

INNOVATIVE TRENDS IN ENGINEERING EDUCATION

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Engineering education in India has witnessed a major change over the past few years. Substantial increase in the demand for high-quality education has led to the adoption of Information and Communication Technologies for extending the outreach of education. The employability of the engineering graduates produced by the Indian education system is poor. The poor quality of engineering education should be addressed first. It should be addressed by national apex bodies concerned with engineering education like UGC- NAAC, AICTE- NBA and ABET have been looking for ways and means to bring out reforms. These apex bodies should address the modern technical educational system which would improve the quality of the technical education in Indian Universities and affiliated colleges. The mission of this in engineering education particularly is set to mould the students with required knowledge, skill-set and personal traits. This will facilitate them to get suitable employment and build career and contribute towards nation building. The present educational system should be outcome based one. The review of some of these technology, enhanced initiatives already taken up by the government of India, as well as by some of the leading institutions in the country. In this paper few problems are addressed.

Introduction

Technical Education is one of the most important needs of the mankind. It makes all round development of an individual. No subject is of great importance than that of technical education. It is the men and women in any country that make and build a powerful nation and it is the engineering education that is supposed to build those men and women. Technical education prepares an individual to face the challenges of life by bringing out the best in him/her. If this is true, the engineering education should be relevant to the needs of the time and address the problems of the society. It is most importantly, it should be available to all. Technical Education in India has seen phenomenal growth during the last decade with surge in the number of institutions providing graduate, postgraduate and doctoral level courses. Engineering programme of studies in universities throughout the world has become multidisciplinary in nature since it deals with dynamic systems drawn from, disciplines of civil, mechanical, electrical, electronics,

computer science etc. Thus a fresh engineer is not only expected to know the basic principles of given course but also able to apply the knowledge to technology as per environmental conditions. He/she should develop employable skills, but most of the students are lagging the employable skills and it should be addressed by the every institution.

University education is a key force for modernization. It should be addressed number of challenges. The quality of technical education depends on the cultural, academic, economic policy, political, administrative factors, general funding and population growth. At university level/Institution level quality education is a form of human capital development. Engineering colleges in India churn out lakhs of engineering graduates every year. However, only fraction of them are considered to be employable. The fresh engineer should develop employable skills of global standards through technical education and training. The country is not able to produce world class caliber, technical

manpower due to wide variations in the quality of technical education within category of engineering institutions. Such a situation has arrived because of a very large mismatch between engineering education and requirements at the workforce in industries, MNCs etc.

To prepare skilled workforce in India the existing colleges need to be upgraded to the quality standards of IITs. The institutions should provide and address innovative technology of the highest order to meet complex needs of technology of nation as well as world. Therefore, technical education systems have a major role in achieving and contributing in development of skilled man power and creation of innovative technology. To achieve excellence in technical education, the following defects that need to be tackled and addressed.

Wide gap of technical institutions ranging from IITs to NITs to Government Engineering Colleges and self financed Colleges.

Faculty shortage due to the mushrooming of number of institutions.

Outdated recruitment, promotion, incentive policies and procedures are hampering the recruitment and retention of good quality faculty in the most of the institutions.

Minimal avenues of regular trainings and qualification up gradation for faculty and staff are adversely affecting the quality of education imparted.

Lack of Industry-academia collaboration.

Absence of modern-teaching aids.

Obsolete curricula not being able to meet the rapidly changing needs of the industry.

Absence of research, development and innovative culture.

Institutions are not able to make meaningful contributions in technology enhancement and innovations.

Under production of Masters and Doctoral degree holders.

Non availability of qualified teachers adversely affecting the quality of technical education.

Today's technical Education requires a lot of innovative

changes. Few innovative changes are Multimedia Instruction, Innovative teaching Learning models, Outcome based Education, and Accreditation

Multimedia Instruction

A picture is better than thousand words and word with picture is still better than million words. Multimedia instruction is more effective when words and pictures are presented. The multimedia teaching consists of text, images, audio, video animation. Hence the chalk and talk method must be supplemented with multimedia teaching Every student 10% by reading, 20% by hearing (verbal), 30% by seeing(visual), 50% by talking and presentation and 90% by doing. The changes in engineering education paradigms should be implemented. At present few education institutions deploying technology in class rooms and emphasizing on development of digital skills of mathematics, reading and writing fundamentals. The changing technology paradigm will inspire the students and help them to acquire knowledge, skills and abilities to get good employment. The changed technology may be starting with usage of pagers, mobile phones with camera and internet, TV games computers etc. The modern class rooms should equip with laptops, big interactive screens and softwares with internet which will captivate them to learn more. The modern tools with multimedia in class rooms turn the teacher into a guide instead of lecturer. By doing this the passive learning will be converted into active learning.

Innovative Teaching Learning Models

Teacher is a great innovator. Teacher should perform any duty with utmost commitment, and professionalism. Perhaps, it is this meticulous care and judicious use of time, energy, resources and opportunities which have made him what he is. He should be a remarkable teacher, an able administrator, a man of vision and originality. He should have enthusiasm and passion for teaching passion for learning and research, personality and attitude humor etc, made them to become his staunch admirer. Therefore, every institution should appoint a good engineering teacher.

Anyone who stops Learning is old, whether at the age of twenty or at the age of eighty. The teacher should guide

without dictating, participants without dominating. To teach a lesson a teacher has to learn twice. The learning should be student centered one facilitated by teacher with goal of development. A teacher can provide plenty of opportunities and resources out of which a student can choose. There is a pressing need for communication among teachers, researchers and developers of the standards and systems. Learning is creativity, creativity leads to thinking, thinking provides knowledge, and knowledge makes the students great. Good Education doesn't lie in big monumental buildings and gigantic structures, financial resources but it will lie in the good attitude of mind of the students and this attitude reaches to altitude. Good education without character, Politics without principles, Science without humanity, Commerce without morality, are all not only useless but also positively dangerous. Hence, every student should have good attitude. ICT can play a major role in transformation of technical education and learning. ICT can enhance educational reforms by enabling teachers and learners to move away from traditional approaches to teaching and learning. ICT can be defined as "the study, design, development, implementation, support or management of computer-based information system, particularly software applications and computer hardware." ICT deals with the use of electronic computers and computer software to convert, store, protect, process, transmit, and securely retrieve information. Technical education for human development in the learning society requires collaborative learning and involves focusing on building knowledge. For all modern teaching-learning methods institution should have internet facility with broadband connectivity. Students should also be encouraged to participate in extra-curricular activities in sports and games for a holistic development with the college bearing all expenditure incurred for such participation.

There is a growing demand from teachers for effective guidance on good instructive practices, designing of activities and assessments based on the various theories of learning, a number of instructional design models are emerged. Few of them are used for developing the class room instructions to enhance the quality of the course. The well known models are ADDIE model,

Kirkpatrick model, Blooms' Taxonomy model and Adult learning model.

ADDIE Model

It is an outcome based teaching and training. It represents a guideline for building effective training and performance support tools in five phases. They are: analyze, design, develop, implement, and evaluate. Florida State University initially developed the ADDIE model to explain, for military interservice training that will adequately train individuals to do a particular job and which can also be applied to any interservice curriculum development activity. The five phases of ADDIE model are : analysis, design, development, implementation and evaluation.

Kirkpatrick's Evaluation Model

It is a four level outcome based model. In this model students react to learning, through learning students gain skill and knowledge, with the help knowledge performance will be improved and because of good performance good results are obtained.

Bloom's Taxonomy Model

Bloom's taxonomy improves from the lower order thinking to higher order thinking. First of all it is an outcome based model. It is a classification of learning objectives of engineering education. It is named for Benjamin Bloom. It divides educational objectives into three "domains": cognitive, affective, and psychomotor. The goal of Bloom's taxonomy is to motivate educators to focus on all three domains, creating a more holistic form of education. Bloom's taxonomy is considered to be a foundational and essential element within the education community.

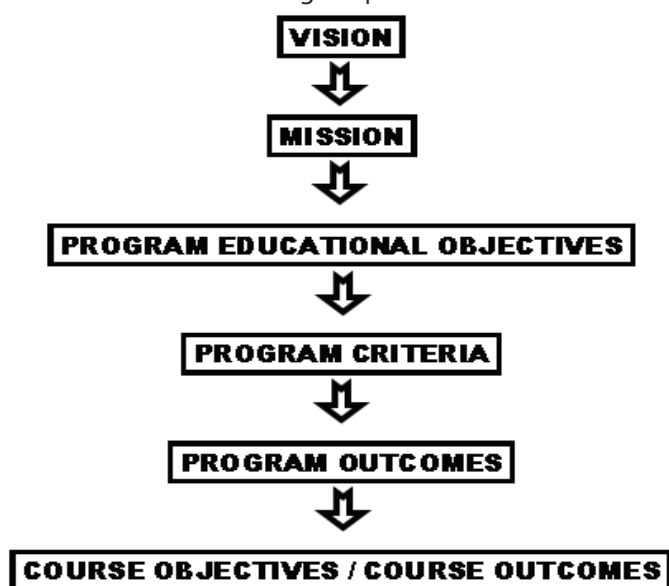
Adult Learning Model

It is an art and science adults and it is derived from andragogy. Adult learning technique as compared to young students is a life experience which offers an advantage to the adult learners. In this model every one has to know, experience, self concept, readiness, orientation and motivation.

Outcome Based Education

Every Institution should have a goal to build a topnotch Institution of Technical Excellence that is capable of producing high caliber engineering professionals needed in the nation building. Every Institute should provide a vibrant, creative and challenging environment to develop potential in relevant skills that are marketable and sought by today's employers. Every engineering program should demonstrate that their students should attain the following outcomes to get employment:

1. an ability to apply knowledge of mathematics, science, and engineering.
2. an ability to design and conduct experiments, as well as to analyze and interpret data.
3. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
4. an ability to function on multidisciplinary teams.
5. an ability to identify, formulate, and solve engineering problems.
6. an understanding of professional and ethical



Interlinked Factors

Outcome based model

Accreditation

Accreditation is an exercise in quality assessment of the programmes. Accreditation is a process by which educational programs of institutions are reviewed to determine the standards of quality engineering. Accredited status is not permanent; it has to be renewed through periodic check. The need of accrediting technical education programmes has grown tremendously in order to impart high quality engineering education by quality Institutions in the wake of unprecedented growth in the number of educational Institutions and the programmes offered by them.

Conclusions

The planning and designing of an education system should have objectives of facilitating the students to get good employment.

The present engineering education system should be outcome based one.

Every institute should have good funding facilities to improve quality of engineering education.

The institution should not aim for increasing of the seats in each branch, but it should try for quality improvement.

Every institute should develop innovative teaching learning practices.

Accreditation must be compulsory for good quality engineering man power development.

