Conclusion

Statistics of Hungarian higher education underline necessity of interdisciplinarity in EE. Traditional courses of EE encourage mostly male students, but the situation is much better at interdisciplinary courses. In this decade when the total number of the 18th year age population is decreasing none of the university courses can allow to acquire students only from the one half of the population. Besides of more female also a small part of males suppose easier interdisciplinary studies and sympathize with such courses. It means that from input side advantages are obvious, but acceptation of interdisciplinary graduates
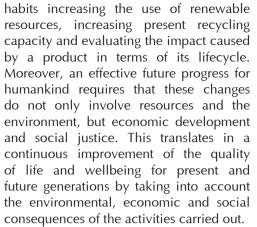
by companies is a question. The first experiences at least in Hungary are not very encouraging. Companies know well traditional engineering but they are not really familiar with abilities and knowledge of Computer science engineers, Engineering managers or Biomedical engineers. They state that developers of special fields (for example car electronics and -sensor developers) should be highly educated in the specialized fields. This view should be accepted, thus industrial needs will make a right selection of specialised or/and interdisciplinary professionals. Future research on experiences should be performed in coming years.

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An Interdisciplinary Approach for Acquiring Competence for Social Responsibility

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Graduate students should exhibit hard competences – specific knowledge- in their field of study and, also soft or transversal competences that provide complementary abilities to use the former in any specific environment. Social responsibility is among the list of transversal competences. This competence provides graduates a guidance to develop their activities as professionals within a framework of sustainable development, in such a way that projects include considerations concerning environmental, social and economic dimensions. In the present work we revise the concept of social responsibility and propose a quality assurance procedure to assess and improve the level of competence achieved by graduates.

Key words: interdisciplinary approach, higher education, sustainable development, social responsibility.

1. Introduction

The effective progress of humankind requires policymakers and leaders to be competent for social responsibility. Social responsibility provides an ethical framework to act with the vision needed to understand the strongly interwoven environmental, economic and social consequences of specific decisions taken, guaranteeing a vision of long-term strategies for the benefit of society at large. Lack for social responsibility competence by leaders in technology, government, business and industry may result in choices that can compromise the development of present and future generations.

Social responsibility is a transversal competence that should be acquired along a study program, requiring further development during the professional life. Accordingly, Institutions of higher education through their study programs and Professional associations through the professional code of ethics have a direct responsibility to build up a solid competence for social responsibility of leaders in technology, government, business and industry.

The process of acquiring competence for social responsibility by graduates is connected to a holistic education for sustainable development delivered from Higher Education Institutions. A holistic education requires not only greening study programs, but involves greening the campus [1]. The present work aims to review different aspects connected to the implementation of a holistic approach on education for sustainable development and describes a quality assurance system to assess its degree of implementation by Institutions of Higher Education.

2. Sustainable development

Different studies suggest that with present population growth rate and use of resources, the Earth will reach its carrying capacity at the end of the XXI century [2, 3]. Fortunately, these studies also suggest that there is a model of sustainable development that meets the needs of the present without compromising the ability of future generations to meet their own needs [4]. This model takes into account an expected increase of technological efficiency, but the most important requirement is a change in people's lifestyle. More specifically, citizens need to change their consumption

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habits increasing the use of renewable resources, increasing present recycling capacity and evaluating the impact caused by a product in terms of its lifecycle. Moreover, an effective future progress for humankind requires that these changes do not only involve resources and the environment, but economic development and social justice. This translates in a continuous improvement of the quality of life and wellbeing for present and future generations by taking into account the environmental, economic and social consequences of the activities carried out.

Awareness of the population is a key ingredient to bring humankind into a sustainable development track. This will generate pressure on policymakers to think in the long-term consequences of the actions undertaken at present. Globalization helps to increase the awareness of populations, stressing the consequences of non-responsible attitudes. A remarkable result in this pressure came with the rise of the ecologism or green political theory that has been regarded as a distinctive ideological tradition since about 1970s [5]. However, the need for humankind to follow a sustainable development track should be embedded in any policymaker. Population awareness is also necessary to urge states to work for a closer cooperation. In this regard, we are presently in the ratification process of the Paris convention [6], an ambitious plan to reduce greenhouse gas emissions to reverse global warming and its catastrophic consequences.

3. Social responsibility and education for sustainable development

As mentioned above, the desperate need for humankind to follow a sustainable development track should be embedded in any policymaker. However, choices made by leaders in technology, government, business and industry are sometimes taken without consideration broader perspectives neglecting the framework of a sustainable development. Social responsibility is a transversal competence that helps professionals to take decisions in

a framework of sustainable development. It requires full awareness of the need to preserve the quality of life and wellbeing for present and future generations, by linking economic development, protection of the environment and social justice, together with a personal commitment to act in these lines through a responsible consumption, enhance the use of circular economy and follow an ethical behavior.

Social responsibility should be acquired by graduates along a study program and reinforce during their professional life. A necessary condition to produce graduates competent for social responsibility is to embed students in a holistic educational process for sustainable development aimed at providing the necessary tools to increase knowledge and understanding, skills, and attributes needed to create a just and sustainable future. Education for sustainable development requires a multi-disciplinary approach that allows making connections, share knowledge, and work together on emergent areas [7]. It aims to develop students' ability to understand and evaluate connections between big issues, such as inequality, public health, global consumption, biodiversity loss and the limits of natural systems.

Higher Education Institutions are considered as key actors in the process of education for sustainable development as stressed in the report on the Decade of Education for Sustainable Development (2005–2014) led by UNESCO recently published [8]. They are viewed as the drivers of the education process since they are involved in training most of the professionals who develop, lead, manage, teach, work in, and influence society institutions, including the training of educators who provide education at both primary and secondary levels.

Higher education institutions have long been engaged in embedding environmental education and education for sustainable development into their functions including education, research and community outreach, but also in campus operations

[9]. Since the Talloires Declaration in 1990 [10], an increasing number of institutions have been engaged in activities to embed the principles of sustainability into their systems. Today, many institutions are interested in embedding sustainable development in their operations and activities, as well as on the consequence of their implementation including training social responsible graduates and creating a social responsibility culture in their institutions [11]. However, not all the initiatives reported by diverse institutions are in line with a holistic implementation of programs, research, outreach activities and campus operations embedding environment, society and economy. They range from those institutions that have implemented initiatives for greening campus to those that have incorporated social corporate sustainability in their strategic planning; from those that have included courses on environmental science in their programs to those that offer a full integration of sustainability related topics into existing curricula or research [12].

4. Levels of implementation of education for sustainable development

As mentioned above, a necessary condition for graduates to be competent for social responsibility is that institutions have implemented a holistic education system for sustainable development including programs, research, outreach activities and campus operations. Institutions around the world exhibit a differential approach to implement such a system. It is important to have a way to assess the degree of completeness achieved by an institution to implement a holistic system of education for sustainable development. There are different approaches described in the literature for this purpose including the Auditing Instrument for Sustainable Higher Education [13], the Graphical Assessment for Sustainability in Universities [14], Sustainability Tracking, Assessment & Rating System [15] or the Quality System of Science and Technology Universities for Sustainable Industry [16], all of them

based on the premises of quality assurance methods.

The first tool published was proposed by the Dutch committee for sustainable higher education who developed the Auditing Instrument for Sustainable Higher Education (AISHE). In this approach the idea is that organizations can be in one of several development stages with respect to a number of criteria. AISHE covers four fields: vision and policy, expertise, educational goals and methodology, education contents. The procedure involves an analysis of each of the four fields to end up with a self-assessment report that may be audited externally [13]. Another tool to assess the degree of development of universities in education for sustainable development is the Graphical Assessment for Sustainability in Universities (GASU) [14], based on the Global Reporting Initiative sustainability guidelines [17], designed to cover specific aspects of the activities carried out in the institutions of higher education including education, research, campus operations and community outreach. Its strengths lie in its multi-stakeholder approach and its number of indicators in the economic, environmental and social dimensions. The Sustainability Tracking, Assessment & Rating System (STARS) is a self-assessment tool designed for an institution to earn points based on the performance on diverse items related to sustainable development grouped in four categories: academic, engagement, operations and planning and administration. The final score permits to understand the degree of involvement of an institution in sustainable development [15]. Finally, the Quality System of Science and Technology Universities for Sustainable Industry (QUESTE-SI) is a quality assurance system, which supports quality improvement of sustainable development education in higher engineering education institutions. It requires the elaboration of an internal assessment report that is followed by an auditor team external evaluation. QUESTE-SI assessment is based on the information

gathered in four dimensions: Institution strategy, education and curriculum, students' involvement and research and innovation [16]. Similarly to STARS, after the evaluation institutions get a score that informs of the present institutional status in regard sustainable development and helps to identify weaknesses for improvement in the future.

Although these are tools designed to assess the degree of implementation of education for sustainable development of higher education institutions, it is expected that a more holistic approach of institutions in designing a system on education for sustainable development will provide a higher accomplishment of competent students for social responsibility, although this needs to be further studied.

5. Conclusion

Social responsibility is a competence that all our graduates should accomplish.

It permits to act with a breadth and depth of vision needed to understand the strongly interwoven environmental, economic and social consequences of specific decisions acting for the benefit of society at large. A necessary condition for students to acquire such a competence is that institutions of higher education are committed for sustainable development in their strategic vision and provide a solid interconnected view of the environmental, social and economic components in their functions: education, research and community outreach, as well as campus operations. There are different tools available to assess the degree of implementation for sustainable development of higher education institutions. It is expected that stronger implication of institutions for sustainable development provide higher accomplishment of competent students for social responsibility.

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