CURRICULUM FOR SOCIETY-ENGINEER INTERACTION STUDIES

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SUMMARY

Engineering is a people serving profession. What the engineer accomplishes through his work affects society in manifold ways. The engineers are change agents of the society as well as managers of change. Inspite of this reality, the engineers' education and training is inadequate to the extent that it does not enable them to play thier role effectively in this respect. This has forced the engineer into the position of a second fiddle in decision making related to major societal coners.

The paper discusses these issues and proposes addition of new courses in engineering curricula which have relevance to society-engineer interaction and other interrelated aspects of man-management facets of engineers' work. It is concluded that this proposed new curriculum will bring about a dynamic change in the professional integrity and leadership role of the engineers in society. In the present scenario all the benefits of the work done by engineers is taken for granted, whereas, a lot of blame is put on them for spoiling the world and its environment. It is for engineers to remedy the situation through changes in education and training in the colleges, as well as through continuing education throughout their lifetime.

1. INTRODUCTION

In the now well-established defination of engineering, the main concern of engineers is with the creation of engineered systems for the benefit and use of humankind, and subsequent operation and maintenance of these systems during their working life, and replacement thereafter.

Change and innovation are the hall marks of technology and new products and systems are continously designed by engineers for human use. These innovations affect our life style as well as value systems. Over the last two hundred years, revolutionary changes have taken place in social modes as a result of discoveries and innovations in science, engineering, and technology. It is evident that the impact of engineering on human lives is immense. Lately, the work of engineers has come in for adverse comment form the environmentalists who view the impact of engineering on the environment as negative. However, it is also well known that engineers have shown concern for the environment ever since the Industrial Revolution began, and even today they are in the forefront of devising ways and means to prevent damage to world's environment from pollutants and industrial hazards.

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It is the engineers' creed to view his profession as a "People Serving Profession" and towards that end every effort is being made by them. Whatever deficiencies are noticed, remedial action is initiated.

In the following discussion, it has been pointed out that the engineering curricula need some drastic changes in order to restore to the engineeerr a pivotal leadreship role in the society rather than that of a mere technical functionary working at the behest of others. In the present scenario, all the benefits of work done by engineers are taken for granted, where as a lot of blame is put on them for spoiling the world and its environment. It is for engineers to remedy this situation through changes in education and training in the colleges, as well as through continuing education throughout their life time.

2. Engineer's Functions:

Irrespective of the special field of engineering, it will be seen that engineers perform a few of the below mentioned manifold functions :

i) Planning & Design

ii) Development & Research

iii) Manufacturing

iv) Management

v) Marketing & Sales

vi) Operation & Maintenance

vii) Teaching & Research

viii) Entrepreneurship

ix) Consulrtancy Service

Carring out any of these functions involves the competence of the engineer in respect of the following basic skills :

a) Technical known-how

b) Communication skill

c) Social awareness, and

d) Management.

These ingredients of engineer's education and training must therefore be provided in the curriculum in an integrated and balanced manner. At present, the situation in this respect is far from satisfactory.

There is a proportionally higher emphasis only on the technical know-how aspects, with the result that the engineer faults on the remaining three viz. management, communication still, and social awareness . This leads to a situation where the non-engineer, with better skills in these people related areas, overtakes the engineers and leaves them in a subordinate role of mere technically skilled functionaries. Many engineers at midcareer level feel quite frustrated on this account.

3. Society-Engineerr Interaction Studies:

The three subject modules namely, communication skill, social awareness and management have in this study been grouped together and are called "*Society-Engineer Interaction Studies*". It is to be emphasized that these courses do not have only to be given a peripheral importannce but have to be intertwined strongly as an important strand with other parts of the curriculum in order to produce the strong rope that is "engineering".

Team work and leadership function are very crucial to the success of any enteprise. Engineers have to be well groomed in these skills in order to be able to handle practical work situations competently, besides providing leadership and guidance in the management of change in the enterprise. as well as in the society. It has been rightly emphasized (1) that engineering managers have to deal with the six M's of Management viz. *Men,Materials, Machines,*

Methods, Markets and Minutes. Irrespective of the discipline of engineering in which one is working, the management aspects of the work in respect of six elements mentioned above remain unaltered. The engineer has to be made familiar with the fundamental aspects of these topics which are vital for his success in the profession.

An engineer without communicationn skills and social awareness is not very different from a robot who is programmed to carry out manifold functions without relevance, thinking, or discrimination in respect of impact of these functions on the society. Such engineers cannot claim to be serving people with an awareness of siceital concerns and providing new visions and creative leadership for developing a bettter, more harmonious, and ecologically stable world in the future.

4. Level at which Courses are to be offered :

The coverage of the Society - Engineer Interaction Studies envisages, the inclusion of the following topics :

i) Wholistic thinking

ii) Humanities

iii) Communication Skills

iv) Success Skills

v) Management & Enterpreneureship

vi) Co-curricular activities (CCA)

In a four-year programme of engineering studies as is prevalent today, the Courses are proposed to be covered as per the following schedule:

• Wholistic thinking	1st year
• Humanities	2nd year
• Communication skill	3 rd year
• Success skills	3rd year
• Management & Entrepreneurship	3rd year, and 4th year
• Co-curricular activities (CCA)	Every year

If the Course is conducted as per the semester system, then the course work must be carried out in two modules, spread over both the semesters of the academic year, except for the course on *Wholistic thinking* which must be covered with intensity in the very first semester. This course provides the very grounding for the subsequent learning process by the student in a fruitful and *creative mode.*

5. Outline of Course Contents:

The course contents proposed for the above topics are given below. These are just indicative of the coverage and can be improved upon by the individual teacher and by mutual discussion amongst faculty. The idea is to give an integrated and systhetic view of the subject matter.

Co-curricular Activities (CCA):

No formal course contents can be suggested for cocurricular activities which are distinct from Extracurricular acticities in that these are meant to broaden the mental horizons of the student and bring out his creative abilities to fruition. CCA should be viewed as a non-formal interaction between the engineering educator and the student in order to *develop the student's ability to think and act creatively.* CCA should use brain-storming techniques and help students in synthesizing knowledge for the solution of challenging intellectual and practical problems. Student must also be encouraged to develop artistic talents, aesthetic tastes, and cultural values, to round off their personalities.

Wholistic Thinking:

The thinking process, creativity and creative thinking, innovative problem solving, positive, purposive and ordered thinking; getting the best out of human effort; reducing stress and improving well-being.

Humanities:

Social awareness; socio-economic systems; Society, technology and development; Economic planning; Govt and political process. History of humankind; history of science & technology; biographies of renowned engineers; Ethics &Values; personal values; science and humanism - a world view. Ecology and technologival development; Environmental concerns of men; Focus on integration and interdependence of technology and environment. Theories of knowledge; Limits to technological growth.

Communication Skill:

Language; reports, presentation and format; modern means of communication: communication technologies. Art of public speaking. Communication in organization; Listening as a means of vital communication; communication for orderly change.

Success Skills:

The art of living; key skills for success in life; goal setting; team work; attitudes; values; interpersonal skills; career planning strategy; self- awareness; knowledge; commonsense and wisdom; norms of professional success; Profiles of successfull professional peers;Professional ethics; code of ethics for engineers.

Management and Enterprenurship:

Management basics; Industrial operations; productivity; managerial effectiveness; project management; information management; Inventory control; Human resource management and development; team work; leadership; Enterprenurship; Establishing new enterprises; Motivation & effective human effort.

Conclusions:

It would be appropriate to conclude this article with what Peter Drucker (1989) has put forth in his latest book (2). He says that "Management will merge with humanities as a discipline dealing primarily with the issues relating to people, their values, and the requirement of their growth and development. The major challenge of the top management task in managing people would centre round creating a unified view of the enterprise, developing rewards, recognition and caeer opportunities for them".

Only those engineers who possess technical knowledge and societal skill in comunication, and people management, and are imbued with appropriate personal values can rightly accomplish these leadership tasks in the coming years

The propposed curriculum would train the students and provide a sound basis for helping them to achieve the goal of proper economic development within the given parameters of appropriate technology and societal concerns (3).

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