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CHALLENGES IN QUALITY IMPROVEMENT OF ENGINEERING EDUCATION IN INDIA

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Abstract

In India, Engineering Education is being implemented under Ministry of Human Resource Development. Factors contributing for the quality of Engineering education are mainly - financial constraints, trained technical teachers, lack of standardization, lack of practical exposure, lack of priority and other factors. The research discusses the initiatives undertaken for quality assurance in engineering education. It identified the need for development and training of technical teachers in imparting knowledge based teaching and learning, redesigning suitable curriculum, use of multiple teaching resources, introducing ICT added teaching and competency based assessment along with others. The rising need for Industry Institute collaboration emerges out for identification of manpower requirement, identification courses, sector-wise skill profile and development of competency based curricula and learning material, competency based training, assessment & joint certification.

Keywords

Engineering Education, Quality Improvement, Scenario of Industry

1. Introduction

Engineering education has become the most favored and dream degree of Indian Youth but Engineering education in India suffers with poor quality because of will power of policy makers & resource constraints. In India since inception Engineering education is imparted in traditional system. Engineering Education in India is going through a transitional phase. Three decades back in 80's there were very few Engineering Colleges and getting admission in the course of was very difficult. For increased Pace of Industrial Development and coping with liberalization, privatization and globalization Government of India along with regulatory bodies like All India Council of Technical Education (AICTE) opened the sector for Private Investment (Chouksey R.G. and Mehra C., 2010). Many Engineering Institutions at the Apex level were also promoted by Government. Engineering Colleges doubled within span of last 10 years. This increased pace of growth inherited many quality problems. Major factors being lack of trained and competent faculty, lack of support infrastructure etc. Employability skills/competency deteriorated to a great extent and only 20%-30% Engineering Graduates were employable as report by Industry. Therefore, quality is prime concern of Engineering Institutions.

2. Current Scenario of Engineering Education System

In India, formal technical education beginning can be dated back to the mid 19th century. The major initiatives in the pre-independence time included start of the Indian Universities Commission in 1902, Indian Education policy resolution in 1904 and the Governor General's policy statement of 1913, thus stressing the importance of Engineering education, the establishment of I.I.Sc. in Bangalore, Institution for Sugar, Textile and Leather Technology in Kanpur, N.C.E. in Bengal in 1905 and Industrial schools in several provinces. Major developments by the Government of India include: Constitution of the Engineering education Committee of the Central Advisory Board of Education (CABE) of 1943; Preparation of the Sergeant Report of 1944; and Formation of the All India Council for engineering education (AICTE) in 1945.

Based on the recommendations of CABE, The AICTE was set up in November 1945, to stimulate, coordinate and control the provisions of educational facilities and post war period industrial development. At that time, mandate of AICTE basically covered only programs in Engineering and Technology. Just after independence, the growth of industries in the Country

also demanded the need for qualified professionals in other fields, such as Architecture, Business Management, Hotel Management, Pharmacy etc. Although the diverse elements of Management such as Finance, Psychology, Commerce, Economics, and Industrial Sociology were being taught for a long time. In 1954, it was decided by the Government of India, to set up a Board of Management Studies under AICTE to formulate standards and promote Management Education. Other Management Education initiatives taken include: setting up of the National Productivity Council, Administrative Staff College of India at Hyderabad in the late fifties and Indian Institution of Management in the early sixties. Architecture was covered under the Architects‟ Act, 1972. Architecture Education was also placed under the purview of AICTE, For better coordination of the Professional Courses. The AICTE Act, 1987 The AICTE Act, 1987 was passed by the Parliament, to provide for the establishment of the All India Council for Engineering education (AICTE) with a view to ensure proper planning and coordinated development of the Engineering education System throughout the Country, qualitative improvement of such education in relation to planned quantitative growth and the regulation and proper maintenance of norms and standards in the Engineering education System and for matters connected therewith (Chouksey R.G. and Mehrotra V.S., 2007).

3. Current Scenario of Industry and Engineering Education in India

The issue that needs introspection is the relationship between the industry and the curriculum of the technical institutions. Before proceeding into further discussion it will be good to understand the term `industry'. One of the definitions which can be closely related to Engineering education says that any enterprise in which a person is engaged, whether wage employed or self-employed, to earn his/her livelihood'. Over the years, the industry has also undergone a metamorphosis. Though there could be several classifications of the different types of industry, one classification which will help to give a direction to the Engineering education system is based on the functions and sub-functions in relation to the roles the engineers from the technical institutions will undertake i.e. all the industries especially in India (and probably elsewhere also) could fall under two major categories'.

1. Research & Development type of industries (major focus of such type of industries is research and development) i.e. DRDO, all the centrally funded and privately funded research institutes and such others which employ the graduates from the technical institutions.

2. Manufacturing & Service type of industries (major thrust of such industries is on the manufacture of products and the marketing or the services that they provide) i.e. automobile industry, process industries, service industry and the like.

Generally, in India there are relatively very few `R & D' type industries (approx 15%) performing the major function of R & D viz. Indian Space Research Organization (ISRO), Defense Research Development Organization (DRDO) and few others. However, every year such `Industries' employ relatively very few engineering graduates.

Table 1: *Current Industrial Scenario & Curriculum Focus in India*

Curriculum Design & Teaching Focus in Technical Institutions	**Type of Industries in India (Approximate %)**	**Job opportunities for graduates from Technical Institutions**
Currently, major focus of teaching is towards R & D type of industries	MM Industries – 85%	About 85%
	R & D – 15%	About 15 %

The two major groupings of the Industries specified above is also the basis for classification of engineering education institutions into two distinct categories.

- Engineering education institutions of the first categories need to design their curricula to produce `engineering graduates' to take up `R & D' related jobs. Relatively few institutes such as the IITs in India, primarily produce graduates to perform R & D work. IITs are `chartered' to produce graduates to work in the `cutting edge' of engineering and technology.
- The engineering education institutions of the second category are relative more in India, They need to design and implement curricula to produce `engineering technology graduates' possessing competencies needed by the ` Manufacturing & Service type of industries which are substantially more in India (compared to R & D related industries). Therefore, for greater employability of the engineering graduates, the teaching-learning in majority of the colleges need to be directed more to Manufacturing & Service type of industries related competencies so that the students acquire specified competencies that are acutely and currently required by the industry. Secondly, the curriculum needs to be periodically reviewed/ revised to accommodate with changing industrial scenario (Dixit, R.K., 2002; Shymal Majumder, 2008).

4. Quality Affecting Factors of Technical Education

Any system quality is possible only by keeping an opti-mal balance among demands and supply gap of that system. This is also true for quality of technical educa-tion system. Analysis of the scenario of Technical Education in the country reveals that some of the imbalances that affect the quality of technical education are - Lack of resources, Lack of uniform expansion in different states, Lack of need based curriculum, Lack of government investment, Uneven Dispersal of Technical Institutions, Lack of appropriate trained faculty, Lack of faculty development activities (Technical and Vocational Education in India Report, 2008, World Bank Report, 2000).

5. Quality Enhancement Strategies in Engineering Education

The challenges discussed above are responsible for creating a wide gap between what is required by employer in contrast to what Engineering education system is churning out, there by affecting the quality of Engineering education programs. This is also highlighted by number of studies conducted by national as well as international agencies. The percentage of institutes providing quality Engineering education programs are far less than required as mentioned in subsequent paragraph. It is therefore required that institutes providing Engineering education programs must be vibrant enough to geared themselves with latest developments and innovations carried out world over related to various aspects of Engineering education such as Competency Based curriculum design and development, Competency Based curriculum implementation, Teacher training, Resources development, Competency Based performance assessment, evaluation & monitoring system, skill development, capacity building etc. Thus quality subsystem helps in quality assurance of engineering education system. Some of the quality enhancement strategies and ini-tiatives are listed as follows: management and administration of engineering education, reforms propagated through TEQIP, sensitization and awareness program, networking with industry, mentorship of various colleges by industry, replicating success story of NPTEL, mandatory pre-service training of faculty, encouraging public–private partnership, learning from the above three best practices, private players in engineering education, accreditation of engineering colleges.

6. Conclusion

Quality of Engineering Education should be a centre stage issue in the technical education system if India, if we wish to leverage its demographic dividend, else it may become a demographic liability. There is need for optimize utilization of the capacity already created in the higher education sector. Private sector has been in the forefront in creating new capacity. These need to be encouraged further by providing conducive frameworks and incentives as well as encouraging PPP arrangements. For improving the quality all the parameters related to technical education system via, faculty, supporting staff, curricula, lab manuals, text book, examination system, laboratory work, project work need to be oriented/updated, so that the input and processes to technical education system is in tune with expected output which is globally employed. Initiatives undertaken for quality assurance in engineering education during XI plan include Engineering education in flexible mode through modular courses of varying duration with credit transfer facilities. Some institutes like IITs, NITs, BITS, VIT etc and corporate universities like Nirma, JP, Dhirubhai Ambani have their own pedagogical models for effective technical training. The pass outs of these institutions have technical knowhow and skills required by the industries. The new initiative undertaken need to be strengthened in future with more numbers of government and private institutes adopting the same for providing quality programs for the masses.

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