POSSIBILITIES OF INTEGRATING SUSTAINABLE DEVELOPMENT AS SUBJECT IN ROMANIAN HIGHER EDUCATION'S CURRICULA

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ABSTRACT: *Seriousness of the problems focused to the protection and quality of the environment at the national and international levels impose the need for urgent changes in educational systems of many countries. Modern educational theory, practice and recommendations of international organizations conduct for introdcing basic aspects regarding to sustainable development and environment protection. In order to understand the need and the importance of environmental factors and laws in professional domain, the connection between environmental and professional aspects of student's future professional activities, it is necessary to understand the environmental protection as the necessary content and principle of educational work at the university. In the paper, the educational needs of different groups of the academic population are sinthetized, in fact, the program's educational orientation for the environmental protection in higher education is shown.*

Keywords: *environment,, sustainable development, highter education, educational needs.*

Introduction and background

The Rio Declaration is the foreword to Agenda 21, which sets out the basic principles that guide progress towards sustainability. Agenda 21 is the action plan and strategy for sustainable development, comprising 40 chapters and divided in four main sections: section 1 - social and economic development ; section 2 - the conservation and management of resources for development; section 3 - role of groups involved in achieving sustainable development; and section 4 - means of implementation. Agenda 21 introduces a new thinking, a new philosophy about economic development. The man moves from the quantitative, limitless, or so-called wild development of the western type, which is egocentric around the man, ignored the existence of nature and ecosystems, and proved itself to be a failure, to a new qualitative, sustainable development which, based upon a systems approach, considers fulfillment of man's developmental goals in harmony and coexistence with nature and ecosystems. The values of sustainable development are, among others: control of overconsumption, control of overpopulation, food security and combating of poverty, education and health for everybody, healthy natural environment, and harmonious coexistence of man and nature.

Formal education leading at developing thinking and behavior commensurate to the ideals of sustainable development can and should start at the primary school level. This is also a mandate of Agenda 21 (Chapter 36). Symons (1996) suggests that teachers need to adjust their current approaches that develop understanding of nature and ecological systems and combine them to those related to equity and social change. Similarly, in secondary education, lesson content and pedagogy need to be revised so that they contribute to education for sustainability. For example, ideas of pollution prevention, waste minimization and recycling, should be introduced in the science classes. Concepts of «greening of business» should be introduced in business and economics classes. Of course, primary

and secondary school teachers need to be formally trained on sustainable development issues.

Today, integration of Sustainable Development in the preparation of future engineers is a recurring question for engineering schools. However, due to its complexity, Sustainable Development cannot be simply integrated as a supplementary course within the engineer's curricula(Lourde 2004). Before being able to teach this new concept, it seems essential to reflect pedagogically how to best accomplish this. First, what should be the objectives? Then how to integrate this multidisciplinary dimension in the educational structure? Moreover, how to approach such a broad subject in a pragmatic way? Another very important element which should be treated is how to evaluate this process. Finally, what is the student's understanding of the Sustainable Development?

After dealing with these questions, a tool that can evaluate the student's understanding of Sustainable Development concepts will be presented. The analysis of a student's sustainability's comprehension, based on cognitive maps, has been developed. The students are asked to write and connect by arrows all the terms that they associate to the concept of Sustainable Development. The assessment of the aforementioned cognitive maps is based on an approach via semantic category (Legrand, 2000).

Studying these cognitive maps has several benefits. Primarily, to identify what are the notions, which were both learned by the simulation game or previously known, as well as what is missing in their comprehension. This study can be used to evaluate the impact of training sessions on students. Another advantage is to analyse how the student's knowledge are interconnected.

This seems particularly interesting because the study of this transdisciplinary concept as well, necessitates an integrated vision. This tool appears to be useful for teachers. Using the cognitive maps could assist professors to have insights about the content of a Sustainable Development's course.

Example of an innovative pedagogic method (Lourdel 2004) conduct the student in order to to approach the interdisciplinarity and the participative dimension of this concept with the following educational objectives:

- to give to students a more concrete vision of the stakes that are associated to Sustainable Development;
- to make them think about the possibilities of integration of the concept in an industrial context;
- to make the students apprehend the complexity of a real case by identifying the interrelations between the various stakes (economy, social, environment, but also the governance)

Curricula changes

Changes in higher education to address sustainable development including, greening of curricula, and conducting research and publishing on sustainable development subjects. The engineering curricula, need to reflect the changes also in the professional practice. More specifically, for greening an university needs several requirements as curricula containing environmental courses (in science, engineering, politics, economics, etc.); educational programs for the personnel and applied policy on pollution prevention, waste minimization and recycling; educational programs for the personnel and applied policy on energy and resources conservation; programs to raise environmental awareness; an environmental auditing system; policies related to smoking and public health, occupational health and safety, equity and justice between employees, harassment of women, minorities, students.

Greening of the curricula is also a major issue at the University of Alba Iulia, and since last two years and there were introduced new SD related disciplines both for engineering and non engineering specialisations.

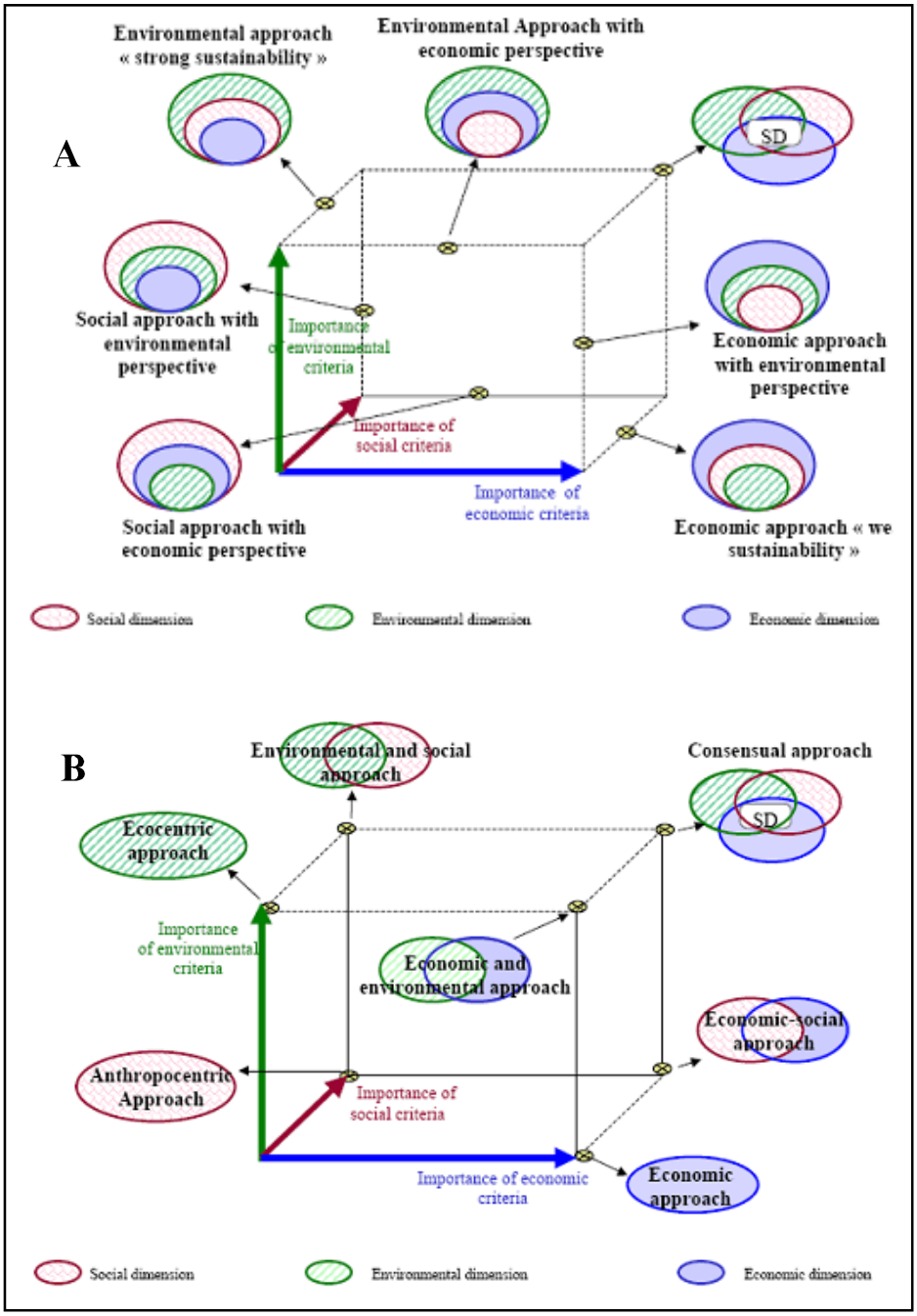

Fig. 1 .Schematic representation of the diversity of approaches of Sustainable Development according to its three pillars

Particularly at the engineering specialisation it was introduced as first step an elementary course "Basics of sustainable development" which is structured on issues related to:

- man-environment interrelations and their approach modalities;
- sustainable development:
  - basic concepts, principles, paradigms, methods, research directions;
  - environmental impacts;
  - hazard and risk assessment;
  - environmental perception and behavior;
  - environmental assessment;
  - global changes.

Trough this course students develop a skill in using environmental assessment tools, understanding man-environment interrelation, as well the decision analysis tools.

Beside this course other SD related courses were introduced, according to Agenda 21:

No.	Core course
1.	Environmental Ecology
2.	Environmental Geomorphology
3.	Environmental Geology
4.	Soil science/Soil Treatment
5.	Hazard and Risk Assesment

Conclusion and future development

According to the development plan of the Univesity of Alba Iulia, initiated a degree program, offering a 4 years Diploma in Environment engineering, with a curriculum of 8 semester with credits in humanities, social sciences and economics, basic sciences, engineering sciences, environmental engineering core courses, and in environmental engineering electives, offering multidisciplinarity and integrated knowledge.

The major aims of this degree program are to ensure three major aspects of sustainability: Environmental Sustainability, Social Sustainability and Economic sustainability.

The major global issues that need to be considered can be derived from Agenda 21 and include:

For environmental sustain ability:

- Environmental and human health;
- Resource consumption;
- Water quality and quantity;
- Climate change ;
- Land use and productivity;
- Food production.

For social sustainability the issues are:

- Poverty;
- Consumption patterns;
- Demographic dynamics;
- Human health conditions;
- Human settlement development;
- Incorporation of environment and development in decision-making.

For economic sustain ability:

- Function of society and its role within the environment;
- Profitability to ensure the ongoing operation of the activity;
- Investment in employment and training;
- Research and development;
- Innovation;
- Productivity.

REFERENCES:

1. Legrand, E. (2000). *Utilisation pragmatique de cartes mentales comme outil d'évaluation en éducation relative à l'environnement*, in Education relative à l'environnement (pp. 74-95).
2. N. Lourdel, N. Gondran, V. Laforest and C. Brodhag. *Introduction of Sustainable Development in engineer's curricula : problematic and evaluation methods* **,** EESD 2004, Edited by D. Ferrer Blas, F.K. Mulder.
3. Henry, J.G. and Heinke G.W. (1996). *Environmental Science and Engineering*, Prentice Hall, New Jersey, USA.
4. Mac, I., (1998), Geografia mediului înconjurător. Note de curs, Facultatea de Geografie, Cluj-Napoca.
5. Mac I. (2000) Geografie generală, Ed. Presa Universitară Clujană , Cluj-Napoca.
6. Mac I. D. Petrea (2003) Sisteme geografice la risc. in:Riscuri şi catastrofe vol II, Ed. Casa Cărţii de Ştiinţă, Cluj Napoca.
7. Mac I. (2003) Ştiinţa mediului, Ed. Europontic, Cluj Napoca.
8. Rojanschi, Vl., Bran, Florina., Diaconu, Gheorghiţa., (1997), Protecţia şi ingineria mediului, Ed.Economică, Bucuresti.
9. Symons, G. (1996). «The primary years,» in: *Education for Sustainability*, Huckle, J. And Sterling, S. (Eds.), Earthscan Publications Ltd., London, UK.
10. Tsihrintzis, V.A. and Panagiotakopoulos, D. (1998). «A Comparative Study of Environmental Engineering Curricula,» *Proceedings of the International Conference Protection and Restoration of the Environment IV*, 1-4 July, Halkidiki, Greece.
11. United Nations. (1992). Press Summary of Agenda 21 - Final Text, *UN Conference on Environment and Development*, Rio de Janeiro, Brazil, 3-14 June.
12. Wildes, F., T., (1995), Recent Themes in Conservation Philosophy and Policy in the United States, Environmental Conservation, Vol. 22, No. 2.