

# Engineering Education System in Modern India: A Paradigm Shift

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**Abstract:** Technical education transforms a human being into a human resource. It enables mankind to be a resource creator. The technical education scenario in India is not at all satisfactory. The present paper investigates the lacuna in the curriculum in Indian Universities. It also proposes the means and methods of improving the curriculum to make it relevant and efficient. The present paper has proposed revolutionary changes to produce employable engineers. It is hope that the regulatory authorities will take sincere cognition of this and prepare model educational system of engineering.

**Keywords:** Engineering, Education, Skill,

## 1 Introduction

### 1.1 The education

Education is a process of manifestation of potential inherent in mankind. It is the most referred definition given by Swami Vivekananda. The basic idea in the definition is that the education is not a process of injecting the knowledge rather is a process of lighting

the fuel inside the student. The teacher initiates the process of lighting. The student must have the potential inside. It is analogous to the process of churning the curd and getting the butter. The butter does not come out from the churning; it is already there in the curd. Churning assists in extraction of butter.

### 1.2 Technical education

Mankind by birth is a consumer. It consumes resources from nature to fulfill its needs. Education imparts ethos in mankind to make him human being. Technical education transforms a human being into a human resource. It enables mankind to be a resource creator. In simple terms it links mankind with employment. Employability is the supreme objective of technical education.

### 1.3 The Indian technical manpower

The potential and caliber of Indian engineers can never be questioned. The Indian IT engineers drive the IT industry in USA. NASA has significant proportion of Indian engineers. Indian civil engineers dominate the construction market of Middle East Asia. India has become a missile power and atomic power owing to its engineers only. The glorious story of successful Mars Mission is a certification of excellence of Indian engineers.

However, the coin has a darker side too. There is a large fraction of engineering graduates who are not

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only unemployed but are unemployable also. It is an issue of serious concern.

#### 1.4 Scenario of Technical education in India

The technical education scenario in India is not at all satisfactory. The premium institutes like IITs and NITs have severe staff deficit to an order to 30 to 50%. The private institutes are working with sub-standards in spite of several regulatory authorities including AICTE monitoring over them. The glitches in the monitoring systems are evident. Result is that there are 60 – 70 % engineering graduates are unemployable. This is a dangerous situation.

There are several reasons to this situation. One of the prime factor that hinders the employability of engineers is the curriculum. The curriculum is obsolete and irrelevant in many cases. It severely lacks in practical exposures.

The present paper investigates the lacuna in the curriculum in Indian Universities. It also proposes the means and methods of improving the curriculum to make it relevant and efficient.

It is anticipated that the proposed changes will revolutionize the Indian Technical Education System and will lead to paradigm shift in it.

## 2 The proposed paradigm shift in the Indian educational system:

The proposed technical education system proposes certain radical changes in the existing system. They are discussed as follows:

### 2.1 Entry level criteria

Presently the entry to the graduate level is after 12<sup>th</sup> standard. However, the proposed system proposes the entry after 10<sup>th</sup> level. In this system the student will undergo an Elementary level skill development program. It will be identical to the existing ITI courses. The country of Denmark has made it a compulsory requirement for any kind of higher education. 'Skill Test' will follow it. The skill test will not be a formal examination rather it will be a practical assessment of the skill.

### 2.2 Engineering Foundation Course & Skill Enhancement Activities

Prior to the actual introduction of engineering courses, there must be a foundation course, which the engineering aspirant must undergo. This course must focus on skill development activities, both the technical skill as well the relevant soft skill. Emphasis must be given on soft skill development. The areas of soft skill focus should include Emotional Intelligence, Problem Solving skills, Presentation Skills, Time Management, Interpersonal Skills, Leadership & Management, Business Etiquette, Communication Skills, and English proficiency. The achievement of skill should not be measured by formal examination. Rather it should be assessed by skill test that should be object-oriented.

The engineering foundation course should include Introduction to Engineering Principles, awareness about Engineering Applications, aptitude in Information Technology, understanding of Engineer and Society, proficiency English, fundamental exposure to Applied Physics, Applied Chemistry, Applied Mathematics, development of Critical Thinking, and Troubleshooting ability, sense of Design, and Artistic Sense. It is important to be noted that the foundation course is important for the holistic development of student. It is comprehensive and exhaustive.

The successful completion of foundation course should be ascertained by skill test.

### 2.3 Pre requisite for engineering graduation

Graduation as such is a higher-level course in engineering. It is proposed that the graduation must be preceded by a diploma level course. After qualifying diploma level course the student will have a choice to continue or not the graduation. In case the student drops out, s/he will at least hold a diploma to enter into the field of engineering.

The curriculum of the diploma course must be rational. It must include two month complete and extensive training at industry level. The successful completion of first year must be ascertained by a conventional examination. The second year of diploma must include applied subjects and completion must be ascertained by skill test. The third year of diploma should include an internship of six months. It should be followed by the exit tests. The concept of the exit test is that once a student has developed proficiency in a particular test, s/he will be

qualified in that particular subject and will acquire certification in that. Thus the final completion of diploma will not depend upon a single formal examination. Rather it will be a gradual process in which the student will get certifications as and when s/he gains a particular skill.

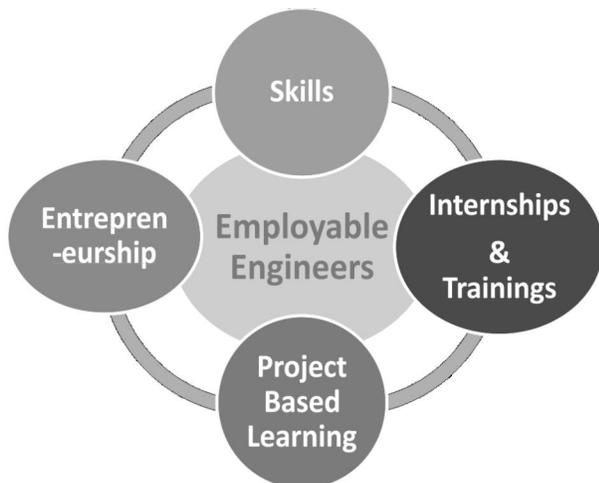
#### 2.4 The pattern of graduation course

The graduation course must be discipline specific. The candidate will undergo a conventional examination as well as skill tests to ascertain the overall suitability. The graduate course will emphasize on project-based learning. The ability in a particular skill will be judged by exit test. Thus, the completion of a graduation course will be a gradual process, unlike a single shot process like the present system. The graduation course should be finally completed by a six-month internship of the student.

#### 3 The pattern of post graduate course

The postgraduate program in engineering must be a specialization oriented. Technical Knowledge Proficiency Tests must ascertain the completion. The postgraduate curriculum must also include project based learning. Entrepreneurship development program must be an integral aspect of this course. The post graduate engineer must be skilled in specialized courses and must have entrepreneurship abilities also. The post graduate engineer must not be a job seeker rather must be a job creator.

The overall view of engineering educational system can be described by figure 1.



**Figure 1 : An over view of engineering education system for employable engineers**

#### 4 . Proposed assessment and evaluation system

Assessment of acquired skills is a crucial aspect of engineering educational system. The proposed assessment system has following aspects:

1. Multiple Choice Question Test
2. Short Answer Test
3. Descriptive Answer test
4. Essay writing
5. Performance or Skill Test
6. Report Writing
7. Project Development ( Minor & Major)
8. Presentations
9. Oral Examinations
10. Group Discussions
11. Field Visits

#### 5. Conclusions

India is a country with great heritage of knowledge and culture. It had ancient universities like Nalanda and Takshshila where international students and scholars visited. Presently also it has world's premier institutes and best students. Yet its technical education system needs paradigm shift. The present paper has proposed revolutionary changes to produce employable engineers. It is hoped that the regulatory authorities will take sincere cognition of this and prepare model educational system of engineering. This will ascertain the employability of engineers and lead the nation prestigiously on the voyage of economic prosperity and strength.

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