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SOME ASPECTS OF TRAINING SOCIALLY RESPONSIBLE ENGINEERS ABROAD

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***Abstract.** The article gives an overview of various concepts of social responsibility abroad. It is underlined that Ukrainian technical universities should borrow the best practices of ethical education from foreign countries. Analysis of social responsibility content and structural components as well as some ways of its development abroad is given.*

***Key words:** social responsibility, future engineer, professional training, foreign experience.*

НЕКОТОРЫЕ АСПЕКТЫ ПОДГОТОВКИ СОЦИАЛЬНО ОТВЕТСТВЕННЫХ ИНЖЕНЕРОВ ЗА РУБЕЖОМ

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***Аннотация.** Проанализированы взгляды зарубежных исследователей на понятие социальной ответственности. Охарактеризованы особенности социальной ответственности инженеров, а также разные подходы к определению ее содержания и структуры. Обозначены некоторые пути формирования социальной ответственности студентов в вузах развитых стран.*

***Ключевые слова:** социальная ответственность, инженер, опыт зарубежных стран.*

ДЕЯКІ АСПЕКТИ ПІДГОТОВКИ СОЦІАЛЬНО ВІДПОВІДАЛЬНИХ ІНЖЕНЕРІВ ЗА КОРДОНОМ

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***Анотація.** Проаналізовано погляди зарубіжних дослідників на поняття соціальної відповідальності. Схарактеризовано особливості соціальної відповідальності інженерів, а також різні підходи до визначення її змісту та структури. Окреслено деякі шляхи формування соціальної відповідальності студентів у вищих розвинутих країнах.*

***Ключові слова:** соціальна відповідальність, інженер, досвід зарубіжних країн.*

Introduction

The level of development of the automobile and road industry in any country is one of the distinct characteristics of its civilization. Unfortunately, in Ukraine this level does not comply with the world standards. Despite numerous economic reforms carried out in the country, the problems of the branch remain unsolved, because no reform will be effective unless workers fulfill their duties honestly and responsibly.

The difference in the state of roads in Ukraine and in the developed countries suggests we should learn the experience of not only professional but also ethical education of the future engineers of the branch at technical universities abroad so that we could borrow the best practices of training socially responsible specialists.

Recent Papers Review

The problem of social responsibility (SR) is being discussed by many researchers abroad. Some

critics argue that SR distracts from the fundamental economic role of businesses; others argue that it is nothing more than superficial window-dressing, or «greenwashing» [1]. But most researchers [2–8] share one common view that scientists and engineers are morally responsible for the negative consequences which result from the various applications of their knowledge and inventions. Though they agree on the importance for the specialist to be socially responsible, there are an array of views on what can be considered social responsibility, what components it includes and, what is more important, how it should be formed.

Problem Setting

To train socially responsible engineers for the automobile and road branch of Ukraine it is necessary to study the views of the world's leading experts in the area on the content and structure of social responsibility, as well as on the ways of how the technical university students should be educated to do their future job for the benefit of society and without harm to environment.

Problem Solution

In general, SR is regarded as an ethical framework which suggests that an entity, be it an organization or individual, has an obligation to act for the benefit of society at large. This responsibility can be passive, by avoiding engaging in socially harmful acts, or active, by performing activities that directly advance social goals.

Nowadays very often the term «corporate social responsibility» (CSR) is used. It has been defined as the continuing commitment by business to behave ethically and contribute to economic development while improving the quality of life of the workforce and their families as well as the local community and society at large [2]. CSR is one of the newest management strategies where companies try to create a positive impact on society while doing business.

There is no clear-cut definition of what CSR comprises. Every company has different CSR objectives though the main motive is the same. All companies have a two-point agenda – to improve qualitatively (the management of people and processes) and quantitatively (the impact on society). The second is as important as the first and stake holders of every company are increasingly taking an interest in «the outer circle» –

the activities of the company and how these are impacting the environment and society [1].

There are various points of view on the content and structure of engineers' SR. F. Collins [3] claims scientists and engineers have a collective responsibility for the choice and conduct of their work. Committees of scientists and engineers are often involved in the planning of governmental and corporate research programs, including those devoted to the development of military technologies and weaponry.

Many professional societies and national organizations have ethical guidelines. Clearly, there is recognition that scientists and engineers, both individually and collectively, have a special and much greater responsibility than average citizens with respect to the generation and use of scientific knowledge.

Unfortunately, the author points out, the situation is not that simple and scientists and engineers should not be blamed for all the evils created by new scientific knowledge and technological innovations. First, there is the common problem of fragmentation and diffusion of responsibility. Because of the intellectual and physical division of labor, the resulting fragmentation of knowledge, the high degree of specialization, and the complex and hierarchical decision-making process within corporations and government research laboratories, it is exceedingly difficult for individual scientists and engineers to control the applications of their innovations [3, p. 75].

Another problem that is emphasized by researchers is ignorance. The scientists and engineers cannot predict how their newly generated knowledge and technological innovations may be abused or misused for destructive purposes in the near or distant future. While the excuse of ignorance is somewhat acceptable for those scientists involved in very basic and fundamental research where potential applications cannot be even envisioned, the excuse of ignorance is much weaker for scientists and engineers involved in applied scientific research and technological innovation since the work objectives are well known. In all cases where the application of scientific knowledge and technological innovation is well known a priori, it is impossible for a scientist or engineer to escape responsibility for research and technological innovation that is morally dubious [4].

According to J. Beckwith, responsibility falls on those who provide the funding for the research and technological developments, which in most cases are corporations and government agencies. Furthermore, because taxpayers provide indirectly the funds for government-sponsored research, they and the politicians that represent them, i.e., society at large, should be held accountable for the uses and abuses of science [5]. Compared to earlier times when scientists could often conduct their own research independently, today's experimental research requires expensive laboratories and instrumentation, making scientists dependent on those who pay for their studies.

No doubt, J. Avery believes, science has given us great power over the forces of nature. If wisely used, this power will contribute greatly to human happiness; if wrongly used, it will result in misery. In the words of the Spanish writer, Ortega y Gasset, «We live at a time when man, lord of all things, is not lord of himself».

The great problem of our times is to keep society from being shaken to pieces by the headlong progress of science, the problem of harmonizing our social and political institutions with technological change. Because of the great importance of this problem, it is perhaps legitimate to ask whether anyone today can be considered to be educated without having studied the impact of science on society, whether this topic should be included in the education of both scientists and non-scientists.

The education of a scientist often produces a person with a strong feeling of loyalty to a particular research discipline, but perhaps without sufficient concern for the way in which progress in that discipline is related to the general welfare of humankind. To remedy this lack, it would be very desirable if the education of scientists could include some discussion of ethics, as well as a review of the history of modern science and its impact on society.

That means that educational reforms are needed. Science and engineering students ought to have some knowledge of the history and social impact of science. They could be given a course on the history of scientific ideas; but in connection with modern historical developments, such as the industrial revolution, the global population explosion, the development of nuclear weapons, genetic engineering, and information technolo-

gy, some discussion of social impact could be introduced. One might hope to build up in science and engineering students an understanding of the way in which their work is related to the general welfare of humankind. These elements are needed in science education if rapid technological development is to be beneficial rather than harmful.

As an example of the horrors that have been produced by lack of conscience in the application of science and engineering, one can think of drones, which make the illegal killing of men, women and children in distant countries into a sort of computer game played by operators sitting in the comfort of their Nevada bunkers. Now, apparently, there is a move to make killer robots completely free from human control.

Like doctors, scientists and engineers have life-and-death decisions in their hands. It has been proposed that graduates in science and engineering should take an oath, analogous to that taken by graduating medical students. They should promise never to use their education in the service of war, nor for the production of weapons, nor in any way that might be harmful to society or to the environment [6].

Presently, the focus of US ethics education in science and engineering tends to be on the individual and the responsible conduct of research, or microethics. In Europe, ethics education in science and engineering is grounded firmly in the concept of social responsibilities of scientists and engineers, or macroethics.

The European macroethical approach to science ethics education arises from a full-throated declaration of the goals and role of higher education in society. In the last 10 years, as part of an effort to harmonize educational requirements at institutions of higher learning across Europe, an overarching educational framework has been adopted that highlights the widespread and strongly-held European view of social responsibility (Bologna Process 2005).

The framework of qualifications for European Higher Education (EHEA) includes the expectation that all graduates, including those in science and engineering, «have the ability to gather and interpret relevant data (within their field of study) to inform judgments that include reflection on relevant social, scientific or ethical issues» (at the bachelor's level) and «have the

ability to integrate knowledge... and formulate judgments ... that include reflecting on social and ethical responsibilities linked to the application of their knowledge and judgments» (at the master's level) [7].

Social responsibility and responsible research conduct are the two essential sides of ethical science. Both are necessary for an adequate education in science and engineering.

Studying the process of teaching social responsibility at universities, P. Adamek has discovered a huge range of CSR synonyms: Business Ethics, Corporate Citizenship, Sustainability, Business and Society, Business and Governance, Business and Globalization, Stakeholder Management, Governance, Corporate Environment Management [8, p. 734].

The nature of CSR courses is defined both in terms of individual modules (semester length courses) and full dedicated programs (multiple modules leading to a degree or other award).

There are specific subjects taught at the universities: Business ethics (32 %); Ecological/ Environmental management (28 %), Corporate Social Responsibility (21 %), Accounting (18 %), Corporate Governance (17 %); Business and Society (10 %), Corporate Citizenship (5 %); Sustainable Development (3 %).

Many CSR teachers and practitioners share this view that CSR should be fully integrated into degree level teaching programmes. This is known as «mainstreaming» and would enable every student to be made aware of the social and ethical dimensions of their future activities as a specialist.

The author offers various forms in university education that can be borrowed by Ukrainian higher technical education: formation of optional modules, embedding ethics in other modules and courses, compulsory modules and other CSR teaching activities (seminars, conferences, special events, workshops, etc.)

He identifies the most effective teaching tools in CSR teaching. They are: business speakers, CSR based on case-studies, NGO speakers, CSR speakers, Communication (media) speakers, E-learning, Discussion forums, International student exchange, etc. [8, p. 735–736].

Conclusion

It has been pointed out that the problem of social responsibility is very acute in training future engineers is being discussed by many researchers abroad. Despite various points of view on the essence of social responsibility, it is generally regarded as an ethical framework which suggests that an entity, be it an organization or individual, has an obligation to act for the benefit of society at large. The problem of training social responsibility at technical universities remains open though attempts are being made to develop appropriate modules, courses, materials, tools.

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