THE EFFORTS AND PERCEPTIONS REGARDING SUSTAINABILITY OF STUDENTS FROM “HERMANN OBERTH” ENGINEERING FACULTY OF SIBIU

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Abstract: In a world with increasing environmental, social and economic issues, higher education is considered critical to resolving these issues and sustainable development. Sustainable development is a complex concept which concerns a wide range of social, technoeconomic and environmental issues. Institutions that shape the values and attitudes of future engineers are increasingly called upon to play a leading role in developing a multidisciplinary and ethically-oriented form of education in order to devise solutions for the problems linked to sustainable development and influencing the directions in which society might move and the choices it is able to make. This paper aims to identify the awareness level of the concept of sustainability among students of the "Hermann Oberth" Engineering Faculty of Sibiu. The paper presents the results of an interesting research conducted on students' perception on sustainability in higher education. The research pursued two main dimensions: (1) pilot study of student attitudes and behaviors relative to the concept of sustainability applied in Romanian higher education, (2) the importance of some demographic factors on these attitudes and behaviors.

Keywords: sustainability, higher education, engineering education, student perceptions

1. INTRODUCTION:

Earth’s exploitation is threatening its very existence and delicate balance and structural problems like depletion of resources, clean water, poverty and malnutrition are threatening the safety and stability of modern society. The concept of sustainable development refers to economic growth that can meet the welfare needs of our societies, on short, medium and especially long term. It is assumed that development must meet the needs of the present without compromising the ability and resources to future generations. Today, almost everything is carried out under the banner of sustainable development: education must become sustainable; industry and agriculture develop sustainably, research must support sustainable development; water resources (or other resources) must be used sustainably, etc. [4]

Education is the most effective means available to a society to meet the challenges of the future, sustainable development being one of the interesting and necessary challenges. Progress increasingly depends on more than research ability, innovation, and adaptation to new generations. Access to education is a sine qua non requirement of youth participation in socio-economic and cultural life at all levels of society.

Obviously, education does not entirely resolve contemporary issues but should be part of the effort to create new relationships between society members and to generate an increased respect for the needs of environmental protection.

The United Nations declared the period: 2005-2014 the decade of education for sustainable development, arguing that education for a sustainable society "enables people to acquire knowledge, values and skills to participate in decisions ... that will improve lives currently, without destroying the planet in the future".

Education is not confined to academic instruction, ie its formal aspects. It includes non-formal and informal sides, without being neglecting the role of family and local community. The vast community of educators is a very important human resource but is not used for the needs of sustainable development and whose contribution can be valuable in all local communities.

What if higher education was to take the lead, as it did in the race for space or in the fight against cancer, to prepare students and provide information and
knowledge to develop a just and sustainable society? [8]

2. OTHER APPROACHES:

Education is one of the key mechanisms through which we become human beings that act and interact on the basis of a common culture and one of the key ‘producers’ of culture and the way we see reality. It is, at the same time, and because of that a vital condition for realizing sustainable development.

In an essay entitled "The role of education in achieving a sustainable society" (Council President for Sustainable Development, 1995, p. 5), Tony Cortese said that "... [higher education] has the unique freedom to develop new ideas to analyze society and to engage in bold experimentation and to help create new knowledge". Universities in particular are designed to develop students to their so-called dynamic qualities (Posch, 1991) allowing them to analyze, build and operate with a high degree of autonomy and self-determination, if not in their personal lives, at least in working life. At the same time, universities should develop for their students, skills that will allow them to handle uncertain situations, and vaguely defined, with norms, values, interests and conflicting, or at least divergent situations of reality. [3]

Despite the questions we have regarding "sustainability" as an organizational structure of higher education, we see a great educational potential that can and should be valued by higher education institutions (Fig. 1).

The focus is on engineering, more than on the natural and physical sciences or on social science, because the activities that implement scientific advance are generally rooted in engineering. Engineers were once able to initiate engineering projects, able to transform real need into design and finally material form. However, “the full scope of the social responsibility of engineers has been seriously curtailed, and hence impaired, by the socially, intellectually and culturally subordinate role of engineers in modern society”. [12]

Sustainable development engineering education is about giving engineers an understanding of the issues involved as well as about raising their awareness of how to work and act sustainably. The resulting concept is that “the engineer should be a first-rate technical expert who acts as a social agent, rather than just a technician” with a “broad understanding of the social and philosophical context in which he will work” [11].

3. RESEARCH OBJECTIVES

To emphasize students’ perception on the concept of sustainable development (sustainability) of higher education, at „Hermann Oberth” Faculty of Engineering from "Lucian Blaga" University of Sibiu, a research was conducted on this issue, as a result of the increased concerns of the university on the topic sustainability in higher education.

The research has followed two main dimensions: (1) a pilot study of student attitudes and behaviors relative to the topic of sustainability, (2) the importance of demographic factors on these attitudes and behaviors.

4. RESEARCH METHODOLOGY.

4.1. Sampling.

In May 2010, a study regarding students’ perception on issues related to sustainability in higher education was conducted at „H. Oerther” Faculty of Engineering. 400 questionnaires were distributed, out of which 325 valid questionnaires were collected, representing a response rate of 81.25% and providing a confidence level of 95% with an error of ± 5%. The interviewed subjects were chosen so that their totality would form a representative sample. Stratified sampling was done by selecting at random semi-group of each specialty and each year of study. The chosen sample has particularly good representativeness, both quantitatively and qualitatively, as the semi-groups of one specialization are formed by distributing the students so that averages and standard deviation of the school grades to be equal between them. As a result students have relatively similar profiles regarding the educational target (Fig. 2).
4.2. Methodology development questionnaire:

**Phase I. Focus group.**

During the pilot training session of the module Resource Management and Sustainability of the project for Improving University Management – coordinated by UEFISCUS, organized and presented at the "Lucian Blaga" of Sibiu, which was attended by experts, a focus group was carried out [2] on sustainability in higher education.

The participating persons, holding managerial positions, from 13 universities discussed the following topics:

- Identification of proposals for the inclusion of sustainability into the curriculum;
- Identification of measures to improve relations of the university with the:
  - Students
  - Community;
- Identification of necessary key changes.

The information gained from the discussions focused on specific themes of sustainability in higher education have been integrated into a single model. As a result, the variables examined in the questionnaire were aimed at checking the relevant premises, centralized from this focus group.

**Phase II. Creating the questionnaire.**

The questionnaire contains seven variables, which are listed below.

- Variable I. Actions required to implementing the main principles of sustainability. Questions were divided into three main categories: environmental, economic and social. Questions were formulated in the form hypothetical statements with evaluative values: individuals make decisions on each of these categories.
- Variable II. Attitudes related to organizations’ policies. Questions were divided into three main categories: environmental, economic and social. The questions were formulated so that companies would be judged according to their policies regarding the three pillars of sustainable development (economic, social and environmental).
- Variable III. Opinions about the actions needed for implementing sustainability in universities.
- Variable IV. Assessment of the impact of sustainable development measures on organizations’ profit.
- Variable V. Evaluation of subjects’ real actions to support sustainability.
- Variable VI. Determination of the main ways of communicating with students.
- Variable VII. Demographic information.

5. RESULTS - INTERPRETATION

The questionnaire sought two main dimensions: (1) a pilot study on students’ attitudes and behaviors relative to the topic sustainability (2) the importance of demographic factors on these attitudes and behaviors. For the analysis of the questionnaires the software PASW (SPSS 18) was used [7]. There were observed consistently high scores regarding general attitudes about sustainability issues, students considering all dimensions of the concept - ecological, economic and social - as being relevant and actual (Fig. 3).
Besides considering sustainability to be important, they consider that it’s necessary that the following measures should be taken:

- the application of general principles of sustainability at the individual level,
- integration of sustainability into the policies of organizations,
- enforcement of judgments of Talloires Convention in all universities.

An interesting result is that students, while assessing the measures to be taken by universities to support sustainability as having a negative impact on profits, are consistent with them. It is important to note also that in most specialties economical subjects are taught, therefore students are informed when answering the questionnaire.

To explain the distribution of scores, there was intended to compare demographic variables: year of study, the average of the grades from all years of study, residence, gender and average monthly income per family member. These relations have been pursued for the discovery of trends in the chosen sample, showing both explanations of observed phenomena and points of departure for further more detailed studies.

The only difference between the students from different years of studies is noted in the perception of effort for environmental protection, therefore the everyday behavior, which is higher in years 3 and 4, compared with years 1 and 2. This difference may be explained by changing the curriculum from theoretical and abstract level, towards a level of synthesis and integrator, or the students becoming more mature.

There is a steady upward trend of the approach and the commitment to sustainability, proportionally with the increasing averages of grades for the years of study. Therefore the scores of students with high average marks were significantly higher than of students with very low grades.

Gender and residence, urban or rural, does not explain any difference in distributions and sample averages.

6. CONCLUSIONS

Following the interpretation of the questionnaires, it appears that there is interest from students for sustainability topic. These behaviors are already formed and the students want their involvement and the faculty’s in promoting sustainability.

Research has confirmed that sustainability is a concern particularly of those with high incomes. Also for the chosen sample it is confirmed that although environmental issues have a greater interest from the general public, it continues to be disinterested to measures aimed at promoting policies on population, social development, poverty reduction, etc.

Universities should develop curricula, pedagogical approaches and extra-curricular activities, academic and campus life in a way to determine students to develop values, skills and thought, in order to contribute to sustainable development. We need to re-invent education in such a way that it will contribute to a new culture that is in line with the principles of sustainable development such as, a respect for indigenous peoples and their culture, a knowledge of the state of the natural environment, an understanding of global dynamics, and the protection of routes of transmission of culture, knowledge and skills to future generations. [12]

Such a re-invention means educate engineers:

- to ask a wider set of intelligent questions before formulating their solutions, rather than simply attempting to teach “technical solutions” to a narrowly defined set of current sustainability issues.
- to meet clearly defined needs, rather than simply delivering outputs.
- to rethink their fundamental approach towards a broader, multiple perspective approach in which problem formulation and context setting play a vital role in reaching consensual solutions with a disparate range of stakeholders.

Sustainability must become an integral part of planning, of activities, the design of facilities, procurement, investment and student life and all these efforts must be closely related to the curriculum. Student life is both the content and context of the cement for this type of learning. Universities should give students a good example in the implementation of sustainable development concept. "Setting an example is not the main means of influencing others; it is the only means." (Albert Einstein).

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8. REFERENCES