing poverty
- Develop an enquiry-based project around: "Is poverty increasing or decreasing?"

Source: UNESCO (2017).

Relating the key themes to national and local challenges

The previous section demonstrated that climate change, biodiversity, sustainable production and consumption, and reduction of poverty are of crucial importance for sustainable development, and can therefore be seen as key themes in ESD.

However, these selected themes should be regarded as suggestions and are not exhaustive. While the key themes presented here are relevant worldwide, they need to be complemented by specific topics and issues of national and/or local relevance. Moreover, different aspects of the key themes will be of particular importance in different countries and regions. For example, while some countries and/or regions contribute more to climate change, biodiversity loss and global injustice, other countries suffer more from the

consequences. Therefore, ESD should focus in the former case on changing unsustainable lifestyles that have negative impacts on other world regions, and in the latter case on empowering learners to question global economic structures and/or to demand a better quality of life. Similarly, one country might possess intact biodiversity hotspots that can be protected and conserved, while another might have damaged ecosystems where the focus will be on restoration.

Highlighting the interrelationships between key ESD themes

Climate change, biodiversity, sustainable production and consumption, and reduction of poverty are described as separate key themes within ESD. However, as the SDGs make clear, these themes, as well as other sustainability topics not described here, are highly interrelated. For example, ongoing climate change will lead to greater biodiversity loss and increased poverty. Conversely, more sustainable production and consumption patterns will lead to lower levels of climate change, biodiversity loss and poverty. It is important, therefore, to ensure that no single key theme is addressed in isolation, and that interrelations with other sustainability topics are clearly identified. To this end, learning settings should be created that allow learners to experience these interrelations. For example, action or enquiry-based projects could create such learning settings.

Conclusion

Several topics have been identified as crucial for sustainable development and can therefore be seen as key themes for ESD. Climate change, biodiversity, sustainable production and consumption, and reduction of poverty are such key themes. All of these topics are persistent long-term challenges and offer a high potential for action on the part of learners.

The selection of topics is important for the development of perception, knowledge and competencies related to sustainable development, however the perspectives under which these themes are dealt with is decisive. The values framework of sustainable development opens up diverse perspectives on the topics (e.g. justice and production and consumption, human rights

and production and consumption, ecological capacity and production and consumption) and offers orientation possibilities for communication and negotiation processes and the development of normative competence. Meanwhile, the sustainability strategies (e.g. efficiency, consistency and sufficiency) open up fruitful perspectives for the analysis of, and search for, possibilities for transformation. This implies the inclusion of both regional and global perspectives. Thus, different perspectives from the sustainability discourse can be used as pedagogical concepts in education processes for sustainable development.

Finally, ESD should create spaces in which learners can familiarize themselves with the key issues of sustainable development and develop the necessary competencies to address them.

Part II:

Implementing Education for Sustainable Development in Practice

Chapter 4

Advancing policy to achieve quality Education for Sustainable Development

Robert J. Didham and Paul Ofei-Manu

Introduction

The unique and important relationship between quality education and Education for Sustainable Development (ESD), first brought to prominence by the UN Decade of Education for Sustainable Development (DESD) in 2005, has gone from strength to strength. This increased awareness has fostered the transformation of educational policies and learning approaches in countries around the world. Even more attention was paid to the value of stronger linkages between quality education improvements and ESD following the mid-decade UNESCO World Conference on ESD, held in 2009 in Bonn, Germany. The Bonn Declaration avowed that, 'Education for sustainable development is setting a new direction for education and learning for all. It promotes quality education, and is inclusive of all people. It is based on values, principles and practices necessary to respond effectively to current and future challenges' (UNESCO, 2009b, para. 6). The Aichi-Nagoya Declaration that marked the end of the Decade also reaffirmed 'the growing international recognition of ESD as an integral and transformative element of inclusive quality education and lifelong learning and an enabler of sustainable development' (UNESCO, 2014b, para.6).

This unique relationship between quality education and ESD has influenced overall understanding about quality education. The Millennium Development Goals and The Dakar Framework for Action – Education for All (UNESCO, 2000) mainly viewed quality education in terms of measurable learning outcomes, competencies and national standards. However, the ESD perspective on quality education is concerned with lifelong learning and developing the skills and values of learners with an emphasis on applying them to address global challenges for sustainability.

> An enriched view of quality education is now seen to encompass the relevance of education and its purpose, methods and content for learning throughout life … Many now agree, quality education for sustainable development reinforces peoples' sense of responsibility as global citizens and better prepares them for the world they will inherit (UNESCO, 2014a: 28).

Since the launch of the Decade, ESD has progressed on many fronts, not least through the effort of numerous countries to transform their educational policy to advance ESD and quality education. The lifelong learning focus on quality education is not intended to devalue the foundational importance of key competencies such as literacy and numeracy. Rather, it provides a critique of the philosophical proposition that the primary goal of education is knowledge transmission and, instead, asserts that education must provide each generation with the capacities and skills to improve on the work of previous generations and overcome the most pressing challenges of their time. This quality ESD perspective has challenged educational policy-makers, school administrators and teachers to reconsider the nature and objectives of education for the betterment of children and youth.

In 2013, sixty-eight countries responded to a UNESCO survey regarding their country's greatest achievements in the area of ESD during the Decade. Twenty-one countries highlighted the integration of ESD into policy and/or curriculum, while another nineteen noted the development of a national ESD strategy. Combined, these two aspects account for 57 per cent of the responses received, while the majority of remaining responses indicated that implementation of specific projects was their greatest achievement (UNESCO, 2013a).

Although there have been substantial efforts to advance ESD policy, these are far from uniform and many countries are still looking for effective ways to

strengthen policy for ESD and quality education. This chapter explores many of the promising trends and good practices in advancing ESD policy and considers possible pathways for achieving quality ESD.

ESD policy's roots in educational theory

> Quality education for sustainable development is about what people learn, its relevance to today's world and global challenges, and how learners develop the skills and attitudes to respond to such challenges and prosper, now and for future generations (UNESCO, 2014a: 21).

Discussions about ESD, especially those focused on educational content, often limit their attention to sustainable development. While the sustainability dimensions of ESD are crucial, they are sometimes accentuated to the detriment of the 'education' component, which draws on a long history of progressive educational theories. ESD is not defined by generic 'education' on the specialized topic of sustainable development; rather, it is constructed from a series of specialized education pedagogies that aim to integrate and address a wide variety of topics through the sustainable development lens. The pedagogies and learning approaches included in ESD draw on earlier work in environmental education, global citizenship education and experiential education. The unique aspect captured by ESD is its holistic packaging and application of these various educational theories and pedagogies with a perspective towards transformative learning. 'The real need is to change from transmissive towards transformative learning, but this in turn requires a transformed educational paradigm. Paradigm change is itself a transformative learning process' (Sterling, 2001, p. 11). Based on a study of the impacts of ESD in eighteen countries, Laurie et al. (2016) found that ESD pedagogies have had a stronger transformative impact on primary and secondary education than the sustainability content.

The International Commission on Education for the 21st Century, chaired by Jacques Delors from 1993 to 1996, conducted a series of studies and global consultations on the ways in which education could be reformed to live up to and address the challenges of the coming century. The commission's final report, *Learning: The Treasure Within* (1996), heralds education as a 'principal means' to achieve social transformation and through this 'foster a deeper and more harmonious form of human development and thereby to reduce poverty, exclusion, ignorance, oppression and war' (Delors, 1996: 13). The

report argues strongly that education must be the stimulus and source for lifelong learning and the realization of a 'learning society founded on the acquisition, renewal and use of knowledge' (Delors, 1996: 24).

The report also asserts that if education is to rise to meet the challenges of the twenty-first century, it must be organized around four pillars:

1. Learning to know, that is acquiring the instruments of understanding;

2. Learning to do, so as to be able to act creatively on one's environment;

3. Learning to live together, so as to participate and cooperate with other people in all human activities; and

4. Learning to be, an essential progression which proceeds from the previous three (International Commission on Education for the 21st Century, 1996: 86).

As the concept of ESD developed, it became viewed as a vehicle for achieving these four pillars of learning, as well as helping to explicate a fifth pillar:

- Learning to transform oneself and society, to empower people with the values and abilities to assume responsibility for creating and enjoying a sustainable future (Schaeffer, 2006).

Throughout the Decade, all five pillars were adapted to correspond directly with specific aspects of ESD, but, as a whole, these five pillars of learning still serve to define the major conceptual outcomes that education, in general, should work to achieve.

The overall goal of reshaping education around a learner-centred approach is the holistic development of individuals so that they can actively apply their knowledge, skills and values in real-world situations to improve quality of life and well-being for themselves, their families, communities and wider society. In addition to student-centred learning, the principles of ESD learning can be seen as a direct contrast to the principles of traditional education approaches (Didham and Ofei-Manu, 2012a). They include: engaged learners (rather than abstract observers), cooperative and social learning (rather than individualistic and competitive learning), problem-solving and practical experience-oriented learning (rather than information memorization and rote learning), and critical

awareness and reflexivity to create personal knowledge constructs (rather than rationalistic, factual transmission). The overall framework of ESD captures and draws together a large number of concepts, theories, policy prescripts and practical methods/tools aimed at reforming education systems to address sustainable development (Lenglet, Fadeeva and Mochizuki, 2010).

In 2009, the mid-term review of DESD acknowledged that ESD was being implemented under two divergent pedagogical interpretations:

- ESD as a means to transfer 'appropriate' sets of knowledge attitudes, values and behaviour; and
- ESD as a means to develop people's capacities and opportunities to engage with sustainability issues so that they themselves can determine alternative ways of living (UNESCO, 2009a: 27).

While these interpretations differ significantly, they are not incompatible. Even if one follows the second interpretation, the need for ESD to address specific knowledge, skills and values remains pertinent. The same report also highlighted another view with important implications for educational policy, which holds ESD as 'a means to improve the quality of basic education, to reorient existing educational programmes and to raise awareness' (UNESCO, 2009a: 27).

To reconcile these interpretations of ESD, which hold it as a means to develop people's capacity and improve quality education, it is important to recognize the role that educational pedagogies and learning methodologies play in shaping a progressive vision of ESD. Much like the wider concept of sustainable development, the concept (or framework) of ESD is not based entirely on new methods and approaches, but rather integrates and builds on a wide range of pre-existing educational theories and pedagogies. The framework of ESD draws on many education theories including those of experiential learning theory[1], communicative action and reason[2], critical

1 Experiential learning theory was conceptualised by Kolb and colleagues (1970s) and draws on the works of Dewey and Piaget. The theory promotes a four-part learning cycle that includes concrete experience, reflective observation, abstract conceptualization and active experimentation.

2 Habermas (1981) developed the theory of communicative action as a means for the social construction of reason through its organic transmission and renewal as a collective process that can free the individual from the restrictions of a rationalistic system.

praxis and critical pedagogy[3], cooperative inquiry[4], and communities of practice[5] (Didham and Ofei-Manu, 2012a: 9). Because of its emphasis on the importance of student-centred learning pillars and the progressive reframing of pedagogies, ESD is viewed as a powerful tool for reforming education systems and achieving overall improvements to the quality of education.

> The perception of ESD has shifted and broadened and has influenced parallel debates on rights and needs for quality education as fundamental to human advancement. There is now growing consensus that what constitutes quality education should be considered within the context of the overall purpose of education (UNESCO, 2014a: 21).

Advancing policy on Education for Sustainable Development

> The setting of ESD policies and frameworks at the national level establishes a broad statement of purpose and, by providing mandates, directives, encouragement and support for ESD implementation, creates the space needed by stakeholders for action. While responsibility for education policy varies considerably from country to country, in general such policies relate to curriculum (teaching and learning), teacher accreditation and assessment, professional development of pre-service and in-service teachers and school-community relationships. (UNESCO, 2014a: 48)

Advancing ESD policy is a primary mechanism to ensure ESD's inclusion and uptake in education systems. However, a mere mandate for ESD is seldom enough to achieve strong practice. A number of institutions and factors must

3 Freire (multiple works starting in 1970) argued for the recognition of the political nature of education and promoted education as a means for individuals to achieve critical consciousness. Ledwith (since 2005) applied these ideas of critical pedagogy to community development and found that processes of participatory action and reflection (i.e. critical praxis) could also achieve this conscientization.

4 Heron and Reason (multiple works since 1971) have promoted the concepts of cooperative inquiry and participatory action research as a means to shift from 'research on/about people' to 'research with people'. This involves recognition of four types of knowledge (propositional, practical, experiential and presentational knowledge) within the process of collaborative meaning making.

5 Lave and Wegner (1991 and 1998) presented this concept as a means to understand how groups learn together in meaningful ways and to better understand the processes and factors that strengthen this.

be accounted for when advancing ESD policies, especially when viewing ESD as a means for wider educational reform. Policy approaches for ESD vary across countries, and ESD policies need to address multiple aspects such as the curriculum, pedagogies, the learning environment and teacher training to name only a few. 'In principle, ESD challenges policy-makers to go beyond the links between ESD and content-oriented educational priorities and to consider how education can contribute to greater sustainability in the economic, labour market and industrial sectors' (Benavot, 2014: 6). The focus of ESD on integrating social, cultural and economic priorities and policies into and with educational policies is a unique feature, and one which manifests in the types of educational reform ESD is promoting (UNESCO, 2012).

The policy frameworks for ESD that already exist are helping to guide the implementation and practice of ESD in many countries around the world. Various approaches to advancing ESD policy have proven effective in the context of different states, but certain key aspects stand out across the majority of these countries. A number of regional initiatives, strategies and frameworks were launched during the Decade that contributed strongly to efforts to contextualize ESD into regional perspectives and supported countries to develop their ESD policies and plans.

Regional frameworks such as the Strategy of Education for Sustainable Development for Sub-Saharan Africa (launched in 2006) and the Mediterranean Strategy on ESD (endorsed in 2014) have supported knowledge and expertise sharing, common monitoring and reporting, and stronger political incentives (UNESCO, 2014a). The establishment of national coordination bodies has also been a key aspect of effective policy-making on ESD in many countries. These coordination bodies can be cross-ministerial and multi-stakeholder in nature, which helps to enhance the development and adoption of ESD policies and strategies. At the end of the Decade, 80 per cent of countries reported having an ESD focal point and 50 per cent of countries had established a national coordination body (UNESCO, 2014a: 48-49). However, in a majority of countries the existing policies have not adequately secured the necessary financial resources to implement all ESD initiatives (Benavot, 2014). Nevertheless, the ESD-related policies put in place during the Decade to drive the process of reorienting the education curriculum, teacher training and the learning environment towards sustainable development, constitute a 'solid work in progress' with considerable achievements already recorded (UNESCO, 2014a).

ESD policy instruments for reorienting the curriculum

The national curriculum often serves as the most significant piece of educational policy and can provide the surest means to secure the implementation of ESD. In many countries, the initial entry point of inclusion for ESD has been National Plans for Sustainable Development. However, these mandates for ESD do not always translate quickly into strong integration into educational policy. For example, out of 70 reporting countries in the UNESCO (2013a) survey, 66% indicated having an ESD strategy or plan and 50% identified the inclusion of ESD in relevant policy; but when reporting on their major achievements during the decade, only 28 countries (40%) indicated actual integration of ESD into the curriculum or standard teaching objectives as one of their achievements. Similarly, in a detailed review of progress made on ESD in seven countries in Southeast and East Asia, only three countries reported clear inclusion of ESD into recent curricular revisions even though all countries had related policies including ESD (Didham and Ofei-Manu, 2012a). It is worth noting, though, that due to the normal cycles and timing of policy and curricular revisions, it can take several years before an interested country is able to achieve this type of change.

Countries around the world have demonstrated a variety of successful practices designed to reorient curriculum towards ESD (UNESCO, 2014a).

Studies from South-East Asia highlight a number of approaches: China and the Republic of Korea have mandated the inclusion of ESD following guidelines and standards; Japan established an open period that allows for teacher flexibility to integrate appropriate topic/themes; Malaysia and the Philippines mainstream ESD as a component of traditional subjects; Indonesia integrates ESD as a locally based component of the curriculum for context-rich problem solving: and Thailand integrates ESD through multiple approaches (Didham and Ofei-Manu, 2012b; Phang et al., 2016).

In several European countries, ESD has been implemented through interdisciplinary teaching approaches, and some observers have noted a move away from treating ESD as a separate topic, often incorporated within environmental education (UNESCO, 2014a; UNECE, 2016).

Mandates for ESD often have the most impact when they form part of a wider social policy that outlines the role of education as one of its key features. In Mauritius, for example, the Maurice Ile Durable (MID) (2008) is a broadly scoped sustainable development policy aimed at making the country a world model by 2020. As one of the five pillars of this policy, ESD has been

integrated into the national curriculum and receives the support of a number of ministries and non-governmental organizations (UNESCO, 2014a). Costa Rica has enacted a Carbon Neutral (C-Neutral) 2021 policy, which is further outlined in their National Strategy on Climate Change (2009), under which both ESD and climate change education (CCE) are specifically identified as part of a wider programme for capacity-building, public awareness-raising, education and cultural change (UNESCO, 2014a). These climate change policies are providing a strong foundation for the implementation of ESD and CCE in Costa Rica (UNESCO, 2015c).

While it is natural to look to a specific ESD policy or mandate as the key to the success of ESD, this is not always essential nor does it guarantee effective implementation. Early in the Decade, some countries responded to mandates for ESD in their National Plans for Sustainable Development by incorporating it mainly as an add-on subject in limited areas of the curriculum, but providing few support measures to ensure its implementation. Throughout the Decade, appreciation of the benefits of ESD grew, and countries began to recognize the reformative value ESD could have across the entire education system. Accordingly, countries began to enact softer approaches to ensure that effective implementation of ESD would be supported by the necessary institutions, resources and capacities. For example, countries such as Barbados, Malaysia and Montenegro are trying to address the challenges arising from teaching ESD in an integrated manner by strengthening ESD as a component in teacher training and developing specific teaching guidelines. Meanwhile, China, the Cook Islands and Iran have utilized ESD as a means to reform and improve early childhood education in their countries (UNESCO, 2013a).

Box 1: Case study – Thailand's integrated curriculum

Thailand's own unique interpretation of sustainable development as the 'philosophy of sufficiency economy' has played a leading role in shaping policy, including the National Economic and Social Development Plan and the National Education Act. ESD is highly integrated into the curriculum of primary and secondary education in Thailand through the framework of sufficiency economy. The National Curriculum of Thailand, which integrates the country's 'philosophy of sufficiency economy', is an important case in point. Since 2002, the country's education plan has promoted the inclusion of ESD in five distinct ways. First, ESD topics and content are incorporated into the eight main subject areas of the curriculum, with ESD learning standards defined in a scaffolded manner for each subject area. Second, student character development is defined by eight characteristics including active learning, sufficiency lifestyle and public mindedness. Third, the plan aims to provide specific project-based learning activities, such as natural preservation and environmental clubs and camps. Fourth, ESD-specific learning modules are developed and incorporated, such as renewable energy or the philosophy of sufficiency economy. Fifth, following structural reforms in 2008, Thailand now has a 30 per cent inclusion rate across the entire curriculum for decentralized, locally based subjects and teaching. These should address topics pertinent to the local context and often include issues relating to sustainable lifestyles and the sufficiency economy (Didham and Ofei-Manu, 2012a).

At the global level, UNESCO has facilitated an increase in the quality and effectiveness of formal, non-formal and informal education in the context of ESD. ESD was integrated into the global education and sustainable development agendas, particularly in the areas of CCE, disaster risk reduction (DRR) education and biodiversity education (UNESCO, 2013b). A global analysis of ESD and global citizenship education (GCED) in the curriculum using fifteen key ESD-related skills and competencies found: (i) values and attitudes integral to ESD and GCED, and (ii) a strong emphasis on skills and competencies in the curricula applied across subject matter, while sustainability and environment-related content was commonly found in curricula worldwide (Amadio, 2013).

Nationally, governments have implemented educational policy measures to integrate ESD elements into guidelines, curricula and, to a limited extent, in assessments. For example, in Japan the UNESCO Associated Schools Programme Network (ASPnet) expanded from 19 schools in 2005 to 900 in 2015, and the instructional guidelines for kindergartens and curriculum guidelines for elementary, middle and high schools aligned ESD with the course for integrated studies (UNESCO, 2015d). In Chile, the country passed a National Policy on ESD in 2009, and three years later this policy was followed up by an action plan for 2012-2014 that aimed 'to work in educational spaces to re-direct management, the curriculum, education and evaluation mechanisms towards sustainable development' (Mejía, 2017: 6). Both

China and New Zealand are incorporating ESD into primary and secondary education through the use of a whole-school approach. In Australia, the Sustainability Curriculum Framework provides guidance for curriculum developers and policy-makers at the national, state and territorial levels (Didham and Ofei-Manu, 2012b).

The integration of ESD into the curriculum in a holistic manner, through the inclusion of ESD pedagogies and topics into traditional disciplines or interdisciplinary approaches, has far-reaching consequences for the implementation of ESD in formal education. A well-developed curriculum embedded within ESD perspectives is indicative of a rich content, clear learning methodologies and progressive learning goals characterized by local relevance and cultural appropriateness. With learning materials and approaches that promote transformative learning, the structure and content of ESD embed important elements of progressive pedagogies into the curriculum, such as active, experience-based, student-centred learning and collective inquiry aimed at strengthening lifelong learning (Ofei-Manu and Didham, 2014).

Countries that have made strong efforts to integrate ESD across their national curriculum have often enacted precursor policies and practice activities, the results of which helped to demonstrate the overall educational reform value of a quality education-focused ESD. However, once these curriculum reforms have been implemented, they often overshadow specific ESD policies. In fact, within a holistic curriculum for integrated ESD, it can actually become difficult to identify individual 'ESD components' because they are no longer standalone, distinguishable features; instead, they take the form of a guiding directive deeply embedded in general educational practice.

ESD policies to innovate pedagogy and teacher training

Comprehensive teacher training that takes into account the improvement of teachers' total knowledge and how this is communicated is an important factor in any educational reform process, especially with regard to ESD integration (Pataki, 2005). ESD is a significant contributor to promoting change in teaching and learning processes across educational settings. Its approaches engage students in student-centred, cooperative learning relationships and include questioning, critical thinking and decision-making, with the teacher serving as a facilitator (UNESCO, 2014a; Ofei-Manu and Didham, 2012). In a recent global study, 65 per cent of the seventy-eight countries analysed across all regions described their pedagogical methods as student-centred in their national curriculum frameworks (IBE-UNESCO, 2016).

Engaged and collaborative learning that applies critical analysis and problem-solving to address real-life problems is key to nurturing the development of transformative lifestyles. In this context, ESD-based teaching and learning can provide frameworks for students to individually and collectively examine prevailing knowledge systems and socio-cultural norms through processes of deliberative discourse. Critical reflection on one's own behaviour and the use of other affective learning outcomes, which support values-based learning, reinforce the motivation and capacity of the teacher for transformative learning (Ofei-Manu and Didham, 2014). The application of such learning perspectives depends, however, on the competence and ability of teachers to utilize such pedagogical approaches.

In many countries, the inclusion of ESD in pre-service teacher training and at teacher education institutions has led to the advancement of holistic and interdisciplinary teaching perspectives. This has involved multi-perspective approaches to teaching and the use of interdisciplinary subject matter applied together with basic literacy and numeracy training. As a result, teachers are encouraged to embrace student-centred pedagogical approaches as they try to move away from traditional methods. For example, the Swedish International Centre of ESD (SWEDESD) implements the 'Education for Strong Sustainability and Agency Programme' through partnerships between SWEDESD and countries in Southern Africa and Southeast Asia to train teachers to develop teaching content and learning methods in a holistic manner, while also focusing on the inclusion of school administration in overall ESD initiatives. 'The programme offers strategies, process, tools and partnerships for teacher educators to develop and apply methods, approaches and content in their daily practice' (Lenglet, 2015: 62). This is a unique approach in its efforts to build the capacity of both teachers and school administrators to develop their own teaching methods and materials for connecting ESD topics to the real-world contexts of their students and their schools.

Box 2: Case study – Brazil's implementation of teacher training at the municipal level for climate change education for sustainable development

Brazil is one of the few countries with an Environmental Education (EE) Law and a long record of promoting environmental education. However, a recent analysis of the national EE strategy found serious failings in efforts to address issues of climate change education (CCE) and disaster risk reduction (DRR). This was due largely to the fact that teachers lacked the requisite knowledge and necessary tools to effectively teach CCE and DRR in the classroom.

Brazil was selected as a pilot country for UNESCO's Climate Change Education for Sustainable Development (CCESD) country programme. UNESCO Brazil, in collaboration with the Environmental Education Department of the Ministry of Education and the Education Department of the Itajaí Municipality, embarked on a pilot teacher training and capacity-building programme. This programme collected and adapted teaching methodologies and materials that the teachers themselves were actively involved in developing. The training included not only classroom work, but also field trips organized to sites where natural and man-made flood-related disasters had occurred. Following the training sessions, teachers were able to implement the course in their classrooms using the materials.

The Itajai case serves as an example to other localities in Brazil, which may have different contexts. Plans were made to pilot the project in three to four other municipalities in 2016, after which the Ministry of Education would be encouraged to adopt the teaching materials and scale-up the effort across the country. Additionally, implementation of the ESD projects on climate change and disaster risk reduction education resulted in the formation of constructive alliances with ministries and other relevant entities. The partnership with policy-makers in the host country was key to the success of the project.

Source: Information based on the authors' interviews with local informants.

The UNESCO (2013a) survey identified a number of relevant national examples. In Indonesia, guidelines and teaching materials on ESD implementation are provided for all levels of education, and a number of training courses for teachers were completed. In Japan, the Education Ministry regularly organizes the National Conference on ASPnet Schools and Regional Exchange Meetings to strengthen teachers' competency. In Namibia, teacher-training programmes were organized in partnership with the National Institute for Educational Development, the Wildlife and Environment Society of South Africa and the engineering company Ramboll in Sweden. The Finnish National Board of Education is making a wide range of information and material on ESD available online[6]. In Italy, a number of organizations, mainly non-governmental (NGOs), engaged in sustainability education promotion by offering courses, position papers and educational games for students and the

6 See the ESD capacity-building website of the Finnish National Board of Education: www.edu.fi/teemat/keke.

general public. In Costa Rica, manuals and modules were developed through pilot programmes on ESD promotion in schools (UNESCO, 2013a).

At the regional level, expert meetings were held to enhance regional coordination and capacity-building for ESD and to strengthen educational responses for climate change education and disaster risk reduction (UNESCO, 2013b). In Europe, 90 per cent of member states have reported significant efforts to address the inclusion of ESD in pre-service and in-service teacher training. In addition, European member states report high achievement rates for advancing ESD competencies and learning outcomes (92 per cent) and for the use of ESD-related pedagogical approaches in early childhood, primary and secondary education (95 per cent) (UNECE, 2016).

Teachers' agency is a dynamic catalyst in effecting social change through schooling. The lack of trained teachers in many parts of the world therefore constitutes a major disadvantage for the implementation of both quality education and ESD. Teachers' existing workload and wide responsibilities (including extra-curricular activities) can also hinder ESD practice. Both teachers and other actors in charge of ESD implementation need sufficient knowledge and expertise to work in a holistic, integrated, interdisciplinary and systemic manner. Mandates that grant teachers the autonomy to translate parts of the national curriculum to the local context will help to make learning more relevant and meaningful for students. The efforts of teachers must also align with wider ESD strategies that are linked to the curriculum, learning standards and achievement criteria, and to school administrations and management if effective synergies are to be maintained.

ESD policies to create effective learning environments

Educational policy can also advance ESD by providing the space for developing innovative learning environments for real-world, participatory, action-oriented and holistic forms of education. There are many good examples of such environments within ESD teaching, but the support of educational policy is often necessary to systematically legitimize and mandate the development of such learning environments. Safe and effective learning environments engender dynamic opportunities for engaged, experience-based learning, and they support the development of mutual trust and social bonds through cooperative learning relationships to enhance students' emotional safety. A safe and effective learning environment for ESD also facilitates linkages with surrounding ecosystems, and thus provides dynamic opportunities for practice and problem-solving with sustainable development. Schools can become hubs for community learning where local

citizens can participate in and contextualize learning opportunities to meet their needs. This helps to develop strong social ties, trust-building and a sense of citizenship (Ofei-Manu and Didham, 2014).

The idea of a decentralized and locally based component as a proportion of the national curriculum is an approach that has taken hold in several countries in East and Southeast Asia. China, Indonesia and Viet Nam have all implemented this approach, and it serves as an effective way to extend the learning environment into a practical, real-world context (Benavot, 2014; Widjajanti, Matakupan and Didham, 2014). In Indonesia, a series of 'centres for education and education personnel development and empowerment' have been established around the country. These centres – a few of which focus specifically on ESD – provide key support to teachers and educators through the development of locally based learning modules and teaching materials (Widjajanti, Matakupan and Didham, 2014).

The development of whole-school and green school approaches is another way to enhance the learning environment for ESD. Countries around the world are developing programmes based on these approaches under various names, and governments (or international organizations such as the Foundation for Environmental Education) are providing some type of policy framework that allows schools to become accredited once they meet a minimum set of criteria which may also be supported with positive incentives. For example, the Eco-school Programme in Hungary is described as a network that, 'gives a professional framework for schools to develop their own sustainability projects' (UNECE, 2009). Eco-schools and Green Schools that also offer environmental and sustainability education seek to develop learning environments that are conducive, effective, learner-friendly and safe. Additionally, school buildings are designed to embrace the natural surroundings to encourage connections between learners and their environment, and facilities are managed with environmental principles to serve as a model of good, sustainable practices.

Box 3: Case study – Green School Bali, Indonesia

Quality educational outputs and outcomes based on ESD are best achieved at local school and classroom levels. A model example of a 'learner friendly' sustainability learning environment is the Green School Bali, Indonesia, which aims to 'educate for sustainability through community-integrated, entrepreneurial learning, in a wall-less, natural environment' using a holistic student-centred approach for inspiration and empowerment to promote green leadership (Green School Bali, 2017).

`The brainchild of John Hardy, a Canadian industrialist, Green School Bali – arguably the most beautiful piece of architecture in the world wholly built with bamboo – sits in south-central Bali on 20 acres of rolling garden. As of 2010, children from over twenty-five countries attended the school.

Living by example, the school has avoided concrete pavements and petrochemicals by substituting them with volcanic stones and gravel laid by hand. Green School Bali generates its own energy from solar and hydro power. It uses compost toilets and grows organic food, which is cooked on sawdust burners and served with plates made from 100 per cent natural materials. All the fences in and around the school are made from green materials. The classrooms have no walls and the teachers write on bamboo blackboards or put paper behind old automobile windshields to convert them into alternative whiteboards. The desks are also made with natural materials.

On a visit to the school in August 2014, to witness the signing of a Memorandum of Understanding on 'Green schools for sustainable development' between the Government of Indonesia, United Nations REDD+ and the Green School, former UN Secretary-General Mr Ban Ki-moon remarked: 'As Secretary-General of the United Nations, I've travelled many countries and met many different people, I have visited many different places and many schools, but this is the most unique and impressive school I have ever visited' (Green School Bali, 2017).

Other initiatives and programmes may aim to engage students in real-world, active learning such as 'youth environmental investigator' programmes or position schools as hubs for wider community learning. These efforts to provide safe and effective learning environments are based on three objectives: (i) to have schools serve as learning models for sustainable practices, (ii) to contextualize learning opportunities in terms of local needs and challenges, and (iii) to provide dynamic opportunities for engaged, experience-based learning (Didham and Ofei-Manu, 2013: 7). The Asia-Pacific Cultural Centre for UNESCO (ACCU) implemented the 'Linking Field Initiatives to Global Partnership' and the 'Innovation Programme for ESD', which complemented school and community-based ESD activities conducted in nineteen schools from India, Indonesia, Japan, Korea, Philippines and Thailand to enhance the promotion of ESD in practice in both formal and non-formal education settings. It is also possible to establish learning environments conducive to ESD through online platforms. This is demonstrated by the collaborative online platform of UNESCO's ASPnet in Action initiative entitled

'Global Citizens connected for Sustainable Development'. This pioneering interactive web-based initiative builds on ASPnet's online global learning community, with over 200 participating schools, and provides an opportunity for learning exchanges among ASPnet schools worldwide. It can also serve as a model for future projects aimed at producing international exchange and multicultural collaboration.

The safety and effectiveness of learning environments should be mandated and integrated into national education policies. One basic practice is to develop criteria for the environmental management of school facilities. However, another important mechanism is to detail in the curriculum ways to actively use the school environment for experience-based and practice-based learning opportunities. Some countries already have laws on lifelong learning and education, for example, the Japanese Lifelong Learning Promotion Act (1990) and the Republic of Korea's Lifelong Education Law (1999, amended in 2007) (Yang and Yorozu, 2015). Strengthening national laws on lifelong learning, which are strongly linked to community learning, is a valuable way to promote safe and effective learning environments in both formal and non-formal education settings.

Policies for local partnerships and ESD learning communities

Multi-stakeholder, participatory and collaborative learning partnerships create opportunities for reflexive and inclusive trust-building, which ultimately leads to the development of solutions and innovations (Ofei-Manu and Didham, 2014). ESD in the public sector has involved intergovernmental agencies at the international level, including several UN agencies, governments, the private sector and civil society. International agencies engage in partnerships by framing and sharing the ESD agenda, mobilizing resources and programmes, and strengthening programmes through inter-agency collaboration. Government entities at the national, subnational or local levels usually mobilize resources and create the enabling environments needed to guide and support ESD. Businesses commit to their corporate social responsibilities, and civil society organizations play an array of roles to advance ESD promotion and implementation (UNESCO, 2014a).

Many countries created partnerships among government agencies for the implementation of ESD, and several countries have made innovative efforts to expand these to include multi-stakeholder partnerships. For example, in Costa Rica, the Blue Flag programme established strategic partnerships with different actors, while in Mexico, the energy, education and environment ministries established the Inter-ministerial Agreement Transversal Agenda

through an inter-ministerial partnership. In Uganda, the National Environment Management Authority of Uganda, the Uganda National Commission for UNESCO, Nature Uganda, Kyambogo University and others partnered with international organizations including the German and Korean National Commissions for UNESCO and the Danish Outdoor Council to engage in advocacy, research, capacity-building and training of stakeholders on ESD principles. In Europe, the Polish Working Group on DESD included governmental, non-governmental and academic institutions representing twelve different institutions.

Engagement with the private sector to elicit their involvement in sustainable development has been advanced through a series of ESD-related capacity-building programmes. In Qatar, the government formed a strong partnership with the private sector. In Italy, the Ministry of Environment formed a partnership with public actors and the private sector under the framework of a national campaign on education for sustainable consumption. ESD-related curricula and teaching methods are also being used in business schools around the globe. Executive education programmes for business managers are developing the capacity of leadership to incorporate a systems approach in corporate decision-making (UNESCO, 2014a). ESD capacity-building has also progressed significantly in the public and non-governmental sectors. However, further capacity-building in the private sector and, in particular, the media, will go a long way towards stabilizing and enhancing the transition to sustainability.

Community-based learning initiatives are also supported by ESD policy. These promote autonomous actions and reaffirm local values and practices from an ESD perspective through the development of platforms for community dialogue, exchange, networking and mobilization of resources in several countries (Noguchi, Guevara and Yorozu, 2015). ESD learning communities have made significant contributions to systemic change by challenging existing norms, creating new knowledge, building consensus to address local sustainability issues and empowering communities to address those challenges. Policy support from international, national and local agencies has provided strong legitimacy for the implementation of many community-based ESD learning initiatives and support for large-scale replication and global networking between various local initiatives.

Community Learning Centres (CLCs) exist in many countries but are concentrated in the Asia-Pacific region. While each CLC is unique and has functions to meet specific local needs, the universal function of CLCs is to facilitate the establishment of safe and effective learning environments

for multi-generational gatherings and non-formal education in local communities. As of 2009, there were over 28,000 CLCs supporting actual grassroots implementation of ESD practices. Model CLCs are located in Kitakyushu and Okayama in Japan. The Okayama Kyoyama ESD Environmental Project has enabled communities to help develop better living places, learn to address relevant sustainability challenges in a cooperative manner and strengthen social relationships through these collective endeavours (Noguchi, Guevara and Yorozu, 2015; Oyasu and Riewpituk, 2014; Sasai, 2014).

Box 4: Case study – RCE Cairo – The Educamp Project

RCE Cairo is a regional centre of expertise (RCE) working at sub-national and local levels in Egypt. The centre has initiated a multi-level cooperation programme with RCEs across several geographic areas, with the participation of diverse stakeholders, in order to promote strong uptake and implementation of ESD at local-levels and in all forms of education. The EduCamp Project – 'Education for Sustainable Development beyond the Campus' involves three European RCEs, RWTH Aachen University in Germany, the Egyptian Ministries of Education and Higher Education, seven Egyptian universities, Bibliotheca Alexandrina, three NGOs and two international organizations. The project has been funded by the European Commission to promote and implement ESD locally and at all levels of education nationwide. The project was structured to make the best use of the RCE Cairo's network, as well as the global network of RCEs.

RCE Cairo was responsible for identifying and analysing local sustainability needs and communicating them to their European partner RCEs, namely RCE Graz-Styria in Austria, RCE Creias-Oeste in Portugal and RCE Ireland. For example, RCE Cairo identified a lack of sustainable development topics in the curricula and the need for best practices to fill this gap. European and global best practices related to both school activities and teaching materials were collected by the European partners and then made available to the Egyptian partners. Other resources that could be used to enhance teaching methodologies and skills, as well as the learning environment, were also identified. RCE Cairo then collaborated with Alexandria University and Suez Canal University to modify the content to suit the local problems, context and culture before implementing them locally. To overcome the identified problems, RCE Cairo, European RCEs and local universities, thus, worked together and with partners to find innovative solutions, develop appropriate materials and transfer the knowledge capacities to teachers through training programmes (Sewilam, 2012).

ESD policy and educational assessment

Calls for monitoring and evaluation (M&E) of ESD increased throughout the Decade of Education for Sustainable Development to demonstrate ESD impact and influence future education policy and practice, among other reasons (Didham and Ofei-Manu, 2012b; EFA Global Monitoring Report, 2015;

Kutesa, 2015). The International Implementation Scheme for the Decade identified M&E as one of the seven key strategies and recommended that UNESCO 'identify suitable, relevant and measurable indicators at every level – local, national, regional and international – and for each initiative and programme' (UNESCO, 2006: 38). However, formulating appropriate M&E frameworks and finding effective methods and indicators to measure ESD progress or otherwise engage in ESD assessment are very challenging and critical tasks.

Educational assessment has increased rapidly for two main reasons: (i) the increasing popularity of international testing schemes and consequent high levels of participation, and (ii) the increasing demand for accountability regarding educational outcomes from education systems, governments and international donors (IBE-UNESCO, 2016). The primary aim of educational assessment – ultimately to ensure better teaching and learning – should be viewed through the lens of policy and operations, and critically reviewed and aligned to global and national sustainability goals. In a recent global study (IBE-UNESCO, 2016) involving ESD and GCED-related 'assessment' in seventy-eight countries, the curriculum documents generally did not provide specific instructions on how assessment should be conducted. Out of those countries, 73 per cent of respondents identified traditional assessment and standardized testing as their primary methods. It should be noted, however, that self-assessment and/or peer assessment were mentioned in some cases, and a small number of countries stated that the aim of the alternative assessment was 'to measure students' development of skills (and, in some cases, values), as well as knowledge' (IBE-UNESCO, 2016).

Challenges for M&E and assessment of ESD include:

- how to evaluate the current status of ESD implementation in relation to sustainability learning outcomes;
- how to identify and strengthen institutions to efficiently and effectively conduct M&E (besides developing dedicated tools), in order to produce a systematic review of ESD implementation;
- how to present the results so they can be used effectively for subsequent curriculum and pedagogical reforms and identify key lessons for further mainstreaming;
- how to synchronize and synergize the components of ESD and the domains of the Learning Metrics Task Force (LMTF, 2013) to broaden

the scope/content of international assessment tests such as PISA and TIMMS (Lenglet, 2015); and

- how to decide which trajectory of those available to M&E of ESD to follow, based on careful evaluation of the benefits and deficiencies of each approach.

National governments should therefore establish effective monitoring and accountability mechanisms and incorporate them into their respective policy and planning strategies (UNESCO, 2015a). They should ensure that clear indicators and specific, measurable, short and long-term targets are established at the start of each project. Appropriate tools for data collection need to be developed, and the M&E process needs a defined framework for the scope and pace of the work. Thematic and country-based studies will provide an important point of data collection. It is also necessary to optimize various mediums for both communicating and distributing the findings in order to reach different target groups (UNESCO, 2016).

Looking forward

At present, countries are developing and planning their national responses to several important international agreements, including the Paris Agreement on climate change, the 2030 Development Agenda and the Sustainable Development Goals (SDGs). Both which contain articles citing the importance of education to achieving the overall goals and supporting the transition to a more sustainable society. These agreements also represent major opportunities for countries to galvanize and focus their efforts to implement ESD. In relation to SDG4 on education, they also offer the potential for ESD to provoke a qualitative shift in educational reform and advancement. UNESCO has a clear mandate in the Education 2030 Incheon Declaration and Framework for Action (UNESCO, 2015a) to support the educational targets of the SDGs. In response to this, the organization has also developed a guide identifying key learning objectives for each of the SDGs along with eight overarching competencies for sustainability that ESD should work to achieve:

- systems thinking competency
- anticipatory competency,
- normative competency

- strategic competency
- collaboration competency
- critical thinking competency
- self-awareness competency, and
- integrated problem-solving competency (UNESCO, 2017).

To ensure coherence, ESD policies and mandates must address several key aspects of the education system. Effective implementation of ESD depends on the way in which it is integrated into the curriculum, teacher training, the development of learning materials and the learning environment. It is also important to address four implementation modalities: (i) governance, accountability and partnerships; (ii) effective coordination; (ii) monitoring, reporting and evaluation for evidence-based policies; and (iv) financing (UNESCO, 2015b). In addition to granting authority for implementation, ESD policies also need to ensure that the necessary institutions, resources and capacities exist to ensure effective delivery. For example, if a country establishes a strong policy mandating ESD, but fails to support this with ESD-linked teacher training or ESD learning material development, there will be significant shortcomings in implementation.

One of the most effective means used by countries to accelerate the integration of ESD into the primary and secondary curriculum is to provide a measure of flexible implementation at the local policy level. Examples include decentralizing a proportion of the curriculum to address local issues, as has been done in China, Indonesia, Thailand and Viet Nam (Benavot, 2014; Didham and Ofei-Manu, 2012a; Widjajanti, Matakupan and Didham, 2014; UNESCO, 2014a). Notwithstanding, flexibility in educational policy that enables primary and secondary schools to integrate local relevance and cultural appropriateness into curriculum content and projects generally remains a major challenge (UNESCO, 2014a). Creating more opportunities for the autonomous development of locally contextualized learning modules is an important way to strengthen the relevance of ESD. However, support needs to be given to teachers to develop such action-oriented and real-world lessons. ESD, with its focus on building skills for quality lifelong learning and constructing collaborative relationships for collective problem-solving, should aim to enable learners to make connections between existing knowledge in local contexts when learning abstract concepts, thus allowing personal knowledge and academic concepts to develop together (Laurie et al., 2016:

3-4). This process of learning focuses on the socio-cultural processes of meaning-making that occur when learning draws connections between 'existing experience and context and more abstract forms of representation' (Lotz-Sisitka, 2013: 23). As such, it functions as a key to education that can support social change and transitions towards sustainability.

The curriculum is an important vector of change in the process of educational transformation. Accordingly, flexibility must be built in to the curriculum to increase the efficiency and effectiveness of ESD implementation with stakeholder involvement (Pataki, 2005). Given that education is a strategic sector of the economy, curriculum design and development should involve a social debate with the participation of all stakeholders. It should also be acknowledged that the curriculum is a source of influence and that decisions made in this regard define the use of already limited education resources (UNESCO-IBE, 2013). Consideration should thus be given to policy dialogue aimed at reorienting the curriculum towards ESD. In this regard, local policy-makers will need greater support to ensure the implementation process goes smoothly. Another area in need of further exploration is the integration of ESD into PISA and other international assessment tests that influence curriculum content in many countries.

At all levels of education, implementation of ESD should be underpinned by clearly defined ESD strategies and policies. The capacities of policy-makers and authorities, curriculum developers, school administrators, assessment experts and teachers should also be enhanced, as these stakeholders hold the key to the successful development and mainstreaming of ESD curricula (UNESCO, 2014a; Ofei-Manu and Didham, 2014). Strong educational policies are only as effective as the institutions and structures in place to implement them. Moreover, the existence of such support systems must be achieved through strong policies. The overall efficacy of ESD depends on key improvements such as reforming educational systems, strengthening curricula, innovating new pedagogies and forms of teacher training, transforming learning environments, building diverse partnerships and creating local learning opportunities. However, there are opportunities to advance policies that will help strengthen and achieve each of these objectives. When such policies are formulated in a holistic and integrated manner it is possible to carry out these improvements in a systematic and unified way.

With national commitments in place and a global endeavour underway to address the challenges of climate change, while securing the well-being and quality of life of the world's population, there is no greater endeavour for humanity than the collective realization and pursuit of sustainable

development. To this end, the greatest vehicle at humanity's disposal is education, in particular an education system geared towards delivering quality education for sustainable development. However, advancing policies for ESD cannot consist solely of efforts to add topics such as climate change and sustainable development to an already overcrowded curriculum. Rather, policies for ESD must explore ways to transform education systems, such that the entire system becomes a model of sustainability and provides ample opportunities to explore, debate, discover and learn about the meaning and implications of sustainable development. The concept of sustainable development is not defined by an end state or a final destination; rather, it describes a continuous journey and path of learning. It is the role of education to prepare learners for that journey.

Chapter 5

How are learning and training environments transforming with ESD?

Rob O'Donoghue, Jim Taylor and *Vivo Venter*

Over decades and centuries the web of meaning unravels and a new web is spun in its place

(Harari, 2015: 146).

Introduction

Action Area 2 of the Global Action Programme (GAP) on Education for Sustainable Development calls for the transformation of education and training environments[1]. This transformation can be interpreted in terms of changes in learning environments brought about by the inclusion of ESD in education and training initiatives. This includes the integration of learning-led change found in whole-school approaches that emphasize inclusive school governance, pedagogy and sustainable campus management, as well as cooperation with partners and broader communities. These approaches are changing learning environments in significant ways.

1 Here, 'environment' is used to refer to the inclusive make-up and surrounding dimensions of education and training practices. This encompasses social, economic, biophysical and political (power) relations (O'Donoghue, 1989).

This chapter takes a look at these changing learning environments. It examines learning and training environments in community, school and other institutional contexts that have undergone shifts in policy, theory, pedagogy and whole-institution practices with a view to implementing ESD. While it does not offer a comprehensive review of these learning environments, it does examine an interesting sample of education sites that are promoting learning-led change[2]. These ESD learning environments are emerging as co-engaged arenas of learning and change, where participants can explore shared concerns and ways of knowing and doing that are meaningful to all involved.

Conventional education and training has proven a relatively effective means of knowledge transfer and skills development but seldom at the level of the whole institution. The advent of environment, social justice and sustainability education imperatives, however, has shaped learning and training environments in support of this holistic approach. Longer-term trends in education and more recent ESD policy imperatives appear to be galvanizing more participatory, reflexive and learner-led environments. This chapter examines the attributes of ESD learning environments with respect to changing education and training and activating learning-led change.

As ESD learning environments change, they appear to be becoming more inclusive and action-orientated. Collaborative learning is also being supported to a greater extent in learning networks and whole-school approaches. This chapter reviews the shift towards inclusive action learning through a series of case studies selected to illustrate some of the different dynamics of change in ESD contexts developing within the UNESCO GAP framework:

- Case study 1: A new ESD centre with a national sustainability mandate (Al Ain, Abu Dhabi)
- Case study 2: Course-activated social learning networks (Grahamstown, South Africa)
- Case study 3: Using multimedia for intergenerational learning (Mexico)
- Case study 4: Positive learner-led actions as 'Handprints for Change' (India)

2 The term 'learning-led' change is preferred to the more conventional term 'learner-led' change. Learning-led change encompasses learner-led change, but also incorporates other wider social dimensions that guide and shape learning.

- Case study 5: Stepping up to the Sustainable Development Goals through a sustainability commons (Lesotho)
- Case study 6: Developing whole-school action learning (Howick, South Africa)
- Case study 7: Co-engaged evaluation in Regional Centres of Expertise (Africa region and Japan)

The evident transformations in learning environments using whole-institution approaches include:

- engaging participants in a situated, critical review of current knowledge (Cases 1-7)
- supporting communities in networked learning activities over time (Cases 3, 4, 5, 6 and 7)
- enabling participants to undertake open-ended change projects (Cases 3, 5 and 6)
- supporting deliberative, learning-led re-visioning of future sustainability in learning networks (Cases 3, 5, 6 and 7).

Changes in the selected learning environments and shifts in practices cannot be attributed to ESD alone. Some changes come about as the result of an educational impetus to resolve social-ecological, social justice and other emerging dilemmas relating to future sustainability that are also found in environmental education and global citizenship education.

How ESD is transforming conventional wisdom

Greater attention to learning environments, processes and outcomes in ESD has led to a narrowing of the sharp distinction between education and training. Earlier differences were perpetuated by the proliferation of training as a primary driver of economic recovery and growth after the Second World War. Today, both education and training are found in competence approaches to the mediation of new environmental knowledge and the development of associated skills needed for transitioning to future sustainability.[3] The slow

3 'Future sustainability' is understood here as the competence to 'produce the future we want' as well as the associated sustainability practices.

integration of new knowledge, more inclusive dispositions and an emphasis on action skills is shaping ESD as a process of change in education and training environments.

Early top-down, linear and deterministic approaches brought with them limitations. Now many learning and training environments are undergoing rapid change as ESD demands more collaborative knowledge production, better situated learning and more relevant learning-led change for future sustainability.

The emphasis has shifted from simply 'getting the message across' to facilitating civic participation, deliberative learning and re-imagining future possibilities. The importance of living more sustainably together with the necessary practices and skills to achieve these future states is therefore evident. In this way, learning and change in ESD is supporting learners to contemplate the desired freedoms associated with social justice, equity and practical ways of transforming things for the common good. The interplay between education and training is taking shape in new, more participatory forms of policy and practice, notably whole school/institution imperatives. Ironically, these perspectives have, been around in education for a long time, but have seldom been widely implemented.

Education theory to frame action learning environments for ESD

An adequate mix of learning theory for ESD actions for co-engaged and change-orientated learning has been slow to emerge. Learning theories were widely contested in the 1970s and 1980s when education and training were seen as two very different processes. As mentioned earlier, the distinction between education and training is decreasing and more process-orientated approaches to learning and change are appearing (Engestrom and Sannino, 2014). For example, process approaches to learning have emphasized action learning in many environmental learning programmes of the Wildlife and Environment Society of South Africa (WESSA) (O'Donoghue, 2001; Taylor and Venter, 2017; UNEP, 2004).

In the following case studies, action taking is the starting point for change-orientated learning processes. However, the perspectives (theories) informing the diverse learning environments and training practices (Kemmis and Mutton, 2012) differ in all cases. Regardless, the learning environments reflect better situated, more deliberative and more open-ended orientations. This is a significant change from the instructional and experiential approaches developed with a view to provoking behaviour

change (structural functionalism), which were common in education and training up to the late twentieth century.

With ESD, many learning environments are now co-engaged arenas where participants focus their learning actions by tuning in to shared concerns in a school, institution or community setting and engaging in deliberative learning transactions to change practices in ways that are meaningful to everyone. The concept of 'tuning-in' and making real-life connections has thus become an important way to begin deliberative, action learning.

Finding suitable learning theory to inform action learning in ESD education and training

> The method which people use in acquiring knowledge is functionally interdependent with, and thus inseparable from, the substance of the knowledge they possess, and especially from their basic image of the world. If this image is different, the method they devise for acquiring knowledge is, as a matter of course, different too (Elias, 1987: 64).

This insight constitutes a central tenet informing action learning approaches in ESD. The proposition is evident in the participatory expansion of ESD as processes of learning-to-change. For a schematic overview of ESD as an expansive social learning process or what may be described as situated action learning see figure 1.

This approach is informed by the cultural-historical learning theory of Lev Vygotsky and the research of Yrjo Engestrom and Annalisa Sannino (2010), who worked with a Vygotskian perspective to frame cultural historical activity theory insights into expansive learning and change. This perspective highlights how engaging with and resolving contradictions in existing knowledge is a reflexive and expansive learning process. Learning-led change happens as participants uncover and resolve contradictions in their worlds and in how all individuals are living together in a changing world.

A key focus here is not only participatory learning as a reflexive social process, but the centrality of reflexive learner agency. Learner agency includes the emerging capability of learners to use their knowledge to bring about change together. Roy Bhaskar (2016), building on Elias (quoted above), notes that the real world 'means and media' (agency and imagery) of learners need to be deployed in learning transactions, as 'It is that which we must take into

account (fallibility) in order to act, and that which in acting, in our activity, we reproduce and transform' (Bhaskar, 2016: 69).

Etienne Wenger (Wenger, McDermott and Snyder, 2002) also accentuates the importance of situated culture in learning. His work is informed by perspectives and dispositions in emerging communities, and tracks and theorizes as to how humans can learn together in 'communities of practice'.

Drawing on Vygotskian learning theory, Anne Edwards (2014) developed task-sequencing tools for learning environments in curriculum settings. Edwards emphasizes how the acquisition of knowledge of society is essential for participatory learning to become learner-led learning that fosters change. Many of these and other learning theories have accompanied and informed an increasing concern for participatory input and leadership in education and training environments. Each theory has its advocates and there are diverse contexts in which complementary mixes of these ideas are helping to frame learning environments for ESD-inspired processes of change.

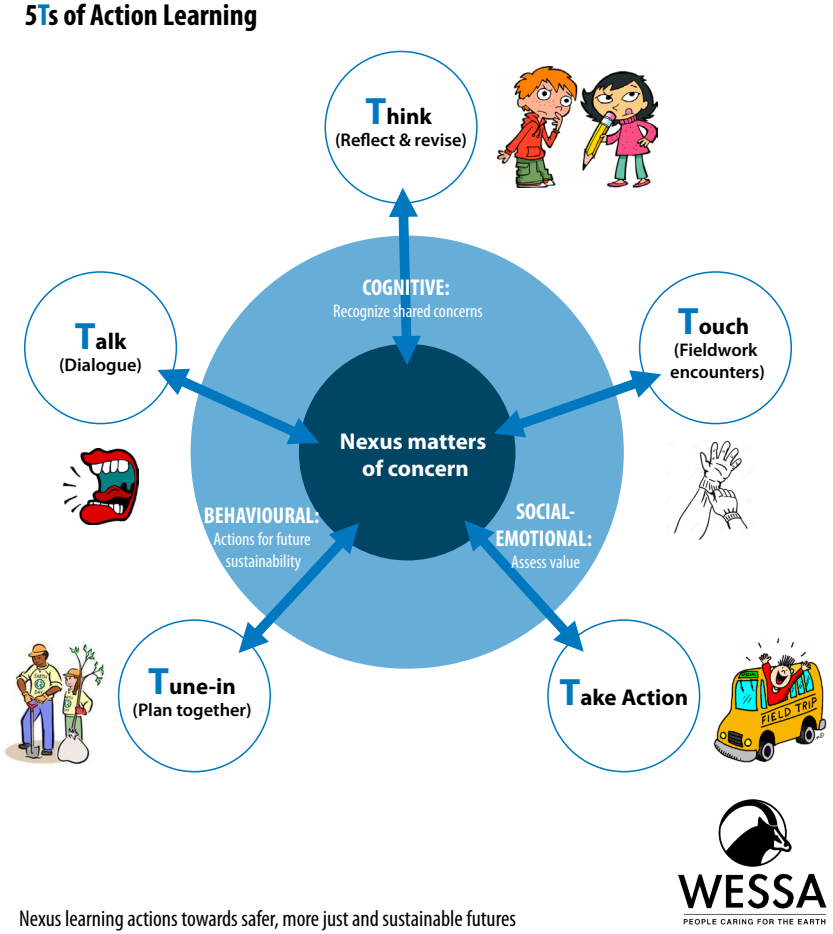
Many of the current perspectives informing ESD still reflect early concepts such as 'experiential learning cycles' (Kolb, 1984), and the reflexivity implicit in the 'double-loop learning' of Schon (1983). 'Social learning', discussed by authors such as Wals (2007), also provides a useful synthesis to inform education and training environments as sites of transformative learning. Implicit in this is an interest in researching transformative social learning that addresses the transition to sustainable futures (Lotz-Sisitka et al., 2014).

In a school curriculum context, lesson planning usually centres on the cognitive approach to learning (*recognizing concerns*). Environment and sustainability education initiatives have placed more emphasis on socio-emotional dimensions (*assessing value*) and behavioural change practices (*taking action*), along with ethical drivers for seeing and doing things differently in a changing world. Co-engaged processes of coming to *recognize matters of concern*, that enable learners to *assess value* and *take action* towards transitioning to future sustainability, constitute a useful mediating progression for deliberative learning environments in ESD. These processes are commonly framed as competences for ESD (Schreiber and Siege, 2017), or as learning objectives for the SDGs (UNESCO, 2017). In the case of basic education in Finland, Halinen (2017) reports an expansion to transversal competencies that specify categories of competencies for 'development as a human being and as a citizen' in teaching for future sustainability.

Tuning-in together through a deliberative focus on 'what is already known'

All these dimensions of competence and collaboratively developed learning objectives relate to the processes of recognizing shared concerns, assessing value and taking action in social learning sequences of local enquiry and problem solving. These co-engaged enquiry and discovery approaches are presented in the process model 'The 5Ts of Action Learning' developed by the WESSA field centres (Figure 1). It shows a situated environment for transformation through deliberative action learning at the nexus of shared concerns and future sustainability. Other similar constructs for deliberative social learning are now more widely used in changing teaching and learning environments.

Figure 1: The 5Ts of Action Learning for framing a deliberative nexus learning environment



A key part of any ESD learning experience at a WESSA field centre is the careful planning of learning activities with participants. The objective is to establish the key topics (concerns, issues or risks) to be covered so as to orientate participants in the knowledge needed to inform learning. A good mediator of co-engaged learning will always seek to 'bring forward' or 'mobilize' prior knowledge and understanding among the participants so that they can connect their understanding to the learning experiences to come. This is also commonly the case in problem-based and enquiry learning in curriculum settings. A key point is to situate the matter of concern in a shared context so as to establish the focus for learning. This could include a curriculum topic, a local concern, a conservation issue or risk, or a practice as a nexus[4] issue that needs to be resolved (see the central circle of Figure 1).

The Tune-in environment provides a foundation for deliberative learning at the nexus of shared concerns, where participants can use what they know to make sense of what they see and experience. The co-engagement here allows learners to work things out together as their concerns are shared.

As a rule of thumb for ESD learning environments, the 5Ts of Action Learning can prove a useful referent for undertaking and supporting co-engaged social learning where concerns meet and are shared. It involves engaging in a 'Tune-in' process that expands into open but interlinked deliberative activities of 'Talk' or dialogue, and 'Touch' or real-life encounters such as fieldwork. These activities all include 'Thinking' or reflection, which is directed towards and associated with participants 'Taking action' for the common good.

In deliberative, nexus learning environments, the 5Ts intersect and flow into each other and are commonly mediated in a socio-cultural context. They use open-ended methods to support co-engaged and experiential meaning making.

Action learning environments as situated processes of deliberative nexus learning are a helpful means to engage learners in schools, communities, field centres and other institutional settings. They are also useful for reflecting on connecting concerns evident in whole institution (school) programmes, which have developed rapidly in recent years. The more participatory and deliberative approaches to education are reflected in the case studies that follow.

4 The term 'nexus' is increasingly relevant in learning situations where things meet or crossover as different imperatives come to shape, influence and respond to risk

Case studies of transforming learning environments

Environments for ESD as transformative learning processes are unlikely to manifest in school and community education or institutional training settings unless these settings actively engage learners, are developed around shared concerns and work to address the challenges of future sustainability. The changes identified in the following studies reflect emergent trends in ESD learning environments that cut across many of the cases reviewed. Many of the changes to learning environments are subtle and include a mix of the following:

- **mainstreaming** sustainability concerns
- becoming more **inclusive and participatory**
- enabling a **critical review** of received knowledge
- supporting **learner-led re-visioning** activities
- sustaining **networked learning** over time
- enabling practical **change projects** and
- the inclusion of **whole institution** approaches.

Some of the above patterns of change can be explicitly isolated as they reflect a dynamic move towards learning environments that are inclusive and collaborative, with deliberative processes of reflexive, learning-led change in each developing case. These are highlighted in some useful mediating resource materials for education institutions, notably the seven steps of Eco-Schools[5] (see Case Study 6) and the guide Getting Climate Ready[6]. Whole institution approaches are providing a platform for a proliferation of innovative changes in teaching and learning environments[7]. Readers are invited to use and expand these criteria in relation to the changing education environments and training practices in which they are involved.

5 See www.ecoschools.global/seven-steps.

6 Available from http://unesdoc.unesco.org/images/0024/002467/246740e.pdf.

7 See www.leuphana.de/en/leverage-points.html and Case Studies 2 and 3 as components of whole institution innovations in higher education.

Case studies of ESD learning environments

Seven case studies were selected to illustrate how co-engaged leaning environments are expanding in ESD.

The first case study illustrates a state-of-the-art renewable technology educational facility in Abu Dhabi, where possible real-life learning strengthens the co-engagement of learners with the topics of the study, leading to a rise in action taking.

Case study 1: A new ESD centre with a national sustainability mandate (Al Ain, Abu Dhabi)

This case study explores how an ESD policy has shaped the emergence of environment and sustainability monitoring processes in a whole institution approach at a national centre. The data are being taken up through action learning and activities that are beginning to track social-ecological and economic change as an ESD transitioning process.

Background

The rapid transformation and development of the United Arab Emirates (UAE) has led to multiple environmental issues and a per capita ecological footprint of 9.5 global hectares (WWF, 2006). As a response to these sustainability concerns, the Al Ain Zoo developed and opened the award-winning Sheikh Zayed Desert Learning Centre (SZDLC) in 2016.

A teaching facility designed to teach through real-life examples

The building is described as a 'state-of-the-art exhibition building' that teaches visitors of all ages about the relationship between nature, environment and sustainability through interactive exhibits. When designing the education programmes, the team focused on the concept of experiential learning actions.

The SZDLC created an opportunity to teach students about sustainable living using low-carbon technologies adopted by the centre. This was achieved by means of physical readings displayed on Noveda screens, installed throughout the building, and measurements taken by Vernier data-logger instruments attached to a set of probes. Students take live abiotic factor readings, transfer

them to a spreadsheet, and use this data to analyse the success of the low-carbon technologies in the building compared to conventional fossil fuel burning technologies. Involving students in the data recording and analysis process helps them to understand the concept and operation of an energy-efficient device in real terms.

How can this create change?

By contextualizing the concept of an 'off-the-grid' building operation, and seeing how solar, wind, geothermal and energy-saving devices can lead to a decrease in CO2 production, students come to understand how the installation of low-carbon technologies make a building more efficient and eco-friendly.

Students who have experienced the sustainable technologies programme at the SZDLC leave animated and inspired, with a practical knowledge of the industry, and the ability to foresee how using such technology can benefit themselves, their families and their community over the long term. Such programmes can also inspire students to undertake open-ended change projects and pursue careers in the industry, and may lead to further research and development in these technologies.

Engaging participants in situated, critical reviews of current knowledge

When visiting the centre, participants are given the opportunity to critically evaluate the lifestyle choices they make by means of an interactive carbon footprint calculator. Based on a questionnaire, visitors receive personalized results on their carbon footprint highlighting specific areas of concern. Visitors must then review their lifestyle choices and suggest ways to improve their footprint. This is followed by advice on practical solutions and changes that can result in more sustainable living. The impact of the education programme and the knowledge received during visits to the facility is evaluated through the use of a pre and post-visit survey based around a set of 'Biodiversity is Us' tools[8].

Community involvement and progressive learning opportunities

The SZDLC is accessible to and visited by different groups of all ages from the wider community. The Government of the UAE has made visiting the school compulsory to other schools in the surrounding area. This decision has made it possible for the establishment to offer progressive curriculum programmes, which permit learners to return each year and build on previous learning. It also facilitates the establishment of learning networks and the growing reputation of the centre as a model for whole institution (school) innovation.

The Sheikh Zayed Desert Learning Centre addresses SDGs 3, 4, 6, 7, 8, 9, 11, 12, 13, 15, 16 and 17.

In Grahamstown, South Africa, Rhodes University is researching and applying course-activated learning with teachers and adult learners. The courses that participants undertake focus and shape the actions in their own work, community and household contexts.

Case study 2: Course-activated social learning networks (Grahamstown, South Africa)

This case study reports on a course-activated process of ESD in relation to rainwater harvesting in the Eastern Cape of South Africa.

Background

Amanzi for Food (Water for Food) is a project initiated to encourage the practical application of materials on rainwater harvesting in agriculture produced by the Water Research Commission. It was developed to engage agricultural colleges and surrounding communities of food growers in water conservation farming. A co-engaged, course-activated process was used to incorporate both the expert knowledge in the resource materials and the local knowledge of participating partners. This inclusive approach to intended curriculum change involved local learning actions aimed at food production in a region of high climate variability.

Collaborative mediating of water conservation farming

The curriculum for the course was co-developed around Water Research Commission materials on rainwater harvesting. An initial course was offered over a period of three to four months with participants undertaking a local change project to introduce rainwater harvesting into either a college curriculum or a local community context. The Rhodes University accredited the start-up course and the participants constituted themselves as an informal learning network. The collaborative learning processes led to the inclusion of local knowledge practices relating to seasonal cycles in the area and a change project approach enabled participants to develop local water harvesting projects, which were included as practical learning sites for the local agricultural college.

Three interesting projects grew out of the start-up process.

- Expansion of the learning network into local radio programming. Using a community of practice (Wenger, McDermott and Snyder, 2002) approach, participants shared their stories on the radio. A collaborative learning network was formalized and expanded to include many more local farmers and food growers.
- Development of a teaching garden. A demonstration garden was established in the agricultural college as a site for practical learning. It illustrated both intergenerational water conservation practices and modern drip irrigation.
- A collaborative research project to include climate smart agriculture in the curricula of agricultural colleges in other regions. An activity systems approach was used to identify tensions and contradictions in the curriculum innovation process. This allowed staff to collaborate on curriculum change to better meet the needs of students and begin to conceptualize climate smart curriculum and teaching practices.

Insights and conclusions

The initial course-activated learning process, the change projects and the subsequent collaborative research highlighted ways in which co-engaged approaches to ESD can foster learning-led change and the agency to re-imagine and transition to more sustainable futures. The inclusion of school gardens was a key step towards the development of whole-school approaches that include innovative solutions to hunger and enable students to experience practical innovations that bring immediate benefits.

The course-activated social learning networks address SDGs 2, 4, 11, 12, 13, 15 and 17.

The following intergenerational learning case with youth offers a further crossroads of intersecting concepts and challenges. In the next case study, a range of participants from youthful learners to more elderly practitioners worked together in media-led learning environments to document indigenous knowledge processes and sustainability practices.

Case study 3: Using multimedia for intergenerational learning (Mexico)

Background

In the Zaragoza community (Nahua) fishing practices are managed according to traditional knowledge developed over hundreds of years. Despite being a living tradition, the practice is dying out, due to limited communication between younger and older generations concerning the importance of traditional knowledge.

This ESD project aimed to create a participatory documentary video through a process of collaborative learning, and an intercultural approach to document traditional local knowledge and practices, and explore tensions and potentialities related to the transmission of these forms of knowledge to younger generations.

Collaborative mediating of intergenerational learning

This youth-led intervention was designed as a practical process of collective reflection focused on knowledge that has been displaced or become invisible. A group of fisherwomen and the young filmmakers mapped out the parameters for the execution of the project. Each participant then played a collaborative role in documenting the traditional knowledge practices.

In developing the documentary, the young filmmakers highlighted several indigenous concepts of significance in the modern world. For instance, during fishing the fisherwomen talk and joke with each other, recount funny stories and enjoy themselves. These recreational exchanges, which occur out of view of their husbands, children and the community, are referred to as 'Tapuluhtiá'. The main reason for the fishing is to complement the family's diet or to make a profit. However, these fishing practices are not evaluated purely from an economic or nutritional viewpoint. If the fishing is not good, the journey, the effort and the time taken to reach the fishing grounds are still meaningful because of the communal experience of having fun (Tapuluhtiá).

Insights and conclusions

Networked learning with modern media is an effective way to stimulate knowledge of the environment, as well as a means to identify environmental problems, for example, water pollution. Through the use of modern media – in this case video technology – this project was able to engage participants in important local issues. The strengthening of local networks helped to build knowledge based on relationships and connections. As a consequence, the young filmmakers were able to identify a potential strategy for creating links between local communities facing the same problems, and to strengthen local organizational skills in order to confront socio-environmental concerns. The use of media covering local issues and story sharing transformed learning environments and strengthened community links by connecting schools with community learning.

Using multimedia for intergenerational learning addresses SDGs 3, 4, 6, 14 and 17.

The fourth case study focuses on the 'Handprints' approach to learning among young children, a project that began with the Centre of Environmental Education in India. Handprints is an action learning process that has become popular among people and projects who seek to encourage positive learning actions for a more just and sustainable world.

Case study 4: Positive learner-led actions as 'Handprints for Change' (India)

Background

A key best practice identified during the Decade of Education for Sustainable Development (DESD) is the Paryavaran Mitra programme. This uses Handprints as a core pedagogy to involve school students in taking positive action towards sustainability through various change projects. The actions taken might include bettering the condition of their community, school premises or home, or solving a local issue. Instead of focusing on the negative aspects

of carbon footprints, the Handprint approach applies a pedagogy of hope to instigate actions that make a positive difference.

Transforming learning environments through change projects

Since the launch of the programme in 2010, students have engaged with various issues and transformed their learning environments. A group of students from western India, for example, explored the issue of food wastage at their school. The school provides meals to about 700 students. The group collected the wasted food for a week and concluded that, on average, 12 kilogrammes was being wasted daily, an amount that could easily feed 70 students. They prepared and implemented a campaign with posters, talks and a skit (drama). They also installed a board in the canteen highlighting daily wastage and initiated a signature campaign enlisting a commitment from students to not waste food. Over a three-month period they reported a reduction in food wastage of 50%. The students went on to create a compost pit in the school garden to utilize organic waste from the canteen.

A whole-school approach

Many schools that have been part of the programme have now started to re-think their policies, for example, by encouraging the ongoing use of old textbooks. In the process they save on expenditure and promote a message of re-use and the reduction of consumption patterns in society.

Sustained networked learning over time

The Global Handprint Network launched by the Centre for Environmental Education (CEE) facilitates and promotes networking and strengthens interactions among its members, allowing them to exchange information and share updates on the latest sustainability practices and actions. The initiative aims to bring people and communities together to create a large network able to take positive actions for sustainability.

Insights and conclusions

The experience of individual or collective participation in real-life situations helps students to understand the complexities of issues and to develop the systemic thinking required to achieve desired solutions. Although the approach originated in India through CEE, 'Handprints' for sustainability are also popular in Africa and other parts of the world. They are particularly notable as a practical stepping-stone towards more whole-school learning environments led by student initiatives (for more information see: www.handprint.in).

The Handprints programme addresses SDGs 1, 2, 3, 4, 5, 6, 7, 11, 12, 13, 15, 16 and 17.

Case study 5 presents the concept of a 'Sustainability Commons', which is used in Lesotho to illustrate co-engaged learning environments and change-choice-practices. This offers participants who are mainly adults, families and organizations choices for improving resource use in their daily lives.

Case study 5: Stepping up to the SDGs through a Sustainability Commons (Lesotho)

This project mobilizes inexpensive, low-carbon technologies to help participants engage practically in learning about climate change. Change project innovations enable people to select, implement and articulate sustainability practices and share them with others through a Sustainability Commons in Lesotho.

The underlying concepts and theory

An action learning approach enables groups of people to:

- tune-in to new, more sustainable technologies and ways of living
- talk among themselves about possibilities
- reflect on different less expensive and less harmful technologies
- try out low-carbon technologies
- implement more sustainable ways of living.

This open approach is effective for whole-school and community innovation contexts, resulting in many benefits and tangible outcomes.

Practical implications

When implementing a Sustainability Commons, people first undertake an audit of the resources they are using, such as electricity and water, as well as their impact on biodiversity (plants and animals) and how they are generating

and dealing with waste. In Southern Africa, most electricity on the national grid is generated from non-renewable, coal-fired power stations. Efforts to reduce the amount of electricity used from the grid therefore save money and decrease the harm being done to the planet. Other sustainable choices include using water more wisely, managing waste better, taking care of local biodiversity, and looking after indigenous plants and animals. To help people make better decisions, the project developed a booklet entitled 'Stepping Up to the Sustainable Development Goals' (WESSA, 2016), which includes learning pathways and change-choice practices.

The specific context of this case study

The Lesotho Council of NGOs (LCN) represents 40 non-government organizations (NGOs), which are spread across the country. With offices based in Maseru, the capital of Lesotho, LCN is well placed to establish a Sustainability Commons. This has already been done in a modest way at their headquarters in Maseru. LCN has focused on rainwater harvesting, reducing electricity use, better waste management and tree-planting to develop their vision of a more sustainable world. Most of the technologies are adaptable for use in whole-school, institution and community approaches, where additional small-scale innovations can be tested. The advent of whole-school approaches has worked to promote change and savings at the school level, as well as through inclusion in formal teaching programmes

The Lesotho LCN Sustainability Commons project addresses SDGs 1, 3, 4, 6, 7, 9, 11, 12, 13, 15, 16 and 17.

Case study 6 on whole-school action learning with children and adults presents an example of students becoming engaged in assessing and acting on local matters of concern through the development of school environmental policy and an eco-code to guide action learning. This case is developing into a learner-led process reshaping the ethos of a school taking up a role of positive activism in the community and establishing networked learning exchanges with similar programmes elsewhere.

Case study 6: Developing whole-school action learning (Howick, South-Africa)

Background

A high school in Howick, South Africa, is developing a whole-school approach to ESD through successive school policy-linked action projects. Howick High School initiated a whole-school, action-learning supplement to the formal curriculum and developed it with groups of students over a period of four years.

Transforming learning environments through action projects

The beginnings of a whole-school approach emerged out of the efforts of an energetic group of students in search of challenges relating to the local environment and sustainability. Joining the Eco-Schools programme provided a start-up policy development framework and audit tools that helped the teachers and students organize themselves and initiate action projects. An important dimension of their whole-school approach was the development of an Eco-Code that galvanized a student vision for their activism:

'We fight for those who can't fight for themselves. We speak for those who have no words. We stand up for the birds, the bees, and even the trees. The things we do will bring you to your knees. We are the Eco-Fighters and we bring peace.'

Successive years of expanding action learning

The early projects of this small team of enthusiastic learners centred on engaging the school in a waste audit and recycling. The concern for waste was extended the next year and the group worked with Mini-SASS to assess and report on the local river, where they now regularly monitor water quality using student-led bio monitoring at two test sites (www.minisass.org). As the group grew, they diversified their activities, maintaining and expanding upon the focus areas of previous years. Concern with water-related issues evolved during a major regional drought. In response, the group engaged the school community in water-wise gardening, including vegetable production and the use of grey water. They also took part in a project initiated by Wildlands called 'Clothes for Life', which aimed to assist the homeless and poor who live in nearby informal settlements, and set up a drive to provide wheelchairs for disabled people. The group is now a formal part of the school's extra-curricular programme and has an annual budget to support core activities.

Reaching out to the community and beyond

The expansion of hands-on waste and water-testing with auditing (Graham, Dickens, Taylor, 2004), and data generation represented a significant starting point to engage learners in whole-school activities and extend these to include the community. Water-saving pledges made during the drought and joining the Water Explorer network extended the scope of the work and fostered wider learning interactions that brought back new ideas to the school through exchanges with other schools both locally and internationally. The waste drive began to produce an income and recycled plastic milk bottles were used in the production of 'green benches' for students to sit on during break times.

Reflections on the challenges ahead

The energetic work of engaged students is currently being supported as part of the formal school programme, but the challenge of linking and mainstreaming an environment and sustainability focus as a core learning activity of the school still remains. The ethos of the school has expanded to adopt this focus and both the parents and students value the generative work for the common good that is beginning to engage the whole school and beyond as a preparation for life in a changing world.

The whole-school action learning approach addresses SDGs 1, 2, 3, 4, 6, 14 and 17.

Finally, Case study 7 presents the development of an evaluation as a learning approach to change, targeted for ESD professional and RCE participants. Here, the study explores the work of the United Nations University and the various Regional Centres of Expertise (RCEs) to highlight co-engaged appreciative processes of collaborative monitoring, evaluation, reflection and learning (C-MERL), where learning is as much a part of the evaluation as it is of the changes being realized.

Case study 7: Co-engaged evaluation in Regional Centres of Expertise (Africa region and Japan)

This case study describes a hybrid tool to document and review learning actions and their outcomes.

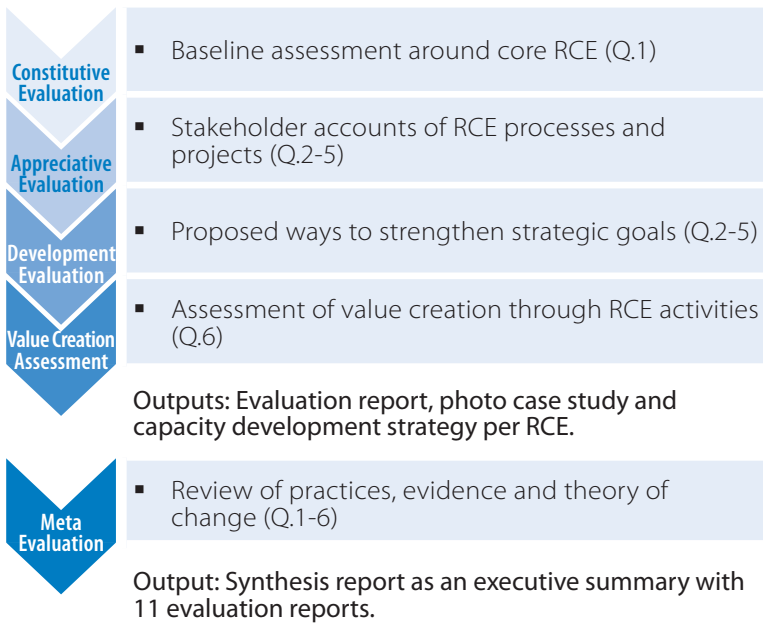
Background: the emergence of a hybrid framework for co-engaged evaluation in RCEs

There are many common conventions in the evaluation of ESD programmes and projects. Many of these share common features as well as a concern to document and support positive change. Cooperrider and Srivastva (1987) have suggested that inquiry into the social potential of a system should begin with

appreciation, and should be collaborative, provocative and applicable. These initial insights have led to the development of an approach to evaluation known as appreciative enquiry. These orientations to evaluation allowed Southern African RCEs to develop a hybrid tool for initiating collaborative evaluation processes in their ESD initiatives. Figure 2 outlines the appreciative enquiry phases that were developed.

Figure 2. Overview of the evaluation tool kit developed for SADC RCEs

An overview of the RCE Lessons Learned Evaluation



Framing a toolkit for collaborative assessment

The perspectives that were drawn resulted from Constitutive, Appreciative and Developmental Evaluation, as well as Wenger's approach to Value Creation Assessment in a community of practice (Wenger, Trayner and de Laat, 2011). The toolkit drew on this range of evaluation traditions to raise probing questions for documenting and reviewing learning actions and their outcomes. The questions were designed to be adapted to different needs and contexts.

By way of an example, the RCE Evaluation Toolkit was used over a three-day review workshop by 12 participants at the Makana RCE involved in education activities related to:

- water (Water for Dignity)
- energy (St Mary's Development and Care Centre)
- waste and sanitation (Makana Youth)

- cleaning and compost gardens (Inqaba Yegolide)
- education services (Albany Museum).

The workshop evaluation took the form of a primarily discursive review process of six stages of supporting questions, as outlined above, with a field visit to generate case evidence of situated practice. It was seen as a preliminary evaluation to lay the ground for further review cycles in the future.

Insights and conclusions

The simple framing toolkit for evaluation served to situate a positive, co-engaged and developmental evaluation process. The evaluation enabled participants to document and probe ESD practices at a whole-school, institution and community level, to generate evidence of impact and to assess value creation within learning pathways for future sustainability.

Co-engaged evaluation in RCEs addresses SDGs 4, 6, 7, 13 and 17.

Conclusions and an emerging grasp of ESD as a deliberative learning environment

There are numerous commonalities across the case studies of changing ESD education and training environments reported in this chapter, as well as a clear shift away from earlier conventions of attitude and behaviour change. Most notable are the shifts to situated, co-engaged, participatory and inclusive learning approaches in whole institution (school) critical reflection and innovation practices. The ESD processes that are emerging in the cases of education and training environments examined include:

- situated relevance: located and connected and relevant to the topic
- co-engaged, learning-led change: learning together, rather than transmissive, top-down learning. Learning-led change means developing understanding where learning together about the topic leads to greater understanding and action.
- action learning networks: groups of people actively learning and taking action together through connected networks.
- ethics-led whole institution change projects: where learning is led by values and the whole institution is involved in changing the situation so that it is more sustainable.

A common feature characterizing ESD learning environments as sites of learning-led change is therefore ESD where learners and educators jointly figure out and address solutions together. This involves dialogue between the different and linked issues. This is particularly notable in whole institution (school) approaches and represents a profound shift from earlier learning environments that centred on interventionist conventions developed around environmental problems such as pollution, biodiversity loss and climate change, for example. Rather than being confronted by wicked problems where complexity can become overwhelming, ESD initiatives are commonly situated in whole institution settings as co-engaged deliberations around concerns that are immediately relevant and can address the bigger issues in an iterative manner.

Deliberative learning environments are extending to include collaborative approaches to monitoring and evaluation. This focus emphasizes education processes that accelerate civic engagement to bridge cultural and economic boundaries and engage communities in social justice and future sustainability.

Chapter 6

Building capacities of educators and trainers

Ahmad Qablan

Introduction

Some educators attribute current unsustainable practices and lifestyles to a specific deficiency in education systems worldwide – a lack of focus on helping learners to think critically about their own lifestyles (UNESCO, 2014). To help address this situation, the Global Action Programme (GAP) on Education for Sustainable Development (ESD) calls for education to be reoriented towards providing opportunities for all learners to acquire the knowledge, skills, values and attitudes needed to contribute to sustainable development.

To achieve this objective and, thus, transform education systems it is essential to build the capacities of teachers. GAP, therefore, made building the capacities of educators and trainers one of its five priority areas (UNESCO, 2014).

Focused professional development opportunities are an essential means to empower educators to teach ESD. Effective educational transformation depends on motivating teachers to bring about change not only in their instructional practices, but also in their surrounding school and community environments. Through targeted development approaches, educators explore popular education theory perspectives (Freire, 1970) that encourage learners to examine their lives critically and take action to change social conditions. Using people's experience as a starting point (Mackenzie, 1993), the community works to identify problems, then reflects on and analyses

the issues involved from a local to a global perspective in order to develop solutions. Finally, the participants plan and carry out action for change. Adult educators (i.e. teachers) can facilitate the process by serving as democratic collaborators who ensure that learning takes place and leadership and self-direction develop within the group (Arnold and Burke, 1983).

The critical role played by teachers and educators in this process means that teacher education institutions need to rethink the set of competencies required by teachers and redesign their teacher education programmes accordingly. Stromquist (1997) recommends that teachers be trained in critical dialogue approaches that blend political content with instructional practices and connect the issues with participants' immediate reality.

Developing key competencies: the UNECE report

In this context, the United Nations Economic Commission for Europe (UNECE) report proposed an array of critical competencies that future teachers need at their command in order to help transform non-sustainable societies into sustainable ones (UNECE, 2013). The acquisition of these competencies provides a framework for the professional development of educators and helps them to play vital roles in transforming their societies towards sustainability. The competencies framework consists of three main essential characteristics of ESD, namely:

1. *A holistic approach* that promotes integrative thinking and practice;

2. *Envisioning change* as a means to explore alternative futures, learn from the past and inspire engagement in the present; and

3. *Achieving transformation* in the way that people learn and in the systems that support learning.

The competencies within these essential characteristics are subdivided into four groups to reflect the wide range of learning experiences:

- Learning to know: understanding the challenges facing local and global societies and the potential role of educators and learners;

- Learning to do: developing practical skills and competencies for action in relation to ESD;

- Learning to live together: contributing to the development of partnerships and acquiring an appreciation of interdependence, pluralism, mutual understanding and peace;

- Learning to be: developing personal attributes and the ability to act with greater autonomy, judgement and personal responsibility in relation to sustainable development. (Delors, 1996)

According to UNECE (2013), the first step in implementing these competencies is translating them into words (languages) and examples, in order to facilitate engagement among educators and further develop the competencies to better reflect the differing needs of each country.

Promoting the development of these competencies among students is not an easy task. However, several theoretical approaches have been suggested that could help educators better understand how to help learners acquire these competencies and become global citizens. The following section presents relevant concepts and theories in teacher education from adult education literature.

Relevant concepts and theories in teacher education literature

The standards for teacher competencies and qualifications vary considerably from nation to nation. Teacher education and preparation systems are grounded in political, social and economic priorities, and in many cases reflect general social objectives attached to education and, in particular, their value for future generations. However, teacher training/education and preparation usually consists of three differing categories or stages that are universally consistent:

- *Initial teacher training/education:* a pre-service training programme undertaken before teachers enter the classroom, usually provided by a university or teaching/educating facility;

- *Induction programmes:* a supervised 'apprenticeship' learning opportunity designed to support novice teachers while teaching, usually during the first year in the classroom, normally organized by individual schools or as part of a university training programme;

- *Teacher professional development or continuing professional development:* in-service courses and training activities for practising teachers offered by a variety actors including: private companies/institutions, colleges and universities or Ministries of Education.

Classroom teachers have mostly experienced at least one of these three preparation strategies prior to entering the classroom.

Learning theory and trends in teaching

A number of psychological and cognitive learning theories have contributed to the way in which teachers approach the task of educating. For example, the behaviourist school of thought (Watson, 1913), tends to view the process of learning as one based on the individual's response to their physical environment – essentially a form of conditioned behaviour grounded in a system of rewards and targeted learning goals. Cognitive theorists, on the other hand (Piaget, 1936), prefer to focus on the ways that humans process information and advocate the idea that these processes affect our behaviour and knowledge of the world around us, not vice-versa. The most popular approach – that of the constructivists (Bruner, 1986; Vygotsky, 1978) – suggests that the ability of individuals to learn relies heavily on pre-existing knowledge and understanding, and the ways in which humans build on that knowledge. The learning theory most relevant to ESD is transformative learning theory (Clark, 1993), which focuses on transforming individual perspectives through three dimensions: (i) psychological – how individuals change their understanding of themselves; (ii) convictional – how they revise their belief systems, and (iii) behavioural – how they change the way they respond to their physical environment. The behavioural dimension is relevant to ESD because it provides insights into how to reshape the relationship between humans and their environment.

Proponents of transformative learning theory

The psychological aspects of transformative learning are best articulated by liberation theologist Paulo Freire (1970) through a process he referred to as conscientization. According to Freire, teachers are required to foster and develop a critical consciousness about what, why and how they teach their students. Conscientization is, thus, not limited to the teacher but is also incorporated into the methods they use to teach their students, and the skills they foster and develop among them. These include the ability to critically analyse information, pose questions that challenge the status quo, and take action on political, cultural and economic issues that shape and affect their

lives. Understood in this sense, learning helps teachers and their students to develop a deeper understanding of the ways that social structures shape and influence the way they think about the world and themselves. Freire argues that education has the potential to foster freedom among learners through praxis, a process of personal and collective reflection that enables individuals to reassess their world and thereby change it.

Transforming individual convictions requires a process that Jack Mezirow (1991) labels 'perspective transformation'. The action of deriving meaning and knowledge of the world based on personal experiences undergoes a process of reflection, critical reflection and critical self-reflection. Personal convictions/perspectives normally consist of a set of beliefs, values and assumptions experienced through day-to-day reality. They help people to organize and make sense of the world around them, but can also distort or limit what they are able to perceive and understand. Through critical reflection, education has the potential to encourage individual self-actualization. Mezirow (1991) believes that the outcomes for both teachers and learners would result in 'individuals who are more inclusive in their perceptions of the world, able to differentiate increasingly its various aspects, open to other points of view, and able to integrate differing dimensions of their experiences into meaningful and holistic relationships'.

Transforming behaviour and the way that individuals respond to their physical environment requires much more from teaching than the ability to read, acquire relevant skills or reflect on various aspects of the self and its relationship with the world. Translating notions of conscientization and self-actualization into classroom instruction means that the teaching and learning process needs to be significant for both the teacher and the learner. The knowledge, skills and values being studied need to be relevant, meaningful and valuable, and reflect the complex transaction between the individual and their context. The education acquired needs to have a sense of purpose and must develop the skills and knowledge necessary to recognize the need for change, and prompt the action required to bring about that change. Education in this sense becomes a mechanism for enabling populations to critically examine the world they live in, identify potential problems and find lasting solutions, contextualize the world's most pressing economic problems and intractable social and environmental challenges and work towards viable solutions.

Transforming teacher education to promote sustainable futures

The question of *where* to apply the transformative principles of ESD can be answered by examining the effect that existing systems (economic, political, social, industrial, etc.) have on people, the planet and prosperity (the 3Ps). Factors that threaten the existence or sustainability of any of the 3Ps must be applied and integrated into daily teaching and learning priorities. Key areas of consideration for teacher training and preparation for ESD include: respect for all lifeforms (people, plants and animals); preservation of the planet's natural resources (the oceans and freshwater, the air and land) and responsible consumption strategies that support prosperity. This cannot be achieved without the political will and insight to work towards the four basic aims of ESD (USTESD, 2013):

1. Improve access to and retention in quality basic education;

2. Reorient educational priorities to apply ESD goals and objectives (3Ps);

3. Improve public understanding and awareness of sustainability;

4. Provide training to different sectors within the learning community (USTESD, 2013: 7).

In this context, the role of the teacher is ultimately to encourage students to acquire the knowledge, skills, values and perspectives to foster a durable and sustainable future. A pedagogy that considers the impact of what is taught and learnt in the classroom through the lens of the implications for the 3Ps will stimulate students to ask questions, analyse content, think critically, make sustainable choices, and promote sustainable behaviours and actions.

ESD pedagogies prepare educators to move from teacher-centred to student-centred lessons, and from rote memorization to participatory learning through place-based or problem/issue-based practices that encourage critical thinking, social critiques and analyse of the 3Ps within a local context. Teachers need to involve students in the discussion, analysis and application of sustainable values anchored in the 3Ps to make learning both relevant and meaningful. 'ESD pedagogies often draw upon the arts using drama, play, music, design and drawing to stimulate creativity and imagine alternative futures. They work towards positive change and help pupils to develop a

sense of social justice and self-efficacy as community members' (UNESCO, 2012: 1).

Holistic models for ESD teacher training: in-service and pre-service

Research detailing the characteristics that contribute to effective teacher training call for a complete restructuring of the existing pre-service model, which in many cases is heavily grounded in theoretical and discipline-based content rather than practical, hands-on application and skills (Stoddart et al., 2013). One question that has gained substantial attention from educators is whether teachers are born or made (Malikow, 2006). Some educators argue that good teachers have an innate ability that cannot be taught: the natural 'born' teacher is effective because of certain inborn characteristics. The second group of educators argue that anyone can become an effective teacher by enrolling in training programmes grounded in developing specific techniques that focus on building teacher expertise and teaching skills. Malikow (2006) argues that effective teachers are both born (i.e. gifted) and made (i.e. trained in pedagogy).

The pre-service model for effective ESD teaching in the classroom relies heavily on the quality of teaching presented and the power of good teaching to transform student's perceptions and attitudes towards sustainability. Teachers are expected to ensure that their students master the academic content in order to be able to apply what they have learned, think critically and solve problems, and keep pace with rapidly changing learning environments and new technologies. Teachers are also expected to oversee the cognitive and social-emotional development of their students.

To prepare teachers for the complexities of ESD, both pre-service and in-service teacher training programmes must include incentives to ensure that practical fieldwork (i.e. student teaching) is interwoven with academic content (pre-service), professional courses (in-service) and supervised internships. The National Council for Accreditation of Teacher Education (NCATE) in the United States identified 'clinical preparation as one of the three aspects of teacher preparation that are likely to have the highest potential for effects on outcomes for students' (NCATE, 2010: 2). The complexities involved in preparing teachers to impart the principles and values inherent in sustainable development necessitates a holistic training programme that can prepare teachers to address them. The NCATE have identified ten principles for effective teacher preparation that have the capacity to address these complex values and ideals:

1. Student learning is the focus;

2. Clinical preparation is integrated throughout every facet of teacher education in a dynamic way;

3. A candidate's progress and the elements of a preparation programme are continuously judged on the basis of data;

4. Programmes prepare teachers who are expert in content and how to teach it, and are also innovators, collaborators and problem solvers;

5. Candidates learn in an interactive professional community;

6. Clinical educators and coaches are rigorously selected and prepared and drawn from both higher education and the P-12 sector;

7. Specific sites are designated and funded to support embedded clinical preparation;

8. Technology applications foster high-impact preparation;

9. A powerful research and development agenda and systematic gathering and use of data supports continuous improvement in teacher preparation; and

10. Strategic partnerships are imperative for powerful clinical preparation (NCATE, 2010: 5-6).

When considering the inconsistent variations found in teacher training and accreditation programmes, a unified and systematic approach incorporating the ten principles identified by NCATE appears to be the most effective strategy for training teachers to effectively apply the principles and values of ESD in the classroom.

Progress of ESD teacher training objectives

Current models and initiatives for integrating ESD into teacher education programmes

This section presents and analyses a range of programmes that have sought to embed new ESD perspectives within pre-service teacher education. It identifies the processes used by the programmes, key characteristics and the professional development models that underpin each initiative. Examination of these initiatives focuses on the ways each initiative or programme aims to bring about change in teacher education.

The following initiatives are organized according to three broad models for change within teacher education: (i) the Collaborative Resource Development and Adaptation model; (ii) the Action Research model; and (iii) the Whole-of-System model. A separate section explores the trend of MOOCs on ESD.

The Collaborative Resource Development and Adaptation (CRDA) model

The Collaborative Resource Development and Adaptation (CRDA) model assumes that change toward ESD can occur through the provision of curriculum and pedagogical resources and adequate training in the use of these resources (Ferreira, Ryan and Tilbury, 2006). Innovative adaptations of this model in the environmental education field have led to the development of participatory and relevant professional development guides and resources. Several initiatives have adopted this model including: School Development through the Whole-School Approach to Sustainability Education; the Sustainability Education in European Primary Schools (SEEPS) project; the Teaching and Learning at the Environment, Science, Society Interface (TaLESSI) initiative; and the Teaching and Learning for a Sustainable Future (TLSF) initiative.

For example, the SEEPS project was initiated by a group of educators from universities across Europe (Shallcross, 2004). This continuing professional development project was designed to help teachers promote whole-school approaches to ESD in their schools. The main goal was to provide training opportunities for teachers (both in-service and pre-service) in the whole-school approach to sustainability through the creation of a resource bank of activities that could be adapted to suit local contexts. The group was led by

Manchester Metropolitan University and was funded by the European Union Comenius 2.1 Project for European Cooperation (Shallcross, 2004).

Initiatives that follow the CRDA model often incorporate a collaborative materials development phase, which engages teacher educators in the process and increases their uptake and commitment to the initiative. Some initiatives based on this model (i.e. School Development through the Whole-School Approach to Sustainability Education) also use the resource as a stimulus for more specific adaptations to suit the needs of local contexts.

According to Shallcross (2004), the model offers a number of advantages. It has the ability to reach a large target audience and is relatively cost-effective because, in most instances, once the resource is produced and disseminated there is little ongoing cost, although in some cases this perception limits the funding made available for further adaptations.

The model also has a number of drawbacks, however. Its success depends very much upon uptake and use of the resource in the current system. It targets change at the level of curriculum and pedagogy rather than at the broader systemic level. Contemporary research suggests that systemic change may be a more successful means of mainstreaming ESD within and across a system (Hjorth and Bagheri, 2006; Packham and Sriskandarajah, 2005).

Initiatives that adopt this model generally address teachers who are already interested in integrating ESD into their teaching, and who seize the opportunity to participate in developing or adapting the resource. Current interpretations of the model provide little incentive for others to take an interest in the resources.

The Action Research Model

Initiatives using this model seek to engage deeply with educators as key agents of change through a process of 'action research' (Shallcross and Robinson, 1999). The aim is to build the capacity of educators to deliver the curriculum effectively. The apparent effectiveness of this form of professional development is based on its involvement of individuals who are able to act as key agents of change within their institutions (Brydon-Miller, Greenwood and Maguire, 2003).

The two major initiatives that use this model are: 'Learning for a Sustainable Environment' and the 'Action research for Change Towards Sustainability' (ACTS). These two initiatives have proved extremely effective in engaging

teacher educators and academics and managers in a professional development process based on reflective action (Brydon-Miller, Greenwood and Maguire, 2003). Both initiatives effected changes in the curriculum and course structures through the inclusion of Learning for Sustainability principles, and in the immediate institutional climate to make it more receptive to sustainability.

The model relies on meaningful engagement by key stakeholders and support for action to ensure the success of the initiatives. The level of engagement increases both the competencies and the propensity of research participants to act for change, and thus prolongs the longevity of the intervention. In the case of the ACTS initiative, participant researchers still meet and provide mutual support two years after the completion of the project. It has also expanded to incorporate institutions that did not participate in the original process. The model recognizes that key stakeholders operate within a system that itself needs addressing if real change is to take hold. However, some difficulties may arise when implementing initiatives that adopt the action research process. Examples include the time needed to implement the project and difficulties with 'selling' the project because of a lack of 'tangible' outputs for potential funders. Current interpretations of the model have therefore focused on higher education institutions and curriculum or organizational change, and have not attempted to mainstream Learning for Sustainability across the system.

The Whole-of-System model

Initiatives that use the Whole-of-System model of professional development have a radically different approach to change than the initiatives reviewed above (Henderson and Tilbury, 2004). Whole-of-System initiatives seek not only to introduce new curriculum content and/or pedagogical processes, but also ensure that change occurs in a multi-faceted and system-wide manner (Henderson and Tilbury, 2004).

The model assumes that change towards sustainability cannot be achieved without aligning the different components within the system. The model needs to take into consideration the variety of factors and components that exist within an organization and is, thus, extremely complex. Its success depends upon its ability to leverage both top-down and bottom-up approaches to change simultaneously. The strength of the model lies in the stability created by the partnerships negotiated across all layers of the system, which enable it to effect broad-based systemic change.

An example of an initiative that has adopted this model is the Sustainable Teacher Environmental Education Project (STEEP). The STEEP project is an outstanding example from Jamaica of an effort to bring about broad-scale, systemic change. The initiative aims to transform the whole of the pre-service teacher education system in Jamaica and has, accordingly, engaged with the ministries concerned (the Ministry of Education for teacher education and the Ministry of Agriculture for the environment) (Easton, 2004). In addition, the initiative also works with the local Joint Board of Teacher Education and the National Environmental Education Council. These stakeholders play a pivotal role in the process by providing high-level, ongoing support and encouragement for the initiative.

According to Easton (2004), the initiative produced several documented changes. These include: offering professional development for ministry and teacher education officials; lobbying for policy changes and the inclusion of Education for Sustainability in national curricula such as Science and Early Childhood; garnering high-level support from government departments and agencies, NGOs and college executives; and appointing an environmental coordinator in each institution and providing supportive networks and resources to enable them to bring about change within their institutions.

Massive Open Online Courses (MOOC) on ESD

In order to maximize the outreach of ESD initiatives, some educational organizations have begun utilizing ICT resources and infrastructure to disseminate current thinking and knowledge about education for sustainability (Zhan et al., 2015). According to Johnson et al. (2013), massive open online courses (MOOCs) are a key recent trend in education technology challenging traditional models of education. MOOC courses offer professional development for teachers, head-teachers, leaders and policy-makers in primary education to enhance their knowledge and understanding of approaches to reorient existing teacher education towards sustainability (Jobe, Östlund and Svensson, 2014).

Several platforms such as EdX and Coursera deliver MOOC ESD courses. However, the majority of these courses are more concerned with the concept of sustainable development than ESD (Zhan et al., 2015). Furthermore Zhan et al. (2015) note that most offered courses adopt 'direct instruction without adopting specific pedagogies'. However, James Cook University in Australia offers a more interactive ESD MOOC course called 'Foundations in Sustainability in Education (FSE)' (Tomas et al., 2015). This course combines typical MOOC content such as video lectures and reading lists with hands-on

science experiments and real-world data collection (Ajoyce, 2017). Tomas et al. describe the activities of the FSE course as follows:

> Weekly tutorials provide opportunities for experiential learning and modelling of classroom pedagogies for science and sustainability education. Students perform simple science experiments and activities involving the simulation of the greenhouse effect in a jar, the identification of soil samples and the use of dichotomous keys to classify plants and animals. All of the activities and experiments are designed such that they can be performed with simple everyday materials, making them accessible to online students (Tomas et al., 2015).

The course also involves place-based learning and investigation of local sustainability issues. Students must produce an assessment based on their observation of local contexts in order to test their scientific and ESD pedagogical knowledge.

Despite the huge potential benefits of ESD MOOC courses, the majority encounter challenges to address ESD effectively (Ajoyce, 2017). However, strong collaboration between universities and technical companies can help bridge the gap between technology, ESD and pedagogy (Ajoyce, 2017). An example of such collaboration is the project recently launched between Google and the Queen Rania Foundation for the Creation of a K-12 Arab Online Learning Platform (Queen Rania Foundation, 2017).

Challenges in teacher education and training for ESD

Over the past decade, numerous initiatives have been developed and implemented by teacher education institutions with a view to institutionalizing ESD within the education system. One criticism of these initiatives is that most were directed at individuals already involved in environmental education or with an interest in sustainability. Examples of initiatives include 'Reorienting Teacher Education towards Sustainability' (UNESCO, 2005); the UNESCO and Griffith University 'Teaching and Learning for a Sustainable Future' project, and OECD's 'Teacher Education and School Development' (ENSI) project (Environment and Schools Initiative). Although these initiatives have taken an interdisciplinary approach to building

teachers' knowledge and skills, they have not succeeded in mainstreaming sustainability in pre-service teacher education. However, the existing ESD literature indicates that no initiative has yet attempted to mainstream sustainability into the core of teacher education programmes. Instead, most initiatives focused on integrating specific sustainability concepts into existing teacher education courses or adding new courses that address sustainability.

The literature also cited a number of broader educational and social issues that have hindered efforts to mainstream sustainability in teacher education programmes (i.e. aligning educational policies and pedagogical practices to address ESD). These have a strong influence on teacher education departments and universities, and explain in part the difficulties encountered in mainstreaming Learning for Sustainability within these institutions (Parliamentary Commissioner for the Environment (PCE) New Zealand, 2004). Education systems that support existing and dominant unsustainable social practices can present a dilemma to those attempting to bring about sustainability, as they often contradict the outcomes sought through Learning for Sustainability (PCE, 2004). The dominance of economic values such as efficiency, accountability, quality assurance and productivity are producing changes in everything from the purpose of education to curriculum, funding, management, and the role of schools and teachers (Sterling, 2001; Tilbury and Janousek, 2006). This purely business approach to education emphasizes precise 'learning outcomes' and 'performance standards and indicators' that judge success and failure on the extent to which predetermined outputs are achieved.

Another issue affecting teacher education institutions is the need to focus on core content for pre-service teachers. There is an increasing trend to identify certain areas of knowledge as core content, with the most common examples relating to literacy, numeracy and science (Donnelly, 2004). However, many ESD educators (USTESD, 2013) argue that integrating sustainability issues into existing educational curricula helps students enhance their numerical and literal competencies and enables them to develop into active and effective citizens. Integrating sustainability issues into existing educational curricula also helps improve students' quantitative reasoning and scientific understanding and enables them to apply their critical thinking abilities and problem-solving skills to the multifaceted and complex issues of global sustainability – a topic critical to all inhabitants of the planet (UN, 2015).

A third challenge facing teacher education institutions relates to teacher training and professional development models. The current international trend in teacher education emphasizes increased periods of professional

practice for school teachers (Inman, 1996). However, this raises the question of how much instructional practice is needed to achieve a level of professional preparation for in-service teachers, taking into account the limited time spent preparing pre-service teachers (Adey, 1998; McMeniman, 2004). In Australia, for example, there is a tendency to increase the time that student teachers spend in schools on work placement. However, some universities (e.g. Queensland University of Technology) have tried to create partnerships between student teachers and schools that last throughout the period of study. There have also been international calls to return to an apprenticeship model of teacher training (i.e. the UK model of teacher education) (Inman, 1996; Scott, 1996a). Advocates of this model argue that such training would be based on practice as opposed to theory, and would provide 'real-world' training (Buckingham, 2005). There are concerns among many educators, however, that such an approach would not only lead to the institutionalization of poor practices currently present in schools and a 'dumbing down' of the profession, but would also reproduce current systems that are not necessarily compatible with a Learning for Sustainability approach (Inman, 1996).

Approaches to mainstreaming Learning for Sustainability in teacher education

Despite international recognition of the significance of teacher education as a means to advance the status of ESD worldwide, there is still a need to mainstream Learning for Sustainability into pre-service teacher education in a consistent and coherent manner (Brinkman and Scott, 1994; Tilbury, Coleman and Garlick, 2005). Some educators argue that this is the result of a gap between rhetoric and reality. This gap has been the subject of much investigation and speculation (Ballantyne, 1995; Posch and Rauch, 1998; Scott, 1996a, 1996b; Spork, 1992; UNESCO, 2005a), and the following factors have been documented as possible explanations:

- lack of consumer demand for Learning for Sustainability expertise from teacher registration boards, school communities and student teachers (Ballantyne, 1995);

- competition for time in already overcrowded curricula, which tends to relegate ESD to elective courses (Ballantyne, 1995);

- lack of cross-curricula dialogue and unwillingness to cooperate across discipline boundaries within teacher education (Thomas, 2004; Williams, 1992);
- shortage of teacher educators with strong expertise in sustainability (Oulton and Scott, 1995; Papadimitrou, 1995);
- diverse standards, structures and procedures across teacher education institutions (Scott, 1996a);
- lack of professional development models that are congruent with Learning for Sustainability approaches (Tilbury, 1992); and
- an inability to plan and strategically manage change within education systems (UNESCO, 2005a).

Although the most popular approach to integrating sustainability into teacher education programmes is to 'work within current structures', some educators criticise this approach as promoting a diluted version of sustainability (Huckle, 1996). They argue that these changes cannot be sustained due to the misalignment between the guiding thinking of the programme and its methodology. Other educators drawing upon the body of organizational change theory argue that small incremental steps that introduce cultural change gradually are necessary in order to effect broader and far-reaching systemic changes (Atkisson, 1999; Thomas, 2004). The large body of literature on organizational change (Clark, 1993; Doppelt, 2003; Dunphy et al., 2000) can provide guidance here, especially with regard to recognizing the stages of organizational change and identifying where change occurs within a system.

Emerging frameworks for teacher education for sustainability

In recognition of the weaknesses and drawbacks of the above-mentioned initiatives, several calls have been made to reform the approaches and methodologies used to mainstream ESD into teacher education systems. This section briefly outlines these approaches.

- *Competency frameworks:* this is the scaffolding around which teacher education courses are constructed. The competencies in question are

usually generic skills that graduates must demonstrate over the course of their degree. The notion of competency-based frameworks for pre-service teacher education has sparked a wide and ongoing debate in education circles (Queensland Board of Teacher Registration, 1993) around whether the complex skills involved in effective teaching can be broken down into separate and distinct competencies. Some argue that such an approach is simplistic and mechanized and may lead to the further de-professionalization of teaching (Inman and Champain, 1996). Others have argued that a more complex interpretation of a competency-based framework can facilitate the planning of education provision and provide a platform to ensure that ESD is addressed in a strategic and targeted manner (Cutter-Mackenzie, 2003; Fien and Tilbury, 1996), Inman and Champain, 1996; Wilke, Peyton and Hungerford, 1987).

- *Content frameworks:* the diversity of competencies that student teachers are expected to demonstrate requires a variety of approaches and content in student courses. As the provision of a prescriptive course structure for every education student is not appropriate, some environmental education scholars have offered essential content in Learning for Sustainability for pre-service teacher education programmes (Huckle, 2005; Käpylä and Wahlström, 2000). Examples of such offered content include: Environmental philosophy and ethics, History of education, Philosophy of education, Geography, Engineering, Sociology of education, Cultural studies and educational psychology, and Political and citizenship education. Such grounding in sociology, philosophy, history and politics helps teachers to critically examine the social, cultural and political contexts within which education occurs and to understand the discourses that shape current education systems. This is particularly relevant to ESD as a crosscutting theme that aims to challenge unsustainable thinking and practices (Huckle, 2005; Orr, 1992; Sterling, 1996).

- *Pedagogical frameworks:* This framework is designed to support the paradigm shift required for ESD to transform both education and people. Such a shift necessitates pedagogical approaches that differ substantially from traditional teaching styles (Robottom, 1987). Teacher education programmes that adopt this new paradigm would not only introduce systemic views of the economy, environment and education, but also employ critical pedagogy approaches (Tilbury, Podger and Reid, 2004).

Case studies on teacher education for sustainability

The previous section discussed models of teacher education for sustainability. This section presents several case studies chosen from around the world to demonstrate how ESD is being integrated into teacher education and preparation systems.

Professional teaching standards and Learning for Sustainability in Scotland

In 2013, the General Teaching Council for Scotland (GTCS) launched its revised professional standards, which apply to all registered teachers in Scotland (UK National Commission for UNESCO, 2017). The new standards embedded Learning for Sustainability in the criteria that all registered teachers and education professionals are expected to comply with throughout their careers.

The new standards were introduced following a decision by the Scottish Government in 2012 to implement the recommendations of the *Learning for Sustainability Ministerial Advisory Report*, which encompasses the whole school experience of 3-18-year-olds. Learning for Sustainability encompassed ESD, global citizenship and elements of outdoor learning. The report includes four key commitments:

1. All learners are entitled to Learning for Sustainability.

2. Each practitioner, school and education leader should demonstrate Learning for Sustainability through their practice.

3. Every school should have a whole-school approach to Learning for Sustainability that is robust, demonstrable, and evaluated and supported by leadership at all levels.

4. School buildings, grounds and policies should all support Learning for Sustainability.

According to the UK National Commission for UNESCO (2017), this suite of standards provides a framework for all teachers to examine, inform and continually develop their thinking and practice throughout their professional career. The standards relate to 'registration', 'career-long professional learning'

and 'leadership and management'. Learning for Sustainability is embedded throughout the Professional Values and Standards that all registered teachers/education professionals are expected to demonstrate in their practice irrespective of their career stage.

The integration of Learning for Sustainability into national education policy led to systemic change in Scotland (UK National Commission for UNESCO (2017). Previously, Learning for Sustainability was undertaken by committed individuals in schools or universities. Now, every local authority, teacher education provider, school and individual teacher is obliged to demonstrate Learning for Sustainability in their relevant educational contexts. It is also a significant feature of the new general evaluation framework for schools, 'How Good is Our School?' (UNESCO, 2005a). In addition, teacher education programmes are accredited and must reflect the values and expectations listed in the Professional Standards Framework. An audit tool to ensure that Learning for Sustainability features prominently is currently being developed by the government and the Scottish Regional Centre of Expertise on ESD.

International education through distance learning: the Post-Graduate Education for Sustainability Programme at London South Bank University

The post-graduate Education for Sustainability Programme at London South Bank University was established in 2004 by a consortium of NGOs and academics in response to the Rio Earth Summit's call for education to play a key role in sustainable development. The programme was developed as a distance-learning course to ensure the broadest possible access by educators from all global regions, and is funded by the European Union and WWF-UK. It is designed to be relevant and applicable to real-world situations and encourages active engagement with the business, public and not-for-profit sectors (UK National Commission for UNESCO, 2017).

The programme offers courses that cover the theory and practice of ESD. It provides capacity-building for educators from NGOs, environmental journalists and conservation organizations from over forty countries, and contributes to policy and practice, for example, through the development of case studies for the United Nations Environment Programme (UNEP).

The programme's online learning component has enhanced its capacity to attract a wide range of participants from across the globe. Many of those participants have gone on to act as change agents with their subsequent institutions or employers (UK National Commission for UNESCO, 2017).

Additionally, many students attending with a Commonwealth African Scholarship now hold key positions of influence in education ministries, universities, news media, African RCEs and environmental NGOs. This group has formed a strong learning network on ESD practice that covers the whole African region, especially Kenya, Nigeria, the Seychelles and Zambia. As a result, regular independent review processes have evaluated the Education for Sustainability Programme as highly effective in promoting transformative learning and critical thinking.

Faith-based teacher education for ESD in Kenya

The aim of this programme is to create an ESD Teacher's Toolkit to inspire faith-motivated environmental education in religious schools, starting with Kenya and using eco-schools as a strategy for implementing practical micro-projects for active learning. The underlying concept was that integrating religious wisdom and practices into educational materials would provide children with an opportunity to acquire holistic knowledge, practical experience and a sense of responsibility towards environmental conservation. The ESD Teacher's Toolkit targets primary school teachers and learners and divides ESD into seven thematic areas: water, waste, energy, biodiversity, agriculture, climate change and health, sanitation and hygiene. Each theme begins with a brief introduction followed by faith-based reflections and finally suggested activities for teachers and learners including values and skills to be instilled among learners.

The programme was developed by the Alliance of Religions and Conservation (ARC) and the Kenya Organization of Environmental Education (KOEE) in partnership with Christian, Muslim and Hindu faith groups, and government departments. KOEE spearheaded the initiative which was launched in Kenya in 2012. The different faith groups and professional stakeholders worked together to develop the religious and spiritual values component of the ESD Teacher's Toolkit. ARC's faith partners included several Catholic denominations of Kenya and the Supreme Council of Kenya Muslims, as well as curriculum and environmental experts, teachers and policy-makers. In total, thirty-five schools covering all six regions of Kenya participated in the project.

An environmental audit was used to identify each school's local needs and to select the relevant micro-project from among the seven thematic areas of the Teacher's Toolkit. The pilot stage of the programme succeeded in training more than 100 teachers and faith leaders in mainstreaming faith values into ESD, including the relevant methodologies.

The faith-based programme and the Teacher's Toolkit enjoyed notable success through their involvement of the wider community, which led to the roll-out of the initiative in other communities through local faith groups. KOEE in collaboration with ARC and the Kenyan NGO Act Change Transform launched two non-formal faith-based ESD projects in Western Kenya. These focused on combating climate change and enhancing food security in four counties. They built on the faith-based ESD Teacher's Toolkit as well as ARC's four-year programme to encourage faith groups to address issues relating to climate change, environmental degradation, biodiversity loss and sustainability.

The faith-based ESD teacher's programme and the Teacher's Toolkit have proven an enormous success since the initial launch in July 2012, and have been eagerly welcomed by faith groups in Africa. Their effects have been applauded by secular organizations including education, curriculum and environment authorities. The programme has been piloted in Tanzania and Uganda and has also attracted interest from groups in Indonesia and India.

Queen Rania Teacher Academy ESD Teacher Network in Jordan

The overarching goal of the Queen Rania Teacher Academy (QRTA) ESD teacher training network is to foster behavioural change and respect for the environment by training teachers in specific pedagogical approaches and practices that are conducive to changing students' perceptions and attitudes towards the environment (www.qrta.edu.jo).

Four closely-related strategies that build on and support teacher competencies and impact in the classroom are utilized during the programme's implementation. The first comprises the development of teaching networks to support the implementation of new teaching practices and build cultures of continuous improvement in schools. The second strategy consists of the delivery of five professional development training workshops that emphasize an interdisciplinary, project-based approach to ESD instruction. The third strategy focuses on establishing Environmental Clubs in each school to raise awareness and promote sustainability practices and projects in schools and the communities, and encourage change in students' attitudes and behaviours. The fourth strategy involves the implementation of school-based projects to support energy and water conservation and waste reduction in each school of the teacher-training network.

Over a period of two years, teachers participate in six face-to-face training workshops on ESD. The first workshop introduces the notion of sustainability and the importance of realizing its aims in daily life. The second and third

workshop work with teachers to transform their teaching practices so that they embody and transmit the values of ESD. The fourth workshop focuses on designing school and community-based ESD projects and activities. The fifth workshop is intended to enable teachers to lead ESD-based projects in their schools and communities. And the sixth workshop is designed to help teachers build professional learning communities both inside their own schools and with neighbouring schools. In addition, participating teachers receive intensive school-based support from trainers to help them implement the lessons they have learned inside their classroom. Teachers are selected from across the curriculum to emphasize that ESD is relevant to all subject areas, not just science and geography.

To date, five cohorts totalling 2,000 teachers have participated in the programme. Graduate teachers continue to receive support through online communications and social media channels.

A multi-year partnership to mainstream ESD in teacher education in southern Africa

In 2011, in response to current challenges facing science and society (Wolfgang, 2012), practising educators from Swedish and Southern African Development Community (SADC) universities formed a partnership to develop strategies to address relevance and quality in teacher education. The partners from southern Africa were four affiliates of the SADC Regional Environment Education Programme (REEP) teacher education network, the University of Zambia, Belvedere Technical Teachers' College and Rhodes University. The two partners from Sweden were Jönköping University and SWEDESD, UNESCO and SARUA . The outcome of the partnership was the Education for Strong Sustainability and Agency (ESSA).

The aim of ESSA was to enable teacher educators and their institutions to introduce innovative methods and relevant pedagogical content related to ESD into their syllabuses and working practices. Programme implementation went through three distinct stages: conceptualization and development, testing and institutionalization of ESD. The activities were piloted with the collaboration of leaders and staff from teacher education institutions from all fourteen SADC member states.

Although the participating teacher educators developed capacities to integrate ESD into their teaching and learning, problems emerged from the tension between demands for transformation and the demands of the dominant assessment culture, and inadequate policy support. In response,

partners from all the participating countries launched a new dialogue with national teams comprising twenty-four key education officials (six from each country) from four SADC countries (Botswana, Mauritius, South Africa and Zimbabwe). The hope is that continuing dialogue will help all partners overcome their frustrations and work together to advance existing educational policies in the participating countries to help establish relevant assessment strategies for student learning.

Conclusions

The concerted efforts of the international community, non-governmental and governmental agencies, academic and religious institutions, and civil society have raised the level of international awareness about ESD and positioned it at the vanguard of educational discourse and policy.

However, many teachers in many classrooms still remain unaware of the transformative nature of ESD and its effectiveness in promoting competent and socially active learning among students. Teacher training and accreditation institutes need to incorporate sustainability competency standards and transformative pedagogies into both pre-service and in-service training/preparation programmes. Competency standards should require all pre-service teachers to be able to prepare K-12 students to become responsible citizens capable of working towards an environmentally sustainable, globally interconnected, equitable and diverse society. Accordingly, the ultimate goal of teacher training should be to prepare sustainably literate teachers to achieve the transformative goals and objectives of ESD.

The international community has placed a tremendous amount of faith in the ability of education to attain the liberating objectives and goals of ESD. Yet, the discrepancies that hinder those efforts are linked to the very same institution responsible for eliminating them – the classroom teacher. The pedagogies required to nurture the transformative power of education require more from teaching than the ability to read. Teachers need to help their students acquire the necessary skills to reflect on their relationship with the natural world, and alter their behaviour and the way they respond to the physical environment.

The transformative perspective of education should guide all initiatives and teacher education programmes for ESD. Transformation in the context of ESD

should target three major players: teachers (*what it means to be an educator*), pedagogy (*transformative approaches to teaching and learning*), and education systems (*the whole system*).

Transforming what it means to be an educator is necessary because education systems consist of the people who work within them. Changing those systems means supplying educators who are able to change their own practice as critical, reflective practitioners. *Transformative pedagogy* should draw on the experience of learners and create opportunities for participation and the development of creativity, innovation and the capacity to imagine alternative ways of living. *Transforming whole education systems* is necessary to ensure that the system provides education that predisposes learners to consider sustainability across their life choices.

Together, these transformative perspectives will help analyse the extent to which sustainability is mainstreamed in teacher education programmes.

Chapter 7

Youth on the move: intentions and tensions

Priya Vallabh

Introduction

This chapter concentrates on the diverse and constantly evolving topic of action being taken around by the world by youth to promote education for sustainable development (ESD). Despite the breadth of the topic, key trends and patterns emerge across the spectrum of activities being undertaken or involving this group. To make tracking the range of activities clear, this chapter differentiates ESD work involving youth into programmes designed for youth and programmes designed by youth. It is also useful to note that while projects are grouped under these sections, many ESD initiatives are complex with multiple forms of learning and engagement. The descriptions below provide a means of orientation across a diverse landscape of practices, and should therefore not be seen as rigid or unchanging. Rather, they provide a way to describe, think about and discuss the work being done for, by and with youth around ESD.

In the context of this chapter, the term 'movement' is used to describe collaborative efforts for achieving sustainable development – in other words, a range of social learning movements that engage youth in ESD activity. The first section, 'ESD movements developed for youth', describes a selection of influential initiatives in the field of ESD programmes developed for youth. It highlights prominent objectives and trends and related tensions within this area of work. The second section, 'ESD movements developed by youth', provides a counter narrative, describing emerging trends within movements

initiated by youth themselves. Again, the text describes some key objectives and tensions within this area of activity. The final section, 'Emergent reflexive processes for working with youth', highlights a range of emergent pedagogies aimed at strengthening and developing youth-related ESD work. This section responds to the tensions highlighted in the previous section, and describes a range of social innovations currently active across the world.

While the focus of the chapter is on learning, youth-related ESD work often manifests itself first in the form of local socio-ecological actions (including economic activity), before developing into more formalized learning activities. These actions themselves provide a range of learning opportunities.

Youth

The term 'youth' is used in a variety of ways around the world to describe the period between childhood and adulthood. The United Nations (UN) describes youth as persons between the ages of 15 and 24 years (UNESCO, 2017). However, regional and local definitions of youth vary, and extend up to the age of 35 in many regions of the world including South-East Asia, South America and sub-Saharan Africa. In some cultures the term is associated with a particular gender. There may also be different definitions for young men and women, defined by separate rites of passage into adulthood including employment status, and childbirth and marriage. The term can also be used loosely to depict the period of transition from dependence to independence. This period involves significant activity around the development of self-identify, and is characterized by a process by which youth review the society in which they are situated, with a view to making personal choices. What it means to be a young person varies greatly in terms of circumstances, rights and responsibilities, as well as cultural and social situatedness. Race, gender, family context, religion, social position, economic context, education, and local and national contexts all work to shape what it means to be a youth in any particular place at any given time. Youth are neither a generic and uniform social group, nor are they easily defined or described. In the context of this chapter, the term is used broadly to define young people (aged 15-35 as defined by UNESCO) who are engaging in ESD-related activities.

Youth have been engaged in environmental learning, sustainable development and justice movements for decades. As a demographic, they are especially vulnerable to the impacts of environmental degradation, social injustice and economic privation, and are also affected through their situation within families and communities (see Kelly, 2001). They occupy a social position of limited access to resources and decision-making power that

often acts to magnify the risks affecting them, and are even more physically vulnerable to risk than the elders within their communities.

At the same time, youth are also often best positioned to change, redress, reconfigure and renew the social systems that place them at risk. Children and youth will experience the current context of risk for the longest period of time and are expected to address the challenges it presents. ESD priorities related to youth are rooted within the specific contexts in which communities of youth are situated; what is being done, why it is being done, who is doing what and how these ESD activities are being done are all likewise rooted within the unique, specific and complex contexts that youth inhabit. Youth often form part of mainstream ESD actions through their families and communities through resistance movements, neighbourhood clean-ups or other forms of action.

There is also growing acknowledgement that increasing the general understanding of ESD-related issues is not sufficient to effect lasting change. Rather, it is necessary to develop the competencies that enable real change at different levels among all peoples and regions of the world (for examples see UNESCO, 2016; Wiek, Withycombe and Redman 2011). This has led to an increase in approaches to foster youth engagement in ESD actions to address sustainable development challenges.

The first section of this chapter explores a range of approaches to ESD designed by adults to engage and educate youths about the issues involved.

ESD movements developed for youth

A wide range of ESD programmes have been designed for youth, globally. Many of these programmes aim to work with and for youth to mainstream more conventional or dominant sustainable development practices. What defines these approaches is that they are developed, funded and implemented by adults, most often through formal social structures such as government programmes, schools and formal large-scale projects, or through national and regional programmes. These initiatives include policy frameworks, initiatives within formal schooling systems, social innovations and interventions, value frameworks, and initiatives aimed at inducting young people into both revised, contemporary and more traditional ways of being.

A significant advantage of this approach to ESD is that the stakeholders developing these programmes often have access to resources, funding and expertise that they are able to share with young people through these projects. Programme managers and coordinators have a working knowledge of the systems and governance structures impacting on their area of work, and generally also have expertise and a history of engagement in their chosen areas. As a result, these programmes are more likely to be easily upscaled and absorbed into existing social structures.

Key trends towards the mainstreaming of ESD into social structures

Historically, youth have been framed in quite specific ways within global education discourses. Strong emphasis has been placed on the relationship between education and unemployment, in particular the need for greater access to schooling and stronger skills development within the schooling system, and on youth as a group at risk. While this trend is still evident in current discourses, there is also a growing body of counter discourses, especially within the ESD field, that aim to challenge and broaden this limited role for education. Key global undertakings in this regard include UNESCO's *Rethinking Education* report, the Sustainable Development Goals (SDGs), and the Earth Charter, among others. These four undertakings encompass a series of aims designed to help establish a more just and sustainable planet at the macro level. They share a joint interest in the collective and common good, stronger social and ecological justice, and global sustainable development as educational imperatives. Their specific aims regarding youth are described in the following paragraphs.

The 2015 report *Rethinking Education: Towards a Global Common Good?* reframes education as a response to current matters of global concern. In particular, it emphasizes 'a humanistic vision of education as an essential common good'. This approach promotes a vision of education that transcends its use as a utilitarian tool for economic development, and stresses its capacity as a tool to promote inclusivity and universal ethical principles, and act as a central component for building the knowledge and skills needed for sustainable development. While the discourse surrounding youth still revolves predominately around access to education, and the ongoing relationship between education and employment, the report also highlights the need to temper this viewpoint with a more humanistic approach to education. Stronger emphasis is placed on sustainable development as a central good, and on reorienting the market-driven model of education towards understanding education as a common good.

The Sustainable Development Goals (SDGs) resonate with the framework provided by the *Rethinking Education* report and the conceptualization offered by global citizenship education. These 17 universal goals constitute a call to action aimed at ending poverty, protecting the planet, and ensuring that all people have the opportunity to enjoy peace and prosperity. While youth are only mentioned specifically in relation to two goals (quality education and decent work and economic growth), they are implicated in all the goals, and a number of partner projects have been geared specifically towards youth and the SDGs.

The Earth Charter provides a collaborative and negotiated ethical framework for building a just, sustainable and peaceful global society. While the charter itself mentions youth only once, in regard to access to education, the broader initiative places great emphasis on work with youth across multiple platforms and social initiatives.

Between them, these three undertakings signal a shift away from economic imperatives for education and development, and towards a central focus on the common good. They reflect a consolidated global effort to frame ESD more broadly, and to reposition the types of activities designed for youth within the specific contexts of movements and programmes aimed at engaging youth in ESD.

Tensions arising within ESD for youth

While these initiatives collectively provide a powerful system of guidance for ESD for youth, they also position youth in particular ways and give rise to a number of tensions that require attention. The following discussion explores four such tensions and highlights potential processes for engagement.

Engaging with utopianism: The initiatives above frame a collaborative and global orientation to ESD work for and by youth. However, they are aspirational rather than specific in nature, and stand in stark contrast to the complex and often dysfunctional world in which young people find themselves. Lotz-Sisitka (2008) highlights the utopian nature of this form of construction, noting that the powerful 'idealistic universal franchise' under which these ideas are constructed renders them difficult to challenge, while leaving them wide open to multiple interpretations, misinterpretations and appropriations. She explains that they can 'easily become doxic knowledge – accepted as taken for granted, and practised with little regard for real meaning and purpose' (Lotz-Sisitka, 2008: 44). There is a risk that programmes working with youth could engage in processes that adopt a doxic view of

these utopian ideals through uncritical educational approaches and content, contributing to static and potentially superficial engagement with shared matters of concern.

Absence of youth involvement at political and policy levels: The significant lack of representation by youth in areas that work to build systems and develop shared aspirations, goals and priorities is a key concern. Young people's priorities are most often represented by proxy and are based on research conducted on youth. Historically, few processes have engaged directly with youth to acquire their views and priorities, or included them as collaborators in the processes that inform strategic decision-making. While several examples exist of programmes involving youth in implementation of initiatives, self-representation at the strategic and policy level remains problematic worldwide.

Positioning of youth: Although there is a clear intention in the initiatives described above to induct youth into more just and sustainable ways of being, youth are also still largely positioned as recipients of culture, education and adult wisdom. Ideologically, this informs the construction of what it means to be a youth, and limits the pathways through which youth can legitimately influence and engage in ESD initiatives. Youth are both iconized as the hope for the future (Lotz-Sisitka, 2008) and positioned as receivers of cultural and ideological induction. In practice, this means that programme activities are designed and developed by adults who have access to and power within existing structures, and frame what should be done for and by youth within their programmes. Youth are then involved at the adoption stage. Even in cases where youth are invited to contribute and debate ideas, resources are still mostly controlled and divested by adults, These dynamics influence the choices regarding which programmes are prioritized and how resources are allocated within programmes. It also limits the transformative potential for youth participants to shape or influence these movements across programme structures. Finally, it raises the question of whether such participation is equitable and whether programmes involving youth simply work to induct youth into adult ways of being or enable youth to represent themselves and their own views of the world in authentic ways.

While it is important to engage with youth at all stages of decision-making, it is also critical to help them differentiate between activist approaches and research-backed responsible action. Mentoring is an important tool to facilitate knowledge transfer and guidance. It can help to position and engage with youth in a meaningful manner and avoid intergenerational conflicts.

Responsibilization: This term devised by Kelly (2001) describes the individualization and attribution of responsibility in youth. Kelly argues that the processes through which youth are constructed as 'at risk', and the contexts of risk within which they are situated (economic, social and ecological), work to individualize (Beck, 1992) and responsibilize youth in particular ways. Drawing on Beck, Kelly argues that responsibility for the world and for addressing risks that affect society is increasingly devolved to the individual; in other words, young people as individuals are expected to address and resolve the challenges facing them. Failure to manage and resolve these risks is perceived as a deficiency. By ascribing the responsibility to change and the failure to change to the individual, it is possible to lose sight of the reality that the structures of the broader socio-economic system itself generate a large number of side effects. The danger is that non-compliant youth can be framed as deficient and that the ESD initiatives developed to engage them may focus on addressing these perceived deficiencies, rather than engaging with the underlying structures and systems that interact on and with youth.

These four tensions necessitate critical engagement with the reasoning behind the aspirations and intentions of ESD initiatives. They highlight the need to build the personal capacities of educators, as well as those of the young people with whom they work to engage in forms of education that foster and strengthen reflexive, socially relevant and contextually situated learning and action. Simply put, it is not enough to promote and teach the aspirations fostered by the initiatives described above; it is also necessary to strengthen the reflexivity that supports critical engagement with these aspirations, both within educators and within the young people who may become them.

ESD movements led by youth

The previous section considered ESD projects designed for youth. Some of the broader questions stimulated through this discussion include: are there 'youth-only' spaces or only spaces legitimated by those who are not youths? Are these spaces open to change, influence and adaptation by youth, or are they pre-designed with limited opportunity for reformation and youth-shaped change? This section explores youth-led ESD movements by illustrating specific aims and intentions of young people active in ESD, and examines tensions arising within this area of activity. The section deliberately omits youth-led ESD movements that reflect the initiatives described in the first

section and instead focuses on other areas of activity. However, it should be noted that numerous ESD projects led by youth draw on these initiatives and seek to mainstream ratified approaches to ESD into different systems.

Youth-led approaches have the advantage of authenticity in representing the voices and views of youth – albeit those who are either leading a project or are actively engaged in project activities. ESD in this context is articulated, designed and implemented by youth, and accordingly foregrounds youthful priorities. These approaches often lend themselves to new perspectives and visions that originate outside social structures which can otherwise inhibit and constrain mainstream ESD initiatives.

The rising cultures of youth: some key intentions

The mainstreaming of conventional sustainable development practices reflects an interest in upscaling initiatives that support the uptake of such knowledge and practices into existing social structures, with an interest in adapting such structures or making them more socially, economically and ecologically robust on the basis of established and widely accepted ESD-related mandates. One area of activity in discordant harmony with this approach is 'radical systems criticism'. Radical systems critique points to a determination to transgress, transform and radically reform existing social, economic and ecological structures on the basis of significant social and ecological injustice, because they are fundamentally flawed and incompatible with the principles of ESD. The term 'transgressive' is used in this context to describe actions and forms of learning that challenge, violate and re-imagine accepted social boundaries (hooks, 2014; Lotz-Sisitka et al., 2015). The intentions described below attempt to articulate some of the ways in which youth are engaging in radical systems critique and transgressive cultural re-creation within ESD. In the wake of this critique a plethora of subaltern cultures, third spaces and social innovations emerge that speak to a re-imagined world, as well as representing an alternative to social disruption. While it is clear that radical systems critique enables both productive and destructive social engagements, the following section focuses primarily on productive outcomes.

In recent writings, Kulundu (2017) articulates and teases out what she terms the 'rising cultures' that youth reach for, aspire to and embody; simply put, she points to the ways in which youth leaders work to articulate alternative cultures that more authentically reflect the challenges they face, as well as the emerging cultures that they work to create and embody in response to these challenges. Rising cultures emerge through a relationship with radical systems

critique, and what bell hooks describes as 'a way of knowing that is often expressed through the body, what it knows, what has been deeply inscribed on it through experience', which she terms 'embodied knowledge' (hooks, 1994: 91).

Youth engage in radical systems critique in a number of ways including (but not limited to) a range of insurgent practices, consciousness movements and activities through which they contest youth identities and idealization in the context of – and often in response to – a planet at risk. Underpinning many of these potentially transgressive actions is engagement with the politics of being, where they challenge both how they, as youth, are socially constructed, and the social, economic and ecological contexts within which they find themselves. These processes involve social critique through resistance, dismantling and critical review, and social generativity through the creation of new ideas, sub-cultures and identities, and can be either collective or pluralistic in nature. Matters of identity and ethical orientation are of particular significance, as youth wrestle with, appropriate and challenge current ways of being. Many youth (although certainly not all) begin to actively seek alternatives to the systems around them, and through that process, open up opportunities for multiple forms of learning.

Youth participate in radical systems critique and contribute to rising cultures through a range of interactions. 'Occupy', 'Anti' and '#Must Fall' movements have become prolific, and are able to leverage considerable political and social power. The availability of networked and mobile technologies has provided accessible, low-cost platforms for insurgent performance and visual arts, and there are increasing numbers of sub and fringe cultures through which youth adopt and demonstrate alternative models of economy, social cohesion and environmental sustainability. Meanwhile, hubs, hives and micro-communities are emerging and gaining support across the world. All these relationships between critique, transgression and re-imagination are complex, multi-fold and are born out of the unique contexts within which youth find themselves.

Tensions emerging from youth-led approaches

Youthful idealism: As with utopianism, discussed in the previous section, concerns have been raised about the idealism of youth (Lotz-Sisitka, 2008). While youth can contribute their experiential knowledge of the world, they have had fewer opportunities to engage with more complex social processes that contribute more broadly to the formation of risks. This can lead to perceptions and understandings of the world that are sometimes

shallow or biased towards those impacts they have directly experienced within their specific contexts. This can, in turn, lead to narrow views of the challenges they face and the possibilities to address such challenges, or to idealized conceptions of what can be done and how it should be done. This is not to say that youth are always, or even often, biased or shallow in their engagements – many youth-led movements engage in sustained and systematic activities of knowledge building and engagement. Rather, the potential exists for such approaches to become central to the way that a youth movement frames its work.

Mainstreaming and structural integration: While youth often appear to be successful at transforming their own lives or driving small-scale movements, they are less successful at upscaling these ways of seeing the world or living in the world into broader social systems. Although there are many documented cases of youth mobilizing to disrupt social functioning at particular moments in time, they are less adept at dismantling the structures that enable society to adopt these functions more broadly. In other words, youth are less effective at targeted and sustained structural impact than they seem to be at disruptive movements and small-scale localized innovation systems. This can lead to dysfunction when youth raise legitimate concerns but do not have sufficient capacity or are not enabled to bring about change at a structural level. A number of programmes have emerged internationally to help youth understand and access such structures, to enable them to more effectively influence change. However, these programmes usually involve relatively small numbers of youth due to their intensity.

Excluding the other: One blind spot in many youth-initiated and youth-led projects is a tendency to exclude. Through their very critique of social systems, youth-led initiatives can generate a range of 'others' who are excluded or rendered voiceless, invalid or illegitimate. Of particular note are immigrant groups, who are vulnerable to multiple forms of exclusion through their marginalized social status, and are often disconnected from the social spaces where youth meet and collaborate. Other such excluded individuals include those in power within structures that oppose the views and priorities of youth, as they begin to challenge and seek to disrupt those structures. 'Othering' is not unique to youth-led movements, and here, as elsewhere, can give rise to new forms of injustice, exclusion and marginalization.

Misrepresenting youthful ways of being: Tension also arises from the ways in which youth, and the actions and reactions of youth are taken up and represented in popular media, research and policy discourses. Whether youth perceive themselves in the ways they are represented by others, and whether

they endorse the motives ascribed to them through the range of social representations taken up globally, is uncertain. Similarly, the ways in which groups of young people adopt roles representing youthful ways of being, and the priorities and views of other youth can be problematic. Again, this tension is not unique to youth-led movements, but is worthy of consideration in this context.

The following section describes some of the catalytic and innovative methodologies currently being employed to support young people as they navigate and respond to these and other tensions affecting youth and ESD. It draws on the strengths outlined above and provides insights into ways to leverage these strengths in ways that consider and begin to respond to these tensions. The methodologies consist of reflexive processes for working between aspirational ideals and the realities of local contexts that are complex, uncertain and evolving.

Emergent reflexive processes for working with youth

The earlier section on ESD movements developed for youth highlighted challenges of deeper engagement and political power for young people, while acknowledging successes brought about through the use of semi-formalized and formal resources to mainstream and upscale projects. The section on ESD movements led by youth noted that self-driven, youth-led movements that give rise to a tide of rising cultures, and flourish in the spheres of political protest, small-scale community initiatives and self-transformation movements (e.g. sufficiency and efficiency strategies), generally fail to access and transform wider social structures and processes. Together, these two sections highlight a need for projects that are able to both support youth to influence and transform social structures in real and sustained ways, and which maintain authentic youth-identified priorities and viewpoints.

In response to the tensions in the two approaches described above, this section aims to open up a discussion on some of the catalytic and innovative methodologies being employed in work for, by and with youth within the ESD arena. It draws on the strengths outlined in the discussions of intentions, and provides insights into how these strengths can be leveraged in ways that take account of and begin to respond to the described tensions. The

methodologies presented below outline reflexive processes for working between aspirational ideals and the realities of local contexts that are complex, uncertain and evolving. These approaches share a common interest in being reflexive (where reflecting on context, learning and action becomes part of pedagogic practice) and emergent (where what is relevant or needs to be learnt, how it is learnt and what is done with this new knowledge emerges from context and social interaction).

This section attempts to reconcile the gaps between these approaches by considering ways to pedagogically strengthen ESD work for, by and with youth that enable young people to promote their own agendas, while connecting them to communities, systems, and technologies that strengthen their core knowledge and skills. In this context, it explores possibilities for collaboration between youth and adults as co-constructors of ESD movements.

Finding the balance between educating young people and enabling them to challenge and shape the movements in which they participate is neither straightforward nor simple, and there are no easy formulas. However, many groups around the world have begun to develop transformative and transgressive approaches to ESD work with youth. All the approaches in this section share the challenge of working in contexts of uncertainty, mutual vulnerability, and shifting and fluid power relationships. They can be volatile, difficult to manage, prone to internal challenge by some or multiple groups within any one movement, and slow to generate tangible progress towards achieving project outcomes. Nevertheless, they share strengths such as enabling the possibility of more equal and distributed power relationships, greater degrees of transformative action, and more authentic participation among and between different groups within ESD movements. They focus both on providing supportive mechanisms to strengthen young peoples' abilities to engage in sustained large-scale transformative ESD actions, and on working alongside youth in co-engaged ways. The following examples are illustrative, rather than comprehensive.

Intergenerational learning: this approach aims to bring people of various ages together to participate in purposeful and mutually beneficial activities. Such engagements seek to deliberately create interactions and provide opportunities to interrogate, and possibly reconfigure dominant narratives, cultural configurations and ways of being. A key aspect of these forms of activity is an interest in youth and adults both playing active leadership roles across learning, organizational and project levels, and working as peers and co-collaborators. There is an attempt to develop authentic co-governance

strategies that potentially permeate all aspects of a movement. Hollingshead et al. particularly advocate the role of transformative leadership as key within intergenerational programmes. They note that: '[i]ntergenerational learning and transformative leadership intersect when different generations share their knowledge and resources in order to help one another achieve the perspective and means necessary to enact sustainability' (2014: 29).

Counter dialogues and change-oriented dialogue: Building on intergenerational learning, this approach provides opportunities for groups with multiple, and quite possibly, oppositional views to engage with each other around a common area of concern. Such engagement provides a chance to deepen understanding of a shared issue through a process of exchanging multiple views, experiences, impacts and realities within the same movement. All parties in the dialogue are at least somewhat open to shifting their viewpoints or coming to a common understanding of an issue, although consensus is not the aim of the dialogue. Rather, this form of engagement provides a platform for groups to come to an understanding of other positions, and to identify ways of working together towards a common agenda in spite of differing viewpoints, priorities or levels of engagement. One example of this approach is the Mekong Peace Journey in South-East Asia, where participants from a number of countries engage in cultural historical dialogues with one another, to reach an understanding of other lived experiences, and then begin to reconcile peacefully.

Nurturing maker and re-imaginer cultures: this approach engages youth in re-imagining their reality, and in building the ideas, tools and social processes to realize their re-imagined visions of the world. While the term 'maker culture' is most commonly used in relation to technology, within the ESD arena it also encompasses repurposing, re-design and innovative design cultures. It also provides ample opportunities and platforms for youth to engage with one another, which in turn helps foster the imaginative capacity of youth through art and culture.

Co-engaged learning: co-engaged and co-produced learning actions and knowledge-building approaches involve the development of reflexive social learning encounters in response to complex and uncertain contextual and global risk. All participants are considered holders of valuable, albeit differing knowledge (e.g. research expertise, understanding of local conditions, cultural knowledge, etc.). Collaborators work together to develop a shared understanding of the challenge, and discuss what can and should be done in response, and then act in multiple configurations to address the risk.

Collaborative social mapping (CSM): These processes recognize that different members of a community differ in the knowledge and understanding they have about the terrain they inhabit. Age, social position, occupation and gender lend themselves to a variety of relationships with communal landscapes, whether urban or rural, or social, economic or political. Braidatti notes that '[l]ocations provide the ground for political and ethical accountability. Remembrance, cartographies of locations, political (dis) identifications, and strategic reconfigurations are the tools for consciousness-raising' (2011: 272). Collaborative social mapping activities provide opportunities for different groups within a community to work together to build a shared understanding of communal space, as well as the challenges and risks within such spaces, and the potential to respond to mutual challenges from this shared understanding.

Change-oriented learning: Learning activities in this approach carry a strong reflexive component. While some work is undertaken around knowledge building, the approach is predominately concerned with supporting critical and reflexive changes in practice. The question asked when evaluating these types of learning encounters is not 'what have you learned?', but rather 'how have you used what you learnt to inform and transform your practice?' When using change-oriented learning it is important to look at technical and practical issues that could evoke ethical concerns regarding young people's voices and opinions.

Supporting and strengthening the development of transgressive competencies: transgressive competencies refer to the ability to destabilize and challenge normalized views, power structures and dynamics, and voices of authority. This approach differs from the protest and advocacy movements described in earlier sections in that it involves deeply reflexive collective action based on the acknowledgement and validation of multiple forms of knowledge and expertise. It challenges, deconstructs and reconstructs accepted notions of what is considered normal or reputable, established or factual, based on socially distributed systems of knowledge and ways of being.

The following case studies illustrate how these reflexive pedagogies might be enacted in context.

ESD youth leaders for the Global Action Programme on ESD

Fifty-two young ESD leaders attended the UNESCO ESD Youth Conference on 7 November 2014. More than 5000 applications were received from 180 countries. The participants came from all corners of the world, including

Brazil, Fiji, India, Jamaica, Madagascar, Moldova, Morocco, Oman, Sierra Leone, the United States of America. During the ESD Youth Conference in Okayama City, Japan on 7 November 2014, participants exchanged ideas and experiences with peers. They discussed innovative approaches to ESD and ways to promote young people's contribution and further involvement in the global ESD movement. The participants are now called "Okayama Youth" and have submitted the GAP commitments across all 5 action areas, making 47 commitments in total. Okayama Youth as a group now joins the GAP partner network to mobilize and empower youth peers, particularly as mentors for the ESD Leadership training workshops around the world.

Actions for sustainability through co-engaged learning

The Energy and Resources Institute (TERI) initiated the LEADearthSHIP programme on leadership and sustainability in India in 2013, with a view to preparing youth for roles that demand introspection, ideation and action within their institutions, communities and cities. LEADearth fellowships entail intensive training aimed at imparting twenty-first-century skills, and enhancing knowledge and competencies on leadership and sustainable development.

Approximately 100 undergraduate and postgraduate students have conceptualized and implemented sustainability campaigns, building on their skills and expertise, that directly impacted vulnerable communities. Through these projects, LEADearth fellows have not only developed their own indicators, but have also succeeded in providing meaningful responses for existing ones. One project, 'Flashback', worked to bridge intergenerational gaps by reviving connections between the young and old generation around traditional environmental values. Another project, 'Directing Discourse', worked to magnify the kaleidoscope of heritage and environment. 'Project Enviroz', 'Suvidha', 'Sanigene' and 'Youth for Splash' were among projects that reached out to children and youth, as well as to vulnerable communities such as women from economically weaker areas, children living in orphanages and slums, old age homes among others, creating meaningful impacts over a short timeframe. The concerted efforts of projects such as 'Solar Chirag' and 'Green Impact' not only provided sustainable solutions, but also helped to stimulate positive environmental responses in young minds. For more information, visit: www.teriin.org/LEADearthSHIP.

Transformative leadership as a driver of change

Youth in Guatemala and El Salvador experience a host of complex social, ecological and economic challenges, including extreme poverty, traditional gendered ways of being, pockets of extreme violence, and complex and increasing risks to natural resource-based livelihoods. The SERES programme, which is active in these countries, aims to impact this system of risk by promoting aspirations towards transformational leadership among youth. SERES provides an example of a rapidly growing collective of organizations working to stimulate transformative youth leaders within a range of communities and contexts.

SERES promotes a theory of change that embraces a context of uncertainty. It is based on a transformative learning ecosystem, and recognizes that social change is achieved through an intersection between people, process and place. SERES works with youth change drivers from a range of contexts in ways that aim to cultivate higher levels of self-identify, build critical core competencies for sustainability leadership, connect and reconnect young leaders through dynamic networks across a range of areas within and across communities, and create and strengthen common connections among diverse groups. Their aspirations and ideals are enacted through a system of transformative leadership, dialogical engagement and change-orientated learning. The programme has led to a range of reflexive social engagements undertaken by youth leaders, including transgressive activities (e.g. challenging gender traditional roles) and efforts to establish new ways of being, rooted in the contexts in which young people find themselves (e.g. engaging with youth migrations). For more information, visit: www.projectseres.org.

Participatory social mapping as a re-connective process for biological and cultural well-being

MELCA Ethiopia is a membership organization established by environmental scientists, lawyers and activists, and other professionals who share a concern for the biological and cultural diversity and sustainability within Ethiopia. They engage youth in a number of initiatives including school and vocational programmes, intergenerational dialogues and participatory social mapping. The intergenerational dialogues and collaborative social mapping illustrate how communication and shared visions of a communal landscape can be built across generations.

For example, their collaborative social mapping work in a community in Telecho, Ethiopia, was a response to severe environmental degradation and increased impacts on community livelihoods. The process proved particularly successful in creating new ways of discussing the past and present in relation to the future. While the past and the present are often the purview of elders and adults, the future is a space over which youth have particular claim. The mapping process enabled this community to develop a shared understanding of their space, as well as specific insights into different groupings within the same space. While traditional roles and power dynamics still played a significant part in structuring the space, the mapping work engaged different generations in new and unfamiliar tasks. These tasks opened up opportunities for youth to play fresh and important roles in the process by coordinating video documentary and building a 3D model of the communal landscape. Through their role as documenters of the process they engaged with community elders, who shared historical insights as they began to populate the model built by the younger generation. The process of observation and interaction with the knowledge and experience of elders in their community served to reconnect youth with their communal contexts and link them to a shared bio-cultural system of being.

The mapping process required facilitators and community co-participants to participate willingly in processes whose outcomes were uncertain. Participants were mutually and publicly vulnerable to the insights that emerged through the process. For more information, visit http://melcaethiopia.org and see Ali (2014).

Youth programmes of the UNESCO MGIEP

The UNESCO Mahatma Gandhi Institute of Education for Peace and Sustainable Development (MGIEP), based in India, promotes a theory of change through transformative education. It combines a range of global activities for, by and with youth, with an emphasis on transformative leadership and change-oriented learning and actions. The institute has initiated youth programmes such as Talking across Generations on Education (TAGe), which 'offers young people and seasoned experts a space to come together and discuss their views on education, global citizenship and – in particular – violent extremism' (The Blue Dot, 2016); the C3 Global Leadership Programme, which works with youth to engage in change-oriented and transformative learning and systemic action; and Youth-led monitoring of SDG Target 4.7 and Youth 24x7, which engage youth in monitoring and reporting, as well as sharing their insights on global citizenship and the SDGs. Youth are engaged in multiple levels and forms of activity ranging from

attending courses to co-designing and co-facilitating strategic engagements that feed into broader governance structures. An example is the Youth-Led Prevention of Violent Extremism through Education guidebook, which addresses the identified need for a greater role for youth beyond just representation, and recommends that youth lead the process of researching and identifying challenges and opportunities in developing preventive measures against violent extremism. It also analyses in depth the role of education in this process. For more information, visit: http://mgiep.unesco.org/the-youth-program.

One Mind Youth sparks a global movement at Standing Rock

The One Mind Youth Movement is a youth-led initiative born out of a context of longstanding, socio-ecological injustice linked to the displacement of indigenous communities in North America, and the impacts shaping the lives of youth within these communities. In seeking to navigate and find safe places for youth within a complex context of high risk around families, employment, substance addiction and waves of youth suicides, a movement was born that launched a gathering of the Sioux Nations. In desperation to create a new way of being that produced an emotional and social safety net for youth in their community, a small group of young people joined together to build safe spaces for youth.

The One Mind Youth Movement began by creating safe activities (e.g. basketball tournaments and fieldtrips), and expanded into raising funds for the establishment of a safe house for youth. The movement then engaged in the campaign against the Keystone XL Pipeline (which later moved to the Dakota Access Pipeline), which threatens the water resources and quality of vast areas of Sioux lands. The youth employed a number of strategies to engage elders in their community, at first with little success. Their 'prayer camp' and a symbolic series of 'runs' served to raise awareness and draw other youth, often from equally vulnerable contexts of risk, to the camp, and the heart of the Standing Rock movement was born. The movement quickly spread across age, race and radical views, growing into an international movement engaging indigenous and environmentally concerned communities across the world. The solidarity and activity around the camp stimulated and revived traditional systems of belief and spiritual practice across generations, and provided a cultural imperative for youth to take up new forms of leadership within the Sioux Nations. This emergent movement demonstrates how a group of young people was able to stimulate activity around intergenerational dialogue and counter dialogues. For more information, visit: http://standwithstandingrock.net/23-tribes-take-action-solidarity-standing-rock.

Conclusion

This chapter provides an orientation to ESD work for, by and with youth. By articulating the relationships between the different aims and intentions, and the tensions that emerge across these ways of working, it is possible to consider more engaged, reflexive pedagogies and interactions through which to frame ESD movements involving youth.

The chapter also highlights the interconnected position of youth, framing adults and youths in relation to each other, and to the broader social structures within which they are engaged. Youth are not a group that can be disconnected from their enmeshed roles and social positions in communities. Neither are they a uniform group sharing a single set of characteristics, challenges and priorities.

The discussion between aims and tensions highlights serious and compelling questions around the power relationships within youth-related ESD movements, and the relationships between aspiration and enactment, and individual and social structures.

The five case studies provide insights into the ways that reflexive pedagogies can be leveraged as a means to work within aspirations and ideals, and the dynamic, fluid and risky contexts that youth inhabit. As they illustrate, these reflexively emergent processes seem to provide more authentic models for collaborative work with youth, in addition to enabling more sustained and contextually responsive and appropriate intervention at local scales. They serve to highlight the complex relationship between local context, social positioning and the aims underlying any ESD movement involving youth.

Together, these insights lead to the conclusion that ESD movements engaging youth need to reflect the complexity of relationships, ideas, aspirations and often difficult contexts, within which youth are situated. They draw attention to the fact that overly simplistic, idealized and individualized pedagogic interactions are not sufficiently robust to equip youth to act meaningfully and in ways relevant to the complexity of their contexts. Instead, the chapter highlights the need to adopt pedagogies that are reflexive and generative enough to equip youth, and those working to support youth, with the competencies necessary to respond to complex contextual challenges and shared global concerns in dynamic and evolving ways.

Youth have unique ways of seeing and experiencing the world and their contributions to achieving the sustainable development agenda are already tangible and significant. They have valuable insights to offer, both within their own movements, and through co-engaged participation in broader ESD activities. How adults and youth choose to work together will shape the extent to which these contributions can be leveraged and built on.

Chapter 8

Accelerating sustainable solutions at the local level

Victor Tichaona Pesanayi and Chisala Lupele

Introduction

UNESCO and governments recognize the importance of local communities in urban, rural and indigenous settings as key drivers of sustainability. Their efforts and the roles they play are central to the success of sustainability initiatives at the local level.

Sustainable solutions have been defined as those that address society's developmental problems in economically viable and culturally acceptable ways, while at the same time maintaining or improving ecological life support systems (air, freshwater, oceans, forests and soils), rather than harming or destroying them (UNDP/UNEP, 2013; Wolfenson, 2013). Sustainable solutions generated at the local level are likely to reflect specific values, aspirations and capabilities, while those generated at national or global levels tend to be more generic. The global increase in human suffering, despite human endeavour and the ambitions of global development goals, points to an inequitable development and distribution of benefits from sustainable solutions at the local level (United Nations, 2015).

Many sustainable solutions have the potential to be accelerated. However, this requires agency on the part of the people, (local) government recognition, corporate buy-in, a social justice agenda and collective learning regarding the potential to transform society (Freire, 1974; Heinz-Peter, 2000). The relationship between local, national and other hierarchical levels is in a permanent state

of flux due to shifts in power relations, resource flows, tensions in policy and practice and degrees of knowledge and understanding among others. Population growth in cities, which currently account for over half the world's people and expect to absorb most future growth, means that these urban centres are thought to increasingly hold the key to addressing sustainability challenges. In the same vein, rural communities have generated numerous important sustainability solutions, many of them marginalized, often by using corporate solutions (e.g. locally adapted seed for climate change adaptation versus globalized genetically modified varieties). The growing impact on humankind of anthropogenic climate change, persistent poverty and globalization means that sustainable solutions at local level play an increasingly important role in improving the resilience and livelihoods of communities.

This chapter examines cases of successful sustainable solutions at the local level across different regions to demonstrate the role and relevance of ESD. Accelerating sustainable solutions at the local level is the fifth Priority Action Area of the Global Action Programme (GAP) on ESD, making it an important strategy for achieving the programme's overall objectives.

Sustainability challenges at the local level are complex because they are generated by a web of connected concerns and issues; they are contextual because of the localized nature of the matters of concern; and they are contested due to unequal access to resources and power relations among others. Nevertheless, sustainable solutions have been generated at a variety of different levels, timescales and in different places. In 2005, a 10-year-old schoolgirl, Tilly Smith, on holiday with her family in Thailand, detected an oncoming tsunami and alerted her family, in the process saving nearly 100 lives at a local beach. She drew on prior knowledge from a geography lesson at school, which enabled her to recognize the catastrophic threat and react, while others on the same beach failed to do so[1]. The success of this sustainable local solution (applied by a tourist) to an otherwise global problem is an example of what Turner and Killian called an 'emergent norm', which can be accelerated through education via the 'bureaucratic norm' of government such as policy and procedures (Schneider, 1995; Turner and Killian, 1993). Accelerating sustainable solutions at the local level calls for concerted efforts and collective learning by people in various settings working with each other across most, if not all, sectors that influence the local level.

1 See http://news.nationalgeographic.com/news/2005/01/0118_050118_tsunami_geography_lesson.html.

The next section discusses concepts dealt with throughout the chapter, specifically: 'accelerating', 'sustainable solutions' and 'local level'. It explores the practical implications of accelerating sustainable solutions at local level by identifying major trends and challenges in relation to ESD at the local level. It also examines changes that have taken place since the beginning of the Decade of Education for Sustainable Development (2005-2014) up to the present day (beginning of 2017). It then describes links with the Sustainable Development Goals (SDGs), in particular SDG 1, 2, 4 and 11-13, which have a direct and urgent bearing on the acceleration of sustainable solutions at the local level. The final section draws from concrete examples from around the world to examine how efforts to accelerate sustainable solutions at the local level have worked and to highlight the challenges faced. The conclusion summarizes the discussions in the various sub-sections and draws out the overall meaning, before proposing steps for further thinking.

Concepts

This section aims to unpack the meaning of concepts embedded in the subject of this chapter: 'accelerating sustainability' at the local level. This topic affirms the verdict of a Millennium Development Goals report: 'The work is not complete, and it must continue in the new development era' (United Nations, 2015: Local level 4[iii]). Action for implementing sustainable solutions is critical to achieve lasting impacts from policy and practice.

Theorizing acceleration

The 'acceleration' of sustainable solutions has not received much theoretical attention, with its meaning mostly taken for granted, whether at local or global level. This acceleration is applied to various contexts including: speeding up the achievement of SDGs at the international level, speeding up the implementation of sustainable solutions, and replicating success from one scale to another at local level (United Nations, 2013). In all cases, the language of acceleration exerts a sense of urgency with regard to the need to re-double efforts to further the sustainability agenda.

The UNDP strategy for effective and coherent implementation of the new sustainable development agenda, entitled 'MAPS' (Mainstreaming, Acceleration, and Policy Support), defines acceleration as expediting progress in the implementation of sustainable solutions. In this case, it involves 'helping governments accelerate progress on SDG targets by *identifying critical*

constraints to faster progress and focusing on those development objectives that are more relevant to the country context' (Westman et al., 2017: 17). In its recent frontiers, UNEP (2016) highlights the need for an 'aggressive strategy to safeguard agricultural yields in drought-prone areas' (Westman et al., 2017: 60) and emphasizes the need to accelerate such efforts. Throughout the report the language of acceleration is used to indicate that efforts made towards sustainability have been inadequate and need speeding up. Risk factors are now moving faster than the gains made in finding solutions to challenges related to health, financing, corporate investment and climate change.

Theorizing the 'local level' concept

The local level is considered by governments and civil society as the theatre for people's grassroots participation in democratic governance and agency for sustainable development action.

GAP Priority Action Area 5 has the potential to enable local sustainability solutions among learners in schools, local municipal authorities, civil society organizations, the private sector and the media (UNESCO, 2014a). Agreeing on a definition of 'local level' is a challenging exercise, however, as the literature offers up different concepts, with some related examples shown in Table 1. In addition, the boundaries of 'urban' areas do not always align with those of towns and cities.

Table 1: Conceptualizing development and action at the local level

Local level	Examples of development and action
Organizations/ institutions	Educational institutions (e.g. schools, universities, colleges and their governing boards), health institutions, business entities, sports facilities, NGOs
Rural areas	Traditional regulations and/or rural planning policies
Urban areas	Towns and cities, Local Agenda 21 (chapter 27)
Municipalities with local stakeholders	Local Agenda 21, local economic development (LED) approaches
Networked geographical regions	Regional centres of expertise

Table 8.1 indicates five common conceptions of the local level, namely: organizations and institutions, rural areas, urban areas, municipalities with local stakeholders and networked geographical regions. These are briefly described below along with further details of the examples presented in the table. The definitions are not hard and fast, but serve to give a context for the implementation of sustainable solutions.

Community-based **organizations** (CBOs), non-governmental organizations (NGOs), business enterprises and educational institutions are key players in implementing sustainable solutions at the local level (Krishna, 2003) in both urban and rural areas.

A **rural area** is a geographic area located outside of towns or cities that usually has a low population density and small settlements, with most socio-economic activity centred around agriculture, although activity may come from other sectors. These areas are dwindling in number and population relative to urban areas, which are expanding and encroaching on rural territories, often resulting in conflicts around land use conversion and sustainability (Mylott, 2009).

An **urban area** is easy to recognize when seen but less easy to define (Department of Communities and Local Government, 2012; Weeks, 2010). Weeks views 'urban' as a fairly complex concept that is 'a function of (1) sheer population size, (2) space (land area), (3) the ratio of population to space (density or concentration), and (4) economic and social organisation…the urban-rural divide is becoming less obvious' (Weeks, 2010: 34). Changes taking place in technology, world population growth and the proportion of urban compared to rural dwellers are transforming society as well as previous conceptions of 'urban vs. rural' or 'non-agricultural vs. agricultural'. They are also making the pursuit of sustainability a more complex endeavour. According to the United Kingdom's Department for Communities and Local Government, those working on urban issues are 'primarily concerned with conditions in towns and cities. As these have developed historically as the sites of human settlements and the associated man made infrastructure, the natural view of urban areas is one of built up "settlements"' (2012: 5).

On the surface, the above definition implies that sustainable solutions in urban areas would focus on the delimitations of the built-up area. However, it is clear that the social, economic and environmental impacts of built-up areas often have an affect beyond these defined limits, on rivers, air spaces and the hinterland, as discussed below.

Towns and cities can be viewed as urban areas that have attracted greater economic investment than rural areas and are, therefore, places where increasingly large numbers of people live and work. They are also hubs of government, transportation and commerce. Despite these common characteristics, an exact definition of the geographical limits of a city remains debatable. According to the United Nations World Cities data booklet,

> So far, no standardized international criteria exist for determining the boundaries of a city and often multiple different boundary definitions are available for any given city'. One type of definition, sometimes referred to as the 'city proper', describes a city according to an administrative boundary. A second approach, termed the 'urban agglomeration', considers the extent of the contiguous urban area, or built-up area, to delineate the city's boundaries. A third concept of the city, the 'metropolitan area', defines its boundaries according to the degree of economic and social interconnectedness of nearby areas, identified by interlinked commerce or commuting patterns, for example. (United Nations, 2016: 1)

A **municipality** is an administrative division with an elected local government body that has corporate status and limited self-governance rights. It functions as a defined political unit such as a town, city or district. While the original meaning is derived from the Latin municipium, meaning 'free city', contemporary municipalities across the world are either urban or cover both urban and rural areas. Some municipalities have adopted the local economic development (LED) approach, which seeks to promote the economy of the local or district municipal area, led by a professional LED agency (Canzanelli and Agostinucci, 2011).

Local Agenda 21 launched at the Rio Summit for Sustainable Development in 1992 entrenched the importance of local level initiatives, especially those of municipalities. It highlighted the fact that key stakeholders effectively create governance in order to engage in collaborative decision-making on issues that concern the livelihood of current and future generations.

Since 2005, **Regional Centres of Expertise** on ESD (RCEs), a global network of local and regional ESD centres organized by the United Nations University, has used a definition of the local level that is distinct from others. RCEs perceive the local level as a 'wider geographic scope that enables [the performance of]

distinctive functions such as disseminating good practices on a wider scale and serving as a knowledge base' (Aipanjiguly, Mochizuki and Fadeeva, 2010).

Defining sustainable solutions

Sustainable solutions are contextualized at the local level where they address specific needs in an emergent fashion or through top-down policy. This means that the generic solutions normally employed by government machinery can be effective if applied reflexively, but can also fail if they do not take local context into account.

In addition, adaptation to changing conditions and innovation in fields such as working with educational methods, technology, rigid structural barriers and blended knowledge is crucial for achieving sustainable solutions at the local level. Concerted local action by neighbourhoods and city links has proven effective in generating sustainable solutions such as care for the elderly, green energy, and affordable housing and resilience under depressed political economies (Chapisa, 2011).

Which solutions are considered sustainable and to whom?

The definition of sustainable development is highly contested with those driving the sustainability agenda pushing for a strong definition that centres on the wise use of resources and conservation of the environment as limits not to be transgressed by social activities and economic growth. Solutions can therefore be considered to be truly sustainable only when they remain true to the environment (the natural life support systems of the **planet** and all its life forms), society (**social justice** and **peace** for the common good of all **people**, not merely benefiting a few) and the economy (**prosperity** and partnerships for sufficiency rather than profit maximization for its own sake at all costs) in a holistic manner (OECD, 2016). Approaches that connect the highlighted characteristics provide germ cells that generate sustainable solutions through collaborative learning in context.

Different actors play their roles in generating innovation and promoting sustainability solutions at different local levels. These include farmers' grassroots organizations, community health workers, water innovators, CBOs and NGOs promoting alternative sustainable energy, biodiversity and sustainable agriculture among others in rural villages. This process is illustrated by several initiatives (a few of which are presented in the last section of this chapter) that offer solutions inter alia to unsustainable education curricula through curriculum re-orientation towards sustainability, scarce agricultural

water through rainwater harvesting in rural farming, and urban problems of climate change, water quality and pollution.

ESD accelerating changes at the local level

This section discusses the role of ESD in accelerating sustainable solutions at the local level. It looks at what this entails and why it is relevant, major trends and challenges in ESD at the local level, and changes that have taken place since the beginning of the Decade of Education for Sustainable Development (2005-2014).

The role of ESD in accelerating sustainable solutions at the local level: what this entails and why it is relevant

Education for sustainable development at the local level entails various types of formal, non-formal and informal learning, teaching and training (Lockhart, 2016) that aim to accelerate the generation and implementation of sustainable solutions. Therefore, the concept of ESD is used in this chapter to signify good quality education and 'learning as connection' with and within communities and society (Lotz-Sisitka, 2013; UNESCO, 2016) that integrates the acceleration of sustainable solutions at the local level. The characteristics of ESD that appear to be significant at the local level are relevance to local context, contribution to the common good through co-engagement, the development of skills and competencies for sustainability, intersectoral cooperation (UNESCO, 2015) and cultivating hope for a better future through successive actions. These characteristics were used to analyse case examples as shown in Table 2.

Table 2: Analytical framework for the sustainability of solutions

Characteristics of ESD	Questions for analysis
Relevance to local context	How is the solution addressing real, perceived and felt problems?
Contribution to the common good	Who is truly benefiting and how? How are the inter-generational, cultural and socio-economic gaps being filled?
Skills and competencies for sustainability	What skills were critical for sustainability? What competencies were developed?
Intersectoral cooperation	Which government and development sectors collaborated? How and why? How is sustainability being integrated and is it holistic?
Cultivating hope for a better future	What hope is generated by the solution? Is it true and long-lasting?

ESD is relevant here because it deliberately focuses the orientation of local rural and urban development, curriculum development and business strategy towards sustainability as an essential core value rather than as an add-on or alternative.

ESD has the potential to improve the quality and relevance of educational experiences and the agency of ordinary citizens (children and adults), managers of local urban municipalities and rural councils, and politicians elected in their geopolitical constituencies. The International Council for Science (ICSU) and the International Social Science Council (ISSC) (2015) connected education, training and learning (SDG goal 4) to each of the 17 SDGs to show how quality education is an enabler of sustainability. For example, in SDG13, 'education is key to mass understanding of the impact of climate change and to adaptation and mitigation, particularly at the local level' (ICSU and ISSC, 2015: 29). They note that the links between SDG4 and other SDGs 'need to be accounted for in implementation and monitoring in order to have a successful outcome' (*ibid*: 29). They also warned during

the development of the SDGs that the SDG framework 'does not sufficiently reflect and address many of those groups within society that will be required to deliver on the goals ... For example, it largely fails to reflect private sector perspectives and incentives to participate in the delivery of the goals' (ibid: 8-9).

Major trends and challenges in relation to ESD at the local level

When the United Nations launched the Agenda 21 blueprint for sustainable development in 1992, Chapter 28 was dedicated to 'Local authorities' initiatives in support of Agenda 21'. A UNESCO report analysing the outcomes of the UNDESD found at least ten encouraging trends advancing ESD (UNESCO, 2014: 29-31). At the local level, the report found that education systems are addressing sustainability issues by reorienting education policies, curricula and plans in most reporting Member States, and that local commitments for action are growing. Regarding the latter, the report stated that

> Lessons from the DESD suggest that increased engagement with sustainable development organizations that focus specifically on local level sustainable development planning and action – local NGOs, networks of cities and municipalities, rural development networks and other similar groups – can provide additional leverage for ESD at the local level (UNESCO, 2014: 30).

The introduction of ESD in 2005 brought several challenges related to local sustainability issues, including reluctance, slow uptake and lack of vision to integrate ESD into school curricula, business plans and local government systems. However, the greatest challenge for sustainable development at the local level globally is the swelling urban population. Many cities, especially in the developing world in Africa, Asia and Latin America, were established many decades ago with limited carrying capacities, and were never upgraded to accommodate the increased populations they have today. This has put enormous strain on social, environmental, health and sanitation services as demand for energy, water, food and space has more than doubled (Bhatta, 2010). In addition, issues such as civil unrest, war, displacement of people and food insecurity are affecting both rural and urban local level sustainability actions.

In the rural context, issues relating to sustainability centre largely on agriculture (Wolfenson, 2013), while for women, as farm managers in particular, the main issues of concern are access to land, water, forests and energy (Lambrou and Piana, 2006). However, in developing countries sustainability issues relate increasingly to the impacts of climate change and water scarcity on food production and pressures exerted by the food industry and market accessibility, while in the developed world sustainability issues generally concern carbon emissions and chemical pollution from industrial agriculture (De Schutter, 2010). With increasing drought and food scarcity, governments and corporations are developing policies and systems that favour large-scale industrial and biotechnology-driven food production as the answer to hunger at the expense of agro-ecological solutions at the household farm level. Such trends demand forms of education that generate skills and competencies for sustainability, preparing learners to manage current and anticipated challenges successfully.

What changes have taken place since the UN Decade on ESD (2005-2014)?

The main changes discussed here occurred at the local level and relate to the implementation of, and changes in, acceleration of ESD. They are linked to the examples given in the following section and to a broader view of sustainable solutions at the local level.

Since the beginning of the Decade, a number of initiatives have boosted ESD at the local level. Among the most notable is the Regional Centres of Expertise (RCEs) programme of the United Nations University (IAS), which has grown from zero participating local networks at the beginning of 2005 to 154 by January 2017 (United Nations University, 2017). The global RCE network has mobilized multiple stakeholders including universities, other education institutions, local authorities, NGOs and various other players at the local level during the Decade that were able to implement a variety of noteworthy sustainable solutions. These include research and project outcomes around inter-RCE thematic areas such as biodiversity, climate change and sustainable production and consumption, which the RCE Service Centre provided as areas for acceleration in a GAP commitment within Partner Network 5 (UNESCO, 2016).

UNESCO's final report of the Decade noted that 'ESD is grounded in local experience and actions. Experiences during the DESD reveal a diversity of ways in which ESD is being implemented to include unique features that relate to the local context' (UNESCO, 2014: 29).

The Global Action Programme on ESD, the follow-up to the UN Decade on ESD recognizes local level action as one of the five Priority Action Areas of GAP. ESD at local level focuses on: transforming education content and pedagogy to address context-relevant sustainability issues in a more participatory, action-oriented, learner-centred way; providing adequate and relevant training for key local stakeholders and decision-makers to transform them into change-agents; and raising public awareness of sustainable development issues.

Local level interventions have generated many other sustainable solutions initiated by municipal authorities and conscientious individuals and communities. These initiatives have included education for disaster risk awareness and management (e.g. after the great earthquake of Japan in 2011), the acceleration of farmer-based innovations for sustainable agricultural water (FAO, 2014) and pollution reduction in cities, among others (UNESCO, 2014: 29).

Examples

This section discusses concrete examples from different regions of the world that demonstrate the scaling up of sustainable solutions at the local level.

Box 1 presents an example from the Kingdom of Morocco.

Box 1: An eco-schools plant inventory project at a primary school in Morocco

Context

Agriculture is the backbone of the Moroccan economy with over half the active labour force working in farming. Major challenges include land degradation, drought and efforts to promote sustainability within a dichotomous farming model characterized by competition between a large industrial farming sector that dominates the most fertile land (reserved for export production) and small-scale, traditional, mixed farming systems (that support household subsistence and local markets). In June 2001, His Majesty King Mohammed VI established the Mohammed VI Foundation for Environmental Protection with the fundamental mission of raising awareness and facilitating ESD. This work has been entrusted to the Presidency and is led by Her Royal Highness Princess Lalla Hasnaa. It involves the entire spectrum of society from schoolchildren to political and economic decision-makers and the general public. The Foundation's mission embodies the right to a healthy environment as enshrined in the constitution of the Kingdom of Morocco, and in accordance with international commitments made at the Rio Summit in 1992 and Johannesburg in 2002.

Implementation and acceleration of a sustainable solution

The Foundation understood the importance of empowering educators with the necessary knowledge and tools to engage with young learners, and prepare them to engage with sustainable development and take responsibility for preserving their living environment. Through an Eco-Schools programme, the Foundation worked with fifth and sixth-grade learners and supervisors at a primary school in the north of Morocco on a "academic and practice-oriented" (UNESCO, 2016b) exercise: drawing up "an inventory of aromatic and medicinal plants" (ibid). This activity teaches young learners the important role played by local plants in farming, culinary and health sectors. It functions as a sustainable solution at the local school level.

The Eco-Schools programme aims to accelerate sustainable solutions in schools. It is run by the Foundation for Environmental Education (FEE) and was launched in Morocco in 2006 by the Mohammed VI Foundation for Environmental Protection in partnership with the Ministry of Education and Vocational Training. As of March 2017, the programme was working with 1,633 primary schools, 600,000 students and 20,000 supervisors. Out of these schools, 216 were awarded a Green Flag in 2016, certifying their success in promoting environmental management policies. Such recognition and growth is cultivating hope of a more sustainable future among young people, as they discover new problem-solving competencies that they can lead.

Further needs and challenges

There are still uncertainties in government policy and programmes regarding tensions between the liberalization of economic development models versus sustainable development approaches that promote local sustainability. While this contradiction can be confusing, it also brings opportunities to grant local sustainable solutions space for acceleration. More research is needed to provide evidence of the socio-economic benefits of sustainable solutions, and perhaps also of those development trajectories not necessaily modelled to achieve sustainability. This means that sustainable solutions at school level need to be accelerated across the entire education system and linked up with community initiatives.

For more information on the Eco-Schools work at the local level, please see : Mohammed IV Foundation for Environmental Protection (2017), Perry (2015) and UNESCO (2016b) or visit: http://www.fm6e.org/en/nouveautes-des-programmes/2017/17/1009-20-mars-2017-alstom-appuie-sept-eco

The next example comes from the Latin America and the Caribbean region and focuses on a megacity in a developing context. Big cities need sustainable solutions, especially taking into account the growth in urban compared to rural populations over the past eight years (as of mid-2009).1 Box 2 explains how Mexico City made a GAP commitment and developed sustainable solutions to address some of its challenges.

Box 2: Mexico City makes and fulfils a GAP commitment

Context

Mexico City is the capital of the Federal Republic of Mexico and has a population of nearly 8.9 million people. One of the most important policies of the Mexico City Ministry of Environment (SEDEMA) is the development of strategies to strengthen environmental education. The main aim is to embed the values of sustainability in citizens so that they can be manifested in action. SEDEMA seeks to create an informed society with the participation of government, civil society and the private sector, working together to resolve key environmental challenges threatening the city. SEDEMA is scaling-up ESD activities and strategies at the local level and promoting participation by the government, civil society and the private sector.

Implementation and acceleration of a sustainable solution

SEDEMA coordinates three environmental education centres in Mexico City. They are located in the south of the city in Ecoguardas, Yautlica and Acuexcoatl – areas classified as conservation land. These centres "promote the participation of schools, teachers and private institutions in SEDEMA's activities through courses, workshops, tours, campaigns and camps. In these centres people receive training and participate in courses on mobility, conservation of natural areas, biodiversity, climate change, efficient use of water, solid waste management, alternative energy and environmentally friendly habits that can make a difference". (UNESCO, 2016b) The centres have also installed photovoltaic street lighting systems to reduce electric power consumption and conserve energy. In 2015, sustainable energy solutions resulted in the mitigation of 7 tonnes of CO2 equivalent (Mexico City, 2016). Environmental education has also impacted positively on water management solutions. Together, these initiatives have contributed to making Mexico City an epicentre of sustainability. A key factor in the success of this sustainable solutions initiative is the genuine commitment on the part of management to address environmental health and economic issues for the benefit of society, advance environmental and sustainability education, and implement progressive policies.

Further needs and challenges

Despite its success, SEDEMA identified various challenges. At present, environmental education programmes are concentrated in just three areas within the growing city, with expanding illegal settlements not serviced by the government in order to discourage unplanned urban growth. In addition, accelerating sustainable solutions through environmental education and campaigns requires more funding, which is presently limited by the city's budget. A further challenge is the need to balance the provision of clean water to residents at a reasonable cost with efforts to encourage sustainable use. At present, overuse of water per capita is an issue due to its relatively low cost.

For more information, please visit:
http://unesdoc.unesco.org/images/0024/002452/245211E.pdf

The next example is drawn from King's College London (Box 3) and highlights interdisciplinarity.

Box 3: King's College London fosters ESD through interdisciplinarity at the local level

Context

King's College London in the United Kingdom offers numerous courses for students and promotes sustainability education through interdisciplinarity. The college fosters environment and sustainability research and the generation of sustainable solutions for implementation at the local level.

Implementation and acceleration of a sustainable solution

King's College London has integrated ESD into a variety of courses and promoted collaborative engagement with different departments in the college. The aim is to ensure that students achieve a holistic level of sustainability literacy from an interdisciplinary point of view. Implementation of this integrated curriculum saw the emergence of four main ideas to advance sustainable solutions. The first was an understanding of sustainability, resource depletion and the limits to growth. The college then performed an analysis of their current system leading it to embrace a more interdisciplinary agenda. It also examined social impacts and ethics in terms of reflexivity and the importance of linking educational content to real-life learning. Lastly, the college understood the intellectual value of other cultures taught by different departments (i.e. an intercultural interaction between the German and French department at the school). These ideas were then accelerated to other disciplines through curriculum development and included in the three curricula – formal, informal and subliminal. Regarding infrastructure and practices, the college has developed a list of what they describe as 'sustainable solutions' and achievements that include energy conservation, maximizing natural daylight, rainwater harvesting and switching to green electricity as a strategy to lower carbon emissions in a country with a high carbon footprint. These initiatives are led by a College Sustainability team. Key factors in the success of this approach were the decision to connect ESD with the 'College's commitment to the advancement of knowledge, learning and understanding in the service of society' and the establishment of a College Sustainability team (Verstappen and Pereira, 2014: 1).

Further needs and challenges

The college is working to overcome major challenges that emerged through this process related to efforts to connect the informal and formal curricula, strengthen interdepartmental collaborative opportunities and share knowledge.

For more information on the ESD work of King's College London at the local level, please visit: https://create.piktochart.com/output/2253448-learning-for-change-copy

The next example is drawn from rural Africa and focuses on learning and communicating about sustainable solutions on water for food security (Box 4).

Box 4: Amanzi for Food Programme, South Africa

Context

Amanzi for Food is a project funded by the South African Water Research Commission (WRC) from 2013 to 2016. Its purpose was to use published research on rainwater harvesting and conservation to enhance food and nutrition security and to disseminate the knowledge more broadly to the public. The project was piloted in the Eastern Cape Province of the country and the findings informed a national action-oriented dissemination strategy.

Implementation and acceleration of a sustainable solution

In order to disseminate and share the rainwater harvesting knowledge published in previous studies, the project re-interpreted the whole project concept embodied in the linear model of research-develop-disseminate-adopt. The latter's assumptions do not hold as evidenced by the lack of adoption (Lotz, 1995). To address this issue, the project participants established a learning network that consisted of different agricultural practitioners in the Amathole District of the Eastern Cape with support from the Amanzi for Food research team. Diversity in stakeholder selection ensured easy access to, and co-engagement among, university and agricultural college lecturers and trainers, schoolteachers, farmers, agricultural extension officers, municipal local economic development facilitators, NGOs and community radio personnel. Following a nine-month modular training-of-trainers course that focused on developing the necessary knowledge, skills and attitudes, agricultural college lecturers began to strengthen and integrate the rainwater harvesting component into their formal curriculum at the local level using a competence-based learning approach (Lotz-Sisitka et al., 2016). Small-scale crop farmers and homestead garden food growers began to implement the different sustainable agricultural water use practices in their food production, while trainers strengthened sustainable agricultural water-use knowledge as they co-engaged with local farmers and extension officers in the area. These transformative agency actions are attributed to the development of relational and systems-thinking competencies that enabled college lecturers to understand the water contexts of farmers and to bring these to their curricula across their diverse disciplines.

These actions contributed directly to SDG2 'End hunger, achieve food security and improved nutrition, and promote sustainable agriculture' and SDG6 'Ensure availability and sustainable management of water for all'. They also helped develop a new model of network-based extension practice that proved useful for all concerned. The sustainable agricultural water-use solution was accelerated through expansion into different forms using new mediation tools that emerged from cross-boundary learning. These included diverse productive demonstration plots that cultivated hope for improved food productivity among learning network members with real solutions relevant to the local context and the commons (wider water catchment area). This approach blended traditional and new media platforms and sparked discussion and engagement around the shared practice on national and community radio and Facebook, leading to further curriculum innovation.

Following completion of the pilot, the project was scaled up to the national level and the sustainable solutions were embedded into a strategy which has since been implemented in other agricultural colleges. Phase 2 of the programme will support a national rollout through three local-level learning networks to two other provinces. A key factor in the success of the Amanzi for Food case study was the new learning network platform, which helped to provoke and organize collaboration across different boundaries, mandates, knowledge practices and values (Lotz-Sisitka et al., 2016).

Further needs and challenges

One of the biggest challenges of the programme was poor involvement and participation by the NGO sector and schools at both primary and secondary school levels despite initially agreeing to be part of the training. As a result, the goal was not met in these particular local contexts. The new programme phase (2017-2021) will focus specifically on youth, women and school involvement (see www.amanziforfood.co.za). Further needs include research into the effectiveness of formative interventions and new media in accelerating sustainable solutions in terms of social change (the project has already researched the effectiveness of traditional media through the use of a community radio listening club).

For more information on the Amanzi For Food work at the local level, please visit: http://amanziforfood.co.za/

At the global acceleration level, many such sustainable agricultural water-use initiatives are not usually valued by the formal agricultural education sector due to their rudimentary nature. In addition, there is a lack of interconnection between such initiatives, which would help to form a movement for global impact and government recognition. Farmer-led learning innovations with low technology tend to be downplayed, yet they have demonstrated sustainability impacts and acceleration potential at the local level. 'Rainwater harvesting is as old as civilization and is practiced in many countries … from time (immemorial). But governments and people seem to remember this only when water is not available even for drinking purposes' (Sivanappan, 2006).

The last example is taken from a project piloted in a higher education institution in Kazakhstan in the Asia-Pacific region. The project was accelerated through the Ministry of Education (see Box 5).

Box 5: Learning about energy efficiency in the Higher Technical Education System of Kazakhstan

Context

According to Tilbury (2011) an ESD project in Kazakhstan on Energy efficiency promoted local ESD actions in the Kazakh National Technical University (KazNTU). This is shown by the introduction of an ESD course in the Bachelor programme and the generation of ideas for integrating sustainable development themes across curricula.

This case study shows that there developed a sustainability contradiction between the pursuit of industrial development and sustainability skills development in Kazakhstan's Higher Education System. This has "created a need for a new generation of engineers with skills and competencies in sustainable energy technologies" (ibid, p. 89). Education has a key strategic role in policy and practice for confronting environmental and resource degradation in Central Asia. For example ESD principles and methodologies are integrated in Kazakhstan's 'Concept of Transition of Kazakhstan for Sustainable Development for 2007-2024' as a strategy to meet targets on climate change and energy efficiency.

Implementation and acceleration of a sustainable solution

Implementation of ESD at KazNTU was a case of national priorities meeting local-level action supported by corporate and public funding. The project was accelerated by the collaborative efforts of a wide range of stakeholders and sectors in government and civil society. Tilbury (2011) notes that educational outcomes include the new subject area of 'Energy Efficiency and Sustainable Development', "is now being introduced into the Higher Technical Education System of Kazakhstan" (p. 91). Outcomes of implementation also accrued at the levels of the economic (cost savings from application of skills and knowledge), environmental (sustainable energy leadership by a cadre of graduates) and the social (e.g. young people empowered to be transformation agents). (Nachmany et al., 2015) reported that the role of ESD at a local level was one of 16 national priorities for accelerating climate change mitigation or adaptation.

Further needs and challenges

Potential challenges for roll-out include linking the teaching of development in a highly industrialised society with sustainable solutions. Cooperation between the Ministry of Education and Science and the Ministry of Environmental Protection constitutes an example of good intersectoral practice that should be accelerated at the local level, with the inclusion of other sectors.

Collaboration between different ministries on sustainable solutions, as described in Box 5, is neither common nor effective at the global level, as government tends to operate in silos around specific mandates, which tends to complicate sustainability learning and practice efforts at the local level. There are, of course, places where such collaborations work well. The Kingdom of Lesotho (2015) represents one such example, where the ministries of Education and Environment collaborated at the beginning of DESD to

develop and publicize the national ESD strategy (2005). This was one of the first such policy developments at the global level.

Conclusions

This chapter has outlined and described the theoretical concepts underpinning the topic of 'acceleration of sustainable solutions at the local level' and discussed the practical implications using case examples at organizational, urban, rural, municipal and networked geographical region levels. Sustainable solutions are readily available where traditional and cultural knowledge systems can be tapped, and ESD needs to provide avenues to this end. ESD can be provided to learners in different ways through formal, informal and non-formal education. Sustainable solutions at the local level appear to work best when the approaches are systemic and holistic and include co-engagement and trust among the various partners and stakeholders working on matters of common concern. The role of education in accelerating sustainable solutions at the local level centres on providing a space for research, innovation, collaboration and learning that leads to deliberate and consciously sustainable development paths. Evidence shows that while sustainable solutions are increasingly addressing problems in cities whose populations are swelling, they are possibly leaving rural areas behind.

Since the beginning of the DESD, initiatives such as RCEs, urban innovations in energy and mobility, rural innovations in water for food, curriculum innovations in higher education and schools, and initiatives working with youths using ICTs have made headway and impacted the lives of people in need. However, policy support, particularly at the regional and national levels, is still needed to accelerate these solutions both horizontally and vertically and to consolidate local-level actions. The future outlook for accelerating sustainable solutions at the local level holds much promise. It also carries challenges that will require partnerships, orientations to social justice and care for the common good, and collaboration between civil society, local governments, educational institutions and the private sector on joint actions to promote the sustainability of people, the planet and prosperity. More intersectoral cooperation is also needed in the government sector to accelerate sustainable solutions.

Chapter 9

Scaling ESD

Felix Spira and Sirkka Tshiningayamwe

Introduction

Educators, policy-makers and citizens are helping to develop and implement myriad activities to advance education for sustainable development (ESD) in schools, universities, enterprises and communities worldwide. Many of these activities were kick-started under the umbrella of the United Nations Decade on Education for Sustainable Development (2005–2014). However, while ESD actions have proliferated around the world, a recent global monitoring report suggests that ESD is not yet mainstreamed in many educational sectors (UNESCO, 2016). The Global Action Programme on ESD (GAP) aims to close this gap by advocating for the mainstreaming of ESD in all education sectors. The designated mechanism to achieve this goal is scaling ESD actions (UNESCO, 2014). Broadly speaking, the process of scaling ESD actions implies progress at multiple levels – deepening the local impact of actions, moving beyond local constituencies to affect people in other places and changing the institutional governance context in which they operate (IIRR, 2000). The concept of scaling is, however, relatively new to the education landscape. Therefore, in the context of ESD it is important for policy-makers, funders, researchers and practitioners to understand its dimensions, especially given the role it occupies in the GAP.

The process of scaling ESD actions requires dedicated support. Policy-makers play a role by creating a policy context that allows ESD actions to change, replicate and transform people's quality of life. Funders have a tendency to focus on financing new projects, which can lead to a proliferation of activities many of which cease after the end of the funding period (Bradach, 2003).

A focus on funding existing, high-impact initiatives to help broaden their impact would help them reach more people and improve the quality of ESD actions. It is vital, therefore, for funders to understand the concept of scaling and the importance of scaling ESD actions. Practitioners work on the front line to embed ESD in all formal and non-formal educational programmes, youth activities, and within the mandates of both private and civil sectors.

The process of scaling ESD actions can also produce benefits for those playing an active role in the process. Researchers gain an understanding of the gaps in the implementation of ESD policies and scaling of ESD actions, while practitioners are able to ground their work in a better understanding of change on a large scale. This knowledge can help them devise more strategic approaches and thus achieve their goals faster and at lower cost.

While there is an increasing body of literature on scaling the impact of development projects (Hartmann and Linn, 2008), social enterprises (Bloom, 2012) and non-profit organizations (Uvin, Jain and Brown, 2000), the topic of scaling the impact of ESD initiatives has received only limited attention. This chapter therefore aims to enhance understanding of this topic in the context of ESD, by answering these questions: What is scaling? What should be scaled? Who should be involved in the scaling process? What pathways and strategies should ESD initiatives use to scale their impact? The chapter starts by reviewing the research literature for answers to these questions, then presents four case studies to illustrate successful examples of scaling impact. These examples are then linked back to the research literature.

What is scaling?

There is no universally agreed definition of scaling. Scaling is associated with concepts such as scaling up, growing, rolling out, spreading, replication and expansion, some of which are often used interchangeably (Do, 2015). However, there seem to be consensus in the literature that scaling means moving from a small to a large impact (Ford Foundation, 2006). The GAP uses the notion of 'scaling up', which seems to be different from scaling (Do, 2015). Scaling can occur along different dimensions, while scaling up implies scaling vertically, in other words, integrating an initiative into policy-making (Ford Foundation, 2006). The implication is that scaling up considers both the quality and quantitative aspects in terms of impact. On this basis, the chapter discusses the concept of scaling, not scaling up.

The World Bank (2005) defines scaling as "expanding, adapting and sustaining successful policies, programmes or projects in different places and over time to reach a greater number of people" (Quoted in Hartmann and Linn 2008: 8). Critical in this definition is the notion of 'adapting', which implies the importance of understanding contextual factors when scaling. This in turn implies a need to be sensitive and responsive to the context in which scaling occurs. The World Health Organisation (2009) defines scaling as deliberate efforts to increase the impact of successfully tested pilots to benefit more people and to foster policy and programme development on a lasting basis. The notion of 'successfully tested pilots', in turn, influenced the concept of scaling in the GAP, as a means to scale successful ESD actions (UNESCO, 2014).

IIRR (2000) defines scaling as 'bringing more quality benefits to more people over a wider geographical area, more quickly, more equitably, and more lastingly'. This definition foregrounds the quality aspect of impacts brought about by scaling, indicating that 'impact' is not just a question of serving more people and more communities, but also about serving them well. The definition also emphasizes equity. This contrasts with the view of Hartmann and Linn (2008), who argue that equity is more relevant when it comes to scaling interventions that aim to reduce poverty and inequity, but not necessarily as pertinent for other development programmes and policies. Nevertheless, ensuring equitable access across all population groups has been recognized as one of the main challenges in scaling coverage. This chapter defines scaling ESD as a deliberate process through which an ESD action sets out to change the system it operates within, by deepening impacts at an existing location or affecting target groups and institutional governance contexts in other locations.

What is being scaled and who is involved in the process?

It is seldom possible to scale an educational project in its entirety. In most cases, specific aspects of a project can be scaled. Do (2015) refers to these aspects as 'scaling objects', and has noted examples such as principles, concept, norms and values, resources, programmes, educational methods, models, learning processing, and governance models and technologies. Scaling objects can also change during the scaling process (Do, 2015). This approach commonly focuses one initiative or aspects of an initiative that are piloted successfully in one location and then brought to other locations or

target groups (Bloom, 2012). However, this single-initiative focus has been the target of increasing criticism in recent years. Moore and Westley (2011) argue that the goal of scaling should be to work towards system transformation, rather than to just replicate programmes across locations. Kania and Kramer (2011) also argue that scaling should focus on understanding how organizations can work together for collective impact. This chapter provides evidence of how networks of organizations act in partnership to change systems, rather than replicating and growing individual initiatives.

With regard to participants, Do (2015) notes that a variety of different individuals and groups can be involved in scaling. These are referred to as 'scaling subjects' and include: (i) non-governmental organizations who may be funders or partners in an initiative; (ii) researchers interested in observing an aspect of the initiative to inform better scaling; (iii) policy-makers who may be involved in scaling a specific policy; (iv) community members, teachers and trainers who may benefit from an initiative; and (v) institutions responsible for implementing the scaling process of an educational programme. These subjects may hold multiple positions at different times during the scaling process. They may be instigators driving the process of scaling and/or beneficiaries of the scaling process (Do, 2015).

What are the dimensions of scaling?

There are different dimensions to scaling. A dimension describes the direction in which an initiative scales its impact. This chapter reviews four dimensions of scaling (WHO, 2009):

- *Horizontal scaling* occurs when innovations are replicated across wider geographical sites to serve larger populations. The emphasis in this dimension of scaling is on duplicating and replicating the initiative.

- *Vertical scaling* happens when formal governmental decisions are made to adopt the innovation leading to institutionalization through national/international planning mechanisms, policy changes or legal actions. This dimension usually involves multiple stakeholders.

- *Functional scaling* focuses on increasing the scope of activities of an initiative.

- *Spontaneous diffusion* refers to the spread of good ideas or practices on their own accord. This dimension is not usually planned, but rather emerges from the processes of scaling.

As overlaps often occur between these dimensions, there is no universally recommended system for scaling. Scaling up is a multi-dimensional process and rarely occurs across just one dimension. As scaling moves higher up institutional levels, the chances increase for horizontal spread. Likewise, as scaling spreads farther geographically, the chances of influencing individuals at higher levels increase (IIRR, 2000).

What approaches to scaling exist?

While *dimensions* are used to describe the directions in which an initiative can scale its impact, *approaches* describe the specific choices an initiative makes as it follows one or several dimensions. There are a finite number of approaches that ESD initiatives can use to scale their impact. Based on the literature, this chapter classifies the choices initiatives must make into five domains: partnership, openness, information technology, advocacy and financial model. This section introduces each domain and presents the approaches initiatives can use in order to scale. The approaches explored here are extra-organizational and focus on how an initiative navigates in the context within which it operates. They differ from intra-organizational approaches, such as training staff, improving management systems and strengthening the team (Bloom and Skloot, 2010). These approaches fall beyond the scope of this chapter.

Partnership

Partnership describes the extent to which an initiative works with other actors, such as policy-makers, NGOs and companies. ESD initiatives can chose to scale their impact by working alone, through bilateral partnerships or by becoming part of a network.

- *Working alone* means attempting to achieve policy changes or delivering the ESD initiative to more locations or people by growing operations or opening offices (Uvin, Jain and Brown, 2000). This approach avoids reliance to any great extent on partner organizations reliance, to any great extent. Interactions with other initiatives mainly take the form of sporadic knowledge sharing.

- *Bilateral partnerships* occur when an initiative establishes strategic partnerships with other initiatives who deliver the programme for them in other locations or to other target groups (Ahlert et al., 2008). This may involve a contractual agreement in the form of a social franchise or license. Working with others can also involve joint events, knowledge-sharing meetings, funding applications and delivering projects together.

- *Working through networks* allows an initiative to collaborate with other actors as part of one or several networks. These networks can take numerous forms ranging from networks comprising like-minded organizations that come from the same sector and sporadically meet to exchange ideas, to collective impact initiatives that share a vision, activities and a backbone organization (Kania and Kramer, 2011).

There is increasing agreement in systems change literature that achieving large-scale system change and resolving complex social problems implies working together with others (Stroh, 2015). While working alone is a theoretical option, it may not therefore be the most practical choice. The choice of partnership approach depends on the position of the initiative within its social network and its access to partners. For instance, a company employee has access to a different network than a community worker. In addition, the level of trust between actors in the system and the level of desired control on the part of the initiative both influence the partnership approach (Bloom and Dees, 2008).

Openness

Openness describes the extent to which initiatives actively share their expertise with others. Initiatives can opt to retain their knowledge, share it with strategic partners or share it openly:

- Retaining knowledge means that initiatives safeguard knowledge about their ESD activities and keep it for themselves. They can also decide to trademark or copyright the materials developed as part of their programmes (Ashoka, 2016).

- Sharing information with strategic partners means that initiatives share relevant and potentially sensitive information with trusted partners. This may involve social licensing or franchising, whereby other organizations pay a fee to gain access to the intellectual property

produced by the initiative and obtain the right to operate under its brand (Ahlert et al., 2008).

- Open source change-making is the most open approach. This strategic choice involves documenting relevant information and making it freely available through handbooks, webinars, blogposts, videos, documentaries, etc. (McPhedran Waitzer and Paul, 2011). Initiatives can also choose to publish material under a Creative Commons License, which allows others to share, adapt and reproduce the materials.

The degree of openness that an ESD initiative adopts to disseminate its expertise may depend on the degree to which their proprietary knowledge helps generate an income. Initiatives that sell products and services may feel that sharing their core intellectual property too widely could risk their business model or that other initiatives might use it to submit a funding application. Conversely, social franchising and licensing works well for models that can be easily documented, standardized and delivered by another organization (Ahlert et al., 2008).

Information and communication technologies

Initiatives can make use of information and communication technologies (ICTs) to scale their impacts in a variety of ways (Hurst, 2012). They can choose to place ICTS at the core of their scaling approach or use them to provide assistance. Alternatively, they can decide to work primarily offline:

- *ICTs are core to scaling:* this occurs when an initiative leverages ICTs to their full extent and places them at the core of its organizational strategy (Henderson and Venkatraman, 1993). This can involve webinars, blended learning, online courses, an interactive website, apps and various social media channels among others.

- *ICTS as assistant:* this is the case when an initiative makes use of elementary information technologies, such as making materials and information available through a website and engaging with the target group via social media. In this case, technology supports the work of the initiative, but is not core to its efforts.

- *Working offline:* this is the case when an initiative opts against using technology to deliver and spread its projects and programmes. Education materials are printed and knowledge is delivered through workshops or lectures.

The ICT literacy of the initiative's target group and staff are two important factors that determine the extent to which an initiative leverages ICTs. If the target group lacks the skills and knowledge to use computers or does not have access to them in the first place, then working with printed materials is a good choice. However, youth in many countries have a very high level of familiarity with ICTs, and computers and the Internet constitute the best option for transmitting ESD content.

Financial model

Scaling requires a financial investment in terms of staff hours, staff training, technology or materials. The financial model describes how an initiative finances its scaling efforts. ESD initiatives can rely on government grants, private donations or grants, as well as earned income:

- *Government grants* mostly come in the form of grants linked to the implementation of specific projects. Funding for ESD projects may come from education, environment or economic ministries and departments.

- *Private donations or grants* can come in the form of monthly donations, income from crowdfunding campaigns or applications to larger private foundations.

- *Earned income* is often an important source of funding for non-profits who act as social enterprises (Hurst, 2012). In such cases, the initiative offers products and services that are (partly) paid for by the target group.

The choice of funding source depends largely on the availability of funding in the context in which the initiative operates, as well as the entrepreneurial experience and knowhow of staff. In countries with public education sectors and where no education market exists, the national or local government is an important source of funding for ESD initiatives. In cases where an initiative has positioned itself as an enabler to help implement government policies and programmes, it will be more likely to successfully mobilize government funding. Government grants and private donations are important sources of revenue for initiatives that serve target groups that are unable to pay enough for the delivery of ESD activities (Bloom and Chatterji, 2009). Earned income strategies work in cases where the target group is able and willing to pay for services and where the initiative is able to combine an impact logic with a business logic.

Successful case studies of scaling ESD

This section introduces four successful case studies of scaling ESD: the Okayama ESD project, the Eco-Schools programme, the Regional Environmental Education Programme of the Southern African Development Community, and rootAbility.

Okayama ESD project

The city of Okayama is one of the major industrial areas of Japan and home to 720,000 citizens. It is also home to the Okayama ESD project, a multi-stakeholder network coordinated by the city administration that aims to embed ESD within the culture of Okayama and its citizens. The project is a good example of an ESD initiative that has chosen to deepen impacts within an existing geographic location (i.e. Okayama city and the surrounding municipalities). The project was launched in 2005 inspired by the Regional Centres of Expertise on ESD initiated by the United Nations University. The project started with just nineteen participating organizations. As of June 2017, it consists of 268 organizations encompassing a breadth of ESD activities in community learning centres, schools, enterprises, universities and neighbourhoods. This level of maturation makes the project a successful case study on how to support ESD within a local community. In 2016, the Okayama Project won the UNESCO-Japan prize on ESD.

The network is coordinated by the Okayama ESD Promotion Commission, a multi-stakeholder forum that includes representatives of the municipality, university, NGOs and companies. The project is supported through a secretariat located within the ESD Promotion Division at Okayama City Hall. The city finances six people to work at the secretariat and provides the budget for the monitoring conducted by the commission. The significant contribution by the municipality ensures the stability and continuity of the project, making ESD an important element of the international brand of Okayama (Okayama ESD Project 2017).

The commission organizes activities that bring together and support participants within the network. It provides subsidies to member organizations working on ESD, offers capacity-building through training courses, and organizes meetings where participants can exchange experiences and provide mutual support. It also organizes the ESD Okayama Award which showcases good practice projects on ESD from local communities, and provides an online portal where participating organizations

can access a shared calendar, movies, documents and other materials about ESD (Okayama ESD Promotion Commission, 2013). The portal is an example of how the project leverages ICTs to scale its impact, by making it easier for participants to communicate with each other and access information.

Partnerships have been a core strategy for scaling up the project. The network is highly accessible, open and transparent. Openness in particular is a key factor behind the network's year-on-year growth. To apply for membership of the project, organizations submit applications describing what they do and how they can contribute to ESD. The Okayama ESD Promotion Commission has worked to involve the city's community learning centres (*Kominkan* in Japanese). These centres form part of the municipality and support non-formal learning. For example, they have been instrumental in implementing waste reduction projects and running educational courses on environmental issues. ESD principles were integrated into *Kominkan* management policy and ESD training for staff is carried out on a regular basis. Currently, all thirty-seven *Kominkan* function as ESD centres, attracting local stakeholders and initiating citizen-led projects designed to help build a sustainable community.

The Eco-Schools programme

The Eco-Schools programme is an international initiative established in 1994 by the Foundation for Environmental Education (FEE) in Europe. The programme was set up with support from the European Commission to help address the requirements of Agenda 21 adopted at the United Nations Conference on Environment and Development in Rio de Janeiro (United Nations, 1992). The Eco-Schools programme offers schools a flexible approach for implementing environmental management systems and environmental learning. Eco-Schools provide a holistic approach to embedding an ESD whole-institution approach in schools, while encouraging students to participate as a core stakeholder group through positive actions. Eco-Schools are awarded the prestigious International Green Flag once the programme has been thoroughly embedded in schools. Specific features include the promotion of environmental awareness, community involvement and global citizenship. School grounds are also improved though energy and water audits, and so on, through implementation of the Seven Step methodology (OECD, 2008).

The Eco-Schools programme is currently operational in over 51,000 schools in sixty-seven countries worldwide. It is run by sixty-eight national operators (two each in Tanzania and Zanzibar) who work with different organizations to fund its activities. For example, the project was launched in South Africa in

2003 and is coordinated by the Wildlife and Environmental Society of South Africa and World Wide Fund for Nature, as well as other organizations which act as partners (Rosenberg, 2008). The Eco-Schools programme in England is coordinated by Keep Britain Tidy, which works with various partners to offer sponsorship and support to schools. As part of the process, funders learned how to bring a programme to scale, rather than just launch a pilot (WWF-UK, 2004). The Eco-Schools programme has expanded over the years both in terms of participating countries and within countries in terms of participating schools. An important approach to scaling has been the establishment of an international network of national operators that promote and spread the Eco-Schools programme within their countries.

Lack of funding has been the main constraint for scaling the Eco-Schools programme. This limits the number of projects that schools can take up in any year and makes it difficult for them to own the projects because of the mandates of external funders. In some countries, schools pay a participation fee to operate the programme. However, this presents an obstacle for disadvantaged schools, hindering them from joining or continuing to participate in the programme. Another challenge facing the scaling of the Eco-Schools programme is that national operators sometimes need to work for three to four years in order to lay the groundwork for the initiative.

The programme has achieved significant impacts. For example, in South Africa, Eco-Schools are seen as a mechanism for teacher professional development on ESD (Rosenberg, 2008). The whole-school approach provides teachers with opportunities to explore new methods of teaching that not only engage pupils, but also other young people and parents. By broadening their focus to include other target groups, the Eco-Schools programme can promote environmental learning and practices beyond their schools. An evaluation performed in 2007/08 showed that the Eco-Schools programme was growing in size, scope and significance in South Africa, and had become an important part of the South African environmental education landscape. It is now frequently a 'first port of call' for agencies wanting to support environmental education in schools (Rosenberg, 2008).

The Southern African Development Community Regional Environmental Education Programme

In 1997, the Southern African Development Community Regional Environmental Education Programme (SADC REEP) was established as an inter-governmental programme to implement the region's government commitment to sustainable development through education. The

programme obtained funding from the Swedish International Development Cooperation Agency for a sixteen-year period (ending 2014). Its main objectives were ESD policy development, materials development, capacity-building and networking. Since its inception, the programme has been scaled in southern African countries through different regional and national donor-funded environmental education programmes. This occurred mainly to support ESD in national curricular and teacher education programmes. SADC REEP was also inspired by UNESCO's ESD teacher education programme, which was implemented in several system-building, bilateral, national, environmental education government programmes (1990-2000).

In 2002, SADC REEP established a course development network which produced tools and resources to support ESD courses in southern Africa. The SADC REEP implemented an international training programme (2001-2011) which included a strong focus on teacher professional development. In 2004, the United Nations Environment Programme (UNEP) invited the SADC REEP course development network to lead the development of 'Mainstreaming Environment and Sustainability in African Universities', a flagship programme of the United Nations Decade of Education for Sustainable Development. Materials and the change-oriented model developed by SADC REEP and regional programmes informed the 'Mainstreaming Environment and Sustainability in African Universities' programme, which was offered to university educators. In 2008, SADC REEP raised seed funding to support the establishment of three 'Mainstreaming Environment and Sustainability in African Universities' Chairs focusing mainly on teacher education. In response to the global ESD engagements, SADC REEP coordinated a regional research programme on ESD and quality education (2008-2015). This research programme was implemented across ten southern African universities (Lotz-Sisitka et al., 2017).

Following the Bonn Declaration in 2009, SADC REEP launched a dedicated ESD teacher education network to help teacher education institutions in the region develop ESD curricula. The network used the change-oriented professional development model to develop a SADC ESD teacher education workbook for teacher educators. The workbook proved a successful resource for curriculum innovation on ESD in teacher education, resulting in the emergence of change projects that contributed to both individual and institutional development. In 2013, the Swedish International Centre of ESD (SWEDESD) partnered with this network to support regional ESD teacher education work and to extend the 'change project' focus of the network across the region. The change project approach is currently being scaled through 'Sustainability Starts with Teachers', a flagship programme of the Global Action

Programme (GAP). It is implemented in partnership with the Southern African Regional Universities Association, SWEDESD and higher education institutions from nine southern African countries. The Change Project Approach is also being implemented in Central Asia in partnership with the Central Asia Regional Economic Community (CAREC), SWEDESD and UNESCO. The flagship programme provides a learning network for teacher education institutions to drive curriculum innovation and transformation in secondary teacher education towards transformation and sustainability. Through its actions and partnerships, the SADC REEP has provided a major impetus and contribution to capacity-building, supported ESD policy and created a large ESD teacher education network in the region. The ESD reference group comprising ESD experts across the fifteen countries in southern Africa are all alumni of SADC capacity development.

RootAbility

RootAbility was established to address the fact that many of the 170 million students globally graduate from university without learning about ESD as part of their studies or campus life. This is a serious issue, as the 16,000 universities worldwide prepare students for advanced careers in business, public service or the civil sector. However, engaging students in ESD and embedding sustainability into the education, research and operations of universities is a challenging process. rootAbility believes that sustainability hubs are needed to initiate projects, as well as to inform, involve and empower students and staff to engage with environmental sustainability, social responsibility and global citizenship at their institutions. In this way, these hubs become places where stakeholders can come together and receive support, where ESD becomes visible, and where new notions and ideas are created and exchanged to advance change. rootAbility supports the development of these hubs, based on their Green Office Model.

The first Green Offices were founded in 2010 in the Netherlands at Maastricht University. This student-led sustainability hub has eight student employees, one PhD student and the university's environmental coordinator. Among others, the Green Office lobbied the university to set-up solar panels on all rooftops where this is technically possible, developed an extensive sustainability reporting system, and implemented several pilot projects around waste recycling and student-led sustainability education (Spira, 2013; Tappeser, 2012). Upon graduating from Maastricht University, four students – who had worked together in the Green Office – established rootAbility. They wanted to inspire other students and staff to establish similar student-led sustainability offices at universities in Europe.

Over the last five years, rootAbility has supported students and staff to set-up twenty-eight sustainability hubs based on the Green Office Model in six European countries (rootAbility, 2017). Since these hubs are funded by their universities, rootAbility has enabled students and staff to mobilize €1.2 million in funding from their universities to finance ESD, create 100 jobs, and support sustainability hubs to implement over 250 activities that reached thousands of students and staff. Notable successes include the piloting of sustainability minors, honours and student-led courses, ESD curriculum inventories and the support of numerous service learning projects in which students analysed sustainability issues relevant for the university (rootAbility 2016). In 2015, the Green Office Model won the UNESCO-Japan Prize on Education for Sustainable Development.

rootAbility pursues three scaling strategies. First, through open-source change-making the organization makes its knowledge about the design, lobbying, start-up and running of these sustainability hubs freely accessible to the world. All materials are published on its website and licensed under a Creative Commons License. rootAbility develops these materials itself through student research projects or grant-funded projects. Second, rootAbility applies grassroots advocacy as a strategy to support students and staff in lobbying their university to establish a sustainability hub based on the Green Office Model. This involves free support via Skype, as well as paid workshops and consulting. Third, by building a movement, sustainability hubs are able to learn from each other as part of a larger community. To enhance these exchanges, rootAbility hosts an annual summit and works together with partner organizations to organize working sessions. rootAbility also leverages information technology through the learning, exchange and action programme, a dedicated initiative that sustainability hubs can access via subscription in order to participate in webinars, join an online platform, benefit from toolkits and learn through blogposts. Overall, the organization pursues a freemium business model, with free services for student initiatives and paid-for services in the form of workshops, consulting, and the Learning, Exchange and Action Programme (rootAbility, 2017).

Discussion

This section discusses experiences from the case studies with regard to issues identified in the literature review. The case studies are analysed in relation to the scaling dimensions and approaches they used, the objects and actors involved, and the resulting challenges and impacts.

Scaling objects and scaling subjects

The four cases analysed in this chapter had different scaling objects (Do, 2015). Although the cases focused broadly on ESD, the focus in each case was different. The specific scaling object in the Eco-Schools programme was the whole institutional approach model applied in schools (OECD, 2008). This aimed at transforming school grounds and enhancing environmental education in the school curricula at the global level. The SADC REEP initiative aimed to develop capacity for teacher educators and teachers to implement ESD in their context and to enable different countries to contribute to implementation of ESD at the regional level. rootAbility also focuses on capacity-building for ESD, but unlike SADC REEP their focus is on students. This is achieved by creating structures (sustainability hubs) to engage students with ESD and to initiate ESD projects based on the Green Office Model. The focus of the Okayama ESD project is to accelerate ESD actions at the community level.

Do (2015) noted that instigating or driving scaling processes requires different 'scaling subjects'. The four cases cited above had different scaling subjects determined by their respective scaling objects and scaling sites. The Eco-School aimed primarily at strengthening ESD in schools (Rosenberg, 2008). In this case, teacher and learners are the direct beneficiaries of the programme. Because of the use of the whole institutional approach model, the different organizations and communities can also be considered scaling subjects, who enable the scaling process of the Eco-School programme (Rosenberg, 2008). The Okayama ESD project focuses on local communities, but as a multi-stakeholder project, it has different scaling subjects. The Okayama ESD Promotion Commission, a multi-stakeholder forum and secretariat, also played a role in the scaling process. In the case of rootAbility, the scaling subjects are primarily students who are the beneficiaries of the initiative, rootAbility itself, which builds the capacities of students to initiate ESD projects, and the universities that fund the initiative. SADC REEP is a partnership programme. The scaling subjects are funders of the different ESD initiatives created and supported through the programme. The direct beneficiaries of the programmes are mainly teachers and teacher educators. As a regional initiative that also aims to advance policy, the other scaling subjects of the programme were policy-makers (Lotz-Sisitka et al., 2017). The analysis of the four cases revealed that different scaling subjects, especially funders, are critical for scaling ESD actions.

Dimensions and approaches

The Okayama ESD project, SADC REEP and the Eco-Schools programme all demonstrate how scaling can take place along the institutional dimension. The institutional scale describes vertical changes achieved by an initiative within formal governance at the local, national or international level (IIRR, 2000). For example, the Okayama ESD project is run and financed by the municipal government as an important part of its ESD strategy. Over the years, the policy component of the programme formalized by developing clearer goals and action areas. The network developed around the SADC REEP course was invited by UNEP to lead the development of 'Mainstreaming Environment and Sustainability in African Universities', which itself became a UNEP flagship programme during the UN Decade of ESD. In this way, an informal network became institutionalized as a UNEP programme.

The Eco-Schools model and rootAbility's Green Office Model are two examples of programmes that scaled horizontally along the geographic dimension (WHO, 2009). The Eco-Schools programme has been implemented at 50,000 schools in sixty-four countries, while the Green Office Model has been adapted to twenty-five universities in six European countries. The Okayama ESD project did not scale along the geographic dimension, since the programme remained linked to the city of Okayama. The Eco-Schools programme also achieved synergies between the two dimensions: the programme has been taken up by government ministries in some countries who then finance and organize geographic replication of the programme in schools.

All four cases highlight the importance of working through networks. The networks built by the initiatives range from paid-for membership models with clear membership criteria, as in the case of Eco-Schools, to the unpaid membership model without any formal criteria of the Okayama ESD project and SADC REEP. The Okayama ESD project is an interesting case in this regard, because the project itself does not promote any specific ESD activity, but rather provides a platform for companies, NGOs and educational institutions to work together.

The cases also showcase different choices with regard to how they share their expertise. rootAbility pursues the idea of open-source change-making by documenting relevant information about the Green Office Model and making this publicly available on its website. The Eco-Schools programme uses a social franchise model where information about the programme is only made available to schools that pay for it. Some SADC countries refer to the model

using terms such as 'whole school development', but still take on the Eco-Schools experience as a guiding principle. Regarding information technology, the Okayama ESD project developed an online platform that allows actors to access a calendar and ESD-related materials, and share each other's documents. In this case, information technology assists the scaling approach of the project. SADC REEP operates primarily offline through a workbook.

The four cases employ a variety of financial models. Eco-Schools finance the spread of the programme through funders and industry sponsors; the umbrella organization for Eco-Schools is also financed through the membership fees of national operators. The Okayama ESD project is financed by the city, while the development of SADC REEP was funded by a Swedish development agency, thereby providing an example of how development aid can help ESD actions to scale. rootAbility uses a multi-income model by writing grant applications, accepting donations and acquiring money through service delivery.

Challenges and impacts

There is an assumption that reaching more beneficiaries and locations will automatically enhance the impact of an ESD initiative (Snapp and Heong, 2003). This assumption is based on the belief that the size, number of beneficiaries or geographic locations covered constitutes an indicator of an initiative's success and positive influence on people. However, this is not always the case. This chapter defines scaling ESD as a deliberate process in which an ESD initiative sets out to change the system in which it operates by deepening impacts within an existing location or affecting target groups and institutional governance contexts in other locations. This is because educational projects, especially in the formal education sector, are concerned more about improving quality and expanding to more people.

The cases analysed above show that there are various enablers for scaling. These include funding availability, partnerships and networks, capacity-building opportunities, research and existing structures (i.e. materials, policies and forums for sharing ESD knowledge and practices). The SADC REEP case showed that funders have a preference for financing new projects, which often results in projects elapsing following the end of the funding period (see also Bradach, 2003). Its nature as a regional initiative, however, meant that more funders contributed to the replication of the programme, resulting in a wider impact (Lotz-Sisitka et al., 2017). The cases also revealed that factors that enable scaling may act as constraints on scaling ESD initiatives. For example, funding has been a constraint on scaling in the cases of Eco-Schools and

SADC REEP (Lotz-Sisitka et al., 2017). In the case of the Okayama project, the programme encouraged citizens to take action on ESD, but did not define clearly what sustainability meant for Okayama city or the region. While this approach enabled the project to be more open and inclusive, it made it difficult to track and monitor progress.

The four case studies have all grown in size over their period of existence both in number of scaling subjects as well as geographically. For example, the Eco-Schools programme has scaled to sixty-four countries worldwide; in South Africa, the Eco-Schools programmes are seen as mechanisms for teacher professional development (Rosenberg, 2008). SADC REEP has managed to convince all southern African countries to participate in regional programmes on ESD, and to replicate aspects of the programme such as the Change Project approach and training models within their country-specific ESD programmes. rootAbility has increased the visibility of ESD and triggered new notions and ideas to advance change. Over the last five years, rootAbility has supported twenty-five sustainability hubs based on the Green Office Model in six European countries. In addition, it has created 100 jobs for students and supported sustainability hubs in implementing over 250 activities that reached thousands of students and staff. The Okayama ESD project has achieved impacts in terms of supporting non-formal learning. It has also been instrumental in realizing waste reduction projects and introducing educational courses on the environment.

Conclusion

The cases analysed in this chapter show that horizontal and vertical scaling are common dimensions of ESD scaling. They are enabled through use of the network approach, which is the most popular strategy used for scaling with existing institutional budgets. Scaling subjects are determined by the scaling object, however, funders are critical for the success of the scaling process irrespective of the initiative. Successful scaling also relies on the choice of a suitable financial model for the scaling process. It is also worth considering different approaches to scaling, which range from open sharing of information through the use of ICTs, to ways of sharing and safeguarding proprietary knowledge.

Chapter 10

Monitoring ESD: lessons learned and ways forward

Ashley Stepanek Lockhart

Introduction: purposes and benefits of monitoring

Discussions about monitoring and evaluation (M&E) occur throughout the literature on education for sustainable development (ESD), with numerous debates regarding methodology and strategies for interpreting the data. Discussions about the purpose and value of M&E are less common. So why is ESD monitored in the first place? Tilbury (2007) provides a useful answer:

> In their most conservative form, ESD monitoring and assessment frameworks help: ensure on-going relevance and effectiveness of ESD efforts, guide planning and reorienting of… programmes; increase understanding of ESD progress, and improve decision-making and action-taking… If participatory evaluative frameworks are used, the process can also inspire and build knowledge among stakeholders nationally and regionally (Tilbury, 2007: 240).

Of course, the main argument for M&E is to measure progress in ESD learning compared to policy commitments, provision, institutional support, resources and so on. Quantitative researchers in global education commonly refer to these as inputs and throughputs. While this is a core exercise, what kind of progress is actually being discussed? Often, progress is checked against

learning outcomes, which is why student assessments are popular. Higher learning outcomes might suggest that input and throughput activities are making a difference in ESD learning. This would constitute progress. Conversely, a dip in learning outcomes might suggest a problem with these activities. This links to what Tilbury refers to as 'ensuring on-going relevance and effectiveness of ESD efforts'.

New information, analysis and predictions feed into 'improve[d] decision-making and action-taking' to guide and reorient programmes. This process, if it remains open and participatory, increases understanding about the elements necessary to promote ESD learning in a particular context, and could influence other stakeholders. The desired outcome is wider social learning and enhanced ESD knowledge and skills, potentially resulting in diverse activities that promote not just better learning but the ultimate goal of ESD: sustainable living throughout life.

A main requirement of effective M&E in education and learning is clear objectives, otherwise called *competencies*, which stem from defined concepts in a subject. However, the more dynamic aspects of ESD cannot be boxed into a measurable definition because they centre on the unknown and the emergent: they revolve around new concepts and ideas produced by learners to help populations confront global issues such as climate change. This tension is what makes ESD both an essential and challenging subject to track. In other words, it is not always possible to know what to monitor because learners are partially leading the process. The other challenge is to differentiate ESD from two subject areas it is often lumped together with – its precursor, environmental education (EE), and global citizenship education (GCED), which runs complementarily .

Finally, there is an important governance and accountability angle to M&E of ESD. It involves verifying that all learners have access, that the process is inclusive and that the learning provided is suitable. 'At the national level, it is crucial that education authorities be in a position to account for how a significant share of public expenditure (supplemented by sizeable private investment) is ensuring the right of all children, youth and adults to basic educational opportunities that lead to effective and relevant learning' (UNESCO, 2015b: 68). M&E also accounts 'for ensuring equal opportunity for post-basic education and training' (UNESCO, 2015b: 68).

Monitoring is thus concerned not only with learning, but *effective learning for all*, and therefore operates from a position of social justice. It helps to keep special interests and the marketization of education in check, by regulating

the private sector to 'ensure the application of standards adopted by education professionals working in both public and private sectors' (UNESCO, 2015b: 82). Therefore, M&E is supposed to protect and uphold access to quality education for all people throughout life by reining in potentially dominant special interest forces.

Monitoring achievements and challenges

Historical efforts in ESD monitoring and analysis of lessons learned

From 2005 to 2014, UNESCO embarked on an ambitious decade that prioritized and worked to advance ESD. Based on United Nations General Assembly Resolution 57/254, the UN Decade of Education for Sustainable Development (DESD) was conceived as a way to foreground principles and practices of sustainability and marry them with education and learning. This marriage aimed to strengthen ESD worldwide with a view to effecting positive, sustainable change in the ways that people – in this case, learners – make choices and live their lives in relationship to others and their local environment, ultimately transforming broader social behaviour and its effects on the planet.

M&E was an important piece of the DESD puzzle. Everyone agreed that it was necessary to monitor efforts to observe the kind of progress being made. This information could be fed back into the process leading to changes and improvements resulting in better ESD learning. But what was the best way to proceed? The common practice was to measure ESD through inputs, as mentioned in the previous section, including the 'development of strategies, plans, coordinating mechanisms and resources' (UNESCO, 2014a: 184). This approach reflected a more top-down approach to M&E often driven by national reporting to international agencies. It was also representative of a belief that inputs inevitably lead to outputs.

However, the effect of inputs and throughputs on ESD learning proved difficult to see (UNESCO, 2014a: 184). This suggested three things: (i) equating inputs with outputs amounted to a leap of faith, and was not backed up by the evidence. Accordingly, different or a combination of M&E strategies were needed; (ii) DESD activities were not making an immediately observable difference on the ground; and (iii) more information was needed about the context, educational process and so on. Such input-output thinking often goes hand-in-hand with an overly focused, sometimes myopic conversation about indicators (which are sometimes presented as the solution in themselves). Some indicator strategies have attempted to temper and

integrate decontextualized aspirations and goal setting with contextualized priorities and realities.

This mix reflects the balance and tension between translating global and local concerns into goals and targets, and having indicators that help collect information on activities that demonstrate progress towards them. Both are important, as the wider call for sustainable development is a response to overarching, multifaceted (global) problems, such as climate change and specific (local) manifestations and effects on different places for actual people.

During the Decade, the DESD Monitoring and Evaluation Expert Group (MEEG) developed various ESD indicators as part of their Global Monitoring and Evaluation Framework. In particular, the Asia-Pacific region devised a strategy that incorporated country priorities and context. 'With the vast amount of diversity in the Asia-Pacific, "one-size" indicators will not "fit all" national goals and priorities in the region. Early involvement of stakeholders and establishing agreed-upon goals will be vital to addressing this indicator development challenge' (UNESCO, 2007: 16). Coordination between National Commissions and designated working groups led to various types of indicator development bodies each with different purposes.

This strategy resulted in an open and connected process that was part of a larger M&E scheme. By virtue of this, and in reference to Tilbury's quote, indicator development became more relevant and possibly more effective in tracking ESD activities at various levels. This kind of organization and collaboration, and the influence it may have had 'to build knowledge among stakeholders nationally and regionally', is a positive outcome of the Decade.

A country-specific example of collaboration was led by India's National Commission, where 'consultants for education departments and ministries' coordinated to 'recommend and formulate policies to support the development of indicators' resulting in 'a DESD National Action Plan' (Sharma, 2006 – cited in UNESCO, 2007: 20). Another such example was Sri Lanka's National Commission, which involved 'dissemination of information through organized meetings, workshops or discussions on how to develop and implement ESD indicators' and the 'provision of technical specialists' (Chandith, 2006 – cited in UNESCO, 2007: 20). Uzbekistan's National Commission helped with the 'identification and analysis of stakeholder and partner needs related to ESD indicators' (Kurbanova, 2006 – cited in UNESCO, 2007: 20), and Palau's National Commission 'promote[d] and support[ed] partnerships and networks' (Alexander, 2006 – cited in UNESCO, 2007: 20).

Another positive outcome from the Decade is that many M&E experts now believe in evaluating programmes and practices at multiple levels and stages of the educational process (UNESCO, 2014a: 184). Possible multipronged frameworks involve large-scale student assessments and country-level and lower assessments related to contextualized ESD aims and purposes (UNESCO, 2014a: 184). This may include evaluation of the learning environment focusing on pedagogy and learner engagement, and formative assessments to improve professional practice among teachers through peer engagement (UNESCO, 2014a: 184).

While many see the value of a multipronged framework – particularly in going beyond learning outcomes and assessments to understanding what leads to progress in the educational process – some feel that this approach will be insufficient for global monitoring. Where is the meeting point for country and regional comparisons? This question inevitably leads to the key issue of why large-scale student assessments are valued by global, quantitative comparative education researchers, with their findings rolled out as conclusive evidence for better policy-making and practice. The next section provides more details on this topic in relation to the two main international student assessments.

Much of what informs better policy-making and practice is the result of evaluation of a specific, contextualized educational process, not simply test scores. Lower test scores may provide information about a group of learners' general knowledge and skill in ESD, if the questions truly correspond to common principles in the subject and not a supposed proxy version such as geoscience[1].

Lower test scores may suggest that changes are needed to inputs, but do not provide clues as to how to make those changes or the underlying motivation, aside from improving test scores. Improving test scores has little to do with real ESD learning or advancing sustainable development; test scores are only an indication of competence.

The final report of the DESD views large-scale student assessments as promising. However, questions remain as to whether learning outcomes (i.e. test scores, therefore data for monitoring) can accurately portray ESD

1 It is not appropriate to equate subjects that may teach about the natural environment with ESD. For example, in geoscience or earth science, learning focuses on areas such as plate tectonics and physical and chemical processes from inside the Earth's surface that affect its crust. It does not focus on human-made problems such as climate change, etc.

learning both in general terms and in context. Some also wonder whether assessments are contributing to the problem that ESD is intended to tackle by promoting teaching to the test, competition and entrenched conventional thinking. The methodology underlying these tests should be made available for open review to avoid incorrect findings from the analysis of results, and consequent changes to policies, provision and institutional support, which could also influence other areas.

How do countries monitor ESD?

Finding data on how countries monitor ESD has proven difficult. References in the literature to country approaches to M&E invariably follow the model of collecting and analysing policies, capacity-building efforts, implementation, learning objectives, teacher and curriculum, partnerships and networks, and so on. There is little mention of holistic schemes or systems operating in unison. Some instances provide decontextualized discussions about indicators and assessments to evaluate learning outcomes. As these discussions are not part of a larger whole or anchored to country activities, they lose their concrete value and simply amount to a reiteration of oversimplified, input-leads-to-output thinking without any information about what happens between inputs and learning outcomes.

There are a few examples of studies where M&E of ESD within countries could have been inquired about and pointed to, but were not for some reason. The United Nations Economic Commission for Europe (UNECE) Initiative on Education for Sustainable Development includes an objective to 'promote research on and development of ESD'[2]. However, the ten-year evaluation report on implementation does not provide examples of monitoring, and notes only that more and better practices are needed.

The United Nations University Institute of Advanced Studies (UNU-IAS) and the Institute for Global Environmental Strategies (IGES) collaborated on a research project with the UNESCO Asia and Pacific Regional Bureau for Education on M&E for ESD in 2011 to 2012. The study covered nine countries in North and Southeast Asia over two rounds of surveys using a mixed-methods approach (both quantitative and qualitative with a bridge connecting the two data sets) (UNU-IAS and IGES, 2013: 9-10). Similar to the UNECE report, key input, content and process areas were examined. There is lengthy discussion in the final report about the benefits and deficiencies of monitoring, but an absence

2 See www.unece.org/fr/environmental-policy/education-for-sustainable-development/about-the-strategy-for-esd/the-strategy.html.

of country cases to illustrate these points. Examples of what is described and promoted as good practice would be useful, as those developing M&E for ESD are often not experts and need guidance.

A publication developed by UNESCO in 2013 entitled *National Journeys towards Education for Sustainable Development* offers some detail and analysis of M&E in countries within the five world regions, focusing on: Costa Rica, Morocco, South Africa, Sweden and Viet Nam. In the case of Costa Rica, monitoring is addressed but mostly in relation to sustainable human development through the annual report, State of the Nation (UNESCO, 2013b: 21). Further leadership is mentioned as a key concern – one that also impacts M&E. According to the report, Morocco does not appear to have a comprehensive ESD M&E approach in place, including indicators. Accordingly, the report advocates for using SWOT (strengths, weaknesses, opportunities and threats) to evaluate performance (UNESCO, 2013b: 50). Versions of this approach are also applied to other country profiles in the report. According to the publication, South Africa has a strong tradition of M&E in ESD, and implemented the National Environmental Education Project for General Education and Training (NEEP-GET). This is 'one of the largest, most comprehensive formative monitoring and evaluation (FME) processes', which focused on 'contextual monitoring and longitudinal studies, as well as critical appraisals of key issues' (UNESCO, 2013b: 77). In Sweden, the Institute for Research in Education and Sustainable Development (IRESD) is 'one of the most expansive and acclaimed research environments for education and sustainable development in Sweden' (UNESCO, 2013b: 100). However, the report does not provide information on how this links to monitoring ESD. According to the publication, Viet Nam's approach is focused on 'project-based mechanisms and indicators' (UNESCO, 2013b: 116). This includes manuals and guidelines for M&E of ESD, and relevant teacher training.

What can be said about country monitoring efforts during DESD? With the exception of a few, many countries are only getting started. This suggests that the process of developing holistic, multipronged M&E systems for tracking ESD is still in the early stages. More needs to be done (and documented) with an emphasis on the driving reason for monitoring ESD in the first place: to gain information to make good decisions about policies, provision, institutional support, resources, and so on, that lead to better ESD learning and, ideally, broader sustainable behaviour.

Current mechanisms – moving forward

Forward-facing approaches: what elements exist to work with?

Important institutional methodologies in monitoring ESD followed from the DESD, as discussed in the previous section. At the World Conference on ESD in Aichi-Nagoya (Japan) in 2014, countries agreed to carry forward and scale up ESD by creating the Global Action Programme for Sustainable Development (GAP).

GAP encompasses ESD efforts that feed into the SDGs. Regarding ESD, these efforts respond directly to Goal 4 (SDG 4), Target 4.7. SDG4 aims to 'ensure inclusive and equitable quality education and promote lifelong learning opportunities for all'. Its target hopes to,

> By 2030, ensure that **all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles**, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of **culture's contribution to sustainable development**.

Monitoring of the SDGs and corresponding targets at country and subnational levels should be 'part of a broader and more contextually-sensitive monitoring system that will be designed by countries and regions as part of their implementation of Education 2030' (UNESCO, 2015c: 1). Education 2030 came out of the World Education Forum 2015 in Incheon (Republic of Korea), through which 160 countries, many international agencies, and education and development actors committed to improving education and learning through the SDG framework, including M&E.

Through this commitment, countries are also supposed to align their monitoring with data collection on global and thematic indicators corresponding to targets and SDGs. The global and thematic indicators are 'guided by an agreed set of criteria and aimed to meet specific demands …

concentrated on indicators which provide comparable information across countries' (UNESCO, 2015c: 1)[3].

ESD mainly responds to the demands set by SDG4, Target 4.7, but also links to Goal 12 (SDG12), Target 12.8, and Goal 13 (SDG13), Target 13.3.

SDG12 aims to 'ensure sustainable consumption and production patterns'. Its target hopes to 'by 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature'. Therefore, Target 12.8 refers to ESD applied to learning in the widest sense through public information campaigns and informal activities promoting awareness of sustainability issues and better practices.

SDG13 focuses on 'urgent action to combat climate change and its impacts'. Its target intends to 'improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning'. Target 13.3 zeroes in on climate change education, which is part of ESD, and the more technical aspects of what this means – climate change effects, ways to prevent it from worsening, how to offset it, how to live with it and so on. Raising awareness about climate change is also considered social learning in the widest sense.

To synchronize global monitoring of these three SDGs and their related targets, the global indicator for Targets 4.7 and 12.8 is the same. The global indicator for Targets 4.7, 12.8 and presumably 13.3 is the 'extent to which … (ii) education for sustainable development … [is] mainstreamed at all levels in: (a) national education policies, (b) curricula, (c) teacher education and (d) student assessment' (UNSC, 2016: 7-17). Similar way of linking monitoring of Target 13.3 with Targets 4.7 and 12.8 could also be explored.

This global indicator was partially based on existing data sources and data that can be collected consistently at country level on ESD (and GCED in Target 4.7, and other aspects of the other targets. However, national education policies, curricula and teacher education (a, b and c) are all inputs to the educational process, which leads back to concerns raised in the previous section about input-leads-to-output thinking. Moreover, mainstreaming ESD in student assessments (d) is also a requirement of the global indicator. As student assessments are often conducted in a large scale, there is a concern that this

3 These indicators were developed by the Technical Advisory Group (TAG), now the Technical Cooperation Group (TCG), which is chaired by the UNESCO Institute of Statistics (UIS) and reported to the Inter-Agency and Expert Group on SDG Indicators (IAEG-SDGs).

may mean that countries are likely to resort to the traditional summative assessments to measure students' knowledge of ESD. This may not do justice to the principles and practices of ESD. Therefore, there is growing need to find more inclusive, alternative means of measurement for the global indicator that can provide more comprehensive and adequate assessment of how well learners are acquiring knowledge and skills for sustainable development.

Key structural and institutional global M&E mechanisms

Monitoring the SDGs

The Global Action Programme (GAP) introduces an approach to M&E of ESD that points to global targets created during the 2014 World Conference on ESD (UNESCO, 2014b: 29). These reference points connect to five Priority Action Areas of the GAP. The UNESCO *Roadmap for Implementing the GAP on ESD* includes a commitment that 'global monitoring and evaluation of progress in implementing GAP, including indicators and quantitative and qualitative reporting, will be aligned with the monitoring and evaluation of the post-2015 agenda' (the post-2015 agenda is the SDGs) (UNESCO, 2014b: 29).

The progress of the GAP is monitored through annual reports by the key partners with 10 indicators (two in each of the Priority Action Area) and towards their target for 2019 which was set as part of their initial commitments (UNESCO, 2017b).

The GAP implementation supports countries efforts to achieve SDG Target 4.7. However, a comparison of the five Priority Action Areas with the SDG global indicator for Targets 4.7, 12.8 and 13.3, shows that the GAP Priority Action Areas and the SDGs are only partly linked with each other. For example, only two of the five GAP areas have been directly taken up by the global indicator – national education policies and teacher education. Although the 'whole school approach' (Priority Action Area 2) contributes to policies, teacher education and curriculum, the linkage is indirect. Moreover, it is to be noted that while the GAP addresses the important role of non-formal and informal education through 'youth-led initiatives' (Priority Action Area 4) and 'local ESD initiatives' (Priority Action Area 5), the current set of indicators for SDG Target 4.7 do not reflect these areas as much (UNESCO, 2014b, p. 29). Therefore, the inclusion of non-formal, informal learning that often takes place in community settings remains to be explored in the future discussions on the indicators of Target 4.7.

Monitoring on the basis of the 1974 Recommendation

The *Recommendation concerning Education for International Understanding, Co-operation and Peace and Education relating to Human Rights and Fundamental Freedoms*, or the 1974 Recommendation, has become one of the main sources of data for global indicator 4.7.1 of SDG Target 4.7. The reporting process for the 1974 Recommendation, which is conducted every four years, was recognized as a mechanism for country reporting on Target 4.7 (UNESCO, 2016a). The latest report is to be published by the end of 2017.

The 1974 Recommendation was revised to make it easier for countries to complete, in order to improve the response rate. The questionnaires are now available online as well as in paper format, and pose more closed-ended, multiple choice questions with only a few open-ended questions (paragraph 6) (UNESCO, 2016a). Questions also address national education policies, curricula, teacher education and student assessment. The questionnaire also enquires about types of subjects and education, school level, teaching hours, pedagogy, student decision-making, non-school programmes and informal learning, and enabling factors for progress.

The questionnaire for the country reports on the implementation of the 1974 Recommendation originally focused more on civic education, while the new questionnaire concentrates more on the global indicator for Target 4.7. Non-formal and informal learning which are related to Youth and local ESD initiatives in Priority Action Areas 4 and 5 of the GAP are only addressed in a limited manner. (UNESCO, 2016c: 9-10).

Challenges also remain with regard to self-reporting by countries. These reports are filed by governments and mainly concern their own activities although, ideally, reports should be developed with stakeholders. Crosschecking findings with other data sources is important to offset bias introduced by self-reporting.

Large-scale student assessments

There are two large-scale student assessments that collect data on learning outcomes, or outputs, for monitoring Target 4.7. These are the International Association for the Evaluation of Educational Achievement (IEA)'s *International Civic and Citizenship Education Study* (ICCS) and the Organization for Economic Cooperation and Development (OECD)'s *Programme for International Student Assessment* (PISA). These are thought to shed light on ESD learning

by comparing student performance with set learning objectives, or competencies, embedded in the test frameworks.

As agreed with UNESCO, IEA is designing the next round of ICCS, scheduled for 2022, to build on the 2016 cycle, which was implemented in twenty-four countries. It will extend country coverage, themes and indicators of knowledge, understanding, skills, beliefs, attitudes and behaviours related to ESD. Through pledged enhancements, ICCS aims to provide data for thematic indicator 26 on students' understanding of issues related to sustainability, and connects to student assessments (d) in the global indicator. It commits to generating reliable, comparable data over time[4].

The assessment is an 'international cognitive student test consisting of items measuring students' civic knowledge and ability to analyse and reason' (IEA, 2016: 9). It targets eighth graders, or students approximately 14-years old. Questions are mostly multiple-choice, with open-ended questions accounting for 10 per cent (IEA, 2016: 59). The test also collects cognitive, affective-behaviour and content related to civics and citizenship, but also includes contents on the 'environmentally-responsible citizen'. The assessment is accompanied by a student questionnaire (IEA, 2016: 9). These data could be useful for context, as they speak to the student experience and may also highlight something about quality. ICCS also incorporates 'regional student instruments consisting of questionnaire-type items' only administered in the Europe and Latin America modules (IEA, 2016: 9). In addition, it collects information from principals about sustainable development initiatives in schools. This connects to GAP Priority Action Area 2.

Challenges with ICCS include country coverage which is quite limited. Another issue is the target group. ICCS is limited to 14-year-olds in school, their teachers and a country expert. This presents limitations for capturing the inclusive intent of Target 4.7. Some also believe that youth demonstrate wider concern for issues and more active engagement around the ages of 15 and 16 (Hoskins, 2016: 34).

The OECD's PISA is another assessment. It 'evaluate[s] education systems worldwide by testing the skills and knowledge of 15-year-old students' and is administered every three years (OECD website). In 2015, the two-hour

4 The logic is to establish monitoring trends of 'civic knowledge and engagement' among ICCS 2009 (in thirty-eight countries), ICCS 2016 (in twenty-four countries) and ICCS 2021, building on the previous CIVED 1999 study (in twenty-eight countries) and 'three studies in this area conducted by IEA in 9 countries in 1971' (ICCS website).

computerized test (paper-based is optional) was given and students answered a background questionnaire (OECD, 2016a: 11). Similar in some ways to ICCS, this provides contextual information about the student, their home, school, experiences and so on. (OECD, 2016a: 11). Principals have to answer a questionnaire regarding the learning environment, and in some countries, this is mandatory for teachers as well as parents (OECD, 2016a: 11).

Interestingly, PISA 2006 included a module on environmental science called 'Green at Fifteen' which is relevant to ESD. Country coverage remains limited, and the assessment still carries a cost. The target group is limited to students aged 15, excluding younger and older students, and out-of-school and adult learners. However, 15 does seem to be a suitable age for evaluating wider social and environmental concern.

Monitoring through UIS and the GEMR

Two global monitoring mechanisms from the MDGs and Education for All (EFA) era were reconfirmed in Education 2030 and the Framework for Action (or the implementation plan for SDG4).

The first is the UNESCO Institute for Statistics (UIS), which reaffirmed its commitment as 'the official source of cross-nationally comparable data on education' (paragraph 100) (UNESCO, 2015a: 30). For global comparisons on SDG4, UIS is 'to produce international monitoring indicators based on its annual education survey and other data sources that guarantee international comparability for more than 200 countries and territories' (UNESCO, 2015a: 30).

The second mechanism is the former *EFA Global Monitoring Report* (GMR), now the independent Global Education Monitoring Report (GEMR), hosted and published by UNESCO, as the mechanism for monitoring and reporting on the proposed SDG4 and on education in other proposed SDGs' (paragraph 18) (UNESCO, 2015a: vi).

The 2016 GEMR explores education and sustainable development in its thematic section, along with EE. However, ESD itself is not discussed extensively. Neither GAP nor country monitoring frameworks of ESD are discussed. However, there is a chapter on monitoring Target 4.7, which follows the relevant global and thematic indicators. The report argues that the global indicator does not capture the intent of the target's underlying call for values and attitudes to promote sustainable development, and does not address populations beyond children and youth in school (UNESCO, 2016b: 288-289).

The GEMR also discusses the Sustainability Literacy Test (SULITEST), as a possible model for assessing both contextual knowledge and skills in ESD and more global, common principles agreed. Geared towards adults in higher education, institutions, companies and other organizations, it assesses sustainability literacy with the explicit aim of improving and supporting learning (making it formative). The test is short (30 minutes), consists of multiple-choice questions and is available online. It is also free, although participants are invited to pay what they want. The test establishes both global and local benchmarking: '30 questions come from the same database of international questions and are identical for all users throughout the world' (SULITEST website). These are typically combined with 20 other 'specialized' questions that reflect local, regional and cultural specificities (e.g. local regulations and laws, culture and practices)'. The results show test-takers how they performed compared to the assessment framework, and average scores are shared to show how they compare with others from the same course (cohort), university, country, as well as globally.

Conclusion

What to make of all this?

Obviously, monitoring is no small feat. For it to be worth the trouble, M&E of ESD must retain a clear purpose – improving ESD learning and helping to ensure a wider sustainable impact in the place being monitored. This is its inherent value and must remain at the heart of the process.

Monitoring is also not conducted in a vacuum. ESD and sustainable actions have urgent implications for vast numbers of people. Many have real concerns about conflict, adequate food, rising coastal waters and flooding, and other fundamentally important and alarming issues that stem from climate change and its effects on the present and future, among other issues in ESD. In other words, M&E is of little use if it does not contribute to helping people devise new ways to cope, and even thrive, and prevent situations from worsening. Monitoring should not limit the potential of ESD as a source of creative thinking and doing in facing these and other challenges.

It is therefore vital to remember that only what is measured gets counted. The dynamic, emergent aspects of ESD matter *a lot*, but are very difficult to monitor well and go mostly unmeasured. How ESD will help usher in change largely depends on the new ideas and approaches devised by learners, which

are not monitored. Learners must internalize ESD learning in order to make genuine and significant progress towards sustainability. This process is not an easy one, as it must confront a variety of values, many of which dominate society, such as individualism, self-gain, the status quo and so on.

Improving monitoring of ESD

It is crucial to get better at monitoring this aspect of ESD. Beyond input-leads-to-output thinking, more data and analysis are needed on what happens between inputs and outputs in the educational process, with a particular focus on the learner and what they are thinking and doing (tracking them and trying to make sense of their progress versus comparing their performance to learning objectives). What are learners' experiences? What are they doing that is new? Will it help and, if so, how can it be taken forward? Which pedagogies can amplify and help shape this process? What part should curricula play? These questions are crucial to understanding this aspect of ESD.

Despite their emphasis on measuring knowledge of facts, figures, philosophies, strategies and so on, the Member States consultation on the 1974 Recommendation, ICCS and others are attempting to obtain more information about context with background collection on students. But the underlying method still relies essentially on surveying from a predetermined framework, which makes the process feasible on a large scale, but much less effective for collecting diverse, emergent, new data.

It might be worth reconsidering the value of more open-ended questions in these and other mechanisms. While relatively more complicated to interpret and analyse, open-ended questions could provide more information about ESD beyond a predetermined scope and in context for qualitative analysis (i.e. coding these answers through a set framework driven by the content of the data, or an *in vivo* approach).

Collecting data about context could also be a way to measure 'culture's contribution to sustainable development', in answer to the last part of Target 4.7. This may help learn more about modes and areas of ESD learning that may not seem obvious, but could be crucial to sustainable behaviour and activities in reality, such as non-formal education and informal, intergenerational, lifelong learning, among others.

Qualitative methods such as classroom observation, interviews, focus groups, ethnographies, forms of social action research, among others, would also help

researchers perform more explorative, open-ended, data-driven monitoring of the educational process at the local level. Findings from these collections could shed light on what many view as a black box.

This approach could also help researchers make better predictions about how the educational process and learners' experiences of ESD translate into actual sustainable development, and whether this will make a difference. Findings could also speak to the quality of ESD learning, part of which is defined by the staying power of learners' thoughts and ideas, which can (and will) be built upon by learners beyond school.

The gap discussed here concerns qualitative data and relates to how and why quality enters into ESD through different levels and demands of monitoring. If qualitative methods are needed at the local level to monitor the dynamic, emergent, new parts of ESD – often relating to context and how learners respond to issues that are most pressing for them – then the kind of analysis they foster must be considered when developing indicators at subnational and country levels.

Qualitative approaches should also link to global monitoring, although researchers are still working out how to deal with this type of data at this level (arguments include lack of comparability, too anecdotal, too complicated, too expensive, etc.). These approaches should feed up into holistic, multipronged frameworks for country monitoring.

The idea of a holistic, multipronged monitoring framework in countries is valuable. However, the lack of documented examples to learn from, particularly as regards qualitative research, formative assessment and linking to global monitoring, presents a major issue. Efforts by countries in this area should be openly catalogued with characteristics expanded into a typology, along with related policies, plans, methodologies, designs and tools used in practices. An approach which offers clear examples of how M&E can improve ESD learning might help countries move monitoring forward without losing sight of the bigger aim of fulfilling targets.

More technical information is needed on how contextualized monitoring at subnational and country levels, feeding into a global monitoring framework that is decontextualized, is supposed to cycle back to countries to improve ESD. It is assumed that this process – especially decontextualizing for global comparisons – helps countries to improve ESD principles and practice while verifying their linkage to common concerns. This may or may not be true. There is little in the literature to explain how this process works, or whether it

does, or discussion of the results. More research is therefore needed to explore the precise effects.

What about ESD elsewhere?

Here it is important to pause and reflect on a key problem: the M&E discussed in this chapter focuses only on children and youth in school. What about out-of-school children, youth and adults? Their exclusion goes against the spirit of ESD, the articulation of SDG4 and Target 4.7, and monitoring as a means to promote social justice. But most of all, by not including out-of-school children, youth and adults it is probable that monitoring will fail to capture new and exciting ways to learn and live sustainably. Data are also missing on the ways in which adults, both as individuals and as parents and family members, support children and youth in and out of school with ESD learning and wider sustainable activities.

How can researchers go about monitoring ESD in out-of-school children, youth and adults? A major obstacle is that this disparate group is not easily tracked, as its members are not found in a single location, such as a school. One way around this difficulty is to conduct household surveys or to survey people at community centres and other local meeting places. If they have access to computers, this group could be encouraged to take surveys online that indicate values related to sustainability. If necessary, perhaps third-party support could be offered to interpret and answer questions.

Moving into this area of monitoring generates more questions and lines of inquiry that need to be followed up. More research and creative thinking is needed on ways to monitor ESD for out-of-school children, youth and adults, to explore how and what they are learning, and how this is being built upon towards sustainable development. There is also a need for greater innovation on ways to monitor links between ESD learning and wider sustainable impact.

Acronyms

ASPnet	Associated Schools Programme Network
CAREC	Central Asia Regional Economic Community
CBO	Community-based organizations
CCE	Climate Change Education
CCESD	Climate Change Education for Sustainable Development
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CLC	Community Learning Centre
CSCT	Curriculum, Sustainable development, Competences, Teacher training
DeSeCo	Definition and Selection of Competencies
DESD	Decade of Education for Sustainable Development
DRR	Disaster Risk Reduction
EE	Environmental Education
ESD	Education for Sustainable Development
ESSA	Education for Strong Sustainability and Agency
FAO	Food and Agriculture Organization of the United Nations
GAP	Global Action Programme
GCED	Global Citizenship Education
ICCS	International Civics and Citizenship Study
KOM-BiNE	Kompetenzen für Bildung für Nachhaltige Entwicklung (Competences for Education for Sustainable Development)
LCA	Life-cycle analysis
LED	Local economic development
M&E	Monitoring and evaluation
NGO	Non-governmental organization

OECD	Organisation for Economic Co-operation and Development
PISA	Programme for International Student Assessment
QESD	Quality education for sustainable development
RCE	Regional Centre of Expertise
SADC REEP	Southern African Development Community Regional Environmental Education Programme
SCP	Sustainable consumption and production
SWEDESD	Swedish International Centre of Education for Sustainable Development
TERI	Energy and Resources Institute
TVET	Technical and vocational education and training
UNCLOS	United Nations Convention of the Law of the Sea
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme

References

Introduction

Beck, U. 2009. Critical theory of world risk society: a cosmopolitan vision. *Constellations*, 16(1): 3-22. Oxford: Blackwell.

Edwards, R. 1997. *Changing places? Flexibility, Lifelong Learning and a Learning Society*. London: Routledge.

Gough, S. and Scott, W. 2006. Education and sustainable development: a political analysis. *Educational Review*, 58(3): 273-290.

Scott, W.A.H. and Oulton, C.R. 1999. Environmental education: arguing the case for multiple approaches. *Educational Studies*, 25(1): 119-125.

Sterling, S. 2016. A commentary on education and Sustainable Development Goals. *Journal of Education for Sustainable Development*, 10(2): 208-213.

UNESCO. 2013. Education for Sustainable Development (ESD): a sound investment to accelerate African development. Flyer. http://archive.ias.unu.edu/resource_centre/TICADV-ESD-flyer-2p.pdf (accessed 20 February 2017).

UNESCO. 2014a. *Shaping the Future We Want: UN Decade for Sustainable Development (2005-2014) Final Report*. Paris: UNESCO. http://unesdoc.unesco.org/images/0023/002301/230171e.pdf (accessed 28 January 2017).

UNESCO. 2014b. *UNESCO Roadmap for Implementing the Global Action Programme on Education for Sustainable Development*. Paris: UNESCO. http://unesdoc.unesco.org/images/0023/002305/230514e.pdf (accessed 3 February 2017).

UNESCO. 2017. *Education for Sustainable Development Goals: Learning Objectives*. Education 2030. Paris: UNESCO.

Chapter 1

Barth, M. 2015. *Implementing Sustainability in Higher Education: Learning in an Age of Transformation*. London: Routledge.

De Haan, Gerhard. 2010. "The development of ESD-related competencies in supportive institutional frameworks". *International Review of Education*, 56: 315-328.

Education International. n.d. *Education in the post-2015 global development framework*. Available at: http://download.ei-ie.org/Docs/WebDepot/ElandEducationPost2015_EN.jpg.

ICSU and ISSC. 2015. *Review of Targets for the Sustainable Development Goals: The Science Perspective*. Paris: International Council for Science (ICSU).

Learning Metrics Task Force. 2013. *Executive Summary. Toward Universal Learning: A Global Framework for Measuring Learning.* Montreal and Washington, DC: UNESCO Institute for Statistics and Center for Universal Education at the Brookings Institution.

Nussbaum, Martha C. 2010. *Not for Profit: Why Democracy Needs the Humanities*. Princeton: Princeton UP.

Open Working Group on Sustainable Development Goals. 2013. *Concluding Remarks of Co-Chairs, OWG4, 19 June 2013*. Available at: http://sustainabledevelopment.un.org/content/documents/3693cochairsconcluding.pdf.

OECD. 2015. Skills for Social Progress: The Power of Social and Emotional Skills. Paris. OECD.

OECD. 2016. The Education 2030 Conceptual learning framework as a tool to build common understanding of complex concepts, 4th Informal working Group on the Future of Education and skills: OECD Education 2030, Beijing, 2016.

Sachs, J.D. 2012. From Millennium Development Goals to Sustainable Development Goals. Lancet, 379: 2206-2211.

The World We Want. 2013. *Breaking down the Silos: Integrating Environmental Sustainability in the Post-2015 Agenda*. Available at: http://www.worldwewant2015.org/sustainability.

UNESCO. 1977. Tbilisi Declaration. *Intergovernmental Conference on Environmental Education*. Tbilisi: UNESCO. Accessed by: http://unesdoc.unesco.org/images/0003/000327/032763eo.pdf

United Nations. 2002. *The Future We Want.* Available at: http://sustainabledevelopment.un.org/futurewewant.html.

United Nations. 2015. *The Millennium Development Goals Report, 2015*. New York: United Nations.

United Nations. 2015. *2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals*. www.un.org/sustainabledevelopment.

United Nations General Assembly. 2012. *Initial input of the Secretary-General to the Open Working Group on Sustainable Development Goals*. Available at: http://www.un.org/ga/search/view_doc.asp?symbol=A/67/634&Lang=E.

United Nations General Assembly. 2013. *Progress report of the Open Working Group of the General Assembly on Sustainable Development Goals.* Available at: http://www.un.org/ga/search/view_doc.asp?symbol=A/67/941&Lang=E.

UNECE. 2011. *Learning for the future: Competences in Education for Sustainable Development*. Available at: http://www.unece.org/fileadmin/DAM/env/esd/6thMeetSC/Learning%20for%20the%20Future_%20Competences%20for%20Educators%20in%20ESD/ECE_CEP_AC13_2011_6%20COMPETENCES%20EN.pdf.

UNESCO. 2000. *The Dakar Framework for Action. Education for All: Meeting our Collective Commitments. The World Education Forum*. Dakar: UNESCO, pp.17.

UNESCO. 2005. *United Nations Decade of Education for Sustainable Development (2005-2014): International Implementation Scheme*. Paris, UNESCO.

UNESCO. 2008. EFA-ESD Dialogue: Educating for a sustainable world. Paris, UNESCO.

UNESCO. 2009. *Bonn Declaration. UNESCO World Conference on Education for Sustainable Development.* Bonn: UNESCO, pp. 1-31.

UNESCO. 2011. *ESD: Education for Sustainable Development – building a better, fairer world for the 21st century*. Available at: http://www.unesco.org/new/en/education/themes/leading-the-international-agenda/education-for-sustainable-development/.

UNESCO. 2012a. *From Green Economies to Green Societies: UNESCO's Commitment to Sustainable Development*. Paris: UNESCO.

UNESCO. 2012b. *Shaping the Education of Tomorrow: 2012 Report on the UN Decade of Education for Sustainable Development, Abridged*. Paris: UNESCO.

UNESCO. 2013a. *Concept note on the post-2015 education agenda.* Available at: http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/ED/ED_new/pdf/UNESCOConceptNotePost2015_ENG.pdf.

UNESCO. 2013b. *Global Citizenship Education: An Emerging Perspective*. Available at: http://unesdoc.unesco.org/images/0022/002241/224115E.pdf.

UNESCO. 2014a. *Global Citizenship Education: Preparing learners for the challenges of the 21st century*. Paris: UNESCO.

UNESCO. 2014b. *Teaching and Learning: Achieving Quality for All. EFA Global Monitoring Report 2013-2014*. Paris: UNESCO.

UNESCO. 2014c. *Shaping the Future We Want: UN Decade of Education for Sustainable Development (2005-2014) Final Report*. Paris: UNESCO.

UNESCO. 2014d. *UNESCO Roadmap for Implementing the Global Action Programme on Education for Sustainable Development*. Paris: UNESCO.

UNESCO. 2014e. *Aichi-Nagoya Declaration on Education for Sustainable Development*. Okayama, Japan: UNESCO.

UNESCO. 2016. *Global Education Monitoring Report – Education for People and Planet: Creating Sustainable Futures for All*. Paris: UNESCO.

UNESCO and UNICEF. 2013. *Making Education a Priority in the Post-2015 Development Agenda: Report of the Global Thematic Consultation on Education in the Post-2015 Development Agenda*. Available at: http://en.unesco.org/post2015/sites/post2015/files/Making_Education_a_Priority_in_the_Post-2015_Development_Agenda.pdf.

Wals, Arjen. 2012. *Shaping the Education of Tomorrow: 2012 Full-length Report on the UN Decade of Education for Sustainable Development*. Paris. UNESCO.

Chapter 2

Adomßent, M. and Hoffmann, T. 2013. *The Concept of Competencies in the Context of Education for Sustainable Development (ESD)*. http://esd-expert.net/assets/130314-Concept-Paper-ESD-Competencies.pdf (accessed 17 May 2017).

Barth, M. 2015. *Implementing Sustainability in Higher Education: Learning in an Age of Transformation*. London: Routledge.

Bertschy, F., Künzli, C. and Lehmann, M. 2013. Teachers' competencies for the implementation of educational offers in the field of education for sustainable development. *Sustainability*, 5: 5067–5080.

de Haan, G. 2010. The development of ESD-related competencies in supportive institutional frameworks. *International Review of Education*, 56(2): 315-328.

German speaking network Teacher Education for Sustainable Development. 2015. *Teacher Education for a Sustainable Development from Pilot Projects and Initiatives to New Structures. A Memorandum on Reorienting Teacher Education in Germany, Austria and Switzerland*. www.leuphana.de/fileadmin/user_upload/portale/netzwerk-lena/Memorandum_LeNa_English_Stand_August_15.pdf (accessed 17 May 2017).

Glasser, H. and Hirsh, J. 2016. Toward the development of robust learning for sustainability core competencies. *Sustainability: The Journal of Record*, 9(3): 121-134.

Godemann, J. 2006. Promotion of interdisciplinary competence as a challenge for higher education. *Journal of Social Science Education*, 5(2): 51-61.

Kolb, D.A. 1984. *Experiential Learning: Experience as the Source of Learning and Development*. New Jersey: Prentice-Hall.

Lotz-Sisitka, H., Wals, A.E., Kronlid, D. and McGarry, D. 2015. Transformative, transgressive social learning: rethinking higher education pedagogy in times of systemic global dysfunction. *Current Opinion in Environmental Sustainability*, 16: 73-80.

Lozano, J.F., Boni, A., Peris, J. and Hueso, A. 2012. Competencies in higher education: a critical analysis from the capabilities approach. *Journal of Philosophy and Education*, 46, 132-147.

Mezirow, J. 2000. *Learning as Transformation: Critical Perspectives on a Theory in Progress.* San Francisco: Jossey-Bass.

Nussbaum, M.C. 2010. *Creating Capabilities: The Human Development Approach*. Cambridge: Belknap Press of Harvard University Press.

OECD (Organisation for Economic Co-operation and Development). 2009. *Green at Fifteen? How 15-year-olds Perform in Environmental Science in PISA 2006*. Paris: OECD Publishing.

OECD. 2016. *Global Competency for an Inclusive World*. www.oecd.org/pisa/aboutpisa/Global-competency-for-an-inclusive-world.pdf (accessed 17 May 2017).

Rauch, F. and Steiner, R. 2013. Competences for education for sustainable development in teacher education. *CEPS Journal*, 3: 9-24.

Rieckmann, M. 2012. Future-oriented higher education: which key competencies should be fostered through university teaching and learning? *Futures*, 44(2): 127-135.

Rychen, D.S. 2003. Key competencies: meeting important challenges in life. D.S. Rychen and L.H. Salganik (eds), *Key Competencies for a Successful Life and Well-functioning Society*. Cambridge, MA: Hogrefe and Huber, pp. 63–107.

Schulz, W., Ainley, J., Fraillon, J., Kerr, D. and Losito, B. 2010. *ICCS 2009 International Report: Civic Knowledge, Attitudes, and Engagement Among Lower-secondary School Students in 38 countries*. Amsterdam: International Association for the Evaluation of Educational Achievement.

Slavich, G.M. and Zimbardo, P.G. 2012. Transformational teaching: theoretical underpinnings. Basic principles, and core methods. *Educational Psychology Review*, 24(4), 569-608.

Sleurs, W. 2008. Competencies for ESD (Education for Sustainable Development) teachers. A framework to integrate ESD in the curriculum of teacher training institute. Brussels: CSCT. www.unece.org/fileadmin/DAM/env/esd/inf.meeting.docs/EGonInd/8mtg/CSCT%20Handbook_Extract.pdf (accessed 17 May 2017).

UNECE (United Nations Economic Commission for Europe). 2005. *UNECE Strategy for Education for Sustainable Development*. Geneva: UNECE. www.unece.org/fileadmin/DAM/env/documents/2005/cep/ac.13/cep.ac.13.2005.3.rev.1.e.pdf (accessed: 17 May 2017).

UNECE. 2012. *Learning for the Future: Competences in Education for Sustainable Development*. Geneva: UNECE. www.unece.org/fileadmin/DAM/env/esd/ESD_Publications/Competences_Publication.pdf (accessed: 17 May 2017).

UNESCO (United Nations Educational, Scientific and Cultural Organization). 2009. *Bonn Declaration*. Paris: UNESCO. www.desd.org/ESD2009_BonnDeclaration080409.pdf (accessed 17 May 2017).

UNESCO. 2014a. *Shaping the Future We Want. UN Decade of Education for Sustainable Development (2005-2014). Final Report*. Paris: UNESCO. http://unesdoc.unesco.org/images/0023/002301/230171e.pdf (accessed 17 May 2017).

UNESCO. 2014b. *UNESCO Roadmap for Implementing the Global Action Programme on Education for Sustainable Development*. Paris: UNESCO. http://unesdoc.unesco.org/images/0023/002305/230514e.pdf (accessed 17 May 2017).

UNESCO. 2015a. *Rethinking Education. Towards a Global Common Good?* Paris: UNESCO. http://unesdoc.unesco.org/images/0023/002325/232555e.pdf (accessed 17 May 2017).

UNESCO. 2015b. *Thematic Indicators to Monitor the Education 2030 Agenda. Technical Advisory Group Proposal*. Montreal: UIS. www.uis.unesco.org/Education/Documents/43-indicators-to-monitor-education2030.pdf (accessed 17 May 2017).

UNESCO. 2016. *Education 2030. Incheon Declaration and Framework for Action. Towards Inclusive and Equitable Quality Education and Lifelong Learning for All*. Paris: UNESCO. www.uis.unesco.org/Education/Documents/incheon-framework-for-action-en.pdf (accessed 17 May 2017).

UNESCO. 2017. *Education for Sustainable Development Goals. Learning Objectives*. Paris: UNESCO. http://unesdoc.unesco.org/images/0024/002474/247444e.pdf (accessed 17 May 2017).

Vare, P. and Scott, W. 2007. Learning for a change: exploring the relationship between education and sustainable development. *Journal of Education for Sustainable Development*, 1(2): 191-198.

Wals, A.E.J. 2015. *Beyond Unreasonable Doubt. Education and Learning for Socio-ecological Sustainability in the Anthropocene*. Wageningen, Netherlands: Wageningen University. https://arjenwals.files.wordpress.com/2016/02/8412100972_rvb_inauguratie-wals_oratieboekje_v02.pdf (accessed 17 May 2017).

Wals, A.E.J. and Lenglet, F. 2016. Sustainability citizens: Collaborative and disruptive social learning. R. Horne, J. Fien, B. Beza and A. Nelson (eds), *Sustainability Citizenship in Cities: Theory and Practice*. London: Routledge.

Weinert, F.E. 2001. Concept of competence: a conceptual clarification. D.S. Rychen and L.H. Salganik (eds) *Defining and Selecting Key Competencies*. Hogrefe and Huber, Seattle, Toronto, Bern, Göttingen, pp. 45–65.

Wiek, A., Withycombe, L. and Redman, C.L. 2011. Key competencies in sustainability: a reference framework for academic program development. *Sustainability Science*, 6(2), 203-218.

Wiek, A., Bernstein, M.J., Foley, R.W., Cohen, M., Forrest, N., Kuzdas, C., Kay, B. and Withycombe Keeler, L. 2016. Operationalising competencies in higher education for sustainable development. M. Barth, G. Michelsen, I. Thomas and M. Rieckmann (eds), *Routledge Handbook of Higher Education for Sustainable Development*. London: Routledge, pp. 241-260.

Chapter 3

Eurostat. 2012. *European Union Labour Force Survey: Annual Results 2011*. Luxembourg: Eurostat. http://ec.europa.eu/eurostat/documents/3433488/5585208/KS-SF-12-040-EN.PDF/06941c0b-7a22-4f06-b48e-318aa83073c1 (accessed 2 August 2017).

FAO (Food and Agriculture Organization of the United Nations). 2016. *The State of Food and Agriculture 2016. Climate Change, Agriculture and Food Security*. Rome: FAO. www.fao.org/3/a-i6030e.pdf (accessed 1 August 2017).

Fischer, D. and Barth, M. 2014. Key competencies for and beyond sustainable consumption. An educational contribution to the debate. GAIA, 23/S1: 193-200.

IEA (International Energy Agency). 2016. *World Energy Outlook 2016. Executive Summary*. Paris: IEA. www.iea.org/Textbase/npsum/WEO2016SUM.pdf (accessed 1 August 2017).

IPCC (Intergovernmental Panel on Climate Change). 2014. *Climate Change 2014. Impacts, Adaption, and Vulnerability. Summary for Policymakers*. www.ipcc.ch/pdf/assessment-report/ar5/wg2/ar5_wgII_spm_en.pdf (accessed 1 August 2017).

Jansen, M. and von Uexkull, E. 2010. *Trade and Employment in the Global Crisis*. Geneva: International Labour Office. www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_141911.pdf (accessed 2 August 2017).

McGregor, S.L.T. 2011. Consumer education philosophies: the relationship between education and consumption. *ZEP – Zeitschrift für Entwicklungpädagogik und internationale Bildungsforschung*, 34 (4): 4-8.

Norwegian Ministry of the Environment. 1994. *Oslo Roundtable on Sustainable Production and Consumption*. Oslo. http://enb.iisd.org/consume/oslo004.html (accessed 2 August 2017).

Secretariat of the Convention on Biological Diversity. 2010. *Strategic Plan for Biodiversity 2011–2020 and the Aichi Targets*. Montreal: CBD. www.cbd.int/doc/strategic-plan/2011-2020/Aichi-Targets-EN.pdf (accessed 1 August 2017).

TEEB. 2010. *The Economics of Ecosystems and Biodiversity: Mainstreaming the Economics of Nature: A Synthesis of the Approach, Conclusions and Recommendations of TEEB*. Geneva: TEEB. http://doc.teebweb.org/wp-content/uploads/Study%20and%20Reports/Reports/Synthesis%20report/TEEB%20Synthesis%20Report%202010.pdf (accessed 1 August 2017).

UN (United Nations). 2015. *Paris Agreement*. Paris: UNFCCC. http://unfccc.int/files/essential_background/convention/application/pdf/english_paris_agreement.pdf (accessed 1 August 2017).

UNDP (United Nations Development Programme). 2010. *Human Development Report 2010. The Real Wealth of Nations: Pathways to Human Development*. New York: UNDP. http://hdr.undp.org/sites/default/files/reports/270/hdr_2010_en_complete_reprint.pdf (accessed 2 August 2017).

UNDP. 2015. *Human Development Report 2015. Work for Human Development*. New York: UNDP. http://hdr.undp.org/sites/default/files/2015_human_development_report_0.pdf (accessed 2 August 2017).

UNDP. 2016. *Human Development Report 2016. Human Development for Everyone*. New York: UNDP. http://hdr.undp.org/sites/default/files/2016_human_development_report.pdf (accessed 2 August 2017).

UNESCO. 2009. *Bonn Declaration*. Paris: UNESCO. http://unesdoc.unesco.org/images/0018/001887/188799e.pdf (accessed 2 August 2017).

UNESCO. 2014. *UNESCO Roadmap for Implementing the Global Action Programme on Education for Sustainable Development*. Paris: UNESCO. http://unesdoc.unesco.org/images/0023/002305/230514e.pdf (accessed 2 August 2017).

UNESCO. 2017. *Education for Sustainable Development Goals. Learning Objectives*. Paris: UNESCO. http://unesdoc.unesco.org/images/0024/002474/247444e.pdf (accessed 1 August 2017).

Worldwatch Institute (ed.) 2004. *State of the World 2004: Special Focus: The Consumer Society*. New York: W.W. Norton and Co.

Worldwatch Institute (ed.) 2010. *State of the World 2010: Transforming Cultures*. Washington, DC: Worldwatch Institute.

Chapter 4

Amadio, M. 2013. *A rapid assessment of curricula for general education focusing on cross-curricular themes and generic competencies and skills*. Background paper prepared for the Education for All Global Monitoring Report 2013/4). Geneva: UNESCO International Bureau of Education.

Benavot, A. 2014. *Education for Sustainable Development in Primary and Secondary Education*. Background paper prepared for the DESD unit at UNESCO headquarters, Paris, France.

Delors, J. 1996. Education: the necessary utopia. *Learning: The Treasure Within*. Paris: UNESCO, pp. 11-33.

Didham, R.J and Ofei-Manu, P. 2012a. *Education for Sustainable Development Country Status Reports: An Evaluation of National Implementation during the UN Decade of Education for Sustainable Development (2005-2014) in East and Southeast Asia*. Hayama, Japan. http://pub.iges.or.jp/modules/envirolib/view.php?docid=4140.

Didham, R.J and Ofei-Manu, P. 2012b. *Monitoring and Evaluation of Education for Sustainable Development: A Framework of the Main Factors and Important Leverage Points in the Implementation of Education for Sustainable Development in the Asia-Pacific Region*. Hayama, Japan. http://pub.iges.or.jp/modules/envirolib/view.php?docid=4539.

Didham, R.J and Ofei-Manu, P. 2013. *Advancing Education as a Goal for Sustainable Development (IGES Issue Brief on SDGs, No. 2)*. Hayama, Japan. http://pub.iges.or.jp/modules/envirolib/view.php?docid=4667.

EFA Global Monitoring Report. 2015. *Education for All 2000-2015: Achievements and Challenges*. Paris: UNESCO.

Freire, P. 1970. *Pedagogy of the Oppressed*. New York, Continuum.

Freire, P. 1970. *Cultural action for freedom*. [Cambridge], Harvard Educational Review.

Freire, P. 1973. *Education for critical consciousness*. New York, Seabury Press.

Freire, P. 1976. *Education, the practice of freedom*. London, Writers and Readers Publishing Cooperative.

Green School Bali. 2016. *Purposeful Learning Programme*. www.greenschool.org/programme (accessed 15 December 2016).

Habermas, J. 1984 [1981]. *Theory of Communicative Action, Volume One: Reason and the Rationalization of Society*. Translated by Thomas A. McCarthy. Boston, Mass.: Beacon Press. ISBN 978-0-8070-1507-0.

Habermas, J. 1987 [1981]. *Theory of Communicative Action, Volume Two: Lifeworld and System: A Critique of Functionalist Reason*. Translated by Thomas A. McCarthy. Boston, Mass.: Beacon Press. ISBN 0-8070-1401-X.

Int. Comm. on Education for the 21st Century. 1996. *Learning: The Treasure Within*. Paris: UNESCO.

Japanese National Commission for UNESCO. 2015. *UNESCO ASPnet and Education for Sustainable Development (ESD)*. Tokyo: Ministry of Education, Culture, Sports, Science and Technology of Japan. www.unesco-school.mext.go.jp/TEMP/?action=common_download_main&upload_id=8794.

Kolb, D. A. (1981). 'Learning styles and disciplinary differences'. in A. W. Chickering (ed.) *The Modern American College*, San Francisco: Jossey-Bass.

Kolb, D. A. (1984). *Experiential Learning: Experience as the source of learning and development*. New Jersey: Prentice-Hall.

Kutesa, S. 2015. *Transforming Our World by 2030: A New Agenda for Global Action* (Zero draft of the outcome document for the UN Summit to adopt the Post-2015 Development Agenda). New York. http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E

Laurie, R., Nonoyama-Tarumi, Y., McKeown, R. and Hopkins, C.A. 2016. Contributions of education for sustainable development (ESD) to quality education: a synthesis of research. *Journal of Education for Sustainable Development*, 10(2): 1-17.

Lave, J., & Wenger, E. (1991). *Situated Learning: Legitimate peripheral participation*. Cambridge: Cambridge University Press.

LMTF (Learning Metrics Task Force). 2013. *Toward Universal Learning: A Global Framework for Measuring Learning* (LMTF Report No. 2). Montreal/ Washington, DC: LMTF.

Ledwith, M. (2001). Community work as critical pedagogy: re-envisioning Freire and Gramsci. *Community development journal*, 36(3), 171-182.

Ledwith, M., & Springett, J. (2010). *Participatory practice: Community-based action for transformative change.* Policy Press.

Ledwith, M. (2011). *Community development: A critical approach*. Policy Press.

Lenglet, F. 2015. ESD and assessing the quality of education and learning. *Responsible Living*. Cham: Springer International Publishing. https://doi.org/10.1007/978-3-319-15305-6_5, pp. 57–72.

Lenglet, F., Fadeeva, Z. and Mochizuki, Y. 2010. ESD promises and challenges: increasing its relevance. *Global Environmental Research*, 15: 95-99.

Lotz-Sisitka, H. 2013. Conceptions of quality and 'learning as connection': teaching for relevance. *South African Journal of Environmental Education*, 29: 25-38.

Mejía, D.A. 2017. *Analytical Summary of the Revision of Case Studies on the Analysis of International Experiences in Education for Sustainable Development (ESD) Policies*. Paris.

Noguchi, F., Guevara, J.R. and Yorozu, R. 2015. *Communities in Action: Lifelong Learning for Sustainable Development*. Hamburg, Germany: UNESCO Institute for Lifelong Learning. http://unesdoc.unesco.org/images/0023/002341/234185e.pdf.

Ofei-Manu, P. and Didham, R.J. 2012. *Assessment of Learning Performance in Education for Sustainable Development: Investigating the Key Factors in Effective Educational Practice and Outcomes for Sustainable Development*. Hayama, Japan. http://pub.iges.or.jp/modules/envirolib/view.php?docid=4172.

Ofei-Manu, P. and Didham, R.J. 2014. *Quality Education for Sustainable Development: A Priority in Achieving Sustainability and Well-being for All*. IGES Policy Brief, No. 28. Hayama, Japan. http://pub.iges.or.jp/modules/envirolib/view.php?docid=4966.

Oyasu, K. and Riewpituk, D. 2013. CLCs in the Asia-Pacific region. Okayama ESD Promotion Commission (ed.), *Education for Sustainable Development and Kominkan/Community Learning Centre*. Okayama, Japan: Okayama University Press.

Pataki, G. 2005. *Education Policy Centers Network*. EPCN Newsletter. Romania: EPCN.

Phang, F.A., Wong, W.Y., Ho, C.S., Musa, A.N., Fujino, J. and Suda, M. 2016. Iskandar Malaysia Ecolife Challenge: low-carbon education for teachers and students. *Clean Technologies and Environmental Policy*, 18(8): 2525-2532. https://doi.org/10.1007/s10098-016-1215-y.

Reason, P. (2001). The Action Turn: Toward a transformational social science. In J. Henry (Ed.), *Creative Management*. London: Sage Publications.

Reason, P., & Bradbury, H. (2003). Introduction: Inquiry and participation in search of a world worthy of human aspiration. In P. Reason & H. Bradbury (Eds.), *Handbook of Action Research: Participative inquiry and practice*. London: Sage Publications.

Reason, P., & Heron, J. (1996). *A Layperson's Guide to Co-operative Inquiry*. Bath: Centre for Action Research in Professional Practice, University of Bath. Retrieved from http://wagner.nyu.edu/files/leadership/avina_heron_reason2.pdf

Sasai, H. 2013. The role of Kominkan/CLCs in adult learning/education promotion. Okayama ESD Promotion Commission (ed.), *Education for Sustainable Development and Kominkan/Community Learning Centre*. Okayama, Japan: Okayama University Press.

Schaeffer, S. 2006. Beyond 'learning to live together': The key to education for sustainable development. Presentation at the UNESCO Expert Meeting on ESD: 'Reorienting Education to Address Sustainability', 1-3 May 2006, Kanchanaburi, Thailand.

Sewilam, H. 2012. RCE Cairo: the EduCamp project – a multi-level cooperation of RCEs. Z. Fadeeva, U. Payyappallimana and R. Petry (eds), *Towards More Sustainable Consumption and Production Systems and Sustainable Livelihoods – Learning Contributions of the Regional Centres of Expertise on Education for Sustainable Development*. Yokohama, Japan: United Nations University-Institute of Advanced Studies, pp. 96-101. http://collections.unu.edu/view/UNU:5772.

Sterling, S. 2001. *Sustainable Education: Re-visioning Learning and Change* (2002 reprint). Bristol, UK: J.W. Arrowsmith Ltd.

UNECE (United Nations Economic Commission for Europe). 2009. *Learning from Each Other: The UNECE Strategy for Education for Sustainable Development*. Geneva: UNECE.

UNECE. 2016. *Ten Years of the UNECE Strategy for Education for Sustainable Development*. Geneva: UNECE.

UNESCO. 2000. The Dakar Framework for Action: Education for All: Meeting our Collective Commitments. *The World Education Forum*. Dakar: UNESCO. http://unesdoc.unesco.org/images/0012/001211/121147e.pdf.

UNESCO. 2006. *Framework for the UNDESD International Implementation Scheme* (United Nations Decade of Education for Sustainable Development (2005-2014) No. ED/DESD/2006/PI/1). Paris: UNESCO. https://doi.org/10.1017/CBO9781107415324.004.

UNESCO. 2009a. *Learning for a Sustainable World: Review of Contexts and Structures for Education for Sustainable Development.* Paris: UNESCO. https://doi.org/10.2139/ssrn.1485401.

UNESCO. 2009b. The Bonn Declaration. *UNESCO World Conference on Education for Sustainable Development*. Bonn: UNESCO. www.desd.org/ESD2009_BonnDeclaration080409.pdf.

UNESCO. 2012. *Education for Sustainable Development Sourcebook: Learning and Training Tools*. Paris: UNESCO. https://doi.org/10.2753/CED1061-1932430207.

UNESCO. 2013a. *Funding Proposal to Support the Implementation of the United Nations Decade of Education for Sustainable Development (2005-2014) by UNESCO*. Paris: UNESCO.

UNESCO. 2013b. *Results from ESD UNESCO Questionnaire 1: Input from Online Survey for Member States, Stakeholders and UN Agencies*. Background paper for the DESD Global Monitoring Report 2014. Paris: UNESCO.

UNESCO. 2014a. *Shaping the Future We Want: UN Decade of Education for Sustainable Development (2005-2014) – Final Report*. Paris: UNESCO.

UNESCO. 2014b. *Aichi-Nagoya Declaration on Education for Sustainable Development*. Okayama, Japan: UNESCO.

UNESCO. 2015a. *Framework for Action Education 2030: Towards Inclusive and Equitable Quality Education and Lifelong Learning for All* (draft). Incheon: UNESCO.

UNESCO. 2015b. *Not Just Hot Air: Putting Climate Change Education into Practice*. Paris: UNESCO.

UNESCO. 2016. *External Evaluation of Japanese Funds-in-Trust Project: Education for Sustainable Development – Building Momentum towards 2014*. Paris: UNESCO.

UNESCO International Bureau of Education. 2013. Training Tools for Curriculum Development: A Resource Pack. Geneva: IBE-UNESCO. www.ibe.unesco.org/fileadmin/user_upload/Publications/Training_tools/IBE-CRP-2014_eng.pdf.

UNESCO International Bureau of Education. 2016. *Global Monitoring of Target 4.7: Themes in National Curriculum Frameworks* (Current and Critical Issues in the Curriculum, Learning and Assessment No. 6). Geneva: UNESCO. http://unesdoc.unesco.org/images/0024/002463/246382e.pdf.

Wenger, E. (1998). *Communities of Practice: Learning, Meaning, and Identity. Systems thinker* (Vol. 9). Cambridge: Cambridge University Press. https://doi.org/10.2277/0521663636

Widjajanti, D., Matakupan, S.J. and Didham, R.J. 2014. *Introduction to Education for Sustainable Consumption in Indonesia: National Recommendations and Guidelines for Policymakers and Educators*. Jakarta: Institute for Global Environmental Strategies.

Chapter 5

Bhaskar, R. 2016. *Enlightened Common Sense: The Philosophy of Critical Realism*. London: Routledge.

Cooperrider, D.L. and Srivastva, S. 1987. Appreciative inquiry in organizational life. R.W. Woodman and W.A. Passmore (eds), *Research in Organizational Change and Development*, Vol. 1 Stamford, CT: JAI Press, pp. 129-169).

Edwards, A. 2014. Designing tasks which engage learners with knowledge. I. Thompson (ed.), *Task Design, Subject Pedagogy and Student Engagement*. London: Routledge.

Elias, N. 1987. *Involvement and Detachment*. London: Blackwell.

Engeström, Y. and Sannino, A. 2010. Studies of expansive learning: foundations, findings and future challenges. *Educational Research Review*, 5(1): 1-24.

Engeström, Y. and Sannino, A. 2014. Whatever happened to process theories of learning? *Learning, Culture and Social Interaction*, 1(1): 45-56.

Graham, P.M., Dickens, C.W.S. and Taylor, R.J. 2004. MiniSASS – a novel technique for community participation in river health monitoring and management. *African Journal of Aquatic Science*, 29(1): 25-36.

Halinen, I. 2017. The conceptualization of competencies related to sustainable development and sustainable lifestyles. *Current and Critical Issues in Curriculum, Learning and Assessment*, 8. Paris: IBE-UNESCO.

Harari, Y. 2015. *Homo Deus: A Brief History of Tomorrow*. London: Harvill Secker.

Kemmis, S. and Mutton, R. 2012. Education for sustainability (EfS): practice and practice architectures. *Environmental Education Research*, 18(2): 187-207. http://dx.doi.org/10.1080/13504622.2011.596929

Kolb, D. 1984. *Experiential Learning: Experience as the Source of Learning and Development.* Englewood-Cliffs: Prentice Hall.

Lotz-Sisitka, H., Wals, A., Kronlid, D. and McGarry, D. 2014. *Transformative, Transgressive Social Learning: Higher Education Pedagogy in Systemic Global Dysfunction*. Elsevier: Science Direct.

O'Donoghue, R.B. 1989. *PEP-UP: A Participatory Evaluation of the Umgeni Valley Project*. Howick: Wildlife and Environment Society of Southern Africa.

O'Donoghue, R.B. 2001. *Environment and Active Learning in OBE*. Howick: Share-Net.

Schon, D. 1983. *The Reflexive Practitioner: How Professionals Think in Action*. New York: Basic Books.

Schreiber, J. and Siege, H. 2017. *Curriculum Framework: Education for Sustainable Development.* Bonn: Engagement Global.

Taylor, J. and Venter, V. 2017. Towards a sustainable future: action learning and change practices. *African Wildlife & Environment*, 64: 37-40.

UNEP (United Nations Environment Programme). 2004. *Environmental Action Learning in Eastern and Southern Africa*. Nairobi: UNEP.

UNESCO. 2017. *Education for Sustainable Development Goals: Learning Objectives*. Paris: UNESCO.

Wals, A. 2007. *Social Learning Towards a Sustainable World*. Wageningen, the Netherlands: Wageningen Academic Publishers.

Wenger, E., McDermott, R. and Snyder, W. 2002. *Cultivating Communities of Practice: A Guide to Managing Knowledge*. Boston: Harvard Business School Press.

Wenger, E., Trayner, B. and de Laat, M. 2011. *Promoting and Assessing Value Creation in Communities and Networks: A Conceptual Framework*. The Netherlands: Ruud de Moor Centrum. http://wenger-trayner.com/documents/Wenger_Trayner_DeLaat_Value_creation.pdf.

WESSA. 2016. *Stepping up to the Sustainability Goals: A Practical Guide to Integrating the SDGs in our Daily Lives*. Johannesburg: WESSA.

WWF. 2006. *Living Planet Report 2006*. Gland, Switzerland: World Wildlife Fund.

Chapter 6

Adey, K.L. 1998. *Preparing a Profession. Report of the National Standards and Guidelines for Initial Teacher Education Project*. Canberra: Australian Council of Deans of Education.

Ajoyce. 2017. Massive Open Online Courses for Education for Sustainable Development. https://alexajoyce.wordpress.com/author/ajoyce.

Alliance of Religions and Conservation (ARC). Website. www.arcworld.org.

Arnold, R. and Burke, B. 1983. *A Popular Education Handbook*. Toronto, Ontario Institute for Studies in Education/Ottawa: CUSO Development Education.

Atkisson, A. 1999. *Believing Cassandra: An Optimist Looks at a Pessimist's World* (1st edn). White River Junction, Vermont: Chelsea Green.

Ballantyne, R. 1995. Environmental teacher education: constraints, approaches and course design. *International Journal of Environmental Education and Information*, 14(2): 115-128.

Brydon-Miller, M., Greenwood, D. and Maguire, P. 2003. Why action research? *Action Research,* 1(9): 9-28.

Burns, A. 1998. Critical questions in action research. A. Burns and S. Hood (eds), *Teachers' Voices 3: Teaching Critical Literacy.* Sydney: National Center for English language teaching and research, Macquarie University.

Buckingham, J. 2005. Good teachers where they are needed. *Issues Analysis*, 64(19 October). www.cis.org.au/IssueAnalysis/ia64/IA64.pdf.

Brinkman, F.G. and Scott, W.A.H. (eds). 1994. *Environmental Education into Initial Teacher Education in Europe (EEITE) 'the State of the Art'*. ATEE Cahiers No 8. Brussels: Association of Teacher Education in Europe.

Bruner, J. 1986. *Actual Minds, Possible Worlds.* Cambridge, MA: Harvard University.

Clark, C. 1993. Transformative learning. *New Directions for Adult and Continuing Education*, 1993(57): 47-56.

Cutter-Mackenzie, A. and Smith, R. 2003. Ecological literacy: the missing paradigm in environmental education (part one). *Environmental Education Research*, 9(4): 497-524.

Delors, J. 1996. Education: the necessary utopia. *Learning: The Treasure Within*. Paris: UNESCO.

Donnelly, K. 2004. *Why our Schools are Failing*. Potts Point, NSW: Duffy & Snellgrove.

Doppelt, B. 2003. *Leading Change Towards Sustainability: A Change Management Guide for Business, Government and Civil Society*. Sheffield: Greenleaf Publishing.

Dunphy, D., Benveniste, J., Griffiths, A. and Sutton, P. (eds). 2000. *Sustainability: The Corporate Challenge of the 21st Century*. Sydney: Allen and Unwin.

Easton, C. (ed.) 2004. *The ENACT Programme Kingston, Jamaica: Stories in Sustainability.* Report prepared for the ENACT programme. www.enact.org.jm/Publications/ENACT_Stories.pdf (accessed July 2017).

Ferreira, J., Ryan, L. and Tilbury, D. 2006. *Whole-school Approaches to Sustainability: A Review of Models for Professional Development in Pre-service Teacher Education.* Canberra: Australian Government Department of the Environment and Heritage and the Australian Research Institute in Education for Sustainability (ARIES). www.aries.mq.edu.au/projects/preservice.

Fien, J. and Tilbury, D. 1996. *Learning for a Sustainable Environment: An Agenda for Asia and the Pacific*. Bangkok: UNESCO Asia Pacific Centre for Educational Innovation and Development.

Freire, P. 1970. *Pedagogy of the Oppressed*. New York: Seabury Press.

Henderson, K. and Tilbury, D. 2004. *Whole-School Approaches to Sustainability: An International Review of Sustainable School Programs.* Report Prepared by the Australian Research Institute in Education for Sustainability (ARIES) for The Department of the Environment and Heritage, Australian Government.

Hjorth, P. and Bagheri, A. 2006. Navigating towards sustainable development: a system dynamics approach. *Futures*, 38:1, pp. 74-92.

Huckle, J. 1996. Teacher education. J. Huckle and S. Sterling (eds.), *Education for Sustainability.* London: Earthscan Publications.

Huckle, J. 2005. *Education for Sustainable Development: A briefing paper for the Teacher Training Authority*, Draft Report, June. www.ttrb.ac.uk/viewArticle.aspx?categoryId=14448&taggingType=3&contentId=11693.

Inman, S. 1996. Environmental education within initial teacher education. S. Inman and P. Champain (eds), *Thinking Futures: Making Space for Environmental Education in ITE – A Handbook for Educators*. WWF: Godalming.

Inman, S. and Champain, P. 1996. *Thinking Futures: Environmental Education in Initial Teacher Training*. Surrey: WWF.

Jobe, W., Östlund, C. and Svensson, L. 2014. *MOOCs for Professional Teacher Development*. https://oerknowledgecloud.org/sites/oerknowledgecloud.org/files/proceeding_130997%20(3).pdf.

Johnson, L., Adams Becker, S., Cummins, M., Estrada, V., Freeman, A. and Ludgate, H. 2013. *NMC Horizon Report: 2013 Higher Education Edition*. Austin, Texas.

Käplyä, M and Wahlström, R. 2000. An environmental education program for teacher trainers in Finland. *Journal of Environmental Education*, 31(2): 31-37.

Mackenzie, L. 1993. *On our Feet. A Handbook on Gender and Popular Education Workshops*. Bellville, South Africa: Centre for Continuing Education, University of the Western Cape.

Malikow, M. 2006. Are teachers born or made? The necessity of teacher training programs. *National Forum of Teacher Education Journal*, 16(3).

McMeniman, M. 2004. *Review of the Powers and Functions of the Board of Teacher Registration*. Brisbane: Board of Teacher Registration.

McKeown, R., USTESD Network. 2013. *Reorienting Teacher Education to Address Sustainability: The U.S. Context*. White Paper Series, No. 1. Indianapolis, IN: United States Teacher Education for Sustainable Development Network.

Mezirow, J. 1991. *Transformative Dimensions of Adult Learning.* San Francisco: Jossey-Bass.

NCATE (National Council for Accreditation of Teacher Education). 2010. *Transforming Teacher Education Through Clinical Practice: A National Strategy to Prepare Effective Teachers.* www.ncate.org/LinkClick.aspx?fileticket=zzeiB1OoqPk%3D&tabid=7.

Orr, D. 1992. *Ecological Literacy: Education and the Transition to a Postmodern World.* Albany, NY: State University of New York Press.

Oulton, C.R. and Scott, W.A.H. 1995. The environmentally educated teacher: an exploration of the implication of UNESCO-UNEP's ideas for pre-service teacher education programmes. *Environmental Education Research*, 1(2): 213-231.

Packham, R. and Sriskandarajah, N. 2005. Systemic action research for postgraduate education in agriculture and rural development. *Systems Research and Behavioral Science*, 22: 119-130. www.interscience.wiley.com.

Papadimitriou, V. 1995. Professional development of in-service primary teachers in environmental education: an action research approach. *Environmental Education Research*, 1(1): 85-97.

Parliamentary Commissioner for the Environment (PCE), New Zealand. 2004. *See Change: Learning and education for sustainability*. Wellington: PCE.

Piaget, J. 1936. *Origins of Intelligence in the Child.* London: Routledge & Kegan Paul.

Posch, P. and Rauch, F. 1998. Developments in teacher education through environmental education research. *International Research in Geographical and Environmental Education*, 7(3): 255-259.

Queen Rania Foundation. 2017. Google.org org supports Queen Rania Foundation to implement online learning platform. Press release. www.queenrania.jo/en/media/press-releases/googleorg-announces-grant-queen-rania-foundation-towards-creation-k-12-arab (accessed 6 September).

Queensland Board of Teacher Registration. 2002. *Professional Standards for Graduates and Guidelines for Preservice Teacher Education Programs*. Toowong: Queensland Board of Teacher Registration.

Robottom, I. 1987. Towards inquiry-based professional development in environmental education. I. Robottom (ed), Environmental Education: Practice and Possibility. Geelong: Deakin University Press.

Scott, W.A.H. 1996a. Pre-service environmental teacher education: a critique of recent arguments about constraints, approaches and course design. *Environmental Education and Information*, 15(3): 307-318.

Scott, W.A.H. 1996b. The environmentally-educating teacher: a synthesis of an implementation theory for pre-service courses. *Australian Journal of Environmental Education*, 12: 53.

Shallcross, T. (ed.) 2004. *School Development through Whole School Approaches to Sustainability Education: The SEEPS (Sustainable Education in European Primary Schools) project*. Manchester: Manchester Metropolitan University.

Shallcross, T. and Robinson, J. 1999. A model of participation in continuing professional development and evaluation through action research in educating for sustainability. *Professional Development in Education*, 25(3): 403-422.

Spork, H. 1992. Environmental education: a mismatch between theory and practice. *Australian Journal of Environmental Education*, 8: 147-166.

Sterling, S. 1996. Education in change. J. Huckle and S. Sterling (eds), *Education for Sustainability*. London: Earthscan Publications.

Sterling, S. 2001. *Sustainable Education: Re-visioning Learning and Change*. Devon, United Kingdom: Greenbooks.Stoddart, T., Bravo, M., Mosqueda, E. and Solis, J. 2013. Restructuring pre-service teacher education to respond to increasing student diversity. Research in Higher Education Journal, 19.

Stromquist, N.P. 1997. *Literacy for Citizenship*. Albany, NY: SUNY Press.

SWEDESD. 2017. ESSA Partnership. www.swedesd.uu.se/education/essa (accessed April 2017).

Thomas, I. 2004. Sustainability in tertiary curricula: what is stopping it happening? *International Journal of Sustainability in Higher Education*, 5(1): 33-47.

Tilbury, D. 1992. Environmental education within pre-service teacher education: the priority of priorities. *International Journal of Environmental Education and Communication*, 11(4).

Tilbury, D., Coleman, V. and Garlick, D. 2005. *A National Review of Environmental Education and its Contribution to Sustainability in Australia: School Education*. Canberra: Australian Government Department of Environment and Heritage and Australian Research Institute in Education for Sustainability (ARIES).

Tilbury, D. and Janousek, S. 2006. Monitoring and Assessment During the United Nations Decade in Education for Sustainable Development: An ESD Indicator Project. Unpublished Project Description, Macquarie University.

Tilbury, D., Podger, P. and Reid, A. 2004. *Action Research for Change Towards Sustainability: Change in Curricula and Graduate Skills Towards Sustainability*. Final Report prepared for the Department of the Environment and Heritage and Macquarie University.

Tomas, L., Lasen, M., Field, E. and Skamp, K. 2015. Promoting online students' engagement and learning in science and sustainability preservice teacher education. *Australian Journal of Teacher Education*, 40(11).

United Kingdom National Commission for UNESCO. 2017. *Good Practice in Education for Sustainable Development (ESD) in the UK: Case Studies*. London: UK.

United Nations. 2015. *2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals*. www.un.org/sustainabledevelopment.

UNECE (United Nations Economic Commission for Europe). 2013. *Empowering Educators for a Sustainable Future: Tools for Policy and Practice Workshops on Competencies in Education for Sustainable Development.* Geneva: UNECE.

UNESCO. 2005. *Guidelines and Recommendations for Reorienting Teacher Education to Address Sustainability.* UNESCO Education for Sustainable Development in Action Technical Paper No. 2, (Prepared by UNITWIN/UNESCO Chair on Reorienting Teacher Education to Address Sustainability [Charles Hopkins, Chair and Rosalyn McKeown, Secretariat] and the International Network of Teacher-Education Institutions). Paris: UNESCO.

UNESCO. 2012. *Education for Sustainable Development Sourcebook.* Education for Sustainable Development in Action: Learning and Training Tools, No. 4. http://unesdoc.unesco.org/images/0021/002163/216383e.pdf.

UNESCO. 2014. *UNESCO Roadmap for Implementing the Global Action Programme on Education for Sustainable Development.* Paris: UNESCO.

USTESD Network. (2013). Reorienting teacher education to address sustainability: The U.S. context, White Paper Series, No. 1. Indianapolis, IN: United States Teacher Education for Sustainable Development Network.

Vygotsky, L.S. 1978. *Mind in Society.* Cambridge, MA: Harvard University Press.

Watson, J.B. 1913. Psychology as the behaviorist views it. *Psychological Review*, 20: 158-177.

Williams, R. 1992. Report of a survey of the provision for environmental education in initial teacher training. *Environmental Education and Teacher Education – Preparing for Change and Participation*. Sussex University, UK: Education Network for Environment and Development.

Wilke, R.J., Peyton, R.B. and Hungerford, H.R. 1987. *Strategies for the Training of Teachers in Environmental Education.* UNESCO-UNEP International Environmental Education Programme. Environmental Education Series 25. Paris: UNESCO.

Wolfgang, B. 2012. *The Parts and The Whole: A Holistic Approach to Environmental and Sustainability Education: Manual*. Visby: Swedish International Centre of Education for Sustainable Development (SWEDESD).

Zhan, Z., Fong, P. S. W., Mei, H., Chang, X., Liang, T. and Ma, Z. 2015. Sustainability education in massive open online courses. *Sustainability,* 7: 2274-2300. http://doi.org/10.3390/su703227.

Chapter 7

Ali, M.B. 2014. Participatory mapping for intergenerational learning and resilience in Ethiopia. *Intergenerational Learning and Transformative Leadership for Sustainable Futures*. Wageningen Academic Publishers, pp. 90-124.

Beck, U. 1992. From industrial society to the risk society: questions of survival, social structure and ecological enlightenment. *Theory, Culture & Society*, 9(1): 97-123.

Braidotti, R. 2011. *Nomadic Theory: The Portable Rosi Braidotti*. New York: Columbia University Press.

Cobarrubias, S. and Pickles, J. 2009. Spacing movements: the turn to cartographies and mapping practices in contemporary social movements. *The Spatial Turn. Interdisciplinary Perspectives*. New York: Routledge, pp. 36-58.

Elbein, S. 2017. The youth group that launched a movement at Standing Rock. *New York Times Magazine*. www.nytimes.com/2017/01/31/magazine/the-youth-group-that-launched-a-movement-at-standing-rock.html.

Hollingshead, B.P., Weakland, J.P. and Corcoran, P.B. 2014. To walk together: intergenerational learning and transformative leadership. P.B. Corcoran and B.P. Hollingshead (eds), *Intergenerational Learning and Transformative Leadership for sustainable futures*, pp. 21-36.

hooks, b. 2014. *Teaching to Transgress: Education as the Practice of Freedom*. New York: Routledge.

Kelly, P. 2001. Youth at risk: processes of individualisation and responsibilisation in the risk society. *Discourse: Studies in the Cultural Politics of Education*, 22(1): 23-33.

Kulundu, I. 2017. Change drivers at the front lines of the future: rising cultures for sustainability education in contemporary South Africa. *Envisioning Futures for Environmental and Sustainability Education*. Wageningen: Wageningen Academic Publishers, pp. 247-260.

Lotz-Sisitka, H.B. 2008. *Change Oriented Learning and Sustainability Practices*. Research programme proposal submitted to the South African Qualifications Authority.

Lotz-Sisitka, H.B. 2009. Utopianism and educational processes in the United Nations Decade of Education for Sustainable Development: a critical reflection. P.B. Corcoran and P.M. Osano (eds), *Young People, Education, and Sustainable Development: Exploring Principles, Perspectives, and Praxis*, pp. 43-49.

Lotz-Sisitka, H., Wals, A.E., Kronlid, D. and McGarry, D. 2015. Transformative, transgressive social learning: rethinking higher education pedagogy in times of systemic global dysfunction. *Current Opinion in Environmental Sustainability*, 16: 73-80.

Quiroz-Martinez, J., Wu, D.P. and Zimmerman, K. 2005. *ReGeneration: young people shaping environmental justice*. Oakland, CA: Movement Strategy Center. http://movementstrategy.org/b/wp-content/uploads/2015/08/MSC-ReGeneration_Young_People_Shaping_EJ_Movement.pdf.

Scott, C. 2011. Ecological identity through dialogue. *Canadian Journal of Environmental Education (CJEE)*, 15: 135-149.

The Blue Dot. 2016. *UNESCO MGIEP's Talking Across Generations on Education (TAGe)*. New Delhi: UNESCO Mahatma Gandhi Institute of Education for Peace and Sustainable Development (MGIEP). http://mgiep.unesco.org/bluedot/tag-2016-violent-extremism-and-education.

UNDP (United Nations Development Programme). 2017. *Sustainable Development Goals*. New York: UNDP. www.undp.org/content/undp/en/home/sustainable-development-goals.html.

UNESCO (United Nations Educational, Scientific and Cultural Organization). 2014. *Global Citizenship Education: Preparing Learners for the Challenges of the Twenty-first Century*. UNESCO: Paris.

UNESCO. 2016. *Global Education Monitoring Report. Education for People and Planet: Creating Sustainable Futures for All.* UNESCO: Paris.

UNESCO. 2017. What do we mean by 'youth'? Webpage. UNESCO: Paris. www.unesco.org/new/en/social-and-human-sciences/themes/youth/youth-definition.

Wiek, A., Withycombe, L. and Redman, C.L. 2011. Key competencies in sustainability: a reference framework for academic program development. *Sustainability Science,* 6(2), 203-218.

Chapter 8

Aipanjiguly, S., Mochizuki, Y. and Fadeeva, Z. (eds). 2010. *Five Years of Regional Centres of Expertise on ESD. Yokohama, Japan: UNU-IAS.*

Bhatta, B. 2010. *Analysis of Urban Growth and Sprawl from Remote Sensing Data: 17 Advances in Geographic Information Science.* Berlin Heidelberg: Springer-Verlag.

Canzanelli, G. and Agostinucci, A. 2011. *The Local Economic Development Approach: Potentialities and Limits of ART Initiative through the Analysis of Study Cases*. Napoli/New York: International Link and Services for Local Economic Development Agencies/UNDP.

Chapisa, F.G. 2011. *Transnational City-to-City Partnerships as Strategic Tools for Sustainable Urban Development – Case of the Haarlem-Mutare City Link*. Unpublished MSc Thesis, Erasmus School of Economics, Netherlands.

De Schutter, O. 2010. *The Right to Food*. Report submitted by the Special Rapporteur on the right to food, Olivier De Schutter to the Sixteenth session of the Human Rights Council of the United Nations General Assembly, 17 December 2010, New York.

Department for Communities and Local Government. 2012. *Urban and Rural Area Definitions: a User Guide, United Kingdom*. http://webarchive.nationalarchives.gov.uk/20120920003918 (accessed 10 July 2017).

Food and Agriculture Organization (FAO). 2014. *Building a common vision for sustainable food and agriculture: Principles and Approaches*. Rome: FAO.

Freire, P. 1974. Education: the Practice of Freedom. London: Writers and Readers Co-operative.

Heinz-Peter, G. 2000. Paulo Freire (1921–97). *Prospects: the quarterly review of comparative education,* XXIII(3/4), 1993: 439-458. www.ibe.unesco.org/sites/default/files/freiree.PDF (accessed 29 March 2017).

ICSU, ISSC. 2015. *Review of Targets for the Sustainable Development Goals: The Science Perspective*. Paris: International Council for Science (ICSU).

Kingdom of Lesotho. 2015. *National ESD Strategy*. Maseru: Ministry of Tourism and Environment and Ministry of Education.

Krishna, A. 2003. Partnerships between local governments and community-based organisations: exploring the scope for synergy. *Public Admin.* Dev. 23: 361–371. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.390.4618&rep=rep1&type=pdf.

Lambrou, Y,. and Piana, G, 2006. Energy and Gender in rural sustainable development. Rome: FAO.

Lockhart, A.S. 2016. *Creating sustainable futures for all: Non-formal and informal programs and activities that promote the acquisition of knowledge and skills in areas of Global Citizenship Education (GCED) and Education for Sustainable Development (ESD)*. Background paper prepared for the 2016 Global Education Monitoring Report Education for people and planet. Paris: UNESCO. http://unesdoc.unesco.org/images/0024/002456/245625e.pdf (accessed 10 July 2017).

Lotz, H. 1995. Resource materials development in environmental education: exploring some of the myths and tensions in participatory resource development in the 'We Care' primary project. *Southern African Journal of Environmental Education,* 15: 78-90.

Lotz-Sisitka, H. 2013. Conceptions of quality and 'learning as connection': teaching for relevance. Southern African Journal of Environmental Education, 29: 25-38. www.fgcu.edu/CESE/images/Lotz-Sisitka-Learning-as-Connection.pdf (accessed 10 July 2017).

Lotz-Sisitka, H., Pesanayi, T., Weaver, K., Lupele, C., Sisitka, L., Denison, J., O'Donoghue, R., Sithole, P., Van Staden, W., Mabeza, C. and Phillips, K. 2016. *Water Use and Food Security: Knowledge Dissemination and use in Agricultural Colleges and Local Learning Networks for Homestead Food Gardening and Smallholder farming*. Volume 1: Research and Development Report Number 2277/1/16.

Mexico City. 2016. *Mexico City's Climate Action Program (PACCM) 2014-2020: Progress Report 2016*. Mexico City: Government of Mexico City.

Mohammed IV Foundation for Environmental Protection. 2017. *The Mohammed VI Foundation for Environmental Protection and Alstom start their partnership to accompany seven schools in Tangier and the region of Fes in obtaining the Green Flag*. Mohammed VI Foundation for Environmental Protection. www.fm6e.org/en/nouveautes-des-programmes/2017/17/1009-20-mars-2017-alstom-appuie-sept-eco (accessed 9 July 2017).

Mylott, E. 2009. *Urban-Rural Connections: A Review of the Literature*. http://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/10574/Urban-RuralConnectionsLitReview.pdf (accessed 10 July 2017).

OECD. 2016. *The Sustainable Development Goals: An Overview of Relevant OECD Analysis, Tools and Approaches*. Paris: OECD Publishing.

Nachmany, M., Fankhauser, S., Davidová, J., Kingsmill, N., Landesman, T., … and Townshend, T. 2015. Climate Change Legislation in Kazakhstan: An Excerpt From The 2015 Global Climate Legislation Study "A Review of Climate Change Legislation in 99 Countries". London: Grantham Research Institute on Climate Change and Environment. Retrieved from http://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2015/05/KAZAKHSTAN.pdf

Perry, M. April 10, 2015. *Moroccan agriculture: Facing the challenges of a divided system*. http://sustainablefoodtrust.org/articles/moroccan-agriculture-facing-challenges-divided-system (accessed 9 July 2017).

Schneider, S. 1995. *Flirting with Disaster: Public Management in Crisis Situations*. New York: Sharpe.

Sivanappan, R.K. 2006. *Rain Water Harvesting, Conservation and Management Strategies for Urban and Rural Sectors*. State of the Art Lecture delivered at a National Seminar on Rainwater Harvesting and Water Management 11-12 Nov. 2006, Nagpur.

Tilbury, D. 2011. *Education for Sustainable Development: An Expert Review of Processes and Learning*. Paris: UNESCO.

Turner, R.H. and Killian, L.M. 1993. *Collective Behavior* (4th edn). Englewood Cliffs, N.J.: Prentice-Hall.

UNDP and UNEP. 2013. *Breaking Down the Silos: Integrating Environmental Sustainability in the Post-2015 Agenda*. New York: UNDP.

UNEP. 2016. *UNEP Frontiers 2016 Report: Emerging Issues of Environmental Concern*. Nairobi: UNEP.

UNESCO. 2014. *Shaping the Future We Want: UN Decade of Education for Sustainable Development Final Report.* Paris: UNESCO.

UNESCO. *2015. Rethinking Education: Towards a Global Common Good*? Paris: UNESCO.

UNESCO. 2016. *Profile booklet: Key Partners of the Global Action Programme on Education for Sustainable*

UNESCO. *2017. UNESCO Global Action Programme on Education for Sustainable development: Information Folder*. Paris, UNESCO.

UNESCO. Undated web page. *Urban and Rural Areas 2009*. www.un.org/en/development/desa/population/publications/urbanization/urban-rural.shtml (accessed 26 January 2017).

United Nations. 2013. *Finding solutions for addressing sustainable development challenges and accelerating the achievement of the MDGs*. Joint Meeting of the Economic and Social Council and the Economic and Financial Committee (Second Committee) of the General Assembly, 6 November 2013, United Nations Headquarters, New York.

United Nations. 2015. *The Millennium Development Goals Report, 2015*. New York: United Nations.

Verstappen, J. and Pereira, K. June 2014. Learning for change review of education for sustainable development. *King's College London*. www.kcl.ac.uk/aboutkings/strategy/PDFs--Resources/ESD-review-for-CEC-meeting-02-July-2014-JV.pdf (accessed 28 February 2017).

Weeks, J.R. 2010. Defining urban areas. T. Rashed and C. Jürgens (eds), *Remote Sensing of Urban and Suburban Areas*. Springer Netherlands: Dordrecht, pp. 34-35.

Westman, M., Forbes, A., Bass, S. and Smith, D. 2017. *Accelerating Sustainable Development in Africa: Country Lessons from Applying Integrated Approaches*. New York/Nairobi: UNDP/UN Environment.

Wiek, A., and Withycombe, L. 2011. Key competencies in sustainability: a reference framework for academic programme development. *Sustainability Science, 6*(2), 203-218.

Wolfenson, K.D.M. 2013. *Coping with the Food and Agriculture Challenge: Smallholders' Agenda Preparations and Outcomes of the 2012 United Nations Conference on Sustainable Development (Rio+20)*. Rome: Food and Agriculture Organization of the United Nations.

Chapter 9

Ahlert, D., Ahlert, M., Van Duong Dinh, H., Fleisch, H., Heußler, T., Kilee, L. and Meuter, J. 2008. *Social Franchising: A Way of Systematic Replication to Increase Social Impact*. Berlin: Bundesverband Deutscher Stiftungen.

Ashoka. 2016. *Knowledge Guidebook for the Ashoka Globalizer.* Berlin: Ashoka.

Bloom. 2012. *Scaling Your Social Venture – Becoming an Impact Entrepreneur.* New York: Palgrave Macmillan.

Bloom, P.N. and Dees, G. 2008. Cultivate your ecosystem. *Stanford Social Innovation Review,* 6(1): 47-53. https://ssir.org/articles/entry/cultivate_your_ecosystem.

Bloom, P.N. and Skloot, E. 2010. Introduction. P. Bloom and E. Skloot (eds), *Scaling Social Impact New Thinking.* New York: Palgrave Macmillan, pp. 1-10.

Bloom, P.N. and Chatterji, A.K. 2009. Scaling social entrepreneurial impact. *California Management Review,* 51(3): 114-133.

Bradach, J. 2003. Going to scale: the challenge of replicating social programs. *Stanford Social Innovation Review.* https://ssir.org/articles/entry/going_to_scale.

Do, T. 2015. *A Review of Scaling Concepts: ReSolve Scaling Workshops Project.* Uppsala University: SWEDESD.

Ford Foundation. 2006. *Asset Building for Social Change: Pathways to Large-Scale Impact*. New York: Ford Foundation.

IIRR. 2000. *Going to Scale: Can we Bring More Benefits to More People More Quickly?* Workshop Highlights, International Institute for Rural Reconstruction. Silang: Philippines

Hurst, A. 2012. Demystifying scaling. *Stanford Social Innovation Review.* https://ssir.org/articles/entry/demystifying_scaling_part_1.

Hartmann, A. and Linn, J. 2008. *Scaling-up: A Framework and Lessons for Development Effectiveness from Literature and Practice*. Working Paper 5. Washington, DC: Wolfensohn Center for Development at Brookings.

Henderson, J.C. and Venkatraman. 1993. Strategic alignment: leveraging information technology for transforming organizations. *IBM Systems Journal,* 32(1): 472-484.

Kania, J. and Kramer, M. 2011. Collective impact. *Stanford Social Innovation Review*, Winter: 36-41.

Larry, C. and Johannes F.L. 2014. *Taking Innovations to Scale: Methods, Applications and Lessons*. Washington, DC: Management Systems International. www.usaid.gov/sites/default/files/documents/1865/v5web_R4D_MSI-BrookingsSynthPaper0914-3.pdf.

Lotz-Sisitka, H., Shumba, O., Lupele, J. and Wilmot, D. (eds). 2017. *Schooling for Sustainable Development in Africa*. Switzerland: Springer International Publishing.

McPhedran Waitzer, J. and Paul, R. 2011. Scaling social impact – when everybody contributes, everybody wins. *Innovations*, 6(2): 143-155.

Moore, M. and Westley, F. 2011. Surmountable chasms: networks and social innovation for resilient systems. *Ecology and Society,* 16(1): 5. www.ecologyandsociety.org/vol16/iss1/art5 (accessed 24 September 2014).

OECD. 2008. *OECD Workshop on Education for Sustainable Development*. www.oecd.org/greengrowth/41372200.pdf (accessed 25 February 2017).

Okayama ESD Project. 2017. Communications with the Okayama ESD Project. Okayama, Japan.

Okayama ESD Promotion Commission. 2013. Learning together and pass on our previous earth to the next generation. Okayama, Japan.

Rosenberg, E. 2008. *Evaluation of the Eco-Schools South Africa Programme*. South Africa: Wildlife and Environment Society of South Africa (WESSA)/WWF South Africa/C.A.P.E. Conservation Education Programme.

rootAbility. 2016. *Sustainable Development Toolkit for Green Offices*. Berlin: RootAbility

rootAbility. 2017. *Green Office Movement*. Berlin: rootAbility. http://rootability.com/model/movement (accessed 7 July 2017).

Snapp, S. and Heong, K.L. 2003. Scaling up and out. B. Pound, S. Snapp, C. McDougall and A. Braun (eds), *Managing Natural Resources for Sustainable Livelihoods: Uniting Science and Participation*. London: Earthscan (in association with IDRC).

Spira, F. 2013. Driving the energy transition at Maastricht University? Analysing the transformative potential on energy efficiency of the student-driven and staff-supported Maastricht University Green Office. Unpublished Master thesis.

Stroh, D.P. 2015. *Systems Thinking for Social Change*. Vermont: Chelsea Green Publishing.

Tappeser, V. 2012. Change-Agents in Sustainability Governance. Unpublished Bachelor thesis.

UNESCO. 2014. *UNESCO Roadmap for Implementing the Global Action Programme on Education for Sustainable Development*. Paris: UNESCO.

UNESCO. 2016. *Education for People and Planet: Creating Sustainable Futures for All*. Paris: UNESCO.

United Nations. 1992. *Report of the United Nations Conference on Environment and Development* (Rio de Janeiro, 3-14 June 1992). New York, United Nations.

Uvin, P., Jain, P.S. and Brown, L.D. 2000. Think large and act small: toward a new paradigm for NGO scaling up. *World Development,* 28(8): 1409-1419.

WESSA EcoSchools Programme. 2013. *Eco-school South Africa Handbook*. South Africa: WESSA.

WHO. 2009. *Practical Guidance for Scaling Up Health Interventions*. Geneva: WHO/ExpandNet.

World Bank. 2005. *Reducing Poverty, Sustaining Growth: Scaling Up Poverty Reduction – Case Study Summaries.* Prepared for the Scaling Up Poverty Reduction Conference, Shanghai, 25-27 May 2004.

WWF-UK. 2004. *Pathways. A Development Framework for School Sustainability.* Godalming: WWF-UK.

Chapter 10

Adams, W.M. and Jeanrenaud, S.J. 2008. *Transition to Sustainability: Towards a Humane and Diverse World*. Gland: IUCN. https://cmsdata.iucn.org/downloads/transition_to_sustainability__en__pdf_1.pdf (accessed 21 February 2017).

Bereiter, C. 1973. *Must We Educate?* Englewood Cliffs, NJ: Prentice-Hall, pp. 3-20.

Brown, L.R. 1981. *Building a Sustainable Society*. New York: W.W. Norton.

Dunlap, R.E. 2008. The new environmental paradigm scale: from marginality to worldwide use. *Journal of Environmental Education*, 40(1): 3-18.

Earth Charter Initiative. 2000. *Earth Charter.* http://earthcharter.org/discover/the-earth-charter (accessed 11 February 2017).

Edwards, R. 1997. *Changing Places? Flexibility, Lifelong Learning and a Learning Society*. London: Routledge.

Elgin, D.S. and Mitchell, A. 1977. Voluntary simplicity: life-style of the future? *Futurist*, 11: 200-206.

Evans, G.W., Brauchle, G., Haq, A., Stecker, R., Wong, K. and Shapiro, E. 2007. Young children's environmental attitudes and behaviors. *Environment and Behavior*, 39(5): 635-658.

Gough, S. and Scott, W. 2006. Education and sustainable development: a political analysis. *Educational Review*, 58(3): 273-290.

Hawcroft, L.J. and Milfont, T.L. 2008. The use (and abuse) of the New Environmental Paradigm Scale over the last 30 years: a meta-analysis. Unpublished manuscript, Centre for Applied Cross-Cultural Research, Victoria University of Wellington, New Zealand.

Hawcroft, L.J. and Milfont, T.L. 2010. The use (and abuse) of the new environmental paradigm scale over the last 30 years: a meta-analysis. *Journal of Environmental Psychology*, 30(2): 143-158.

Hoskins, B. 2016. *Towards the Development of an International Module for Assessing Learning in Global Citizenship Education (GCE) and Education for Sustainable Development (ESD): A Critical Review of Current Measurement Strategies*. Paper commissioned for the GEM Report 2016. Paris, UNESCO.

IEA (International Association for the Evaluation of Educational Achievement). 2016. *IEA International Civic and Citizenship Education Study 2016 Assessment Framework*. Amsterdam, Springer Open. http://download.springer.com/static/pdf/430/bok%253A978-3-319-39357-5.pdf?originUrl=http%3A%2F%2Flink.springer.com%2Fbook%2F10.1007%2F978-3-319-39357-5&token2=exp=1488307608~acl=%2Fstatic%2Fpdf%2F430%2Fbok%25253A978-3-319-39357-5.pdf%3ForiginUrl%3Dhttp%253A%252F%252Flink.springer.com%252Fbook%252F10.1007%252F978-3-319-39357-5*~hmac=5b586ae6040c154eb1dd54e116961d915e0427ec126f7bd95ca9f1965fe89ebe (accessed 20 February 2017).

Lockheed, M. 2016. *Measures that Matter: Learning Outcome Targets for Sustainable Development Goal 4 – An Examination of National, Regional and International Learning Assessments.* Paper commissioned for the GEM 2016. Paris: UNESCO.

Manoli, C.C., Johnson, B. and Dunlap, R.E. 2007. Assessing children's environmental worldviews: modifying and validating the New Ecological Paradigm Scale for use with children. *Journal of Environmental Education*, 38(4): 3-13.

McKeown, R. 2015. What happened during the UN Decade of Education for Sustainable Development? *Applied Environmental Education & Communication,* 14(2): 67-69.

Milfont, T.L., Hawcroft, L.J. and Fischer, R. 2008. A meta-analysis of the societal variables associated with environmental attitudes. Unpublished manuscript, Centre for Applied Cross-Cultural Research, Victoria University of Wellington, New Zealand.

National Intelligence Council. 2012. *Global Trends 2030: Alternative Worlds*. Washington, DC: National Intelligence Council.

OECD. 2016a. *PISA 2015 Assessment and Analytical Framework: Science, Reading, Mathematic and Financial Literacy*. Paris: OECD Publishing. www.keepeek.com/Digital-Asset-Management/oecd/education/pisa-2015-assessment-and-analytical-framework_9789264255425-en#page3 (accessed 15 February 2017).

OECD. 2016b. *PISA 2018: Draft Analytical Frameworks.* Paris: OECD Publishing. www.oecd.org/pisa/data/PISA-2018-draft-frameworks.pdf (accessed 13 February 2017).

Pew Research Center. 2015. *Global Concern about Climate Change, Broad Support for Limiting Emissions: U.S., China Less Worried; Partisan Divides in Key Countries*. Washington, DC: PWC. www.pewglobal.org/2015/11/05/global-concern-about-climate-change-broad-support-for-limiting-emissions (accessed 1 April 2017).

Randers, J. 2012. 2052: *A Global Forecast for the Next Forty Years*. Vermont, Chelsea Green Publishing.

Rockström, J.W. 2015. *Bounding the Planetary Future: Why we Need a Great Transition.* Boston: Tellus Institute. www.tellus.org/tellus/publication/bounding-the-planetary-future-why-we-need-a-great-transition (accessed 22 February 2017).

Rokeach, M. 1968. *Beliefs, Attitudes, and Values.* San Francisco: Jossey-Bass.

Scott, W.A.H. and Oulton, C.R. 1999. Environmental education: arguing the case for multiple approaches. *Educational Studies,* 25(1): 119-125.

Steffen, W., Crutzen, P.J. and McNeill, J.R. 2007. The Anthropocene: are humans now overwhelming the great forces of nature? *Ambio*, 36(8): 614-621.

Stepanek Lockhart, A. 2016. *Non-formal and informal programs and activities that promote the acquisition of knowledge and skills in areas of Global Citizenship (GCED) and Education for Sustainable Development (ESD).* Background paper commissioned for the GEM Report 2016. Paris: UNESCO.

Sterling, S. 2014. Separate tracks or real synergy? Achieving a closer relationship between education and SD, Post-2015. *Journal of Education for Sustainable Development,* 8(2): 89-112.

Sterling, S. 2016. A commentary on education and Sustainable Development Goals. *Journal of Education for Sustainable Development*, 10(2): 208-213.

Stern, N.H. 2007. *The Economics of Climate Change: the Stern Review*. Cambridge, UK: Cambridge University Press.

SULITEST (Sustainability Literacy Test). Website. http://sulitest.org/en (accessed 8 April 2017).

SULITEST. 2016. *SULITEST V2: Architecture, Tags, … and how to engage topics/ issues experts!* http://www.sulitest.aleaur.com/files/source/Sulitest%20V2%20-%20Architecture%20and%20tags.pdf (accessed 8 April 2017).

Tilbury, D. 2007. Monitoring and evaluation during the UN Decade of Education for Sustainable Development. *Journal of Education for Sustainable Development*, 1(2): 239-254.

UNESCO. 1974. *Records of the General Conference Eighteenth Session: Volume 1 Resolutions*. Paris: UNESCO, pp. 147-154.

UNESCO. 2007. *Asia-Pacific Guidelines for the Development of National ESD Indicators.* http://unesdoc.unesco.org/images/0015/001552/155283e.pdf (accessed 31 January 2017).

UNESCO. 2009. *Bonn Declaration. UNESCO World Conference on Education for Sustainable Development.* Bonn, Germany: UNESCO.

UNESCO. 2013a. *Education for Sustainable Development (ESD): A Sound Investment to Accelerate African Development.* http://archive.ias.unu.edu/resource_centre/TICADV-ESD-flyer-2p.pdf (accessed 20 February 2017).

UNESCO. 2013b. *National Journeys towards Education for Sustainable Development: Reviewing National ESD Experiences from Costa Rica, Morocco, South Africa, Sweden, Vietnam*. Paris: UNESCO. http://unesdoc.unesco.org/images/0022/002210/221008e.pdf (accessed 12 April 2017).

UNESCO. 2013c. *37th Session: Records of the General Conference—Vol. 1 Resolutions*. Paris, 5-20 November 2013. http://unesdoc.unesco.org/images/0022/002261/226162e.pdf (accessed 23 February 2017).

UNESCO. 2014a. *Shaping the Future We Want: UN Decade for Sustainable Development (2005-2014) Final Report*. Paris: UNESCO. http://unesdoc.unesco.org/images/0023/002301/230171e.pdf (accessed 28 January 2017).

UNESCO. 2014b. *UNESCO Roadmap for Implementing the Global Action Programme on Education for Sustainable Development*. Paris: UNESCO. http://unesdoc.unesco.org/images/0023/002305/230514e.pdf (accessed 3 February 2017).

UNESCO. 2015a. *Education 2030: Incheon Declaration and Framework for Action – Toward Inclusive and Equitable Quality Education and Lifelong Learning for All*. Paris: UNESCO. www.uis.unesco.org/Education/Documents/incheon-framework-for-action-en.pdf (accessed 15 February).

UNESCO. 2015b. *Rethinking Education: Towards a Global Common Good?* Paris: UNESCO. http://unesdoc.unesco.org/images/0023/002325/232555e.pdf (accessed 20 February 2017).

UNESCO. 2015c. *Thematic Indicators to Monitor the Education 2030 Agenda: Technical Advisory Group Proposal*. Paris: UNESCO. www.uis.unesco.org/Education/Documents/43-indicators-to-monitor-education2030.pdf (accessed 19 February 2017).

UNESCO. 2016a. *Executive Board: 199th session – Implementation of Standard Setting Instruments*. Paris, UNESCO.

UNESCO. 2016b. *Global Education Monitoring Report 2016. Education for People and Planet: Creating Sustainable Futures for All*. Paris: UNESCO. http://unesdoc.unesco.org/images/0024/002457/245752e.pdf (accessed 15 January 2017).

UNESCO. 2016c. *The ABCs of Global Citizenship Education*. Paris: UNESCO. https://en.unesco.org/system/files/abcs_of_gced.pdf (accessed 2 April 2017).

UNESCO. 2016d. *The Sixth Consultation on the implementation of the Recommendation concerning Education for International Understanding, Cooperation and Peace and Education relating to Human Rights and Fundamental Freedoms (1974)*. Paris: UNESCO.

UNESCO. 2017a. *Education for Sustainable Development Goals: Learning Objectives.* Paris: UNESCO. http://unesdoc.unesco.org/images/0024/002474/247444e.pdf (accessed 3 April 2017).

UNESCO. 2017b. *Education for Sustainable Development: Partners in action*. Paris: UNESCO

UNESCO-UIS (UNESCO Institute of Statistics). 2016. *Sustainable Development Data Digest: Laying the Foundation to Measure Sustainable Development Goal 4.* Montreal: UNESCO. www.uis.unesco.org/Education/Documents/uis-sdg4-digest-2016.pdf (accessed 28 February 2017).

United Nations. 1987. *Report of the World Commission on Environment and Development: Our Common Future*. New York: United Nations.

United Nations. 2012. *Resolution Adopted by the General Assembly on 27 July 2012: 66/288 The future we want.* New York: United Nations. www.un.org/ga/search/view_doc.asp?symbol=A/RES/66/288&Lang=E (accessed 25 February 2017).

United Nations. 2016. *Ten Years of the UNECE Strategy for Education for Sustainable Development: Evaluation report on the implementation of the UNECE Strategy for Education for Sustainable Development from 2005 to 2015.* New York: United Nations. www.unece.org/index.php?id=45227 (accessed 13 April 2017).

United Nations Economic and Social Council: Statistical Commission (UNSC). 2016. *Report of Inter-Agency and Expert Group on Sustainable Development Goal Indicators.* New York: United Nations.

United Nations Department of Economic and Social Affairs (UN DESA). 2013. *World Population Prospects: The 2012 Revision*. New York: United Nations.

United Nations Secretary General's High-level Panel on Global Sustainability (UNSGHPGS). 2012. *Resilient people, resilient planet: A future worth choosing*. New York: United Nations. http://en.unesco.org/system/files/GSP_Report_web_final.pdf (accessed 22 February 2017).

United Nations University (UNU-IAS)/Institute for Global Environmental Strategies (IGES). 2013. *Monitoring and Evaluation of Education for Sustainable Development: A Framework of the Main Factors and Important Leverage Points in the Implementation of Education for Sustainable Development in the Asia-Pacific Region*. Tokyo/Hayama, Japan: UNU-IAS/IGES. https://pub.iges.or.jp/system/files/publication_documents/pub/policyreport/3500/IGES_and_UNU-IAS_--_M%26E_of_ESD_report_%28reduced_size_-_2013%29.pdf (accessed 11 April 2017).

Wells, G. 2000. Dialogic inquiry in education: building on the legacy of Vygotsky. C. Lee and P. Smagorinsky (eds), *Vygotskian Perspectives on Literacy Research*. New York: Cambridge University Press, pp. 51-85.

6, P. and Bellamy, C. 2012. *Principles of Methodology: Research Design in Social Science*. London: Sage, pp. 9-24.

United Nations
Educational, Scientific and
Cultural Organization

Education
Sector

EDUCATION ON THE MOVE

Bringing the latest thinking in education to education specialists worldwide

*Created by UNESCO, the series – **Education on the Move** – focuses on key trends in education today and challenges for tomorrow. The series seeks to bring research knowledge produced by various academic disciplines and within various organizations to those who can shape educational policies and drive reforms. As such, it also intends to contribute to on-going reflections on the international educational agenda.*

Issues and trends in Education for Sustainable Development

Education for Sustainable Development (ESD) is globally acknowledged as a powerful driver of change, empowering learners to take the decisions and actions needed to build a just and economically viable society respectful of both the environment and cultural diversity. This publication comes at a moment of heightened global interest in addressing sustainability challenges through education in order to achieve the targets of the 2030 Sustainable Development Agenda. ESD is not only recognized as a key enabler of sustainable development but an integral element of all quality education. By exploring key issues related to ESD policy and practice, UNESCO aims to help accelerate the reorientation of education towards achieving a sustainable and resilient world.

9 789231 002441

www.unesco.org/publishing

4 QUALITY EDUCATION

Sustainable Development Goals