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SCENARIO OF ENGINEERING EDUCATION IN INDIA

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ABSTRACT

There has been enormous advancements in Indian Engineering education over the past few decades. This magnification of engineering education has been devastatingly due to privately funded educational institutions. Momentarily, India has emerged as the massive pool of engineering talent among the global education domain. Today's engineering education is facing challenges of employment in knowledge intensive, productivity conscious, technology savvy industry environment. Apart from employability issues, maintaining the quality; nurturing innovation and entrepreneurial skills with development of path breaking technological ideas is the need of an hour. With this preview the authors present the scenario of present technical education in India. This paper discusses on major challenges in engineering education and puts forth some possible reforms in evaluation strategies to inculcate quality in technical education. This study explores opportunities for teachers, administrators and management to contribute in a collaborative manner to foster quality technical education.

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INTRODUCTION

Evolution of technical education

In ancient India education system was based on concept of Gurukul where the Guru, the teacher and Shishya, the student resided together in the ashram as an extended family of the Gurus. The Gurukul system was a comprehensive learning centre where the student gained knowledge and also learned independence, self-control which helped them develop their personality. The world's first known university was established at Takshshila in 700BC. The medieval period saw emergence of the caste system. Depending on the skills major castes like Brahmin, Kshatriya, Vaishya, Shudra came into existence. The Brahmin's were trained in performing religious activities and imparting knowledge. Kshatriya's were the warrior class, Vaishya's were the business class and so on. The economy was skill oriented, various technical skills like pottery, carpentry, painting, weaving, and embroidery flourished and the era progressed to become a knowledge economy (Subbarao, 2013).

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The students were trained based on the skill set of agriculture, craft, cattle rearing, pottery, performing religious rituals and many more. Most of these were inherited from their ancestors. The pre Independence era experienced rise of industrial revolution. It became necessary to invent and use machines to reduce human labour. Significant changes happened in almost all fields to reduce human effort and increase productivity. Technical education came into existence in Glasgow School of apprenticeship in the year 1790, which imparted knowledge in schools and colleges. India was ruled by British, who wanted to understand the topography of the country and to do that they established a Survey school in Madras (Chennai) in 1794. This was to make people proficient in land survey to assist British Surveyors. Thompson's Engineering College, Roorkee was the first Engineering college opened in 1847 and taught Civil engineering. Subsequently other colleges like Calcutta College of Civil Engineering, Poona College of Engineering, Industrial School, opened up across the country. There were 38 Technical Education institutes with 2490 seats that were established before independence (Historical development of technical education in India). The post-independence era was a turning point for technical education. There was a need for education more in technical streams for overall technological progress of the country.

Numerous Committees were formed to review the status of higher technical and polytechnic education in India from 1948 onwards. India's growth hinged on knowledge economy and had skill sets that ranged from professional, conceptual, managerial, operational, and behavioural to interpersonal and interdisciplinary. Currently the number of Engineering Institutes in India are on the rise and the total number has crossed 6000. As the world is getting globalized, the knowledge and skill sets are getting multiplied many folds and have become more complex.

Current Circumstances

Although there are more than 6000 engineering colleges all over India, the quality of education imparted, the evaluation systems, the calibre of students, the role of teachers and administrators needs more thought than ever before. Over many decades remarkable efforts and contributions have been made by various industry experts associated with engineering education to directly or indirectly improve the quality of technical education standard. As a result the teaching learning methodologies have continuously improved over time. Over the time linkage of theory and practical is well established and its up-gradation as per the industry requirement is well taken. The qualifying entrance examinations for students who seek admission to Engineering stream help them analyse their calibre to pursue a course in Engineering. The semester-wise evaluation patterns have been changed to continuous evaluation patterns to assess the students intermittently and thereby help them to review and improve performance objectively. The introduction of various appraisals i. e. self, peer, students for teachers to improve the performance of the teacher and to introspect and motivate themselves have been introduced. The qualifying entrance examinations for students who seek admission to Engineering stream help them analyse their calibre to pursue a course in Engineering (Historical development of technical education in India).

Initiatives by the Government of India

Government of India has also taken effort to improve technical education by introducing schemes under Indian Society of Technical Education (ISTE), Technical Education Quality Improvement Programs (TEQIP), establishing technical bodies at the national and state level (AICTE, DTE) to evaluate the quality of technical education. Various committees are appointed to analyse and introduce schemes to improve technical education in various 5 years plans. The institutes are assessed and graded by various accreditation bodies (NBA, NAAC). Gradual improvement with regards to various funding and scholarships availability, skill development courses as per the market requirement, improvement in quality of resources, teaching learning methodologies is the outcome of such initiatives. With all these initiatives there are challenges which act as a road block in the improvement of technical education in India and these challenges need to be addressed (Present Scenario of engineering Education: Shodhganga).

Challenges

For the second largest populated country in the world, the necessity of more number of institutes for technical education is appropriate. As a step to cater technical education to more number of students in the country there has been a tremendous growth in the number of engineering college in the last 2 or 3

decades. This has in turn deteriorated the quality of education due to the poor admission policies adapted by some institutes, availability of qualified and experienced teaching/technical staff, standard/ benchmark infrastructure. The evaluation policies adapted by some of these newly established institutes are also compromised. Larger the numbers of graduates passing out lesser are the number of job opportunities. The availability of jobs in market enhancing technical skills and giving an opportunity to implement them to empower them practically are scarce. The number of graduates with sound technical knowhow being less, it is challenging for industries to recruit, train and further retain them. The process of improving and sustaining the quality in engineering education require consistent review and relentless efforts from students, teachers and other stakeholders also certain policies need amendment.

Necessity of Industry oriented Curriculum

The technical man power in industries will be mostly drawn from various engineering institutions in the country. The Engineering graduates have to be technically and conceptually sound. Certain Engineering institutions have taken steps to tie up with the industry and cater a course where industry requirements are understood. The academia and Industry work hand in hand to ensure that the theory and related laboratory assignments are designed understanding the market requirement. Some engineering institutions now offer integrated courses so that the student completes the graduation and post-graduation. Internship have been introduced towards the end of semester. Furthermore six-sigma in education would help achieve perfection. Implementation of six-sigma while executing various tasks involved in the teaching learning process to achieve perfection should be considered (Durgaprasad, 2012). Various study techniques like mind mapping, can be introduced.

Imbalance of technical knowledge, soft skills and value addition programs

There is a greater need to impart high quality engineering education to produce technically skilled and creative man power in India. Efforts are taken by the curriculum designers to produce graduate who when employed are ready for the work place. Curriculum is designed so that the engineering graduate is well equipped with a balance of technical knowledge and relevant soft skills including communication skills, inter-personal skills, creative thinking skills, and the ability to cope with changing situations, ability to be a solution provider.

The significance of being organized and the benefits of the same are inculcated amongst the students. The Academia should focus on developing interdisciplinary talent ensuring that the graduating student should be multifaceted and versatile. The academic performance alone cannot be the indicating parameter of a successful student. The overall personality of the student should be well supported with his awareness on current affairs, participation in group discussion along with the academic proficiency. Introduction to quality circle conveying significance of group study should be inculcated. Student should be well acquainted with the concepts and have a sound practical knowledge. Introduction of interdisciplinary subjects will help a student develop an understanding of all spheres of engineering domain.

Unavailability of qualified and competent teachers

Motivation and counselling should be very essential for overall development of the student. Sudden improvement would not be possible and should not be expected in any student. There would be a gradual progress in the study patterns, behavioural aspects and organizational skills. Productive behaviours that are systematised into habits make the work easier. It should be a continuous process by means of which teachers can inculcate good habits in a student making him ready to face the challenges.

Lack of support from Administrators/Management

Accomplishing various duties like conducting lectures, performing administrative duties allocated, upgrading academically/pursuing higher education, contribution towards research, maintaining and analysing records, redundancy of work at times to ensure the performance of various accrediting bodies are met deteriorates the efficiency of a teacher. There needs to be a balance between the teaching-learning process and research as a job of a teacher. Engineering institutes need to understand the inclination of the academician as a researcher or an administrator and deploy the work accordingly. This would keep them motivated and ensure job satisfaction. Recruitment should be based on technical knowhow, presentation and teaching skills, contribution towards research or other administrative activities rather than category he/she belongs to. Practicing good HR policies would help teachers remain motivated and improve their efficiency.

Lack of effective learning habits among students

Proper studying habits and planning will give step by step improvement in the results. It would be helpful to prepare a schedule of all activities meticulously and act accordingly. Depending on the individual study pattern and ability, gradual progress can be made in number of hours to put in and efficiency. One should try and reach the ultimate and it is possible to reach only through self-discipline (Alfredo Soeiro). Studying a subject and summarising it to get a bird's eye view is very crucial. While learning new ideas one should be able to correlate the knowledge to what is already known. It is good to understand a topic conceptually and relate it practically to understand the application of the same in day to day life. Reading and understanding the concepts, mathematical expressions, practicing the same, retention of practiced concepts will help a student reproduce it in an examination. Practical implementation is possible if there is sound theoretical knowledge. Similarly when a concept is practically implemented it helps in retention of theoretical knowledge. Student with firm desire and dedication to reach a goal will reach the destination irrespective of any hurdles he has to face. Self discipline and being punctual, hardworking and sincere should be inculcated amongst students and nurtured throughout.

Need to develop effective evaluation Methods

Exam centric evaluation method to judge students based on their academic performance where very less weight age is given to assess conceptual knowledge gained.

As a result of which the graduates produced get passing grades without having a very sound practical knowhow. Large percent of students do not get placed in the right industry (Simon Perry). Various universities and autonomous Engineering institutes have tried to empower the academics by introducing various interdisciplinary courses, skill development courses, courses to pursue hobbies helping improve overall personalities. The lacunae here in some cases are the evaluation system where the teaching and grading is done by the same faculty introducing certain leniency or malpractices.

Necessity of unbiased appraisals

Unbiased appraisals will give an opportunity for a teacher to improve. Fair feedback, be it from a student, peer and higher authority would help introspect a teacher and come up with improved/enhanced qualities. Students should be educated/counselled on importance of their feedback, its impact on a teacher's career. Teachers should not be relaxing the rules for students to ensure good feedback.

Conclusion

The evaluation and grading of various Engineering colleges in India is a critical process. It is difficult to assess/gauge them considering common parameters of evaluation as most of them are dependent on various factors. The contribution from every stake holders of the teaching industry would help improve the quality of education. Management, Industry Experts, Teachers, Alumni, and Students all have a responsibility for the development of the organization. If each one of them execute their duties appropriately most of the challenges would be met.

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