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CONCEPTS AND APPROACHES FOR THE IMPLEMENTATION OF EDUCATION FOR SUSTAINABLE DEVELOPMENT IN THE CURRICULA OF UNIVERSITIES IN LATVIA

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Abstract. *This article identifies general trends in implementation of education for sustainable development into higher education in Latvia. The purpose of this study is to explore to what extent and by means of which approach the higher education institutions in Latvia have been attempting to incorporate sustainability in the curricula. The questioning on 8 higher education institutions was conducted and the current initiatives of practices were assessed. The study results show that higher education institutions are at the first stage of transforming their curricula towards education for sustainable development, and the efforts to incorporate the issues of sustainability into the curricula can rather be characterised as education about sustainable development. Major emphasis is put on the links between environmental education and education for sustainable development.*

Key words: *education for sustainable development, environmental education, university curricula.*

Introduction

Several decades have passed since “sustainable development” was defined for international purposes. During this period, many agreements have been concluded and many global meetings and discussions on sustainable development and its implementation in practice have been organised. Today sustainability has become at least a formal requirement for most of the development planning documents around the world; however, its practical implementation is a difficult and complex task, most often because of the need to acquire new knowledge and to transform attitudes and behaviour with regard to sustainability. By providing research, analysis and conceptual framework for establishing the guidelines for education, universities are seen as key stakeholders in achieving a sustainable future (Cortese, 2003). Just as other social processes, education follows the prevalent key lines and values of society – its culture, political and social attitudes and economic performance within the community. Latvia is located in the eastern part of Europe and has been an EU Member State since 2004. In the context of its development, Latvia has undergone significant changes over recent years – both the largest GDP growth in the year 2006 (12.2 %) and the largest drop in 2009 (-18.4%) (Ministry of Finance of the Republic of Latvia, 2010). Changes in social and economic sectors have provoked wide discussions about the changes required in the higher education as well. Latvia has about 2.3 million population, and there are altogether 57 higher education institutions, running more than 900 study programmes. The total number of students per 100,000 inhabitants is one of the highest in the world (Table 1) (Ministry of Education and Science of the Republic of Latvia, 2010), indicating that the sector of higher education is of particular importance in the case of Latvia. At the same time, one of the major identifiable problems in the higher education system is the

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disproportion of the offered study content with the requirements in society (Ministry of Education and Science of the Republic of Latvia, 2010).

Table 1. Main indices of higher education for the years 2008-2009 (Ministry of Education and Science of the Republic of Latvia, 2010).

Total number of students	112,555
Number of students per 10,000 inhabitants	492
Higher education institutions:	57
<i>State higher education institutions</i>	19
<i>Private higher education institutions</i>	13
<i>Colleges founded by the State</i>	17
<i>Colleges founded by private persons</i>	18

To ensure that the further development of higher education sector also proceeds in line with the principles of sustainability, additional research is needed for assessing whether and how the universities are making their curricula “greener” for the purpose of providing sustainability knowledge and skills to their students.

There are many ways in which universities can be involved in sustainable development and take the responsibility for leading society towards a sustainable future. According to Stephens *et al.* (2008), universities should model sustainable practices for society (practical approaches can vary from working with tangible environmental impacts to simple functioning in an environmentally friendly way – by “greening” the campus, improving waste management, introducing innovations for saving energy and resources, developing an environmental management system etc.). Higher education institutions can conduct real-world problem-based research and teach students the skills of integration, synthesis, and system-thinking to cope with the complex problems of sustainability. Also, universities as transdisciplinary agents promote and enhance engagement between individuals and institutions.

The Talloires Declaration defines a sustainable university as an institution:

1. engaged in education, research, policy-making and exchange of information on population and the environment as well as in development toward a sustainable future;
2. establishing programmes to produce expertise in environmental management, sustainable economic development, population and related fields in order to ensure that all university graduates are environmentally literate and responsible citizens;
3. setting an example of environmental responsibility by establishing the programmes of resource conservation, recycling and waste reduction at universities (Association of University Leaders for a Sustainable Future, 1990).

The initiatives mentioned above fall within the framework of education for sustainable development (ESD) – “a vision of education that seeks to empower people to assume responsibility for creating a sustainable future” (UNESCO, 2006). Universities can implement (Sterling, 2004; Orr, 1992; Vare and Scott, 2007) ESD at different levels, which can be figuratively depicted in the range from *light green* to *dark green*. At the first phase (also named as “*education about sustainability*”), the issues concerning sustainability are included in one or more study courses, but are not integrated in curricula; accordingly, education system largely remains unchanged. The next level represents a transitional phase – the issues of sustainability are included in curricula, but the campus management and the learning process mainly have not been based on the principles of sustainability. In the process of understanding the sustainable development, the environment and life experience serve as learning instruments; therefore, universities have to create curricula by means of which theoretical knowledge is reinforced through practice. The third level is a full transition to education based on sustainability principles. Vare and Scott (2007) call this ESD form “*learning as sustainable development*”, which means that “sustainable development doesn’t just depend on learning; it is inherently a learning process”, learning throughout our lives results in evidence that SD is happening (Scott and Gough, 2003).



Like elsewhere in the world, the ESD in Latvia is rooted in nature and environmental studies. Environmental education in the modern sense began in the 1990s, and at this early stage various environmental non-governmental organisations were among the most active players in shaping public environmental awareness. In formal education, including higher education, the issues of environmental protection and sustainability came into view somewhat later, mainly in the sector of natural sciences. In recent years, Latvia has actively participated in various international ESD activities, also in the implementation of the UN Decade for Education for Sustainable Development. The political will to implement education for sustainable development and environmental education has been clearly stated. For example, Section 42, Chapter VIII "Environmental science, environmental education and education for sustainable development" of the Environmental Protection Law of the Republic of Latvia (adopted by the Saeima on 2 November 2006) stipulates:

1. In obligatory teaching content of the discipline or study course, in accordance with specificity of the syllabus, concordance and succession on different educational levels, issues on the environment and sustainable development are included.
2. In mandatory part of all study programmes of universities and colleges, environmental protection study course is included.
3. Lectures on sustainable development are included in pedagogical study programmes in all universities and colleges.

The Ministry of Education and Science takes the institutional responsibility for the implementation of ESD and environmental education. The Ministry of Environment and the Latvian Council of Environmental Science and Education – an advisory body coordinating the efforts in research and education – also are important actors in the field. At the same time, the national education policy-making bodies have not drafted any general strategy or guidelines for the implementation and/or monitoring of sustainability in higher education. Therefore, universities have considerable autonomy in the field, while still facing the challenges of implementing sustainability-related content throughout curricula.

Studies in social sciences dominate (51% of the total number), followed by humanities and teacher training. At the same time, it is evident that environmental education and education for sustainable development do not have an adequate status in the study content in Latvia, for only 2% of the total number of students have an opportunity to attend study programmes on environmental education or sustainable development (Centre of Higher Education Quality Evaluation, 2010). This means that the majority of students can acquire the knowledge and skills pertaining to sustainability only if the university decides to offer a special sustainability study course among the regular discipline-specific study courses or to change the whole curricula and/or campus in conformity with the principles of sustainable development. The Latvian higher education institutions have not developed the practice of preparing sustainability reports; consequently, there are no data on the transition to sustainability among universities and on their main concepts of and approaches to the implementation of ESD in the curricula.

This study examines the general trends in the transformation of higher education institutions in Latvia toward sustainability and assesses the current initiatives of practices.

Methodology of Research

Study Design

The study is designed of two parts and the first part includes a questioning of higher education institutions in Latvia, to identify the place of ESD in the study curricula and inquire about the content of topics taught. The second part provides a detailed analysis (a case study) of the approach elaborated at the University of Latvia for the implementation of the ESD concept in the study programmes not only at the level of one faculty but also in the whole university.

Questioning and Data Sampling

The questioning was designed on the basis of the Sustainability Assessment Questionnaire devel-



oped by the Association of University Leaders for Sustainable Future (2001) and applied according to the purpose and design of the study (questionnaire consisted of 19 quantitative and qualitative questioning items, mostly pertaining to the curriculum). The data were gathered in November and December 2009. Eight different types of higher education institutions in respect to their form of ownership (state-owned or private) and geographic locations (national, regional) with the largest number of students in each of these categories were selected for sampling (see Table 2). Questionnaires were distributed to the faculties or departments of the sampled universities, and they were completed by the personnel responsible for the curriculum development and practical implementation.

Table 2. Information on the higher education institutions in Latvia.

Higher education institutions	University of Latvia	University of Daugavpils	Riga International School of Economics and Business Administration	School of Business Administration "Turība"	BA School of Business and Finance	Vidzeme University of Applied Sciences	Transport and Telecommunications Institute	Latvia University of Agriculture
Type of governance:								
State	x	X			x	x	x	x
Private			x	x				
University type	x	X						x
Non-university type			x	x	x	x	x	x
Education level:								
College			x	x	x		x	x
Bachelor	x	X	x	x	x	x	x	x
Master	x	X	x	x	x	x	x	x
Doctoral	x	X				x		x
Education sector: (Questionnaires per higher education institutions)								
Social sciences	2			1		2		1
Education		2						2
Engineering							1	3
Agriculture								3
Natural sciences	3							
Businesses			1		1			
Information Technology						2	1	
Humanities		1						
Arts			1					
Communication Science						1		

A total of 27 questionnaires were received, including information about various science sectors and education levels. As the aim of the questioning was to identify general trends in higher education, a comparative analysis of each individual respondent institution was not performed. The results of the questioning were used in order to determine sustainability in higher education, and they include correlating statements about different aspects in government, location or scientific sector.



Case Study of the Implementation of the Concept of ESD in the Faculty of Geography and Earth Sciences of the University of Latvia

The case study on the implementation of the ESD concept in Latvian universities has been carried out in the Faculty of Geography and Earth Sciences of the University of Latvia. This faculty is responsible for education in geography, geology and environmental science, and its total number of students ranges from 650 to 800 (students in the environmental science study programme – 200 to 300). This faculty has the leading role in the advancement of environmental science and education for sustainable development in Latvia. The Department of Environmental Science and the Centre of Education for Sustainable Development are responsible for education about sustainable development. Recently, an initiative has been taken to prepare a study course on the environment and SD and recommend it for all faculties of the University of Latvia as well as for other higher education institutions in Latvia.

Results of Research

Questioning

In the first part of the questioning, respondent institutions had to provide their general view on the importance of sustainability ideas in their faculty/department. The questioning results show that the issues of sustainable development are recognised by higher education institutions as being of high importance – 60% marked off the importance of sustainability as “a great deal” and 37% – as “quite a bit”. Noteworthy, nearly 84% of the questioned institutions pointed out that the importance of sustainability in their structure will increase in the future. The extent to which sustainability has been integrated into the education policy documents is much lower – only about 30% of universities have any references/links to sustainable development in their administration, planning or mission documents.

Higher education institutions were asked to elaborate on how they are implementing the content of sustainable development in their study programmes. The questioning indicated five main approaches (Figure 1):

- Diagram A:** a study course on the issues of environmental protection (N=18);
- Diagram B:** a regular discipline-specific study course, which includes the issues of sustainable development (N=14);
- Diagram C:** a study course about sustainable development (N=9);
- Diagram D:** a regular discipline-specific programme, which includes the issues of sustainable development (N=2);
- Diagram E:** the environmental science programme (N=1).

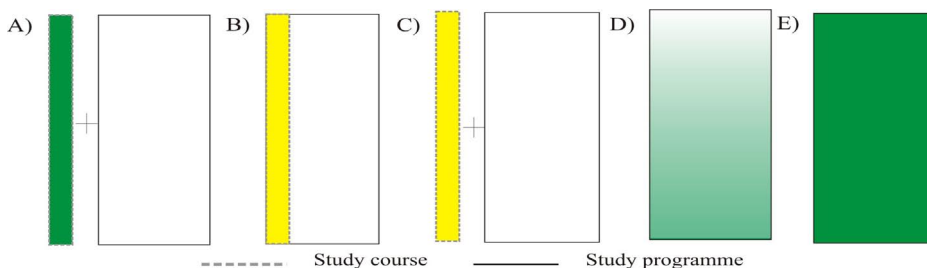


Figure 1: Approaches to introducing sustainability-related content within curricula (identified by higher education institutions).

When asked about the criteria by which the universities choose the themes of sustainable development for their curricula, the most frequent answers were that SD themes are related to the scientific field of regular discipline-specific programmes (25%) and are regionally urgent (16%). Higher education institutions cited the interests of academic staff (12%) as the third most common criterion for selecting the content



of SD. In spite of various scientific sectors represented in the sample of higher education institutions, the environmental issues are dominant in the content of study courses about sustainable development (65%). The economic and social dimensions of sustainability in curricula are represented in approximately equal proportions – 38% and 34% respectively. This tendency is closely related to the previous observation that the most common approach to the ESD implementation in the majority of institutions is a study course about environmental protection.

The findings highlight that the essential condition of the implementation of ESD – the interdisciplinary and holistic approach – is rarely applied in the teaching and learning of sustainability. Only 5 % of the respondent higher education institutions are actually carrying out this principle. 43% of higher education institutions were unable to assess to what extent the issues of SD are integrated into the traditional study programme disciplines (mathematics, art, language etc.). The manner how institutions implement sustainability into their curricula is characterised by the lack of methods, which develop the critical and system thinking, participatory decision-making or value-based learning. Lecture is still the main performance of ESD (80%) for the majority of higher education institutions in Latvia, though there are also seminars and discussions taking place in social sciences (60%) and laboratory works – in natural sciences (40%).

In the conclusion of the questionnaire, higher education institutions were asked to assess their opportunities/resources for introducing and implementing ESD in their faculty/department by marking off a score from 1 to 5 (where 1 is the lowest and 5 the highest rating) for a number of elements related to the study process. Figure 2 represents an average rating with regard to the resources for the implementation of ESD given by higher education institutions.

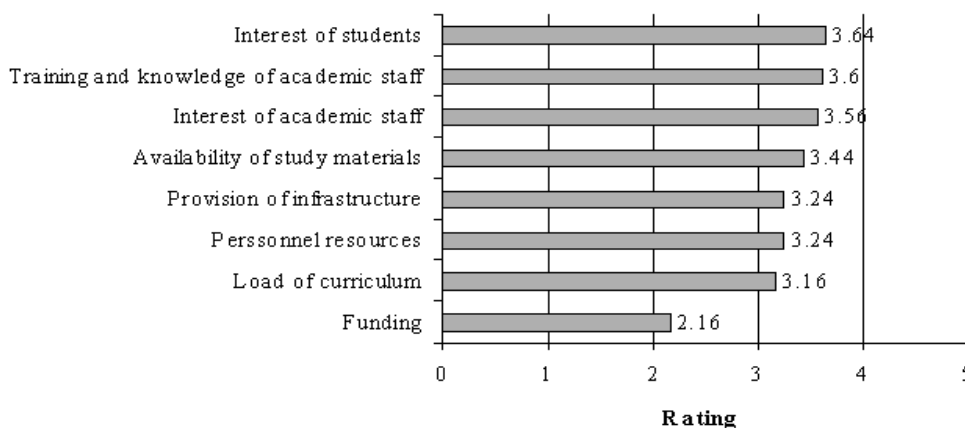


Figure 2: An average rating with regard to the resources for the implementation of education for sustainable development (provided by higher education institutions).

Universities indicate the students' involvement or desire to study sustainable development as the major potential for the implementation of ESD. Furthermore, universities conclude that their academic staff members are/would be interested in teaching sustainable development, and higher education institutions give a relatively high score for the knowledge and skills of their academicians in this field. The lowest rated categories are the availability of funding and the opportunities to incorporate the issues of sustainable development throughout the curricula. Such a result is largely due to the situation that the programmes are already loaded or require a significant reorientation and that funding is not provided or is not generally available for this type of complementation of the study content.

Case Study of the Faculty of Geography and Earth Science

The analysis of the situation and development at the Faculty of Geography and Earth sciences (University of Latvia) represents a possible approach to the reorganisation of the study content towards



the implementation of the ESD concept. The total number of students at this faculty ranges from 600 to 800, and ~ 1/3 of them study environmental science as a study topic at B.Sc., M.Sc. and PhD levels. In the environmental science study programme, a strong emphasis is put on the sustainable development study courses. The studies are organised in such a way as to make sure that the basic approaches of education for sustainable development are delivered for all students of the faculty. The study programme staff is largely responsible for the progress of ESD in this Faculty, and the recently established Education for Sustainable Development Centre offers the basic study courses on environmental issues and sustainability aspects for other study programmes at the faculty level.

Recently an initiative has been taken to promote the inclusion of study topics on the environmental issues and sustainable development in the study programmes of the University of Latvia, first of all in those of social sciences. The elaboration of the study content has been started by carrying out an extensive questioning, covering approximately one third of all students in social science study programmes. The aim of the questioning was to identify the topicality of the issues and the interest of students in the environmental and sustainable development problems and their readiness to study these topics. Furthermore, a research project has been carried out, involving not only academics from Latvian universities but also from Sweden, Norway and Finland. The results of this study were published in a book *Environmental Education at Universities*. The opinions of students, university professors and representatives of the ministries of education of the Baltic Sea region countries clearly favoured the inclusion of the major aspects of ESD and content elements in the study courses on the environment and sustainable development, at the same time stressing the need to advance not only study content but also teaching and study tools, supporting student initiatives, the use of multimedia study materials, e-learning tools. As a result of these efforts, a syllabus for a study course "Environment and sustainable development" has been drawn up and a multi-authored textbook as well as a teachers' support package, e-learning materials and multimedia materials supporting the study process have been developed. The approbation of these study materials that is already taking place demonstrates their usefulness and appropriateness for social, humanitarian and natural science students.

Discussion

The overall evaluation of the results shows that higher education in Latvia has a strong tendency to develop ESD through the environmental science. ESD is currently being promoted and implemented in the curriculum of higher education institutions almost exclusively through the environmental science. This approach is also supported by the responsible institutions, and it has been included in the legislation. On the one hand, the dominance of environmental sciences has been appreciated – it is an interdisciplinary science and, therefore, may serve as a good platform for the development of ESD compared with other scientific disciplines, where the issues of sustainability have been dealt with more narrowly or within a specific vision. Since an active, ongoing implementation of ESD has already been taking place in the field of environmental sciences, figuratively speaking, this sector can be compared to an "open door" through which the ESD practices could be most easily and successfully developed; so, in our opinion, this tradition should be carried on. On the other hand, it is very important to continue the work on promoting ESD in other disciplines as well, and to complement the ESD practices and content with a vision of sustainability taken from these sciences. Otherwise, there is a great risk that just this limited conception of sustainable development will become widespread across the universities. The results of the questioning of higher education institutions already suggest that the environmental dimension of sustainable development is most frequently represented in the curricula compared with economic issues or social dimensions.

A slight majority of the respondents estimate the issues of SD as meaningful and relevant to their institution, and this positive and responsive attitude is of great importance for a successful promotion of ESD. However, comparing the data regarding the practical implementation of ESD, a conclusion can be made that the most higher education institutions would carry out this implementation just in a formal and shallow manner. The dominant approaches are adding new study courses about environmental protection and/or SD to the curricula or are modifying the regular discipline-specific courses by including the content of SD issues. This practice suggests that frequently the issues of SD are embraced into curricula as



education *about* sustainable development. If a curriculum is the sum of all formal and informal teaching and learning experiences provided by a higher education institution, then ESD cannot just be added to the curriculum as a new subject. Only three higher education institutions were a step ahead in the transition phase, as they have modified their regular discipline-specific programmes by including the issues of SD or have been carrying out the environmental science programme.

As mentioned before, the environmental dimension is particularly accented in the content of study courses. This observation is in conformity with the research about the Atlantic Canadian higher education institutions – “the focus and/or understanding of sustainability education appears to be various manifestations of environmental science; environmental science and management courses dominate the listing of courses on offer” (Beringer *et al.*, 2008). Perhaps the emphasis on environmental dimension can be explained by the fact that institutions have previously been familiar with environmental and conservation issues and that these issues have been more understandable to the local community in Latvia. In the rest of the world, the concept of ESD has developed from nature studies and environmental education (Blewitt and Cullingford, 2004); therefore, the narrow vision of sustainability through environmental issues in the higher education institutions of Latvia can be compared with the “environmental education” phase of ESD.

The results of the study also show that a key obstacle to a further successful presentation of SD could be the lack of a holistic and interdisciplinary approach. SD is complicated because of the tight connections between social, economic, ecological and cultural aspects; therefore, the holistic approach is of high importance. ESD is about learning how to build and understand the relationships and interactions between complex systems of SD, and creation of such an awareness is much more needed than just another study course on environmental protection. Sustainability is a holistic concept within which the process of learning is as important as what is being learnt – the content. The questioning showed that only 5% of the respondents carry out this principle, whereas 43% of higher education institutions were even unable to assess to what extent the issues of SD have been integrated into the traditional disciplines of study programmes (mathematics, art, language etc.). Higher education institutions can be described as having poorly developed and applied pedagogical approaches in sustainability studies – in the majority of cases, teaching about sustainability is put into effect through lectures as **subject-based learning**. According to Anderberg *et al.* (2009), the holistic conceptions of SD tend to broaden teaching and learning approach, and this statement supports a conclusion that the conceptions of SD practised on a large scale all over the higher education institutions in Latvia are those of the limited understanding.

The findings in several categories of the questioning demonstrate that academic staff has a leading role in many aspects of the ESD implementation. In many cases, the extent and approach of the ESD implementation in university tightly depends on the will and interests of academicians. Data about the recourses/opportunities for promoting ESD in higher education suggest that there are still many barriers; consequently, we must search for obstacles that hinder the implementation of ESD and for the best solutions for its successful entry into curricula. The participation of responsible institutions in the implementation of ESD is formal, particularly in the dissemination of good practice, communication and information exchange between higher education institutions. Responsible institutions should put more efforts on discussions with higher education institutions, clarifying such issues as how to motivate universities to reorient their programmes, what would be the desirable “help” from the institutions in charge of developing the academic sustainability plans, and what would be the potential course and degree options on sustainability at higher education institutions.

Conclusion

Higher education institutions in Latvia are at the first stage of “greening” their curricula, and the efforts to incorporate the issues of SD into curricula can be characterised more as education *about* sustainable development. Since the environmental dimension is particularly accented and there is a noticeable lack of holistic and interdisciplinary approaches, the limited conception of SD is widespread among the higher education institutions. The possible agents of changes promoting sustainability in university structures are the academicians. Therefore, the activities focusing on the academic staff training and involvement in sustainable development ideas should be developed. Future studies should explore what is the academic



understanding of sustainable development and how this perception affects the teaching and learning about SD.

References

- Anderberg, E., Norden B. & Hansson B. (2009). Global Learning for Sustainable Development in Higher Education: Recent Trends and a Critique. *International Journal of Sustainability in Higher Education*, 10, 368-378.
- Association of University Leaders for a Sustainable Future. (2001). *Sustainability Assessment Questionnaire*. Available at: http://www.ulsf.org/programs_saq.html. Accessed May 12, 2010.
- Association of University Leaders for a Sustainable Future. (1990). *Talloires Declaration*. Available at: <http://www.ulsf.org> (Accessed April 12, 2010).
- Bekessy, S.A., Burgman, M.A., Yencken, D., Wright, T., Leal Filho, W. Garden, D. & Rostan-Herbert, D. (2002). *A Summary of Environmental Practice in Australian Universities*. Available at: <http://www.mei.monash.edu.au/conference/Papers/bekessy-et-al.pdf> (Accessed March 25, 2010).
- Beringer, A., Wright, T. & Malone, L. (2008). Sustainability in Higher Education in Atlantic Canada. *International Journal of Sustainability in Higher Education*, 9, 48-67.
- Blewitt, J. & Cullingford, C. (eds.) (2004). *The Sustainability Curriculum: The Challenge for Higher Education*. London: Earthscan.
- Centre of Higher Education Quality Evaluation. (2010). *Studiju programmu statistika*. Available at: <http://www.aiknc.lv/lv/search.php> (Accessed June 29, 2010).
- Cortese, A.D. (2003). The Critical Role of Higher Education in Creating a Sustainable Future. *Planning for Higher Education*, 31, 15-22.
- De la Harpe, B. & Thomas, I. (2009). Curriculum Change in Universities: Conditions that Facilitate Education for Sustainable Development. *Journal of Education for Sustainable Development*, 3, 75-85.
- McIntosh, M., Cacciola, K., Clermont, S. & Keniry, J. (2001). State of the Campus Environment: A National Report Card on Environmental Performance and Sustainability in Higher Education, National Wildlife Federation, Reston, VA, 2001. Available at: <http://www.nwf.org/campusEcology/HTML/stateofthecampusenvironment.cfm> (Accessed March 25, 2010).
- Ministry of Education and Science of the Republic of Latvia. (2010). Pārskats par augstāko izglītību Latvijā 2009.gadā. Available at: http://izm.izm.gov.lv/upload_file/Registri_statistika/05Tem-grupas-2009.pdf (Accessed June 29, 2010).
- Ministry of Finance of the Republic of Latvia, (2010). Available at: <http://www.fm.gov.lv/?lat/makroekonomika/> (Accessed July 15, 2010).
- Orr, W.D. (1992). *Ecological Literacy: Education and the Transition to a Postmodern World*. N.Y.: State University of New York Press.
- Scott, W.A.H. & Gough, S.R. (2003). Sustainable Development and Learning: Framing the Issues. *Journal of Education for Sustainable Development*, 1, 191-198.
- Stephens, J.C., Hernandez, M.E., Roman, M., Graham, A.C. & Scholz, R.W. (2008). Higher Education as a Change Agent for Sustainability in Different Cultures and Contexts. *International Journal of Sustainability in Higher Education*, 9, 317-338.
- Sterling, S. (2004). Higher Education, Sustainability, and the Role of Systematic Learning. In: Corcon, P.B., Wals, A.E.J. (eds.), *Higher Education and the Challenge of Sustainability. Problematics, Promise, and Practice*. Dordrecht: Kluwer Academic Publishers, 64-78.
- UNESCO. (2007). The UN Decade of Education for Sustainable Development (DESD 2005-2014). The First Two Years. Available at: <http://unesdoc.unesco.org/images/0015/001540/154093e.pdf> (Accessed May 12, 2010).
- Vare, P. & Scott, W. (2007). Learning for a Change: Exploring the Relationship Between Education and Sustainable Development. *Journal of Education for Sustainable Development*, 1, 191-198.

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