

# What Kinds of ESD and GE Competencies Will Our Graduates Need?

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*“Those who contribute to exploiting poor communities and the earth’s ecosystems are those who have BAs, MBAs, MSCs and PhDs and not the ‘ignorant’ poor from the South?”*

(Orr, 1991).

## Abstract

The concept of education for sustainable development (ESD) competencies is seen as an essential landmark for orienting teaching and learning for SD (sustainable development). ESD competence encompasses key competencies that are expected to enable active, reflective and co-operative learning toward SD. In the text, it is also described why the concept of ESD competencies is an innovation in the field of higher education (HE). A competence-based didactical approach can be a valid alternative to the notion of a curriculum as a plan of studies, providing an innovative way of conceiving and organizing the curricular structure and objectives or discipline contents to prepare students to be competent, autonomous, critical and assertive citizenships. Competence-oriented teaching and learning approach is focusing on students gaining the “concepts and abilities for social action”. Our set of 12 ESD competencies embodies the concepts that will enable students to understand and resolve complex sustainability problems by equipping them with the ability to become change agents. The educational approach reinforces the competencies emphasizes pedagogy in terms of the teaching and learning methodologies and strategies that support the attainment of ESD competencies.

**Keywords** – sustainable development (SD), education for sustainable development (ESD), ESD competencies, higher education (HE), pedagogical approaches.

## 1. Introduction

Current students absorb many implicit attitudes from their higher education institutions (HEIs), which may include their approach to the world. These views are learnt by example – what is done as much as what is said. No doubt, universities like to conceive themselves as the leaders of society and social change. This reinforces comment (Orr, 2002) about the shadow curricula of institutions, in which sometimes HEIs have been viewed more as perpetrators of destruction than as proper educators. Universities are in a good position to link the regions, transcend disciplinary boundaries as well as local and

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global dimensions of development. Orienting HEIs toward the global and sustainable future is a huge challenge for the entire academic community. ESD is flourishing at universities where it is embedded in the curriculum as a part of the university culture, where ESD is seen in relation to other agendas such as employability, internationalisation and enterprise and linking sustainable and global initiatives with the wider community. Sustainability and ESD are still emerging and are sometimes contentious (Rowe, 2002) fields of inquiry so the concepts, ideas, models and discussion questions presented in this article are indicative, and not in any way intended to be prescriptive or comprehensive.

## 2. The concept of ESD competencies

Competencies are socio-historical constructions mainly developed through learning situations. In the context of HE, we can define ESD competencies as combinations of knowledge, skills and values that enable graduates to effectively contribute in transition processes towards a sustainable society, on the basis of their domain-specific expertise (Scott, 2002). ESD competencies thus comprise the abilities to take a whole systems-oriented, interdisciplinary, participatory or transdisciplinary, international, cross-cultural, cross-scale, future-oriented and creative approach to SD issues.

In the context of ESD, there is extensive literature on what should be taught and learned in terms of knowledge, skills and values. What stands out in most of this literature is a prominent attention to *values*. The underlying idea is that value education is needed to prepare students for a role as “agents of change”, able and willing to transform our current society into a more sustainable one. Therefore, we argue that the ESD competencies for academic professionals to successfully contribute to sustainable development will be their ability to think, communicate, learn and collaborate across the boundaries that divide future perspectives (Adomßent and Hoffmann, 2013).

The concept of ESD competencies is seen as an essential landmark for orienting teaching and learning for SD. Very important contributions to the discussion on competencies and learning were made by Jürgen Rost, a German psychologist and, from the very beginning, a leading actor in the debate on competencies. In 2010 he pointed out that “you can’t communicate competencies. They have to be developed”. This utterance, combined with the finding that competencies-oriented lessons stand for the individualisation of lessons, has an immense bearing on education in general not only for ESD and on the culture of assignment in particular. It will fundamentally change traditional structures in many education systems.

To be able to participate in today’s knowledge society and contribute to SD successfully, students need to develop values, knowledge and skills that traditional system of HE often does not provide. The following educational goals are identified as significant for teaching and learning of ESD (Jucker, 2002):

- To develop in students an appreciation of the importance of environmental, social, political and economic contexts to their disciplines.
- To provide students with a broad and balanced foundation of Sustainable Development, its key fields and the main debates within them, including the contested and expanding boundaries of the subject.

- To create a stimulating and supportive environment for interdisciplinary and transdisciplinary learning and research.
- To enable high quality transformative learning in a creative, reflexive and participative process which is receptive to students' needs and views and engages the whole person.
- To enable students to understand the different methodologies of the humanities, the natural and social sciences and their relative merits to approach specific questions.
- To enable students to seek solutions in an adequate and non-reductionist manner for highly complex real life problems (including the environmental, economic, social, cultural, technological, moral and political dimensions of Sustainability).
- To enable students to make critical judgements and think creatively and holistically.
- To enable students to develop a high level of self-reflection (both personal and professional).
- To enable students to think critically about the nature of knowledge and about the ways in which knowledge is produced and validated.
- To enable students to identify, understand, evaluate and adopt values conducive to sustainability.
- To enable students to develop social and environmental responsibility.
- To enable students to bridge the gap between theory and practice – in SD only transformative action counts.
- To enable students to participate creatively in interdisciplinary teams and contribute co-operatively to meaningful outcomes.
- To enable students to manage change (including identifying and investigating issues, seeking, implementing and evaluating solutions).

What are the ESD competencies or learning outcomes we intend to develop? Do we teach ESD competencies and what curricula, learning activities, and evaluation methods do we use? ESD competencies to work with those issues are the following (Benedict, 2012):

- Think holistically – causal factors, interconnections, social dimension;
- Develop innovative and flexible approaches;
- Work across agency boundaries;
- Be accountable in a way that does not constrain innovation;
- Engage stakeholders and citizens in the issue and in identifying solutions;
- Understands behaviour change and policy instruments for behaviour change;
- Understands the need for a strategic, comprehensive, coordinated approach rather than piecemeal (Dawe et al., 2005);
- Tolerates uncertainty/failure, and a long term perspective.

The following processes are crucial for pedagogical (Jucker, 2002) and didactical approaches in ESD:

- **Educators as role models and learners:** If HE educators want to make progress in turning societies into something more just and sustainable, no amount of preaching to students, no amount of writing and arguing will do. If the tutors do not change themselves and their lifestyle to be role models for the students and their

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communities alike, there will be no transformation. Gandhi's dictum (1999) is here as relevant as ever: "if we desire [that] change, we must first change ourselves". But here we must be clear: HE educators first have to educate themselves with regard to sustainability before they can think of empowering their students.

- **ESD needs to enact change here and now:** The above also means that we need to live and be that change here and now in our setting. This is a local issue, which should not be delegated or deemed unimportant in the face of global challenges. Change will never come about if we continue to dream and fret about global changes, world summits and international agreements: change happens by "becoming fully present to that close enough to touch" (Rahnema, 1998). In other words, the close involvement of any educational practice into the local community is essential.
- **Critical thinking: This is an important ESD competency:** "students need to be able to think critically about the nature of knowledge and about the ways in which knowledge is produced and validated" (Jones et al., 1999). This ability is crucial because in ESD students will not be able to retreat, as it were, onto the familiar and safe territory of any discipline they might study. They will have to become confident interdisciplinarity and transdisciplinarily, in assessing processes and solutions which take their elements from many different disciplines, for example, when they learn to clarify "the nature of the ideological and economic forces that are perpetuating the domination of the South by the North" or to revitalize "non-commodified forms of knowledge, skills, and activities" in order to enable "them to participate in mentoring relationships that will develop their talents and interests, and to experience other community-centred non-monetized relationships and activities that will develop a sense of responsibility for the well-being of the community" (Bowers, 2003).
- **Experiential Learning:** Reconnecting to reality: education has become ever more specialised and theoretical, far removed from the messiness of real life. ESD will therefore have to try to find real life problems and actual experiences as learning situations to avoid the kind of reductionist "solutions" which we have witnessed since the Industrial Revolution. "Experiential learning is based in messy reality, with all its paradox and untidiness, its ever-changing pattern, its refusal to conform to our expectations. As such, it inevitably leads to humility" (Norberg-Hodge, 2000).
- **Reconnecting to a sense of place:** On the one hand, the last thirty years of environmental education have shown that lecturing students does indeed increase sustainability awareness, but unfortunately this awareness does not automatically translate into sustainable action. On the other hand, it has equally been shown that change does take place if the fundamental values held by people are in tune with justice and sustainability. Only if you know something, love it, have an interest in it and develop responsibility towards it, will you care for it (for example the devastation of local forests). Therefore, if we want students to act sustainably rather than turn into well-informed cynics, "we need to confront the fact that young people and adults are increasingly being isolated from direct contact with nature" (Plant, 1998). ESD will need to reconnect them with nature in local world and develop their sense of belonging to a place and community.
- **Empowerment of the learner:** If we are serious about the empowerment aspect of sustainability (i.e. that people everywhere should be enabled to take control over all

aspects of their lives) that surely needs to be reflected in the pedagogical approaches and apply to students as well. The teacher's role should be to act as "a catalyst for the discussion and re-evaluation of human values and practices, not simply to pass on extant 'naturalised' knowledge" (Plant, 1998). This means that the "ownership of the knowledge" should not be exclusively with the teacher. Indeed, students should be given the "opportunity to participate in the construction and transformation of the study materials in ways that are meaningful in the particular socio-political contexts in which they live and work" (Plant, 1998).

- **Learning for action:** If the above analysis is correct in that we need to move towards sustainability and our current situation is unsustainable, any learning that does not lead to individual behavioural and social change is not successful. Yet this social change cannot be prescribed: ESD should develop the capacity for change, rather than imposing a particular type of change on pupils or students.
- **Systemic learning:** To approach ESD, Sterling has shown that we need "a higher learning level", namely "transformative learning or epistemic learning" (2004). This refers both to the fact that we need to learn to see things differently, i.e. as whole systems, rather than in a reductionist way, and to the necessity to develop enough reflective distance to understand how the whole system works.
- **Change shadow curricula of society:** In view of the overwhelming dominance which the unsustainable paradigms of society have over much of the globe, educators and students will have to work not just on isolated change within individual academic courses, but in the wider context of their lives. The shadow curricula of the media, the economic imperative, the political structure and many of the national and international institutions are preaching everyday unsustainable messages of "growth", "liberal democracy", "scientific progress", "development" and the like. These curricula have to be fought and counteracted through active sustainable citizenship by both educators and students.
- **Institutional greening:** One of the key requirements for ESD is to "promote a whole institution approach to environmental practice" (Howard et al., 2000). Anthony Cortese from Second Nature emphasised that "higher education must 'practice what it preaches' and make sustainability an integral part of operations, purchasing and investments, and tie these efforts to the formal curriculum. The university is a microcosm of the larger community. Therefore, the manner in which it carries out its daily activities is an important demonstration of ways to achieve sustainability responsible living and to reinforce desired values and behaviours in the whole community".
- **Appropriate architecture, learning atmosphere and culture:** However, it is not enough to introduce an energy-saving regime and recycle wastepaper, however important that may be. We have to consider the entire environment within which learning takes place, in other words, we have to check our lecture halls, seminar rooms, libraries, malls, etc.

Learning environments in HE institutions are, thus, increasingly geared towards competencies development, with a problem-oriented approach, an authentic context and active, often collaborative knowledge construction as major ingredients (Frisk and Larson, 2011). Common elements in definitions of ESD competencies are "an

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integrative whole of knowledge, skills and attitudes”, applied to “perform complex tasks in authentic work environments”, thereby meeting “the standards or success criteria required by these environments” (ibid.).

ISBSS have developed a set of 12 ESD competencies, based on an analysis of the concept of ESD teaching and learning. Then, the principles of competence-based learning are applied to identify the characteristics of learning environments in which ESD competencies can be developed.

Competencies		What students gain
1	High level of knowledge	Disciplinary and interdisciplinary
2	Ability to think holistically	Understand context, causes and consequences
3	Ability to think critically	Question dogma or established truths, evaluate priorities and alternatives
4	Ability to solve problems	Evaluate problems from multiple perspectives and formulate alternative solutions
5	Ability to think innovatively	Imagine and explore possibilities and implement new initiatives
6	Ability to clarify own values	Include social, economic and ecological values
7	Ability to promote creativity and change	Effective oral and written communication, cooperation and management/organisation
8	Ability to access information from different sources	ICT, books, newspaper . . .
9	Ability to develop social and inquiry-based learning	Generate new knowledge, evaluate development and the impact of actions
10	Ability to develop initiatives and entrepreneurial spirit	Innovation and taking risks, self-employment
11	Ability to work flexibly and adapt	Various kinds of work environments, organisational forms and cooperative relationships
12	Motivation for	Control own learning in a lifelong perspective lifelong learning

**Table 1.**

Synthesis list of ESD competencies – adapted from Benedict (2010), Naji and Smith (2014)

## 2.1. ESD competence-based learning

Competence-based approaches constitute a key principle of curriculum organization encompassing foundations, objectives, structure, syllabi and the pedagogical practices. The result is that learners build their own knowledge, skills and values through their own activities and experiences in context of ESD. Basic features of competence-based approaches can be the following (UNESCO, 2005):

- Teaching contents are more than knowing and knowing-how
- The student is the main actor of the learning process
- The ability to use knowledge in context is valued

This approach relies on teachers as key mediators and regulators between all three characteristics of a competence-based approach. Consequently, it is important to look at competence-based learning situations as a way to incorporate a cross-cutting ESD



perspective in HE. The idea is that learning should focus on ESD competencies required in professional life, and not on the acquisition of isolated skills and pieces of knowledge (Adomßent and Hoffmann, 2013). The concept of competence-based learning offers an excellent didactic framework for learning of ESD, in which the acquisition of ESD competencies is seen as central. The essential features of ESD competence-based learning environment are given in Table 2.

General features	Application to ESD
Realistic SD issues or cases	<ul style="list-style-type: none"> <li>Structured problem description</li> <li>Multiple scale, multiple domain issues</li> </ul>
Realistic tasks or roles in SD	<ul style="list-style-type: none"> <li>Open-ended</li> <li>Active integration of different aspects of SD problem and knowledge from different domains</li> <li>Thinking and reasoning across diverging scales of time and/or space</li> <li>Stimulating creative solutions</li> <li>Dealing with multiple perspectives on the SD problems</li> </ul>
Realistic SD environment	<ul style="list-style-type: none"> <li>Heterogeneous student groups (multidisciplinary, multi-cultural, international)</li> <li>Open learning environment, interaction with experts, clients or stakeholders from outside university</li> </ul>
Reflection on task performance and learning	<ul style="list-style-type: none"> <li>Group reflection on processes (negotiation, social learning)</li> <li>Individual reflection complemented by group discussions</li> </ul>

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**Table 2.**  
Characteristics of ESD competence-based learning – adapted from de Kraker et al. (2011)

## 2.2. Pedagogical approaches in ESD

Sustainability does not refer to some static paradise, but rather, implies a capacity for human beings to continuously adapt to environmental and societal conditions (Scott, 2002). In other words, successful SD strategies are flexible, resilient, and responsive. Similarly, the principles and pedagogical practices developed for ESD should have a flexible, adaptable character to ensure their relevance in a variety of different settings. Building healthy, responsive educational environment requires that HE continuously evolve and adapt rather than put pressure on students with the out-dated education practices. Rather than simply meeting set standards and “checking off” that sustainability has been taught, the challenge lies in developing methods and actions through which students are effectively acquiring ESD competencies in support of SD actions (Sterling, 2004).

From	To
Transmission of knowledge	Understanding of issues
Learning attitudes and values	Encouraging attitudes clarification
Seeing people as the problem	Seeing people as initiators of solution
Sending messages	Dialogue, negotiation and action
Acting as expert - formal & authoritarian supportive	Behaving as a partner - informal &
Changing behaviour institutional change	More emphasis on structural and

**Table 3.**  
Pedagogical approaches in ESD – adapted from Tilbury (2010)

Current learning processes and practices in HE are generally not aligned with this transformative view of education (Fien, 2001). Thus ESD supports processes which stimulate innovation within curricula as well as through teaching and learning experiences. Sterling (2004) argues that SD provides “a gateway to a different view of pedagogy” and this idea is supported by numerous ESD writings from across the globe.

ESD competencies	Pedagogical approaches
Systems thinking and an understanding of interconnectedness	<ul style="list-style-type: none"><li>• Concepts: Interconnections among the environment, economy, and society, including impacts, trade-offs, feedbacks, and unintended consequences of individual and collective actions</li><li>• Methods: Real-world case studies with place-based lessons and activities Interdisciplinary approaches to problem-based learning</li></ul>
Long-term, foresighted thinking	<ul style="list-style-type: none"><li>• Concepts: Future orientation in terms of achieving inter-generational equity, in minimizing the long-term impacts of human actions, realizing societal visions of the future and developing transition strategies and evaluative techniques</li><li>• Methods: Visioning exercises Forecasting &amp; back casting activities</li></ul>
Stakeholder engagement and group collaboration	<ul style="list-style-type: none"><li>• Concepts: Democratic decision making, including intra-generational equity in participation and consideration of plural perspectives and transdisciplinary collaborations</li><li>• Methods: Community-based service learning Role-playing activities Group projects and collaborative activities</li></ul>
Action-orientation and change-agent skills	<ul style="list-style-type: none"><li>• Concepts: Transformational consumer actions, along with civic and community engagement</li><li>• Methods: Experiential lessons including project-based learning, Community service-learning, and place-based activities</li></ul>

**Table 4.**  
Pedagogical approaches to support ESD competencies – adapted from Frisk and Larson (2011)

3. Conclusions

Changing individual behaviours and motivating collective action is essential to achieving a sustainable future and is therefore a central motivation of ESD. Professor William Scott (2002) argues that in this way sustainability and education “are necessary bedfellows”. The research found that most of the subject disciplines represented by the HE institutions are making a contribution to the sustainability literacy of their students. ESD are not easy to teach in a traditional sense, but there is a growing number of examples of new teaching orientations or approaches which support the development of ESD competencies. The answers about developing ESD and ESD competencies are apt



to be complex and multi-level, situated in organisations and evolving over time. Despite the UN Decade of ESD (2004–2014) there is little targeted educational research on “what works in ESD” – especially in HE – but the field is growing (Benedict, 2012). Higher education institutions (HEIs) should conduct further research on: the importance of ESD competencies for graduate employers; community, student and academic partnerships for ESD; the different definitions and applications of ESD used by students, academics and policy makers. The academic staff should continue to include interdisciplinary teaching and research across their institutions and the HE sector that demonstrates the relevance of ESD to students’ academic studies. And most importantly, students should encourage their institutions to take a holistic approach to ESD, ultimately embedding it into their core purpose through their teaching and learning, ensuring it becomes a graduate attribute.

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## References

- Adomßent, M., Hoffmann, T. (2013). *The concept of competencies in the context of education for sustainable development (ESD)*, concept paper. Retrieved March 10, 2015 from [www.expert-ESD.net](http://www.expert-ESD.net)
- Barth, M., and Busch, A. (2006). *Competencies & Higher Education for Sustainable Development*, working paper, Institute for Environmental and Sustainability Communication, University of Lüneburg, Lüneburg.
- Benedict, F. (2010). *Transforming higher education to give competencies for sustainable development*, public presentation, Norwegian University of Life Sciences.
- Booth, A. (2010). *What do we want our students to be?* Higher Education Lecture Series.
- Bowers, C.A. (2003). Can Critical Pedagogy be Greened?, *Educational Studies* No. 34, pp. 11–21. DOI: [http://dx.doi.org/10.1207/S15326993ES3401\\_3](http://dx.doi.org/10.1207/S15326993ES3401_3)
- Brundiers, K., and Wiek, A. (2010). Educating students in real-world sustainability research: Vision and implementation, *Innovation in Higher Education*, Vol. 36 No. 2, 107–124. DOI: <http://dx.doi.org/10.1007/s10755-010-9161-9>
- Cortese, A. D. (1999). *Education for Sustainability: The University as a Model of Sustainability*. Retrieved March 10, 2015 from <http://www.secondnature.org/pdf/snwritings/articles/univmodel.pdf>
- Cotton, D.R.E. and Winter, J. (2010). It’s not just bits of paper and light bulbs: A review of sustainability pedagogies and their potential for use in Higher Education, in: P. Jones, D. Selby and S. Sterling (Eds.) *Sustainability Education: Perspectives and Practice Across Higher Education*, London: Earthscan .
- Dawe, G., Jucker, R., Martin, S. (2005). *Sustainable Development in Higher Education: Current Practice and Future Developments*, A report for The Higher Education Academy.
- de Kraker, J., Lansu, A., van Dam-Mieras, R. (2011). *Competences and competence-based learning for sustainable development*. Retrieved March 10, 2015 from [Researchgate.net](http://Researchgate.net)
- Fien, J. (2001). Educating for a Sustainable Future, in: J. Campbell (Ed.) *Creating Our Common Future: Education for Unity in Diversity* London, UNESCO and Berghahn Books.
- Frisk, E., Larson, K. (2011). Educating for Sustainability: Competencies & Practices for Transformative Action, *Journal of Sustainability Education*, Vol. 2.
- Gandhi, M. (1999). *The Collected Works of Mahatma Gandhi*, New Delhi, Publications Division, Ministry of Information & Broadcasting, Government of India, Vol. 100 (CD-Rom).

- Howard, J., Mitchell, D., Spennemann, D., Webster-Mannison, M. (2000). Is today shaping tomorrow for tertiary education in Australia? A comparison of policy and practice, in: *International Journal of Sustainability in Higher Education*, Vol. 1 No. 1, pp. 83–96.  
DOI: <http://dx.doi.org/10.1108/1467630010307147>
- Jones, P. C., Merritt, J. Q. and Palmer, C. (1999). Critical Thinking and Interdisciplinarity in Environmental Higher Education: the Case for Epistemological and Values Awareness, *Journal of Geography in Higher Education*, Vol. 23 No. 3, pp. 349–357.  
DOI: <http://dx.doi.org/10.1080/03098269985290>
- Jucker, R. (2002). Our Common Illiteracy: Education as if the Earth and People Mattered, *Environmental Education, Communication and Sustainability*, Vol. 10 Frankfurt/M., Oxford/ New York, Lang.
- Lotz Sisitka, H. (2006). Enabling Environmental and Sustainability Education in South Africa's National Curriculum: Context, culture and learner aspirations for agency, in: C.K. Lee and M. Williams (Eds.), *Environmental Education and geographical Education for Sustainability: Cultural contexts*, Nova Science Publishers.
- Naji, M. (2010). Slovenian GE School Model, *Proceedings of the International Symposium on Competencies of Global Citizens*, in: L. Jääskeläinen (Ed.) Helsinki, Finland: FNBE pp. 81–88.
- Naji, M., Smith, P. (2014). *Schooling for the Future*. Public presentation at the Best Practice Competition, Abu Dhabi Chamber, UAE.
- Norberg-Hodge, H. (2000). *Ancient Futures: Learning from Ladakh*, London, Rider.
- Orr, D. (1991). What is Education for? *The Learning Revolution*, In Context No. 27
- Orr, D. (2002). Foreword, in: S. Sterling (Ed.), *Sustainable education: Revisioning learning and change*, Schumacher Briefings No. 6, Green Books.
- Plant, M. (1998). *Education for the Environment. Stimulating Practice*, Dereham, Peter Francis Publishers.
- Rahnema, M. (1998). Development and the People's Immune System: the Story of Another Variety of Aids, in M. Rahnema and V. Bawtree, *The Post-Development Reader*, London/ New Jersey, Zed Books. pp. 111–129.
- Rowe, D. (2002). Environmental literacy and sustainability as core requirements: success stories and models, in: W.L. Filho (Ed.). *Teaching sustainability at universities*, Peter Lang, New York.
- Scott, W. (2002). *Sustainability and learning: what role for the curriculum?* Inaugural lecture, 25 April 2002, University of Bath.
- Sterling, S. (2004). Higher Education, Sustainability and the Role of Systemic Learning. *Higher Education and the Challenge of Sustainability*, pp. 49–70.  
DOI: [http://dx.doi.org/10.1007/0-306-48515-X\\_5](http://dx.doi.org/10.1007/0-306-48515-X_5)
- Tilbury, D. (2010). *A Global Monitoring and Evaluation Framework: Phase II – Processes and Learning*, Paris, UNESCO.
- UNESCO. (2005). Guidelines and Recommendations for Reorienting Teacher Education to Address Sustainability, *Education for Sustainable Development in Action*, Technical Paper No. 2.
- Wals, A., Jickling, B. (2002). Sustainability in Higher Education, *International Journal of Sustainability in Higher Education*, Vol. 3 No. 3, pp. 221–232.  
DOI: <http://dx.doi.org/10.1108/14676370210434688>