The Role of Education in Advancing Sustainable Development

Education is an important component for progress in the developed and developing world. The access to education, the quality of education, and education that strives to incorporate aspects of sustainability are key factors in addressing current global challenges such as poverty.

There are clear links between global challenges observed in the 21st century. An example of this is the link between water, energy, improved health, and sanitation. Energy and water are two of the most important resources for economic and social prosperity. They are inherently linked to one another in that water is used, for example, in hydroelectric power generation, fuel production, and thermoelectric conversion. Energy, on the other hand, is required for water withdrawal, conveyance, treatment, and distribution. Infrastructures of the built environment that support economic, environmental, and societal advancement also require tremendous amounts of resources including water, energy, and other scarce, non-renewable resources.

Sustainable development, or sustainability, has been defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987). Because of the interconnectedness of various global challenges facing society today, a population that is educated in systems thinking is able to make better decisions concerning issues that affect them and the world around them. Further, interdisciplinary and multidisciplinary approaches to problem solving are necessary, whether it be in the composition of a project team, the types of integrated assessment methods used, or collaborative research. As an example, the evaluation of the feasibility of algal biofuel as an energy source requires a collaborative, multi-disciplinary team from the fields of biology, engineering, and sociology.

To arrive at a multidisciplinary, collaborative, systems thinking method of problem solving, there needs to be a paradigm shift in education towards sustainability. “Education for sustainability is the continual refinement of the knowledge and skills that lead to an informed citizenry that is committed to responsible individual and collaborative actions that will result in an ecologically sound, economically prosperous, and equitable society for present and future generations. The principles underlying education for sustainability include, but are not limited to, strong core academics, understanding the relationships between disciplines, systems thinking, lifelong learning, hands-on experiential learning, community-based learning, technology, partnerships, family involvement, and personal responsibility” (President’s Council on Sustainable Development, 1996).
Objectives of the Book

The overall goal of this book is to provide case study examples for educators, administrators, researchers, and practitioners in the fields of sustainability, sustainable development, and education for sustainable development as a fitting culmination to the United Nations Decade of Education for Sustainable Development (DESD) (2005-2014). The editors of the book are of the view that having exemplary case studies that infuse sustainable development into formal and informal education will allow for the quicker proliferation of education for sustainable development at every level of education (pre K-12 through adult). This aligns with the mission of the DESD, as it directly benefits the following priority areas: promoting basic education, reorienting and revising education programs, developing public understanding and awareness, and providing practical training. These priority areas align with the following UNESCO c/5 major programmes, lines of action (MLA), and thematic areas:

**Major Programme I – Education**

- **MLA 2:** Building effective education systems from early childhood care and education to higher education and furthering lifelong learning (01033)
  - **Thematic area 1:** Early childcare and education (01034)
  - **Thematic area 3:** Secondary education (01037)
  - **Thematic area 4:** Higher education (01038)
- **MLA 3:** Sector-wide frameworks: helping governments to plan and manage the education sector (01039 & 01040)
  - **Thematic area 1:** Education sector policy analysis, planning, and management (01043)
  - **Thematic area 2:** Integrating education for sustainable development in sector-wide frameworks (01045, 01046 & 01047)
- **MLA 4:** Leading the international education agenda, including education for sustainable development (ESD), and tracking trends (01049 &01050)
  - **Thematic area 2:** GMR and possibly other education reports (01052 & 01053)
  - **Thematic area 3:** DESD coordination (01054 & 01055)
  - **Thematic area 4:** Promotion and monitoring of normative and standard-setting instruments in education (01056)

The details were attained from the UNESCO 2010-2011 35 c/5: Approved Programme and Budget document (UNESCO, 2010).

**Scholarly Value and Impact of Book**

To achieve a paradigm shift in education for sustainability, there is a need for (i) a formal education reform, (ii) integration of sustainability in non-formal education setting and outreach, and (iii) strengthened education for sustainability (President’s Council on Sustainable Development, 1996). The dissemination of successful education practices that incorporate sustainability across the globe would allow individuals, educational institutions (formal and non-formal), organizations, industry, and practitioners to assess, modify, and/or integrate these practices into their particular settings. The diffusion and adoption of best
educational practices for sustainability is critical to addressing global challenges that current and future society will face.

The materials covered in the book expand on the fields of the social sciences, engineering, sciences, education, and business. Some aspects that the chapters in this book attempt to expand on include:

- Infusion of sustainable development into both formal and informal education. Sustainable development in kindergarten, primary, secondary, postsecondary/vocational, college/university, graduate school, informal education.
- Challenges of integrating sustainable development—Details of what they were and how were they chosen. Details of the assessment of challenges and how they were overcome or why challenges were not addressed.
- Successes of integrating sustainable development—Measures of success: What was carried out to have a declaration of success.
- Peda- or Andragogy—Analysis of both the teaching and learning techniques utilized to bring about sustainable development education. Details on why certain teaching and learning techniques were chosen would be expected.
- Interdisciplinary and multidisciplinary approaches to teaching sustainable development
- Institutional frameworks/organizational (re)structuring to promote sustainability/sustainable development education

Target Audience

This book is relevant to a diverse audience inclusive of educators/teachers/trainers at all levels of education, sustainable development practitioners, the public at large, and education policy makers, with the main target audience being educators/teachers/trainers at all levels of education inclusive of education administrators. The book is timely as professionals, researchers, educators, and leaders pursue innovative solutions to climate change, population growth, resource scarcity, water scarcity, food scarcity, poverty reduction, improved health, universal education, sustainable infrastructure, environmental health, and disaster planning and management. Addressing these challenges through education in sustainability is key. Since sustainability is a multidisciplinary subject, the information contained in this book is useful to practitioners, researchers, and educators in the various disciplines of the social sciences, sciences, and engineering. The book provides insights into the sustainability concepts, theories, mechanisms and strategies that the audience can incorporate into formal and informal teaching. The book serves as an excellent reference guide for persons working in the areas of curriculum studies as well as sustainability/sustainable development.

Book Structure and Chapters Synopsis

The book consists of thirty six (36) chapters among five (5) major sections pertaining to sustainability. These sections are:

Section 1: Pedagogical Theories and Conceptual Frameworks to Address the Issues of Sustainability Education
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In Chapter 1, Muireann McMahon and Tracy Bhamra present their study entitled: “Sharing the Load: Developing Capacity for Social Sustainability in Design through Collaboration”. This study describes three projects involving collaborations between groups of undergraduate design students from different geographical locations. A brief description of the projects and logistics is followed by an analysis of the outcomes and experiences of participants. Transforming the rhetoric surrounding sustainability into action is where designers often struggle. The results attained here show that designers need to be introduced to a set of competencies that go beyond traditional design skills along with successful approaches for transformation.

Nathan Hensley of Auburn University explores the theoretical underpinnings and practical application of Watershed Education in Chapter 2. His study: “Incorporating Place-Based Education to Cultivate Watershed Literacy: A Case Study”, describes an experiential approach to teaching about stormwater and sustainable stormwater management while working to advance the “watershed literacy” of college students. The case study culminates by explaining a model that educators in both formal and non-formal environments can use to help their students learn about watersheds and stormwater.

Photography has been used to encourage Australians to recognize and value natural landscapes. Photography contributed significantly to the impact of campaigns to save rivers and vast wilderness areas in the south-west of Tasmania. In Chapter 3: “Sustainability in Photography Can Change the World”, Rowena H. Scott aims to elevate the reader’s appreciation, not only of photography, but of artistic endeavor in the quest for sustainability and as an education tool. It describes a case study of an environmental sustainability photography competition in a university that stimulated curiosity, imagination and enthusiasm in the natural environment.

Education for sustainable development (ESD) is inextricably linked to processes of cooperation between countries in order to better perform a curricular innovation and development. These cooperation processes are even more acute in countries that recently came out of situations of serious conflicts. East Timor is an example of a post-conflict country where currently there is secondary school reform in the framework of a cooperation protocol between Portuguese Institutions and East Timor’s Government. In Chapter 4: “Integration of Education for Sustainable Development into Formal Secondary Curricula of East Timor”, Ana Capelo highlights this cooperation in line with the production of new curricular materials for secondary school according to ESD purposes and Millennium Development Goals attainment.

Chapter 5 presents a case study entitled: “Interdisciplinary Approaches to Sustainable Development in Higher Education: Case Study from Croatia” by Dunja Andić and Sanja Tatalović Vorkapić. This chapter presents and discusses the infusion of education for sustainable development into formal higher education through interdisciplinary approaches and its relationship with positive psychology. Sustainable behavior is presented, described and measured, including its use as the predictor of converged forms of
knowledge/effects of subject Pedagogy of sustainable development. In other words, the specific case study from Croatia is described with the aim of testing the positive change in students’ sustainable behavior that is expected to be found under the influence of relevant subject. Also, the relationship between students’ optimism, life satisfaction and sustainable behavior has been analyzed and discussed. That includes the specific interdisciplinary approach in teaching and learning as the basis for further research and future development of similar courses.

In Chapter 6, Fernando Lourenço, Natalie Sappleton, Weng Si Lei, and Ranis Cheng present their case study entitled: “Sustainable Development in Business Education: The Role of Entrepreneurship as Pedagogy”. This chapter provides a discussion of whether it is better to flow with the dominant economic-driven values as prescribed by conventional business education or to challenge it in order to nurture sustainability-driven values among students. These options are explored and the suggestion that entrepreneurship has a role to play as a pedagogical tool to support the teaching of sustainable development is offered.

Engineers are no longer constrained to disciplinary boundaries, and instead, must work across disciplines as members of global communities and multidisciplinary teams. Robert L. Nagel, Kyle G. Gipson, and Adebayo Ogundipe in their Chapter 7 case study entitled: “Integrating Sustainable Design and Systems Thinking throughout an Engineering Curriculum” attempt to address this. Since the inaugural class started in 2008, the faculty of the Madison Engineering Department have strived to integrate environmental, social, economic, and technical contexts of sustainable design and systems thinking as common curricular threads. This case discusses curricular threads to illustrate how content integration, developmental instruction, and a problem-based learning framework are used to train students to understand systems holistically, describe and analyze tradeoffs, understand resultant perturbations, and design effective, sustainable solutions.

In Chapter 8: “Learning about the Different Dimensions of Sustainability by Applying the Product Test Method in Science Classes”, Mareike Burmeister, Janine von Döhlen, and Ingo Eilks report on an initiative that combines curriculum development in the fields of ‘Sustainable Development’ and ‘Chemistry’ with informal education and teacher professional development. This combination is operated by the development of innovative out-of-school laboratory activities dealing with selected sustainable development issues in conjunction with the high school chemistry curriculum. Teaching modules developed to be operated in formal secondary school chemistry and science teaching. Development of such modules is discussed and illustrated in this chapter.

In Chapter 9, Sandra Murray and Susan Salter explore a case study entitled: “Communities of Practice (CoP) as a Model for Integrating Sustainability into Higher Education”. In this study, the authors discuss in depth the Education for Sustainability (EfS) Community of Practice (CoP) model. The EfS CoP is a University of Tasmania initiative. It was established to overcome challenges to the integration of sustainability across the university including curriculum, operations and research. These challenges included the importance of establishing greater collaboration across disciplinary boundaries, between academic and professional staff members, as well as engaging with students and the wider community. The journey of the EfS CoP has also suggested that teaching and learning for sustainability in higher education requires support from senior positional leaders and all partnerships involved in the process.
Section 2: Development and Transformation of Sustainable Development Programs: Elementary and Secondary Education

Project-based learning (PBL) formed the framework for teaching sustainability concepts to elementary students by an informal educator. In Chapter 10, “Using Project-Based Learning to Teach Sustainability Issues to Elementary Students”, Ingrid Weiland, Elisa Pokral, and Kristin Cook highlight how assessment was done by the use of pre and posttests as well as focus group interviews to statistically measure the impact of the informal educator on the students’ learning of sustainability issues/concepts. The actual PBL curriculum that was created is elaborated upon from conception through to post-implementation.

In Chapter 11, Elizabeth Spence, Tarah Wright, and Heather Castleden explored Nova Scotia’s sixth grade curriculum outcomes for the subjects of science, social studies, and health education. They analyzed the curriculum for the integration of the fundamentals of environmental education (EE). The importance of environmentally focused education (EE, ESD, EfS) is explored, with a focus on how educating about the environment is approached in terms of knowledge, skill, and attitude centered curriculum outcomes. Current limitations to the breadth of environmentally focused education and potential solutions are revealed and discussed.

Chapter 12, entitled: “Learning about Sustainability in a Non-Formal Laboratory Context for Secondary Level Students: A Module on Climate Change, the Ozone Hole, and Summer Smog”, by Nicole Garner, Maria de Lourdes Lischke, Antje Siol, and Ingo Eilks, illustrates the application of the Consumer Test Method to develop the Product Test Method. The Product Test Method is intimately linked to ecological, economic and societal sustainability. Thus the application of the modified method allows more focused learning about sustainability. The chapter presents a case of applying the method to a lesson plan on the evaluation of plastic types where the results show the lesson plan’s potential to contribute to higher levels of student motivation and perception of issues of sustainable development.

Educating children about environmental sustainability can begin with their immediate vicinities. In Australia, the New South Wales Department of Education and Communities embarked on a structured, four-year, state-wide Program in which teams of students between the ages of eight and sixteen were financed to create projects that would conserve energy and thereby reduce electricity costs in their schools. These authentic, student-directed projects were linked to syllabus-based outcomes and content. Chapter 13, entitled: “A System-Wide School-Based Program for Sustainability: Climate Clever Energy Savers”, by John Buchanan, Peter Aubusson, and Sandy Schuck, describes the Program in the context of the importance of sustainability development, and the centrality of education in achieving three of the projects evaluated.

Chapter 14, “Teaching Sustainability Competencies to High School Students using Small-Scale Community-Based Construction Project” by Mehmet E. Ozbek and Caroline M. Clevenger, provides case studies for teaching sustainability concepts to high school students, by implementing the service-learning model by way of small-scale, sustainable hands-on construction projects that can be built in a high school shop class. It presents two curriculum tools to assist high school shop teachers develop similar projects. These curriculum tools contain general instructions, as well as suggested “discussion points”, to highlight the inherent complexity of sustainability and engage high school students in discussions surrounding sustainability. It is important to note that the focus of the case studies is on providing a general model for teaching concepts related to sustainability through construction activities rather than providing 100% error free instructions on how to build such projects.
Living more sustainably is one of the most urgent long-term challenges facing civilization. How educators implement instruction to interact with this issue may be a key to getting students to dialogue about solutions. Chapter 15, “Teaching Sustainability as a Social Issue: Learning from Dialogue in a High School Social Studies Classroom” by Jay M. Shuttleworth, and Anand R. Marri, explores how two high school social studies teachers delivered instruction focused on the social issues of sustainability (SIS). It details the kinds of objectives and assessments the teachers implemented when using this pedagogical approach. Their use of SIS instruction revealed promising methodology that might also benefit from ongoing refinement.

Systems thinking provides a powerful cognitive and pedagogical tool for considering problems related to sustainability. In Chapter 16, “Systems Thinking about Severe Storms in Social Studies Education” by Thomas Chandler, Margaret Crocco, and Anand R. Marri, particular attention is paid to critical conceptual aspects of systems thinking as manifest in the use of a curriculum guide addressing Hurricane Katrina called ‘Teaching The Levees: A Curriculum for Democratic Dialogue and Civic Engagement’. The three educators in this study used the ‘Teaching The Levees’ curriculum guide in order to focus on a specific disciplinary aspect of social studies education. The ramifications of systems thinking are addressed within this context.

Section 3: Approaches in Higher Education to Teaching and Learning Sustainability and Sustainable Development Concepts

As many universities and colleges are teaching programs in sustainability, they should be incorporating sustainability concepts in their infrastructure and courses. Two case studies are presented in Chapter 17, “Integrating Sustainability within Higher Education” by Angus W. Stewart, that demonstrate the embedding of sustainability values within a biomedical curriculum, and the implementation and evaluation of a buildings-based waste recycling process that aims to reduce landfill office waste.

The culminating experience for attaining a minor in sustainability at Auburn University is the successful completion of the capstone course in sustainability. The course enrolls junior and senior students from myriad majors and is instructed by two faculty members from a mix of a technical and non-technical backgrounds. The course hinges upon sustainability theory, cooperative team learning, and motivating students to produce sustainable solutions as a team. Chapter 18, entitled: “Teaching about Sustainability: Raising Consciousness and Taking Action” by Richard Penaskovic, Dennis DeVries, and Nanette Chadwick, offers pedagogical approaches to an interdisciplinary project-based course that has practical outputs. The course schedule, syllabus and sample projects are included for ease of adoption.

In Chapter 19, entitled: “Teaching of Sustainability: Higher Education (HE) Case Studies” by Sue Haile and Jarka Glassey, several different cases were explored at Newcastle University, UK that range from 1999 through 2012 where ‘Sustainable Development’ was introduced into undergraduate and graduate curricula throughout the institution. This institutional review is detailed in this chapter and forms a good base and template for other institutions to undergo a similar audit of their provision of sustainability curricula.

Interior Design meets sustainability practice in Chapter 20. Fourth year Interior Design students at Pratt Institute, Brooklyn, NY were provided a unique opportunity to work with an industry client on converting offices into LEED Silver spaces. This experiential learning collaboration was assessed through the completed projects as well as student evaluations. Both of these assessment measures are discussed in depth within this chapter entitled: “The Reinvention of an Unremarkable Building through Adaptive
Reuse: A Case Study” by Deborah Schneiderman and Anne Carr. The key findings are of importance to ensure an innovative and sustainable client-centered design was achieved.

Accounting has traditionally been focused on money and profit maximization. Sustainability and sustainable development in accounting education is a very new concept. Chapter 21, entitled: “Sustainability, Ethics and Education: What’s Accounting Got to Do with It?” by Tehmina Khan, explores how this intersection can be achieved through the ethics knowledge perspective in an undergraduate accounting course. Details of the course structure in order to attain this result are delved into.

The capture, supply and waste of energy are paramount to the sustainable use of the finite resources of our planet. To understand how energy is produced, one must understand basic physics principles. In consideration of this, a unique travel course was created that took students, via train, to Los Angeles, CA to study and visit facilities of various forms of energy production. This course was taught as a hybrid of on and off campus learning and offers a unique model for learning of specialized topics. Author Katrina Hay elaborates on this course in Chapter 22 entitled: “Physics of Energy: A Sustainability-Themed University Travel Course”.

Serious games are viable educational tools for a range of disciplines and for students of all ages. Chapter 23, entitled: “Green Chemistry: Classroom Implementation of an Educational Board Game Illustrating Environmental Sustainable Development in Chemical Manufacturing” by Mike Coffey, describes the design and development process for a science-themed board-game, Green Chemistry, for students at the secondary-tertiary transition. Environmental sustainability is featured in the game, including pollution prevention and mitigation, energy consumption and alternative processes with improved environmental performance using twelve exemplar technologies. Opinions of students and tutors using the game in the classroom as an educational experience are presented.

There are considerable challenges in embedding sustainability into undergraduate engineering programs, even though it is widely acknowledged to be necessary to the modernization of engineering curricula. Chapter 24, entitled: “Designing Sustainability Curricula: A Case Following Chemical Engineering Curriculum Redesign” by Madoc Sheehan, explores a case study within the chemical engineering degree program at James Cook University, in order to describe the mapping, design and implementation of new curricula that embeds sustainability. Examples of relevant skills, techniques, and characteristics associated with sustainability in chemical engineering are described and mapped. A cognitive learning matrix is also introduced as a design tool for fine-scale curriculum development.

Education for sustainability in higher education often faces numerous financial and institutional barriers. One overlooked mechanism for the promotion of education for sustainability is accreditation requirements. Eastern Mennonite University (EMU), a Christian liberal arts university, took advantage of this mechanism by choosing education for sustainability as the topic for one of its accreditation requirements. EMU’s Peace with Creation project builds on grassroots efforts and focuses on infusing education for sustainability throughout the undergraduate curriculum. Chapter 25, entitled: “Using Accreditation to Foster Education for Sustainable Development in Higher Education: The Implementation of the Peace with Creation Project at Eastern Mennonite University” by James Yoder and BJ Miller, explores how the utilization of an accreditation mandate has significantly advanced education for sustainability at EMU. The chapter shows evidence that accreditation can apply powerful leverage for integrating education for sustainability into an institutional framework.

A university is a place of organized scientific rationality, but as a social institution it is also committed to future generations. Therefore, it can be argued that universities should act as “models for sustainability”. Chapter 26, entitled: “Implementing an Interfaculty Elective ‘Sustainable Development’:
Section 4: Contemporary Approaches to Adult Education for Sustainable Development

Organic farming is considered as a method of farming that can deliver sustainable outcomes. Benefits for the environment and health have been recognized, but the application is still relatively slow. To understand these conditions, Chapter 27 explores organic paddy farmers’ learning process in understanding and applying the organic rice farming. The learning methods, influencing factors, and farmers’ barriers in applying the organic system are examined in this chapter, entitled: “Analyzing Farmers’ Learning Process in Sustainable Development: The Case of Organic Paddy Farmers in North Sumatra, Indonesia” by Diana Chalil, to determine alternative solutions and recommendations for improving the efficiency and effectiveness of the process.

Sustainable agriculture practices are becoming more prominent and necessary as our population continues to grow, our natural resources become more limited, and changes in climate and weather patterns create uncertainty in our food systems. Efforts to educate people about sustainable agriculture have recently increased significantly at the post-secondary level, providing a vast array of examples of subject matter, teaching tools and teaching approaches. Chapter 28, entitled: “Growing PEAS at the Duke Campus Farm: An Analysis of Post-Secondary Sustainable Agriculture Education Curricula” by Damon Cory-Watson, describes a study that analyzed these practices to create a unified guide to teaching sustainable agriculture; referred to as the Programming for Education in Agricultural Sustainability (PEAS) tool. The PEAS tool was then used to create an educational program on the Duke Campus Farm. The analysis also identified certain gaps in the way that sustainable agriculture is currently taught.

The magnitude of global environmental challenges and the continuing disparity between developed and developing regions is compelling academics from all disciplines to examine interactions between humans and the natural world. Concurrently, technology has created the expandable classroom, from kindergarten to post-secondary, allowing real-time, face-to-face interactive learning environments (via an internet connection and a properly configured computer) that bring educators and students together from across large geographic distances, multiple countries, and different cultural backgrounds. Chapter 29, entitled: “Synchronous E-Learning on Rural Sustainability: A Reflection on a Course with Six Universities across Canada, Mexico, and the United States” by Denise M. Golden, Alex S. Mayer, Brian E. McLaren, Jason E. Dampier, Patrick T. Maher, M.A. (Peggy) Smith, and Mirella Stroink, discusses synchronous e-learning in delivering a senior-level post-secondary rural sustainability course. The intent of the course was to develop innovative and multi-national approaches for studying the unique aspects of sustainable development in rural communities across North America.

Education for Sustainable Design seeks to develop holistic skills and competencies that allow learners to address the challenges of sustainable development. Design is ideally placed to change, for the better, the products and service systems that the world uses. Chapter 30, entitled: “Growing Oak Trees - Education for Sustainable Design: Building a Sustainable Design Literacy in Undergraduate and Professional
Designers” by Adam de Eyto, outlines a series of educational cases from Ireland that were shown to build the knowledge and skills of undergraduate and professional designers with respect to sustainability. The cases were show to be effective in changing the practice of professional designers and the learning model proposed may be scalable in the international context.

**Section 5: Education for Sustainable Development: Problems, Prospects and Promise**

An abundant amount of research has been conducted on promoting sustainability literacy among students; however very little of this research focused on the amount of knowledge university academics have. Chapter 31, entitled: “Are University Lecturers Literate in Sustainability?” by Noora Kokkarinen and Alison J. Cotgrave, details a case study which assesses the level of sustainability literacy that lecturers in the built environment possess. This chapter also provides a five tier hierarchy that can serve as a benchmark against necessary perspectives that sustainably literate academics may need in construction disciplines.

The great challenge of the 21st century for institutions of higher learning is to train professionals who are critical of, and capable of acting in transforming their frames of reference to achieve sustainable development goals and objectives. The emphasis in Chapter 32 is placed on the role of academic staff for transforming university curricula to address sustainability considering four main questions: 1) “What?”; “How?”; “Where?” and “Whom?” In this context, this chapter, entitled: “Transforming University Curricula towards Sustainability: A Euro-Mediterranean Initiative” by Vassilios Makrakis, describes the case of a Euro-Mediterranean initiative and analyses the extent to which this programme has contributed on transforming curricula changes in a Consortium of 12 partner universities.

The big questions for contemporary society such as food, water and energy security and the avoidance of irreversible environmental damage require multidisciplinary understanding and solutions embracing sustainable development for all of Earth’s people. Chapter 33, entitled: “Embedding Sustainability Learning: Robustness in Changing Circumstances - Perspectives from a United Kingdom (UK) Higher Education Institution (HEI)” by Rosalind (Ros) Taylor, Elise Barron, and Katherine A.T. Eames, explores ways of achieving education for sustainable development that is accessible to all higher education students irrespective of their main study discipline. The case explores embedded strategies ranging from subliminal campus learning to formally assessed academic materials, which expose students and university communities to the theory and practice of sustainability. Real world co-learning with local, regional and international peers and business colleagues is introduced and the challenges of developing the metrics to monitor sustainability learning are considered. It is argued that embedded approaches, such as those presented, are readily transferable between disciplines and offer a more stable, certain and widespread access to sustainability concepts. Moreover, these approaches are less likely to be lost at times of institutional change and curriculum reorganization than dedicated sustainability degree pathways.

Cambodia has been promoting “Education for Sustainable Development (ESD)” and this effort is considered as part of the implementation of the goals of “Education for All (EFA)”. Chapter 34, entitled: “Efforts to Promote Sustainable Development through Education in Cambodia” by Yuto Kitamura, presents how Cambodia has been promoting ESD from three perspectives: (1) acquisition/improvement of life skills; (2) enhancing environmental education; and (3) promotion of peace education and human rights education. It is worth noting here that although the educational activities conducted in Cambodia are not necessarily known as ESD, they certainly embody the concept of it. The chapter emphasizes that the positioning of EFA and ESD as essential lifelong learning is important to achieve a sustainable society.
The digital textbook is an innovation of the Digital Era. Digital textbook in Personal Learning Portfolio is a new educational technology for self-regulated learning. This requires application of the metasystems learning design approach and a new didactical model for digital textbook development. Chapter 35, entitled: “Digital Textbook in Personal Learning Portfolios: A Case of Interdisciplinary Pedagogical Innovation for Sustainability” by Elena Railean, investigates a case of interdisciplinary pedagogical innovation for sustainability. Such innovation could be achieved, if learning outcomes will be designed according to core cross principles and their norms of application.

While many nations around the world have embraced the need for education to achieve sustainability, only limited progress has been made on any level. Our state of the art showed the need of Master programmes that are participatory, holistic, interdisciplinary and contextual, making use of ICTs both as learning pedagogies and means of delivering at a distance or through a blended mode. Chapter 36, entitled: “Intercultural Communication and Sustainable Leadership: The Case of a Joint Master Course” by Nelly Kostoulas-Makrakis, explores in detail the case of a M.Sc. programme on ICT in Education for Sustainable Development through a course on “Intercultural Communication and Sustainable Leadership”.

Ken D. Thomas  
Auburn University, USA

Helen E. Muga  
University of Mount Union, USA

REFERENCES

