
AC 2011-1609: AWARENESS OF SOCIAL IMPACT OF ENGINEERING: THE TASK FOR ENGINEERING SCHOOLS?

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Awareness of Social Impact of Engineering: The task for Engineering Schools?

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Abstract

Social groups have ambiguous understanding about science and technology; some understand it as responsible for the environmental deterioration and the voracious capitalism and others as the ones responsible for the better quality of life with the improvement of health systems, agricultural production and other accomplishments. Both perceptions are not far from the reality. In any case the impacts can be seen along the history and more recently with the sophistication of the so called “information society”. This particular “information society” shows how strong can be the impact of any technology introduced in the society. Real time communication, brutal amount of information available have changed drastically how people relate, make business and study. Engineering occupies an important role in this “brave new world” and it is in fact crucial for the development of science and technology and more important it is responsible for the delivery of such technologies on the service of the betterment of humanity. This aspect may lead to the notion that engineers should be aware of the responsibility to society as they contribute to its development. It is to be aware of the impacts not only environmental but also social of the outcomes of projects. Looking closer to the formation of engineers, there is still a prevalence of good technical formation without thinking of a broader knowledge achievement. This broader achievement is not a recent idea; the French School of Engineering implemented under Napoleon governance formed the “Mr. Engineer” that prepared leaders with high profile of technical knowledge. Even after the globalization phenomenon, with all the discussions about introducing humanistic courses in engineering programs the results are humble. There is still a difficulty for engineers to address technology to solve social issues rather than to apply technology regardless social needs. The other point is that the design of a project now for the “informed society” has to take into account the social impacts as well as the environmental. So the question is the engineering school preparing the future engineer to perform in the new challenging social environment? If it is possible to suggest some actions the key is to prepare the future engineers to learn how to work close to the communities and the governments, addressing the outcomes of the projects to solve socio technological problems.

Key words: sustainable development; environmental awareness; social goals; innovation; prosperity.

1. Introduction

The globalization phenomenon started in the second half of the 20th Century has instigated in scientists, educators and some politicians worldwide the search for Sustainable development with social promotion of individuals and society. It is the key for the surviving of human kind on earth. It is not only a matter of environmental issues that need to be solved but also the social aspects of the mutant world that contemporary society is living in the 21st. Century. It is the application of Science to help society to reach the goal of achieving the same level of development as the technological.

Much of the objects we interact with during a typical day are the result of an engineered process - from the alarm clock to our car, the Internet, through television, the streets and buildings and even the clothes we wear. All these objects so prosaic are the result of human ingenuity, personified in the professional engineer. All these objects came after weeks of reflection and nights, months or years of experiments, testing, developments and improvements, deep moments of sublime technique and passion, until they were ready to serve the man.

In according to the economic theory, this is the time that the driving force of economic growth is operating. There is economic growth only when there is technological innovation.

From this reflection may emerge the understanding of what kind of society, certainly prosperous and fair, we want to achieve, and how we should work towards achieving our goals. Engineering is the key factor that drives the development of present society and so it can add to the discussions of social goals no matter the community. May be it is perfectly capable not only to discuss but also to contribute for the solution of many social problems.

Many educational institutions are addressing this new demand for the formation of engineers and developing programs that include sociology and practical experiences in loco. The results are very humble however this can not discourage the initiatives. It is important to keep searching for ways to enhance social awareness in the students of engineering programs.

2. The Role of Engineering Education

Despite the efforts of so many sectors of society the present status of education in every level in western world is not yet as good as it should be. Education plays an important role in the development of peoples worldwide. It is the key to combat ignorance and consequently the poverty. Science and technology alone can not help. It is fundamental the growth investment in education for all⁰¹.

Education must promote the natural ability of the mind to set and to solve problems and by inter-relation to stimulate the full usage of general intelligence. The present challenges of engineering education institutions in western world are not limited only to the formation of a professional for a global work market, but also to defeat the crises of education in which they are inserted. The crucial problem is the necessity of think again the kind of education which has fragmented knowledge that drives people to an inability of articulating its several parts.

Many discussions about engineering education shows a lot of innovations in terms of what can be done in the classroom, in the curricula development, in labs, promotion of mobility and etc. It

shows very rich broad of efforts in order to form the engineer to act in the work market, in research field and as educators.

This 21st Century brought to the engineering schools the necessity to run fast to keep up the quality facing the constant challenge of innovate and provide the community that it serves the best professional. There is a push coming from enterprises and society to accomplish its mission of forming professionals aware of sustainability and social aspects of engineering⁰².

Education policies have become the driven force for educational reforms in national levels as in Europe where Bologna Process is shaping the high education system. The adequacy in the several countries involved has been very interesting once the differences are very deep in many cases. Anyway the most interesting aspect of this huge movement is the mobility that it will promote. Similar formation in different countries, recognized diplomas will certainly create a new product - a professional with the right tools and so capable to perform in different environment which is very rich and sooner or later the world will follow the model⁰³.

3. The Engineer Profile

Although the technical expertise and rationality are the characteristics more relevant and prevalent in the profile of an engineer, his humanistic education should not be disregarded. Their ability to interact with their peers in a different perspective from that, which favors a mechanistic view, is one of the main thrusts of his professional success. To understand this assertion, it is necessary opposition to the idea that highly technical activities should be analyzed from a reductionism viewpoint, in which problems are identified, classified and solved with solutions of purely rational nature. One should be aware that the technical ability to engineer a fusion of factors resulting from aspects of technical, economic, psychological, cognitive and environmental⁰⁴.

Thus, the formation and perpetuation of the profile of the engineer is continually influenced by sociological structures in which it participates. In its characterization it is necessary to understand the contributions of various fields, which would emphasize the academic, the collective space of professional performance and social environment within which the individual carries out its activities.

4. Analyzing Engineering

Engineering develops itself by the interaction of various professionals, immersed in a social context. Thus, understanding the actions of its members should always take into account the empirical and speculative beliefs of engineers, technical or non-epistemic aspects (such as moral values, religious beliefs, professional interests etc.), and especially the socio technical structures that bind.

It is undeniable that in Engineering - as well as any other field of professional activity - the actions and decisions taken by its members are steeped in individual perceptions and also by thinking of the professional community, historically established and shared by their peers.

As a result, any innovation that is not aligned with the ideas and concepts used by this group tends to be understood as a subversive attitude, because it builds and guides in the opposite direction of its structure of ideas.

The engineering is therefore a social unit, with significant decision-making power in the process of development of society. The engineer is, above all, an opinion leader who builds his ideas from the benchmark set by their professional community⁰⁵.

5. Engineering Professional Paradigm of 21st Century

In this new world scenario the skills, knowledge and training that are required are fundamental to survive in the changing labor market. It is imperative to be able to manage technological changes, be creative, take calculated risks, manage stress, think conceptually and recognize and respect people's diversity and individual differences.

The knowledge required includes the general knowledge of the business, the understanding of the total organization, at least a general knowledge about computers among others. The academic knowledge must provide the basic foundation to get, keep, and progress on a job to achieve the best results⁰⁶.

Sustainability is another aspect when it is about the impact of engineering projects; so new and more complex demands are arising due to the economic and social needs for the present business world. The perception and the capability to deal and work under this paradigm of work is something that must be fostered during the formation of an engineer.

The dynamics of the labor market requires the engineer's ability to perform interactions between several areas of the profession, developing their activities through the exchange of ideas and knowledge. This reality requires that teamwork is not understood simply as a collaboration additive, but rather a collective process involving the creation, through the effort together, a special structure that is not equal to the sum of individual works. In this perspective, agents with ability to innovate are those who, before a need to build solutions to existing problems, are able to establish interactive dialogues with those who are knowledgeable complementary⁰⁷.

6. Engineering Promoting the Prosperity

In search of a social development compatible with the needs and expectations and future of humanity is needed a broader approach to practice professional engineering in order to promote the capabilities of current generations to build the basis of material, environmental and cognitive that will be necessary to preserve and expand human freedoms in the future.

It is also important to emphasize the relevance of engineering - without ignoring the contributions of other fields of knowledge - in the process of social development, the multiplicity of engineering professional roles and the broad involvement of staff in their activities. However, while restricted to a purely economic perspective, the contribution of engineering in these processes tends to be deeply mechanistic and focused only on the presentation of highly technical solutions, without providing any guidance on the solution of emerging social problems.

From this perspective it is assumed that the innovative potential of the engineer is generally undervalued and underutilized, ignoring its important role of a promoter of development⁰⁸.

A Professional Engineer must be able to identify the diversity of variables that has the problem that is intended to address, list the tools available (or can create better tools), and especially to direct their efforts to achieve results towards social cohesion, and technological development as an ally and not as a premise for its action⁰⁹.

Engineers should promote the progress starting combating the poverty no matter where it is. Although it is not an easy task for sure if engineers invested in thinking about these problems and search to find the ways to defeat them certainly it could be solved as many problems in big constructions are solved.

The awareness of social and environmental impact of engineering projects is one step forward in this direction. The simply fact that many social and environmental problems can be avoided is an advancement. Even when economical aspects are stronger the awareness of these variables in the project can make a difference.

Prosperity is defined as the state of being successful and it is not economically, it evolves the health, the family, the job, self esteem and social relations. It is not social assistance that deepens ignorance and poverty. This status can be achieved by a community it is just a matter of willing to. In fact there are places in the world that the society is organized and prosperous at least economically speaking, which leads to healthier environment and higher self esteem.

It may sound some kind of dream however many dreams become true and as engineering is the art of possible it is not craziness to speak and think about this, engineering promoting prosperity.

The new demands and the engineering minds came up with new kinds of sustainable energy generation, new renewable fuels and materials, recycling machines and many others innovations that are changing the way people live.

7. Some suggestions

The transformations that happen when a new technology is delivered are not perceived by the society however some times the effects are devastating. Unemployment is one of the effects of some technologies that were introduced in the producing systems. The pollution is another one and many others of a vast list. By the other hand the positive outcomes are very strong once the technologies keep coming and being introduced. In many fields the impact is such that people expect more and more new and better technologies such as in medical field, new sophisticated equipments that make quick diagnosis, last generations of medicines, high technology for surgical interventions and etc.

How can the engineering school to prepare the engineer for future to face the new demands of technology development? There is one answer. It is a matter that still needs a lot of reflection and discussions and more than that: the research.

The practical experience may be a good example of how it is possible to instigate in the students of engineering the perception of the environmental and social impacts of a project. For that it is necessary to have good relations with industries, governmental and private organizations in order to format specific internships with this objective. Unfortunately so far it is up to the engineering schools to find ways to provide students these experiences.

Still engineers will always have to have a strong analytical skill in order to perform in any field and they will use it to solve problems. That is what makes them problem solvers.

8. Final Remarks

There is a remarkable gap between independence and the neglecting scientific-technological and social development. It is currently witnessing an unrestrained race in the pursuit of development and application of technology, without worrying to undertake the necessary efforts to structure society to understand, administer and implement this technology to their advantage. In the new social context individuals are faced with a situation in which they must adapt or rebuild their references from a model that is constantly changing and presents them not ensures continuity in social interactions. Anyway, this new model of society put change as fetish, rather than the necessary stability maintaining an appropriate model of social development.

It is up to the engineers of future to pursue and to accomplish the difficult task to promote technological development for the betterment of society.

References

- [01] Byrne, J. A: 1997, Management theory - or fad of the month, **Business Week**, 129, 37.
- [02] Vieira, A. H. G.; Brito, C. da R. "História da engenharia elétrica no Brasil". In: Vargas, M. **Contribuições para a história da engenharia no Brasil**. São Paulo, EPUSP, 1994. p. 259-272.
- [03] Ciampi, M. M.; Brito, C. da R. Implementation of an Engineering Educator Graduation Program for the Formation of New Skilled Engineering Teachers. In: IEEE EDUCON Annual Conference, 01, Madrid, 2010. **The Future of Global Learning in Engineering Education**. Madrid: IEEE, 2010.
- [04] http://www.ppgeet.ufsc.br/dis/66/Disse_jl.pdf
- [05] Ciampi, M. M.; Brito, C. da R. Engineering and Technology Education Innovating for Growth. In: International Conference on Engineering and Technology Education, 11, Ilhéus, 2010. **Engineering and Technology Education Innovating for Growth**. Ilhéus: INTERTECH 2010.
- [06] Longo, W. P. e; Telles, M. H. C. Programa de desenvolvimento das Engenharias: Situação Atual. **Revista de Ensino de Engenharia**, 18. Rio de Janeiro: ABENGE, 1998, p.74-82.
- [07] Naisbitt, J.A. **Megatrends 2000: Ten New Directions for the 1990's**. New York: AvonBooks, 1999. 416p.
- [08] JC e-mail 2426, de 11 de Dezembro de 2003; **Engenharia e a Sociedade Brasileira: reflexões para o dia dos engenheiros**, artigo de Denis L. Balaguer
- [09] Ciampi, M. M.; Brito, C. da R. New Trend in Education: Port Engineering Graduation Program. In: International Society of Engineering Education (IGIP) Annual Symposium, 39, Trnava, 2010. **Diversity unifies - Diversity in Engineering Education**. Trnava: IGIP, 2010.