Towards Framework for Higher Environmental Education

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Sustainable development concepts at the higher education level require that undergraduates from higher learning institutions receive adequate sustainable and environmental education. The environmental education fosters skills and habits that students can use throughout their lives to understand and act on sustainability topics. In the recent past, most of education institutions around the world have incorporated environmental issues in their curricula. In order to satisfy the specific needs of sustainable development implementations, higher learning institutions need to use new technologies to facilitate environmental education. The flexible learning approach used at Faculty of Organizational Sciences, University of Belgrade is one of these valuable tools. This paper introduces some of the key concepts of learning and investigates how students can be effectively used in higher environmental education for sustainable development.

1. Introduction

Environment can be defined as a group of all the factors that affect the physical, biological, socio-psychological, socioeconomic and cultural life of an individual or society, and all living beings on the Earth live in interaction in a certain environment. On the other hand, human economy depends on the Planet's natural capital that provides all ecological services and natural resources. As a result of population growth and economic development, humans have exerted a considerable impact on the Earth and have become seriously incompatible with natural resources, environment and economy. At the same time, as outcomes, environmental problems appear as one of the greatest problems of the 21st century. The rapid technological advancements and industrialization have resulted in an increased level of negligence and insensitive behavior, leading to the destruction of environmental balance. Population growth demands a new concept of development – one that is sustainable and that takes into account the satisfaction of the needs and desires of every citizen of the Earth, of the pluralism of societies, but also the balance and harmony between humanity and the environment [2, 27, 32]. The implication of this ecological situation is obvious: to be sustainable, human beings must live within nature's carrying capacity; and they must measure where they are now and how far they can go [34].

The United Nations Decade of Education for Sustainable Development (DESD, 2005-2014), offers an opportunity to rethink the manner in which we approach global environmental and sustainable challenges [33]. Apart from the regional and national launches, progress has been achieved in both institutional and programmatic areas at international, regional and national levels. The Decade of Education for Sustainable Development comes at a time when the economic, social, environmental and cultural realms of global society are faced with daunting challenges. Obligation of higher education is work in a way of mobilizing further political support in countries where Education for Sustainable Development is not yet a priority. Today, more than ever before, the need for a holistic approach to learning and teaching becomes both vital and urgent. If its potential to contribute to the paradigm shift in thinking, learning and teaching for a sustainable world is to be realized, Education for Sustainable Development has to move to the political centre-stage. Sustainable development needs to be added to an already overcrowded curriculum of foundation subjects that must teach the basics of reading, writing and arithmetic. At the same time it can be seen as an integrative, cross-curricular theme that can bring together many of the single issues that schools are already expected to address. Education for Sustainable Development learning goals include: acting with respect for others, acting with responsibility locally and globally, critical thinking, understanding complexity, the capacity to imagine the future, understanding inter-disciplinary relations, responsible behavior and the ability to identify and clarify environmental values [33].

The nature of Education for Sustainable Development demands new perspectives on matters like curriculum, teaching and learning. Education for Sustainable Development and Education Sustainable Development tend to focus on connections, feedback loops, relationships and interaction. Yet the dominant educational structures are based on fragmentation rather than connections and synergy. Another observation is that the search for a more sustainable world requires the full and democratic involvement of all members of society which should also have implications for teaching and learning. Education for Sustainable Development calls for new

kinds of learning that are not so much of a transmissive nature (i.e. learning as reproduction) but rather of a transformative nature (i.e. learning as change) [33].

Many authors agree that good environmental education is crucial for achieving sustainable development [1, 4, 7, 13, 14, 15]. Environmental education nowadays is more and more focused in a perspective of sustainability to promote, not only the fundamental environmental knowledge, but also the behaviors, the strategies and the actions that can really reconvert our development models and our lifestyles. The goal of environmental education is to produce a population aware of the environment and concerned about problems relating to this concept. Environmental education is based on the knowledge, skills, attitudes, motivations and commitment of individuals and collectives willing to deal with the current environmental problems, finding solution to them as well as preventing the new ones. Environmental education implies a brand new style of life, new ethical and cultural values and responsible persons. At its core, environmental education strives to engage the global citizenry in new ways of thinking and acting in, with, and for the environment [7, 18, 20]. Environmental education can be defined as "learning to protect and improve environment in a systematic, planned and knowledge-based way during the whole human lifecycle in order to spread awareness about basic characteristics of environment, its structures and relationships that tends to make a human who protects and improves the environment in a way that will ensure humans' existences now as well as in the future" [28, 29, 30].

2. Methodology of higher environmental education

Higher environmental education is learner-centered, providing learners with opportunities to construct their own understandings through hands-on, minds on investigations. Learners are engaged in direct experiences and are challenged to use higher-order thinking skills [20, 21]. Higher environmental education development emphasizes skills and habits that students can use throughout their life, in order to understand and act on environmental issues. Ultimately, it is about decision-making, critical thinking and citizenship, including acting as an environmentally literate citizen that involves adopting actions that reduce environmental stresses or affecting some conservation target [17, 19]. Higher environmental education improves students' awareness and understanding of sustainable development and most importantly, way to develop and implement preventive strategies to respond to environmental problems in the context of environmental protection and sustainable development in their own communities and regions. What has to be offered in the program of good higher environmental education is interconnected with the wide range of requirements in professional life; therefore the program of higher environmental education is designed to meet these new sustainability challenges, by integrating inputs from the social and human sciences into the study of environmental planning and engineering, and by enabling students to visualize the engineers' task from environmental perspectives [17, 20, 21].

A number of courses of higher environmental education and a number of initiatives to integrate environmental issues into university curricula have been launched in the past decade worldwide. However, to satisfy the specific needs of this kind of education it is necessary to implement innovative methods of delivering such knowledge for sustainability. Higher environmental education through the flexible learning approach used at Environmental Management course at Faculty of Organizational Sciences, University of Belgrade, Serbia is one such innovative method, [8, 9, 11].

Previous studies have shown that introductory university level environmental studies classes can improve students' environmental literacy. Further on, successful learning requires a change in attitudes to education both in the teacher and in the learner [12]. Therefore, good higher environmental education:

- Is learner-centred, providing students with opportunities to construct their own understandings through hands-on, minds-on investigations;
- Involves engaging learners in direct experiences and challenges them to use higher-order thinking skills as supportive of the development of an active learning community where learners share ideas and expertise and
- Prompt continued inquiry provides real-world contexts and issues from which concepts and skills can be used [13].

The learning targets of education for sustainable development must be translated into learning targets and objectives to be pursued in educational interventions which deal with sustainability in terms of knowledge, in terms of attitudes, in terms of behavior – adopting sustainable behavior [12]. These characteristics, when applied in conjunction with the below mentioned objectives and aims for higher environmental education have allowed environmental educators to develop programs that lead to the formation of positive beliefs, attitudes and values concerning the environment as a basis for assuming a wise stewardship role towards the Earth (see Table 1).

3. Flexible approach in higher education

In recent years, open and distance learning have gone through three generations. The first generation was correspondence teaching where a single medium, such as a text, is used in conjunction with the postal service as a means of delivery. The next generation involved multimedia distance learning, where text-based material is supplemented by interaction with the instructors either in face-to-face settings or via technologies such as electronic mail. The third and most recent generation is interactive multimedia distance education, where heavy emphasis is placed on the use of information technology to facilitate the communication. The last generation is the flexible learning generation.

Flexible learning represents a concept that prioritizes learner control over the requirements of institutional practices. Flexible learning focuses on how the students will engage in learning activities in terms of the options available to them and also how such activities can be supported [3, 25]. In the traditional face-to-face learning and distance learning methods, little attention may be paid to the actual learning activities of the students [23]. Flexible learning can be regarded as an approach that builds upon the traditional face-to-face learning methods and distance education practices whilst giving high priority to learner control.

Objectives			**Aims**
Knowledge	**Skills**	**Values**	
o The resources of the Earth, particularly soil, water, minerals, etc., and their distribution and role in supporting living organisms. o The implications of the resource distribution in determining the nature of societies and the rate and character of economic development. o The role of science and technology in the development of societies and the impact of these technologies on environment. o Cooperative international and national efforts to find solutions to common global issues, and to implement strategies for a more sustainable future. o Processes of planning, policy-making and action for sustainability by governments, businesses, non-governmental organizations and the public.	o Frame of appropriate questions to guide relevant study and research. o Defining such fundamental concepts as environment, community, development and technology, and applying definitions to local, national and global experience. o Assessing the nature of different bias and evaluating different points of view. o Developing hypotheses based on balanced information, critical analysis and careful synthesis, and testing them against new information and personal experience and beliefs. o Developing cooperative strategies for appropriate action to change present relationships between environmental preservation and economic development.	o An appreciation of the dependence of human life on the resources of a finite planet. o An appreciation of the role of human ingenuity and individual creativity in ensuring survival and the search for appropriate and sustainable progress and an appreciation of the power of human beings to modify the environment. o A respect for other cultures and recognition of the interdependence of the human community, and a concern for disparities and injustices, a commitment to human rights and to the peaceful resolution of conflict. o An appreciation of the challenges faced by the human community in defining the processes needed for sustainability and in implementing the changes needed, but also a personal acceptance of a sustainable lifestyle and a commitment to participation in change. o An appreciation of the importance and worth of individual responsibility and action.	o Acquiring skills for assess and apply complex management concepts in order to solve today and tomorrow's environmental challenges. o Gaining knowledge in environmental sciences and their practical application o Combining a theoretical orientation with practical project work. o Understanding of the social and political implications of planning and management within the environmental field. o Understanding of the relationships between companies and stakeholders, the environmental challenges facing businesses operating on international markets, and an introduction to various types of environmental regulations.

Table 1. *Objectives and aims for higher environmental education* [17]

Fundamental characteristics of flexible learning must include [6, 22, 26]:

- style of learning,
- learning goals,
- content,
- forms of teaching,
- delivery methods,
- entry qualifications,
- start/finish times,
- location,
- form of assessment.

Any or all of the characteristics listed above would identify a system of flexible learning. Several teaching and learning methods have to be used in the course based on flexible learning, (Figure 1). The course relies upon directed study, reading, and activities using a print-based study guide and reader. It also includes face-to-face lectures or other on-campus sessions. Third, it incorporates Web-based activities using the Internet and on-line communication.

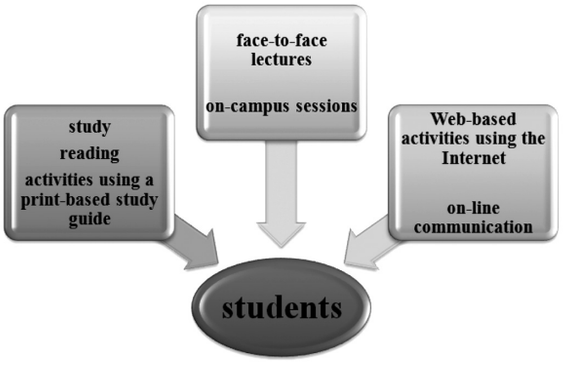

Figure 1. *Teaching and learning methods of flexible learning*

Web-based resources implemented on Moodle platform, facilitate students' choice as to how, when and where they learn, and they provide multiple access points to information as well as access to multiple sources of information. This can facilitate student choice as to the focus and sequence of their learning activities.

4. Methodological improvement of environmental management course – a flexible approach

At the Faculty of Organizational Sciences, University of Belgrade, numerous courses (such as Environmental Management, Design for Environment, Eco-Marketing, and Environmental Law etc.) are focused on environmental issues. Unlike on others, which are elective courses, in the Environmental Management course that is an obligatory course, a framework and a curriculum for good higher environmental education are developed and applied. In addition, we selected this course because it is based on a wide range of scientific and practical knowledge of environmental science and management as good benchmarks for the adequate improvement of students' environmental awareness. Hence, on this course we have applied a learner-centred and action-oriented learning about ecology, management within the environmental field and sustainable development. All of this with foundations of active learning - where educators are mentors and facilitators and students teach each other, [17, 18]. These experiences promoted higher order thinking and provided a cooperative context for learning and evaluation. Also, the purpose of this course is to orientate the student to the basic discipline of environmental management and as a result this course places an emphasis on the basic skills, tools and techniques and environmental perspectives needed to facilitate successful and meaningful environmental management and to promote the concept of sustainability. To develop the student's understanding and insight into the skilful application of a wide variety of environmental dimensions, fields and environmental skill, tools and techniques in order to facilitate informed decision making based on sound information and expert judgment spanning a wide variety of scientific disciplines were developed.

The Environmental Management course at Faculty of Organizational Sciences in the conventional mode consists of 4 lecture hours per week over a 13-week session. Therefore, students learning through the flexible model can expect to spend 2–3 hours more per week studying the materials, in addition to the time required for assignments, [5, 16, 17].

Students enrolled in flexible model of this course are required to attend certain on-campus sessions during the semester. This is a compulsory part of the course and consists of lectures, tutorials, group projects, site visits, video presentations, and consultation with academic staff. During these sessions, students receive an opportunity to listen to various government and industry experts in ecology, sustainable development, perform hands-on exercises on environmental protection, study national and international case studies, and visit industrial facilities. This approach also provides opportunities for the students, especially to form a network among themselves. Regardless of their choice, all students enrolled on the Environmental Management course are provided with a learning package at the beginning of the semester, which consists of:

- a study guide containing key concepts, activities and references to readings;

- a reader consisting of a set of readings from books and journals;
- an assessment booklet outlining the assessment requirements;
- a study skills booklet describing essential study methods.

Environmental Management course incorporates web-based resources which are best used for organization, communication to support self-directed learning, and as a means of providing multiple perspectives and alternative viewpoints. Their use facilitates students' choice as to how, when and where they learn, and they provide multiple access points to information as well as access to multiple sources of information. This can facilitate student choice as to the focus and sequence of their learning activities.

The Web site developed for Environmental Management course includes "upfront" information (course information, study chart, assessment schedule, teaching team, resource lists) and features such as a site map, noticeboard, FAQ (Frequently Asked Questions) list, forum, real-time discussion (chat), glossary, and search facility. All these tools enhance the students' learning experiences with stimulating exercises, real-world simulations, ready access to data in external Web sites, and communication with peers and mentors.

One of the characteristics of flexible learning is to allow the students to determine their own learning goals. Students are strongly encouraged to focus on an area of their choice for paper, project. During Weeks 1 to 5, there is a weekly lecture to introduce the course and to cover the whole content of the course on a broad basis. It is expected that students will develop an interest in one of the areas covered in the modules to examine in the project. The project title, which will be chosen by the student based on the course modules and with approval from the lecturer, must be finalized by the end of Week 4. During Weeks 6 to 10 of the semester, weekly lectures are replaced by weekly communication between the student and the lecturer either in person or by email. Students continue to work on the project and should submit the project proposal by the end of Week 7. Peer review of the project proposal takes place in Weeks 8 and 9. In Weeks 11 to 12, the class reconvenes for student oral presentations on the first draft of the project report. Students receive further feedback from the lecturer and from peers to rework the project into a final project report.

Assessment for the course is based on completion of three assignments:

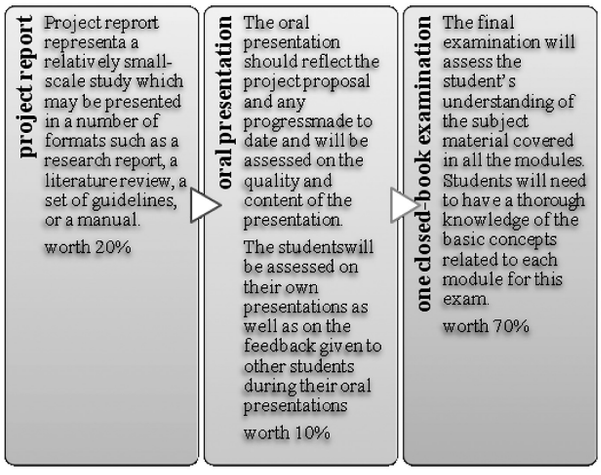

Figure 2. *Three assignments on course*

At the completion of this course, students should be able to: have knowledge and understanding of: the nature and function of ecosystems and how they are interrelated, the impact of people on environment, the role of the community, politics and market forces in environmental decision making, the principles of ecologically sustainable development, career opportunities associated with the environment; have skills for: applying technical expertise within an environmental context, identifying and assessing environmental problems, communicating about environmental problems to others, resolving environmental problems, adopting behaviors and practices that protect the environment, evaluating the success of their actions and the values of: a respect for life on Earth, an appreciation of their cultural heritage, a commitment to act for the environment by supporting long-term solutions to environmental problems.

5. Conclusions

As stated over thirty years ago, "… we are at that point in time when rhetoric and opinion must be substantiated by consolidating existing research efforts and focusing future efforts… we must now be about the business of validating the assumptions and utilizing a research base if environmental education is to continue to advance." [35]. Roth [24] expressed the need for continued development and strengthening of environmental education programs through evaluation of such programs, because the need is recognized for an increased sophistication of methods and techniques used in empirical research involving environmental education. Further on, training and education in a field of environmental education, especially environmental management, environmental protection and sustainable development have become essential for most professions.

The Environmental Management flexible-learning course has received extremely positive feedback from students. So, the flexible learning approach should be more widely explored by universities and other higher learning institutions to train students in environmental management.

In the future, we need to focus on finding the unifying dimensions in our thinking about ESD and work towards identifying ways to translate general themes into particular applications responsive to local needs. This paper has aimed to build a learning path in which environmental education and education for sustainable development contents are developed and proposed using flexible models, following teaching proposals which create a synergy between the features of the learning object and the potential of the teaching tool used, to offer learners rich, articulated and customizable educational paths.

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