E-Learning and Education for Sustainability
Editorial

This book aims to contribute to the global debate on the implementation of education for sustainability, by discussing the use of e-learning in contributing towards sustainable development as a whole, and education for sustainable development in particular. Also it aims at reiterating the role that e-learning can play in this process, linking pedagogical concepts with curricular issues, at the same time that it illustrates the wide range of technological possibilities available, which may help to achieve the intended the sustainability-oriented learning outcomes.

Almost three decades after the concept of sustainable development was formally put in the international agenda by the Brundtland Commission, the year 2014 is a year where historical goals should have been reached, since it is the last year of the United Nations Decade on Education for Sustainable Development (UNDESD). Within this decade, research, projects and educational initiatives were undertaken and various deliverables were produced. E-learning is one of the areas where some developments have been seen, since it has become more widely accepted in formal and non-formal education settings, with a proven potential to be an effective tool towards promoting education for sustainable development.

The use of Information and Communication Technologies (ICT) as a whole, and of e-learning in particular, presents many advantages. Finally, these technologies cater for much content and for various means of delivery. Secondly, the delivery of content is flexible and can be adapted to various circumstances and settings. Furthermore, the use of the internet and social networks have helped to make e-learning on education for sustainable development more popular, and also more present in learning and education processes. Finally, the time and space flexibility associated with e-learning contributes even more for its growing use.

Bearing in mind the broad field of e-learning and sustainability, this book is divided in four main parts: The first part is more related with principles, concepts and competences. The second part focuses on ICT tools, materials and teachers’ skills. The third part presents examples of good practices in emerging countries in Africa and Asia, whereas the final concentrates on formal and non-formal teaching and learning experiences.

A total of 18 double-blind peer-reviewed papers from Europe (11), Australia (2), Asia (1), North-America (2) and Africa (2), cover the different subjects related to the above themes of this book.

In the first part of the book related with principles, concepts and competences readers can found four chapters:

A first chapter from Anne Sibbel entitled “An experience in developing and implementing blended learning for sustainability”. This chapter is about implementing education for sustainability, and it is suggested that higher education curricula can be adapted to respond to the challenge of sustainability through a collaborative and reflective approach to teaching and learning.

Joop de Kraker, Ron Cörvers and Angelique Lansu in he chapter “E-learning for sustainable development: linking virtual mobility and transboundary competence development” review how competences for sustainable development have been defined for higher educa-
tion, and argue that a key competence to be developed is ‘transboundary competence’ (that
authors define it as the ability for productive interaction across the boundaries between dif-
ferent perspectives). The authors apply the principles of competence-based learning, to derive
the design principles for effective learning environments to foster transboundary competence.

In a globalisation context, environmental professionals have to develop social, ethical,
creative, personal and interpersonal skills in addition to technical competences to be of value in
attaining sustainability. These skills are also necessary for university environmental graduates
to enter the labour market, and improve their employability. In the chapter “Training and
employability, competences from an e-learning undergraduate programme in environmental
sciences”, Ana Paula Martinho, Sandra Caeiro, Fernando Caetano, Ulisses Miranda Azeiteiro
and Paula Bacelar-Nicolau assess the development and acquisition of key skills and competen-
ties in the 1st cycle degree programme of Environmental Sciences at the Universidade
Aberta, the Portuguese Distance Learning University, and their contribution to the employ-
ability of its graduates discussing the results within the European framework for higher edu-
cation programmes.

Within sustainability issues, climate change is recognised as one of the most challenging and
defining themes for our future. In the fourth chapter, titled “Transforming academic knowledge
and the concept of lived experience: intervention competence in an international e-learning
programme” Francisca Pérez Salgado, Gordon Wilson and Marcel van der Klink, consider
the concept of the Lived Experience to be important and perhaps even crucial for the domain
of sustainability, where it can be used to expand knowledge and linking academia with pro-
fessionals and citizens. For the authors the concept of the Lived Experience explains the
existence of several perspectives at the same time, connects abstract and distant scientific
knowledge with personal, local and cultural diversity and it considers epistemological diver-
sity as a resource for social learning and holistic knowledge.

The second part of the book about ICT tools, materials and teachers skills is divided in
seven more chapters (chapter 5 to 11):

Daniel Otto in “Let’s Play! Using simulation games as a sustainable way to enhance stu-
dents’ motivation and collaboration in Open and Distance Learning” introduces simulation
games within an Open and Distance Learning (ODL) context. Recent developments in tech-
nology have bridged the gap of adequate tools which have long been identified as the central
hurdle in utilizing simulation games for ODL. Based on its characteristic features, simulation
games seem particularly suitable for learning about environmental topics.

In the chapter “Developing e-Learning materials for teaching industrial ecology and envi-
ronmental sustainability”, Anthony Halog and Gary Dishman state that the urgent call for
climate change mitigation and the need in the pursuit of the vision of sustainable, circular
economy, an increasing number of universities have been developing courses to prepare
students to meet the growing demand for green and sustainability related jobs, which require
systems perspective training in Industrial Ecology (IE) and Life Cycle Assessment (LCA).
This chapter contributes to develop an online-based information system, which provides an
interdisciplinary approach to teach IE and LCA for sustainable industrial development.

Sally Caird, Andy Lane and Ed Swithenby in the chapter “Greening Higher Education
qualification programmes with online learning” introducesthe SusTEACH Modelling Tool,
developed following a research on the impact of computing technologies or Information and
Communication Technologies (ICTs) on HE teaching models, together with a carbon-based
environmental assessment of 30 courses, offered by 15 UK-based HE institutions. Their
discussion includes the role of online learning designs and pedagogical use of computer tech-
nologies for achieving carbon reduction in HE.
Joop de Kraker and Ron Cörvers in their chapter entitled “European Virtual Seminar on Sustainable Development: international, multi-disciplinary learning in an online social network” introduce readers to the European Virtual Seminar on Sustainable Development (EVS), which is a web-based course that aims to foster competences for sustainable development through collaborative learning in virtual, international, multi-disciplinary student teams. The chapter focuses on the recent adoption of a social networking platform to enhance the sociability of the EVS virtual learning environment. The new learning environment is evaluated in terms of student experiences and perceptions, actual tool use, and team performance.

In the chapter “Electronic logistics for a sustainable distance education: the new UNED on-site virtualization of evaluation procedure documents” by Mari Carmen Ortega-Navas, Rocío Muñoz-Mansilla, Fernando Latorre and Rosa María Martín-Aranda, the authors illustrate how the Spanish National Distance Education University (UNED) has implemented a new protocol for evaluation procedures, that optimizes paper use and transportation through on-site digitalization of exams, bringing a new logistics paradigm. UNED evaluation system simultaneously summons students at many locations in Spain and at selected venues across the world. Technology is the main contribution in the so-called “valija virtual” (virtual attaché case) system, which has been developed at UNED.

Leanna Archambault and Annie Warren in the chapter “Leveraging E-learning to prepare future educators to teach sustainability topics” describe Sustainability Science for Teachers, a hybrid course in development at Arizona State University that integrates the use of technology and digital storytelling to teach sustainability topics in a meaningful way. This course is required as part of a programmatic education reform aimed at improving science content knowledge among pre-service teachers. The goal of the course is for future educators to gain necessary knowledge and skills about sustainability, allowing them to become more informed citizens and helping them learn how to address sustainability concepts within their future classrooms.

In this second part, the last chapter “The use of information and communication technologies by the secondary school teachers for developing a more sustainable pedagogy in Latvia” from Dzintra Ilisko and Svetlana Ignatjeva presents the analysis of the use of information and communication technologies in the secondary school setting, as well as the sustainability of the purpose of the use of the ICT. The authors discuss the pedagogy that is equitable with the use of the ICT technologies. A special emphasis is given to the problems and barriers which prevent secondary school teachers to integrate ICT in their teaching, as well as the main purpose why teachers are willing to integrate technologies in their teaching. Finally, the authors outline suggestions for teacher trainers on how to integrate ICT in developing more sustainable teaching and on how teachers can improve their ICT literacy to improve their teaching skills. The article poses questions on whether the current pedagogical models are compatible with ICT, and if the integration of ICT can improve learning. Teachers who are trying to improve their teaching are facing new challenges of how to adopt new approaches and how to integrate new technologies in their teaching.

In the third part of this book, readers can find three examples of good practices from emerging and developing nations (chapters 12 to 14).

In the chapter “A critical narrative of e-learning spaces for sustainable development in the Global South” Rudi W. Pretorius says that the implementation of e-learning poses several challenges for teaching staff, students and administrators in contexts such as the Global South – a collective name for emerging and developing nations. Although these challenges vary from country to country, limitations in terms of access to the Internet – even among university students – remains a barrier for the effective roll-out of education to exactly those seg-
ments of the community needing it the most. Since Education for Sustainability per definition cannot exclude certain community segments, implementation of e-learning in contexts as the Global South should proceed with due consideration of matters such as the latter.

In “Cotonou 2012 and Beyond – An assessment of e-learning for sustainability in sub-Saharan Africa” J. Manyitabot Takang and Christine N. Bukania assess e-learning for sustainability in sub-Saharan Africa, by drawing on some case studies such as the African Virtual University. The assessment investigates to what extent the e-learning initiatives are homegrown, i.e. specifically designed to solve local problems, how e-learning is bridging the lack of human capacity, and access to information on sustainability. Moreover, this chapter addresses the question of how inclusive e-learning for sustainability could be in Africa, especially in view of infrastructural limitations and the costs of participating in e-learning courses. The authors conclude with some recommendations for future developments in e-learning for sustainability in Africa.

Prakash Rao, Yogesh Pati, Manisha Ketkar, Viraja Bhat and Shilpa Kulkarni in the chapter “Sustainability in an educational institution: analysing the transition to paperless e-processes, an Indian case” focus on a new approach towards a sustainability based academic process, through the development of an online system using Information Technology tools at an Indian Business school. This includes tools like Faculty Information Systems, online testing, online student performance appraisal and feedback systems, among others, which have been designed to create improved academic efficiency, higher stakeholder satisfaction levels along with potential environmental co benefits like reduced paper usage. The need for incorporating sustainability as a core element of higher education has been growing over the years in Indian universities, and the study is a step towards providing solutions by using IT systems. Key lessons learnt from the study revealed that replicability of this approach in other institutions is dependent on several factors like stakeholder satisfaction, infrastructure, skilled workforce, top management support and process standardisation.

The fourth and last part of this book is about formal and non-formal successful experiences.

Deep learning is seen as a way to maximize the benefits from sustainability education for both students and society, and Amelia Clarke in the chapter “Building an online Master’s Program for Deep Learning in Sustainability” describes the University of Waterloo’s Master of Environment and Business (MEB) programme in relation to seven characteristics of deep learning. The MEB program is an executive education programme that is mostly delivered online. Student survey responses show a high satisfaction with the programme, and highlight areas where deep learning is occurring. This chapter emphasizes that it possible to ensure deep learning in an online program and in a program’s design (not just at the teaching activity/assignment level). The chapter ends by offering lessons learned for other online courses and programmes.

In the chapter “First online course on desalination by renewable energies, lessons learnt”, Juan A. de la Fuente, Vicente J. Subiela and Baltasar Peñate describe a training initiative that was developed by the ITC under the framework of the PRODES project which was co-financed by the European Commission within the “Intelligent Energy for Europe Programme”. The e-learning course called “Introduction to desalination by renewable energies” is addressed to those people who could be interested in this field of knowledge, as professionals related with water or energy sectors, or technology students. The e-learning course on desalination by renewable energies sets the fundamentals on using renewable energy for desalination, as a contribution to address the world’s water situation by increasing the knowledge on these technologies. After several editions made the international impact is very relevant. After this experience, the ITC is committed to improve the course in each edition; an
extended and upgraded version of the course has already concluded with the collaboration of the European Desalination Society (EDS).

Luísa Aires, Paulo Dias, José Azevedo, M. Ángeles Rebollo and Rafael García-Pérez in the chapter “Education, Digital Inclusion and Sustainable Online Communities” propose a theoretical framework to analyze the relations between online communities, participation and digital inclusion. Sustainability education is interpreted as a shared and interactive process and is associated to community development across collaborative practices. In this framework, sustainable online communities embody the change of educational cultures. The authors state that over the last decade, significant contributions have been made to a better understanding of sustainability and education. However, very little has been researched on sustainability education in the digital society. In new digital environments, collaborative practices, hybrid contexts, distributed knowledge or shared responsibility give rise to new approaches to the relationship between education, participation and digital inclusion – central constructs of sustainable education. The authors conclude that connecting digital inclusion and empowering practices is a way to develop sustainable online education.

A final contribution is provided by Walter Leal Filho, who briefly outlines some of action needed in order to foster the use of e-learning on education for sustainable development.

Given the variety of research, this book offers a diverse thematic and geographic overview of some current of the key issues and good practices in E-Learning and education for sustainability. In addition, the chapters address some important challenges and future developments, also giving insights into how education for sustainability through e-learning may be pursued, despite different subjects and educational contexts.

We would like to take this opportunity to thank all authors who submitted their manuscripts for consideration of inclusion in this book. And since the peer review was a double-blind process, we also thank the reviewers who have taken time to provide timely feedback to the authors, thereby helping the authors to improve their manuscripts, and ultimately the quality of this book.

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