International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 02 Issue: 06 | Sep-2015 www.irjet.net p-ISSN: 2395-0072

QUALITATIVE ASSESSMENT FOR IMPROVEMENT OF TECHNICAL EDUCATION USING TOTAL QUALITY MANAGEMENT: A SURVEY

Harpreet Singh[1], Rahul Malhotra[2], Kulbhushan Rassewatt[3]

[1] *M.Tech (Student), Department of E.C.E, GTBKIET CHHAPIANWALI MALOUT, Punjab, India*
[2] *Director & Principal, GTBKIET CHHAPIANWALI MALOUT, Punjab, India*
[3] *Assistant Professor, Department of E.C.E, GTBKIET CHHAPIANWALI MALOUT, Punjab, India*

Abstract *- **Technical education in India has faced enormous changes after independence to this day. The exponential growth in technical education has, however, not translated into any significant growth in the number of quality graduates acceptable to industry; causing a huge unemployment due to degradation of quality education at the input level as well as at the output level. This work urges the Institutions to focus on maintaining quality of education for making Technical education in India more competitive and fruitful for graduates and suggests various strategies to attain the same such as adopting TQM and hence taking enhancing standard of Indian Technical education the International ones.***

This Thesis discusses the current state of engineering education in India which shows the factor responsible for degradation of technical education at the lowest level and the highest level. The various problems which affect the quality of technical education are : Lack of curriculum planning, Inadequate physical resources & lack of optimum utilization of infrastructure, Ineligible/fresh pass out joining the teaching profession, Teacher centered instructional processes, Greater emphasis on theory, rather than practical performance, Evaluation system encouraging memorization on the part of students, Inadequate physical resources & lack of optimal utilization.

These drawbacks can be solved with help of various methods suggested in this work. These methods include Synergistic Relationships, Continuous Improvement and Self Evaluation, personally and collectively, recognition of the organization as a system.

TQM practices prove to be remedy for the declining Quality standards. It result in the system cost effectiveness and had improve technocrats satisfaction and to develops confidence. TQM also improves the creativity of faculty and students, provides job satisfaction to all employees and enhances healthy competition for development of the institution. These proposed methods of TQM help in eliminating the waste of resources at all levels.

This work attempts to analyze the current state of engineering education in India and continued with explaining the need for quality management practices and its role in enhancing the effectiveness of engineering education in India. The thesis has made an attempt to make specific suggestions for strengthening the present system of engineering education in India.

KeyWords: *Technical Education, Quality Management, etc…*

1. INTRODUCTION TO TECHNICAL EDUCATION

Technical education has been defined in many ways; some of the definitions are given as under:

- Technology education is the study of technology, in which students "learn about the processes and knowledge related to technology". As a field of study, it covers the human ability to shape and change the physical world to meet needs, by manipulating materials and tools with techniques **[1].**
- Technical education**,** the academic and vocational preparation of students for jobs involving applied science and modern technology. It emphasizes the understanding and practical application of basic principles of science and mathematics, rather than the attainment of proficiency in manual skills that is properly the concern of vocational education **[2].**
- Technical education, as the term suggests, is different from regular education. Its ambit, as per our laws, primarily comprises training and research programs in sectors like engineering, technology, architecture, town planning, management, pharmacy, applied arts and crafts, hotel management and catering technology, etc. **[3].**
- Technical Education plays a vital role in human resource development of the country by creating skilled manpower, enhancing industrial productivity and improving the quality of life of its people. Technical Education covers programs in engineering, technology, management,

architecture, town planning, pharmacy, applied arts & crafts, hotel management and catering technology **[4].**

- technical education, teaches skills which are directly related to a specific job or profession, as opposed to academic education which looks at a subject in a more abstract way**[5].**
- Those aspects of the educational process involving, in addition to general education, the study of technologies and related sciences and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupation in various sectors of economic life are called technical education **[6].**

Vocational and technical programs are shorter; more focused training and educational programs that prepare their students for immediate employment. Although both types of schools are considered trade or career schools, they do vary a bit in their focus. According to the U.S. Department of Education, technical schools teach the theory and science behind the occupation, while vocational schools take a more hands-on approach to teaching the skills needed to do the job successfully**. [7]**

1.1 TECHNICAL EDUCATION IN INDIA

Education in India is provided by the public sector as well as the private sector, with control and funding coming from three levels: central, state, and local. Under various articles of the Indian Constitution, free and compulsory education is provided as a fundamental right to children between the ages of 6 and 14.

From the first Five-year Plan onwards, India's emphasis was to develop a pool of scientifically inclined manpower. India's National Policy on Education (NPE) provisioned for an apex body for regulation and development of higher technical education, which came into being as the All India Council for Technical Education (AICTE) in 1987 through an act of the Indian parliament. At the federal level, the Indian Institutes of Technology, the Indian Institute of Space Science and Technology, the National Institutes of Technology and the Indian Institutes of Information Technology, Rajiv Gandhi Institute of Petroleum Technology are deemed of national importance.

The Indian Institutes of Technology are among the nation's premier education facilities. Since 2002, Several Regional Engineering Colleges (RECs) have been converted into National Institutes of Technology giving them Institutes of National Importance status.

The Rajiv Gandhi Institute of Petroleum Technology: The Ministry of Petroleum and Natural Gas (MOP&NG), Government of India set up the institute at Jais, Rae Bareli district, Uttar Pradesh through an Act of Parliament. RGIPT has been accorded "Institute of National Importance" along the lines of the Indian Institute of Technology (IIT), Indian Institute of Management (IIM) and National Institute of Technology (NIT). With the status of a Deemed University, the institute awards degrees in its own right.

The UGC has inter-university centers at a number of locations throughout India to promote common research, e.g. the Nuclear Science Centre at the Jawaharlal Nehru University, New Delhi. Besides there are some British established colleges such as Harcourt Butler Technological Institute situated in Kanpur and King George Medical University situated in Lucknow which are important center of higher education.

Central Universities such as Banaras Hindu University, JamiaMilliaIslamia University, Delhi University, Mumbai University, University of Calcutta, etc. too are pioneers of technical education in the country.

The number of graduates coming out of technical colleges increased to over 700,000 in 2011 from 550,000 in FY 2010. However, according to one study, 75% of technical graduates and more than 85% of general graduates lack the skills needed in India's most demanding and high-growth global industries such as information technology. These high tech global information technologies companies directly or indirectly employ about 2.3 million people, less than 1% of India's labor pool. India offers one of the largest pools of technically skilled graduates in the world.

1.2 VOCATIONAL EDUCATION

India's All India Council of Technical Education (AICTE) reported, in 2013, that there are more than 4,599 vocational institutions that offer degrees, diploma and post-diploma in architecture, engineering, hotel management, infrastructure, pharmacy, technology, town services and others. There were 1.74 million students enrolled in these schools. Total annual intake capacity for technical diplomas and degrees exceeded 3.4 million in 2012.

According to the University Grants Commission (UGC) total enrollment in Science, Medicine, Agriculture and Engineering crossed 6.5 million in 2010. The number of women choosing engineering has more than doubled since 2001**[8].**

2. OBJECTIVES OF TECHNICAL EDUCATION IN INDIA

Generally there are two types of education at higher education level-general and technical. All the colleges and universities impart general education which is constantly engaged in performing teaching functions only. But technical education is something different from general education. Technical education is that science education which acquires expertness in the field of “technical know-now”.

There are various types of technical education institutions which impart technical training for development of skilled manpower in the students. These are engineering, medical, veterinary, commerce and agriculture etc. Further the educational system of technical education is of two types- institution -based and industry-based in institution based system students seek admission to receive theoretical knowledge and practical work.
So education and training proceed in collaboration with each other. But in industry-based intuition workers undergo training to get promotion to higher posts. Whatever may be the types of institution in the education system of technical education, it is a program me of development of skilled manpower.
It develops love for honest workmanship and cultivates in him a desire for efficiency in a particular vocation. The National policy on Education 1986 and its revised formulations (1992) has laid emphasis on setting up a national body covering higher education in general, agricultural, medical, technical and other professional fields.
The Policy states that "The reorganization of Technical and management Education should take into account the anticipated scenario by the turn of the century, with specific reference to the likely changes in the economy, social environment, production and management processes, the rapid expansion of knowledge and the great advances in science and technology."

The objectives are as follows:

(1) To develop interest for creative and constructive work.
(2) To develop positive attitude towards science and technical education.
(3) To develop skill and expertise among students.
(4) To improve the situation regarding man-power information.
(5) To organize Program of computer literacy on wide scale.
(6) To offer the Program through distance learning process, including use of mass-media.
(7) To encourage students to consider "self-employment" as a career option.
(8) To provide training in entrepreneurship through modular or optional courses in degree or diploma programs.
(9) To strengthen the community polytechnic system appropriately to increase its quality.
(10) To keep abreast of modernization and technological changes for being competitive in the global market in order to accelerate the process of industrialization.

Now-a-days technical education has become very important due to the development of science and technology. In order to increase the relevance of technical education, more research should be undertaken as a means of renovation. This research for development should focus on improving present technologies and enhancing production and productivity **[8].**

3. SCENRIO OF TECHNICAL EDUCATION IN INDIA

The history of technical education in India can be traced to Epic Period (1000BC) and Vedic period (Prior to 500 BC) when numerous technical skills such as carpentry, smithy, foundry, and weaving were part of education. Later during medieval India, the vocational skill reached great heights as it is evident from the findings of the archaeological remains of the period

However, the modern cult of technical education began in India with the establishment of "Survey School" at Madras (Now Chennai) by the English traders in 1794. Besides assisting the British surveyors, the School provided training to Indian personal in modern land survey. Later on, technical education spread to other parts of the country and was transferred from generation to generation
The Industrial Revolution was a period from the 18th to the 19th century where major changes in agriculture. Manufacturing, mining, transport, and technology had a profound effect on the socioeconomic and cultural conditions starting in the United Kingdom, and then subsequently spreading throughout Europe, North America, and eventually the world. The Industrial Revolution marks a major turning point in human history. Almost every aspect of daily life was eventually influenced in some way

India has witnessed many changes in Technical education from time to time. This has been described on the basis of respective time ranges as described in **Table 1**.

3.1 TECHNICAL EDUCATION: 1992 ONWARD

Since Independence in 1947, Technical Education System in India has grown into a fairly large-sized system, offering opportunities for education and training in a wide variety of trades and disciplines at certificate, diploma, degree, postgraduate degree and doctoral levels in institutions located throughout the country. In the year 1947-48, the country had 38 degree level institutions with intake capacity of 2,500 and 53 diploma level institutions with intake capacity of 3,670. The intake for postgraduates was 70. There was rapid expansion of the system in the next 20 years. By 1967-68, the number of degree level institutions had increased to 137 with intake capacity of 25,000; and for diploma to 284 institutions with intake capacity of 47,000. In the next 10 years (in 1977), the system capacity increased only marginally to admit 30,000 students for degree courses, 60,000 for diploma courses and 6,000 for

postgraduate courses. The system capacity increased very rapidly in the next 20 years, with the major role being played by the private sector **[9].**

The 1990s were, of course, a period when the Indian economy had just opened up, and the country's technology sector finally found its feet. Quantity of technical graduates was pretty much low and there was a need for expansion in capacity of technical education. India has observed rapid growth in number of technical institutions after 90's.Right from 1980; there were only 794 technical institutions in India. By 1990, the value increased to 1165 but major growth was observed in the time period 1990-2000 showing the value reaching 3487.

3.2 NATIONAL POLICY ON EDUCATION 1986: INDIAN SCENARIO

The National Policy on Education (NPE) 1986 amended in 1992 lamented on the poor equipment of education in our country lambasted the defect of the existing system and charged the system pointing out that 'little consideration was given to the employability of university graduates and or the absorptive capacity of the job market.' The apex body in charge of the higher education in India, the University Grants Commission (UGC) took note of the emerging demands for 'a whole range of new skills. From the graduates of humanities, social sciences, natural sciences and commerce, as well as from the various professional discipline. At the whipping of the NPE and acting on the understanding of realities, the UGC established a Curriculum Development Cells (CDC) for 27 subjects, mandating them for 'modernizing the courses and restructuring them into unit courses and to develop alternate models with emphasis on learning.' The UGC also identified 35 vocational subjects with an 'emphasis on providing knowledge and skills required for entry into gainful employment, particularly self -employment.' But, these are not enough. It was also the time when NPE highlighted the need for reorganizing the technical and management education system to effectively deal with the management processes and rapid expansion of knowledge and advances science and technology. The NPE clearly states that technical education and research should be closely related to industry. Practical training should form an integral part of technical education and there should be continuing review of the technical manpower needs of the country. Such close coordination between technical education and industry was unknown during the pre-independence period. Close cooperation between technical education and industry has been further strengthened in recent years due to certain innovations which have been introduced in the system of technical education in the country.

3.3 Sandwich Courses

One such innovation was the introduction of "Sandwich Courses" (also called "Co-operative Courses) under which a student spends specified periods alternately in an educational institution and in industry. Each period of study in the institution is matched closely with the corresponding period of industrial work so that the entire course becomes a coherent whole of theory and practice1. The system of sandwich courses is applicable to the training of various types of students e.g. degree course engineering students, diploma course technicians, craftsman etc. However, the pattern of sandwich course is changed according to the nature of training and the role which the student is likely to play in industry or in the socio-economic setup of the country on completion of education. NPE also highlighted and laid the specific guidelines for the qualitative and quantitative development of technical and management education sectors, establishment of linkages amongst the concerned agencies, manpower assessment and technical education forecast increasing effectiveness of technical education management system, proper delivery systems, measures to achieve greater cost effectiveness and generation of resources through suitable means. It also turned the UGC's efforts on autonomous colleges, redesigning courses, State Councils of Higher Education, Accreditation and Assessment Councils, etc. With it, came the creation of self-financing capitation fee based colleges that started to supplement the State and Central Government Engineering Institutes and Colleges. This trend has continued till date1. This policy also gave impetus for the involvement of private and voluntary organizations or agencies in setting up such colleges. It lead to the extra ordinary growth of technical education system at that point of time and continued further.

Year	Total no of Technical Institutes
2000	3487
2005	5260
2006	5696
2007	6434
2008	7793
2009	9191
2010	10185
2011	10662
2012	10949

Table -1: Growth of Technical Institutions in India

4. SCHEMES FOR EXPANSION AND UPGRADATION

The Eleventh Plan envisages setting up of 8 new IITs, 6 new IIMs, 10 new NITs, 3 IISERs, 20 IITs and 2 new SPAs. In establishing these institutions, the scope for Public

Private Partnership (PPPs) will be explored. Seven selected technical institutions will be upgraded subject to their signing MoU on commitments to making reforms in governance structure, admission procedure, etc. and aligning with character of the national institutions. In the location and selection of sites for the new institutions, clustering will be a key consideration and the States will be incentivized for co-locating institutions in strategic locations. **[10]**

12th plan on Technical education: 2012-2017

The Planning Commission constituted a Working Group on Technical Education for the formulation of the XII Plan as per notification at Appendix-IB. The Working Group on Technical Education met thrice and on the basis of the deliberations, this Working Report has been finalized.

The Working Group on Technical Education comprised of four Sub-Groups:

I. Research and Innovation
II. Technology-enabled learning
III. Strengthening State technical institutions
IV. Skills and employability.

Our Vision is to realize India's human resource potential to its fullest in the Higher Education sector with equity and inclusion. The three pillars of our strategy in higher education are expansion, inclusion and excellence.

The Mission of the Department of Higher Education is:

(i) Provide greater opportunities of access to higher education with equity to all the eligible persons and in particular to the vulnerable sections;
(ii) Expand access by supporting existing institutions, establishing new institutions, supporting State Governments and Non-Government Organizations/civil society to supplement public efforts aimed at removing regional or other imbalances that exist at present;
(iii) Initiate policies and programs for strengthening research and innovations and encourage institutions – public or private – to engage in stretching the frontiers of knowledge;
(iv) Skill development so as to reap the benefits of the demographic advantage of the country;
(v) Promote the quality of higher education by investing in infrastructure and faculty, promoting academic reforms, improving governance and institutional restructuring.

As 11th plan is considered, it mainly focused on increasing intake capacity (GER), starting new educational institutions, enhancing the capacity of existing ones, starting new programs etc. There were 81 centrally funded institutes of technical & science education (CFTIs) out of which 30 were created during the XI FYP:

In 12th FYP, Central Government is implementing the following schemes/programs:

- **National Mission on Education through ICT (NMEICT)**
- **Technical Education Quality Improvement Program assisted by the World Bank (TEQIP)**
- **Indian National Digital Library for Science & Technology (INDEST)**

5. Polytechnics under coordinated action for skill development

The objective of the scheme is to enhance employment oriented skilled manpower through polytechnic. Under the scheme, financial assistance is provided to the State/UT Government for setting up of 300 new Polytechnics in unserved and underserved districts of the country. Out of 300 Polytechnics, financial assistance has been provided for setting up of new Polytechnics in 277 districts. In addition financial assistance is provided to the existing Government/Government aided Polytechnics for strengthening of infrastructure facility so far 500 polytechnic have been provided for assistance of Rs. 10/20 lakhs each. [11]

6. Setting up of 20 new Indian Institute of Information Technology (IIITs)

The Ministry of Human Resource Development (MHRD) is setting up 20 new Indian Institutes of Information Technology (IIITs) to address the increasing skill challenges of the Indian IT industry on a Public Private Partnership (PPP) basis. As per the approved scheme, the partners in setting up the IIITs would be the Ministry of Human Resource Development (MHRD), Government of the respective States where each IIIT will be established, and the industry. The capital cost of each IIIT would be Rs. 128.00 crore to be contributed in the ratio of 50:35:15 by the Central Government, the State Government, and the industry respectively. The project is targeted to be completed in nine years from 2011-12 to 2019-20. During the current year it is expected that 5 such institutions would be set up. The rest would be taken in the XII FYP.

7. Expansion in the AICTE approved institutions

In addition to the unprecedented expansion in the numbers of the premier CFTI s like IITs , IIM, NITs, IISERs etc., the number of AICTE approved institutions in the country during the period has more almost doubled which rose from 4491 in 2006-07 to 8361 in 2011-12 and annual intake from 907822 in 2007-08 to 2046611 in 2011-12. Similarly, number of polytechnics has increased with corresponding rise in intake from 417923 in 2007-08 and 1083365 in 2010-11.

8. QUALITY IN TECHNICAL EDUCATION

Quality in Education The quality is defined by British Standards Institution, 1978 as "The totality of features and characteristic of a product or service that bear on its ability to satisfy stated or implicit needs".

Quality in Education can be defined as:

- The development of intellectual skills and knowledge that will equip graduates to contribute to society through productive and satisfying engineering careers as innovators, decision makers and leaders in the global economy (R. Natrajan, 1999)
- The ability of a product to satisfy the requirements of the customer (Roma Mitra et al., 2007) and quality in engineering education is an open system at various levels i.e. students, teachers, curriculum, institutional and state level (Kulkarni P.,1999)
- Quality depends on the institution infrastructure, faculty's research and development activities and industry institution interaction etc. (Mallesham P., 2005)

(SangeetaSahney et al., 2004, 2007) define Quality in education from TQM perspective. They believe educational institution as an open system i.e. management system, a technical system and social system. It includes within it the quality of input in the form of students, faculty, supporting staff and infrastructure, the quality of processes in the form of the learning and teaching activity and the quality of outputs include examination results, employment, earning and satisfaction.

Some more definition of TQM are given below-
• TQM is an integrative philosophy of management for continuously improving the quality of product and processes to achieve customer satisfaction (Mohanty&Lakhe, 1994).
• The main philosophies of TQM include customer focus, continuous improvement and process - orientation in teaching and learning process (SitalakshmiVenkatraman, 2007)

Need of Quality culture in Technical Education:

TQM is needed in Technical Institutions for the some of the following reasons:
1. To be growth oriented and have a good reputation
2. To be never out of market
3. To be capable of maintaining customer confidence.
4. To be cost effective.
5.To improve customer satisfaction and to develop confidence.
6.To use the creativity of faculty and students for development of the institution.
7. To provide careers to the faculty instead of jobs
8. To provide job satisfaction to all employees
9. To enhance healthy competition
10. To be an example to other institutions
11. To eliminate the waste of resources at all levels.

Growth of technical institution is largely based on quality system and creativity of everybody. Quality of technical education normally has two important aspects

- Design inbuilt quality- The design by curricular courses and course material, their structure should develop high class quality of graduate students who can meet the requirements of customers internal or external.
- Manufactured quality – Graduate student should comply with a set of standards of the institution. The faculty involved in teaching is creative, innovative, qualified with up to date knowledge. The technical education should be comparable to international standard and must be cost effective.

- **Review for Technical education: 1992-2002** In this phase, as seen from the data shown above, the Quantity of technical graduates was appreciably less whereas there were many jobs in the Industry. Industry was on boom and several plants were setup to meet the country's need. Quality of technical education was not up to the mark and due to a large number of jobs available, there was a lack of workforce available for the companies and they would hire graduates irrespective of their competence. Almost all of the technical graduates were getting jobs in desired profession. So, employment rate was high enough for technical graduates at that time. Government felt need to strike a balance between the quantity as well as quantity of technical graduates as there was a shortage of the both. So, several schemes/plans were implemented to boost the Technical education area to meet the demand of the industry.

- **Review for Technical education: 2002-2012** In this decade, there was an enormous growth in number of technical institutes across the country. In previous Decade, the employment rate for engineering graduates was fair enough and other graduate streams were not getting enough jobs as compared to the engineering stream. So, this reason compelled more and more

students to get enrolled in engineering. In initial years of this decade, employment rate declined but was fair enough to meet the demands of the society. But afterwards, India saw rapid increase in workforce which caused steep decline in employment rate. Instead of that, more and more of Technical institutes were setup across the country causing imbalance between number of jobs and number of pass outs.

Hence, Quality improved but not sufficient enough to cater the needs of the Industry. Even though some of the institutes like IIT's and NIT's were improvising the quality standards and their pass outs got jobs in reputed MNC's whereas the situation in state colleges was deteriorating due to high un employment rate in last years of this decade. So this decade saw a slight increase in Quality whereas a sudden increase in Quantity and hence companies were unable to accommodate the available workforce.

- **Review of Technical education: 2012-onwards** several technical institutes are being set up in India every year. There were almost 15000 technical institutes in India in 2014.To cite an example, there are 3345 engineering colleges approved by AICTE in India and their intake capacity is 14, 73, 871.As a result, 20-33% out of the 1.5 million engineering graduates passing out every year run the risk of not getting a job at all, points out Economic Times. For those who do, the entry-level salary is pathetically low, and has stagnated at that level for the last eight-nine years, though the prices of everything from groceries to vehicle fuel have shot up during the same period.

Whether it is the below-par quality of education provided by private colleges or the stagnating (if not shrinking) demand for the number of engineers, the huge number of engineering pass outs – which, incidentally, is more than the total number of engineers produced by the USA and China combined together, face a bleak future.
A large percentage of the 'fortunate' ones who do end up getting a job after an engineering degree take up jobs which are well below their technical qualifications, since the supply far outnumbers the demand. They do not get jobs for which they are qualified or 'suitable' jobs, which makes the matters worse. According to a report by **dnaindia.com**, the trend of engineering seats going vacant in the state engineering colleges has continued this year (2014) too as approximately 58400 seats remained vacant in the Central Admission Process for engineering admissions. Since Thursday was the last day to submit the form through the CAP process, 1, 06,600 students submitted their applications whereas the intake capacity for the state engineering colleges is 1, 65,000.Last year (2013), there were 1, 62,159 seats available in the state colleges and out of that 1, 07,545 seats were filled and 54614 seats remained vacant.

9. FACTORS AFFECTING THE EFFECTIVENESS

In order to achieve the esteemed goal of producing well qualified and trained technocrats an institution has to work efficiently and effectively. Every technical institution strives towards imparting technical competence to the student by creating a healthy environment for their personality development and finally enabling them to achieve higher grades in their respective fields. The literature clearly indicates that there are various factors which directly or indirectly influence the effectiveness (Quality) in technical education. [12]

Here we group these factors under seven broad heads as discussed below:
[A] Administration
[B] Infrastructure
[C] Teaching Effectiveness
[D] Students
[E] Interaction with Industry and Society
[F] Extra-Curricular Activities
[G] Research and Development

- **Administration**

The administration of technical institution play vital role in its functioning and its responsibilities includes-
1. Setting objectives for the functioning of the institution.
2. Formulating policies and programs to achieve it.
3. Controlling all the functions which directly or indirectly affect the efficiency.

- **Infrastructure**

"We shape our institution and our institution shapes us", Winston Churchill. An institution must have adequate land, necessary buildings, hostels, supporting facilities, canteen, transport, library, well equipped laboratories and workshop availabilities of teaching aids like OHP, LCD projector, seminar halls conference room and last but not lest advance computing facilities. These facilities are initial prerequisite for any technical institution which must be present to ensure proper functioning of Technical Institution.

- **Teaching Effectiveness**

The quality of students coming out of the universities and colleges largely depends upon the quality of the teaching staff employed. The frontier of science and technology are doubling by leaps and bounds to cope with it its necessary, for the faculty to be constantly in touch with the same and try to update themselves through enhancing their qualifications attend various quality improvement programs like workshops, seminars, conference, summer and winter school etc. is the responsibility of the institution to provide a proper and conductive atmosphere for the teacher.

- **Students**

The students constitute the input of the whole system. The accomplishment of the process of imparting knowledge is greatly affected by environment in which the students are put and also on their self-zeal to learn and excel. A student's own awareness and interest for learning and the inherent aptitude to grasp together with his sincerity, regularity and honesty are key to his successful accomplishment of his course. It is also necessary to boost the morale of the students by motivating the students. All these aspects when carefully implemented and nurtured bring about a total turn around in the quality of education.

- **Interaction with Industry and Society**

The fresh engineers from technical institution need to be offered training in industries to give them first hand practical exposure. There is a need for general recasting of curricula, with industry oriented programs and to establish a close link between an educational program and social needs.

- **Extra-Curricular Activities**

Good education in its totality must include the overall development of the student and must not restrict to training in a specialized discipline. The institution must organize various extra- curricular activities like arranging group discussions, debates, technical quizzes, extempore, guest lectures, seminars and promote NCC, NSS, sports, games, cultural and co-curricular activities. These extracurricular activities enhance and improve the inherent capabilities and skill of the students.

- **Research and Development**

Research and development activity is very much essential to survive in this competitive world. The institution must have proper infrastructure to carry out research and development activities. The students must have access to scientific Journals and other modern library facilities. There must be availability of qualified and experienced research oriented and motivated faculty. Adequate financial provision must be present to carry out research activities **[13].**

10. PROBLEMS REGARDING TECHNICAL EDUCATION IN INDIA:

There are lots of problems being faced in Technical education as explained in the previous Article. It has been remarked that 'India can emerge as a knowledge power only if an appropriate architecture for higher education is put in place. Indian youth have demonstrated their inventiveness and energy in the past. Higher education that channels this capacity for innovation will unleash the latent potential of India's demographic dividend. Engineering education, which is part of higher and technical education, is passing through a critical phase and it is imperative for the system to improve quality of its various sub-component parts. [13]

- **Non-campus residence**

The premier Institutions of technical education in our country has been fully residential with negligible daily interaction of residents with outsiders. Privately owned engineering institutions have limited capacity in-campus hostel and majority of them cannot accommodate even half of their students. Those who have even for a few don't have the infrastructure and facilities for extracurricular and co-curricular activities. Thus students are bound to go outside to fulfill their personal needs. When a student moves out of the campus daily, their interaction out of the class and campus to others is least contributory for their career growth. It further becomes sometimes very difficult for a student to decide between personal natural needs and deviations when the whole domain of the interaction of the society of metros like city is open for them and only a few foot steps away.

- **Impact of Social environment**

The impact of social environment in current scenario is dominant due to the fact that most of the students are living in the private homes and hostels rather than institute hostels or knowledge parks. It has lot of impact on their concentration and self-study. They are also some times losing their priceless time in making self-arrangements for daily living. They also many times meet continuously with heterogeneous group of people to tackle their petty issues, thus in the process a lot of deviations and disturbances are added into their mind. Such a situation is harmful for long term concentration and hard work orientation of the students to the curriculum, especially

engineering & technology which needs a higher degree of concentration and effort to get optimum understanding of the concepts.

- **Impact of revolution in IT**

Revolution in the information technology sector during the last decade has been phenomenal. It has enabled the new domain of help for verbal and written communication through internet. It has now become an integral part of the technical education. It has lot of useful information, reference materials, encyclopedias, books, research articles, journals and information that may be needed to the students. There are also case studies, solutions, institutional and industrial information. It enables and provides opportunity to the students to get better pictorial presentation of the processes, systems, machines, devices and connection diagrams.The social sites, networking, chatting and web surfing just to serf have become one of the biggest time killers of the students. Private net cafes provide them all the attractions to further add to their deviation. It has further worsened by smart phones. Students keep on chatting and sending sms even in the class rooms occupying back seats and removing beeps. This problem is accelerating together with advent of new technology and speed of the net.

- **Mismatch b/w Curriculum and Industry needs:**

The demand pattern of the Indian engineers has also been changed tremendously during last one and half decades. There was a time when the default meaning of an engineer in India had been getting job of a class I/II officer in a public sector utility. The country had a very few manufacturing, research and development units. Now a day's situation is quite different. Indian economy has grown up a lot and is poised to grow a lot more. India now has manufacturing, research and/or assembly unit of almost all the major multi-national companies of the world. Indian software industry is known for its achievements. The challenges have also been increased with the increased opportunity in the technical sector. Even the utilities have become more technology, knowledge and skill demanding than ever. But most of the institutions are not equipped with to provide the technical education adequate to the industry needs. The regulatory bodies can't escape from their share of the unrealized responsibility for not making the needed change in their accreditation process after this transition in the industrial demand.

- **Lackness of proper infrastructure:**

Quality of the output is directly proportional to the availability of the infrastructure in the institute. A lot of the enabling facilities are needed for adequate self-learning of the students after class room learning. It includes adequate hardware, software and computers in the laboratories, books and journals in the library, availability of high speed internet facility, ICT tools for better pedagogy, playground for the students and adequate capacity auditorium to organize seminars and conferences for department as well as institute. The adequacy of these facilities in the ratio of the strength of the students is crucial for adequate overall professional growth of the students. Most of the technical institutions of the metro cities and NCR are facing one or more of such type of problems. Many of them take the locational advantage in their educational business but don't provide the same to students. The regulators can play an important role to improve the situation though initiatives had been pessimistic so far.

- **Lackness of intellectual Capital**

This is one of the worst addressed problems in the deregulated regime of the technical education. There are various indices to measure the adequacy and best utilization of the intellectual capital of the institute. These are adequacy of the faculty student ratio, qualification of the faculty, designation of the faculty as per their qualification and experience, overall cadre ratio of the faculty in the department, growth perspective and incentive to the faculty, faculty appraisal, research & development facilities in the institute, annual research budget of the institute, adequacy of the technical, non-technical and supporting staff of the institute. As the ratio of the technical and supporting staff has not been clearly defined by state and central regulatory bodies thus the institutions do a lot of proliferation providing almost tends to nil non-technical and supporting staff. This saving of the institutes has direct bearing with the quality of the learning and overall growth of the students **[41].**

- **Lack of exposure**

Given that the end goal of technical education is a placement in a college, the amount of exposure given to students about the industry is also very little. It is not until the final year of their college that they begin to understand what the industry really wants. An early exposure to industry can give students an idea of what is relevant in the industry, which they can learn in their own time.

- **Lack of employment skills**

To me why students lack job-specific skills is because of these two reasons –Our education systems is more academic oriented. It gives more thrust on acquiring bookish knowledge rather that understanding and using its application. The picture is slowly changing, but there needs to be a perfect balance in these two.

Skills which are missing:

- **Communication**–Both written as well as oral
- **Teamwork**–good social skills
- **Problem solving**–Logical thinking
- **Basic Numeracy** –Numerical ability
- **Leadership**–Go get together attitude
- **Adaptability**–For new ideas, situations, technology
- **Creativity** –Out of the box thinking
- **IT-**general proficiency in MS office and computer hardware

- **Lack of proper educated teacher**:

The qualification of teachers, which are a crucial element in technical education, but there are number of institutions which are not following AICTE prescribed qualifications. The basic reasons include lack of funding to the institute and management problems.

11. PROBLEM RESOLUTION

Input:

With massifcation of engineering education, the quality of students taking admission has gone down. Entrance examinations have lost their significance and students lack the pre-requisite knowledge, skills and attitudes essential to pursue engineering education. The following strategies can help in improving quality of input:

• Entrance examination should have a component of aptitude and students should pursue branch of engineering for which they have the aptitude.

• A cut-off score should be decided so as to admit only capable students in engineering.

• Bridge courses should be offered to fill-in the gaps that exist in the pre-requisite knowledge and skills. These courses can be offered online. [14]

Curriculum:

The curricula of various programs of engineering and technology needs urgent attention in the light of changes that are taking place in the disciplines, technology, workplace, globalization and internationalization.

• Curriculum should be aligned to graduate attributes as accepted by Indian Accord

• Board of Studies (BOS) constituted for designing of curricula of various programs should have mandatory representation of industry.

• A mechanism needs to be instituted to obtain employer's feedback regarding the performance of pass-outs in order to introduce changes in curriculum.

• All curricula should be designed on a modular pattern with credit-based system of evaluation in order to provide flexibility and allow self-pacing to the learners.

• A number of specializations need to be introduced in each discipline so as to enable the students to select courses as per their interests. There may be provision for core courses and open electives.

• Courses related to humanities & social sciences, management, professional ethics & values, environmental engineering, sustainable development, engineering and project management need to be included in curriculum.

• Subjects like Science and Humanism can be included to sensitize the students towards the needs of society and the role science can play in meeting those needs. .

• Soft skills such as communication, creativity, leadership, working in teams, interpersonal skills, lifelong learning must find a place in the curriculum of various courses

• There should also be provision for auditing of courses.

Resources

Physical, human and information and financial resources need to be strengthened.

• The laboratories and workshops need to be modernized as per the latest trends in the various disciplines to provide industry like environment to students.

• Industry should set up laboratories in technical institutions to provide latest technological exposure and train students according to their requirements.

• Ensure optimal utilization by having double shifts, offering continuing education programs and skill development programs, sharing facilities and resources with other institutions

• Attract and retain competent faculty by giving higher salaries and incentives for good performance.

• Develop faculty competence through training.

• Generate e-content for independent study by students.

Instructional Processes:

In order to develop higher level abilities and engage students in teaching learning process, it is essential that:

• Case studies, Problem- solving, Problem based learning, Projects, Group Discussion and Brainstorming should be introduced in order to involve students actively in classrooms.

• Plan as to what is to be learnt by students, allow students to explore, provide adequate practice to learners and then allow them to perform (Plan- Explore-Practice – Perform)

• Project work-both minor and major should be included to help students to apply the learnt knowledge and skills to find solution to problems. Students can be encouraged to undertake live problems of industry as projects.

• Structured industrial training at least for six months in the last semester or in a phased manner over a period of last two years should be provided to students.

• Competitions can be organized for students to motivate them to take up novel and challenging projects and find innovative solutions to the problems.

•Joint supervision of project work dealing with industry problems need to be encouraged.

• Expert Lectures and Seminars by Industry Personnel need to be organized on a regular basis.

• A variety of techniques of evaluation should be used to assess students' performance in theory and practical work and evaluation should be aligned to course outcomes.

• Co-curricular activities such as debates, declamation, competitions, sports etc. need to be organized to develop generic skills among students.

Research:

In order to create a culture of research, institutions need to:

• Provide scholarships to students for undertaking research projects.

• Provide financial support to faculty and students for attending and/ or presenting papers in conferences and seminars with-in and outside India.

• Organize seminars & conferences in emerging areas.

• Organize industry-institute meets to gather information about the problems faced by industry

• Make it mandatory for the students of M Tech /ME to publish at least two papers before submission of dissertation/thesis work.

• Train faculty and students in the area of research and intellectual property rights

• Undertake collaborative research projects with other technical institutes, institutes of higher learning, national research laboratories, industry etc.

• Provide access to online journals-national and international

Suggestions for Management:

The following strategies need to be adopted:

• Academic, administrative and financial autonomy need to be granted to institutions to quickly respond to changing needs and remain relevant.

• Each institution should formulate a strategic plan for itself and closely monitor the implementation of the same and take corrective measures to achieve its vision, mission and objectives.

• Empower employees by involving them in decision-making. Set-up committees such as academic monitoring committee, purchase committee, library committee, co-curricular committee, research committee, employee and students welfare committee etc. involve various stakeholders.

• Education Management Information System (EMIS) needs to be created for efficient management and ensuring transparency and accountability in the system **[15].**

Suggestions for Students:

- **Score well:** Your scores are your first impression .Most of the companies filter out the resumes in the first stage comparing the scores. So, your obvious first step in getting a job as an engineer would be to score high marks in your exams.
- **Bring originality to your resume:** Your resume should reflect your individuality and making it different would draw the attention of the employers.
- **Get some training and practical experience:** The projects and training modules that are done in engineering colleges are primarily useless and when the graduates look for jobs as a fresher, they neither have skills nor confidence to carry out any project independently. You can pursue a free course or take up online paid courses where you can create a real world project. If you have time, it would be a good idea to join some company in your vacations to get real time experience and training.
- **Build your expertise:** the major trend among engineering students is joining short term courses and trying to collect more and more certificates during their vacations.It is better to specialize in one particular field than being a jack of all trades. Determine your goal and work towards it.
- **Stay informed:** The economy is changing rapidly, so are the needs of the industry. You need to be aware of the current trends and requirements.
- **Work on your confidence and communication skills:** Honing up your communication skills is very important as it is as important to convince your employer about your skills as it is to develop your skills. Again, as an employment seeking graduate, you need to work on your confidence to impress your employer and to grab opportunities as they come by

12. CONCLUSIONS

Technical education plays a major role in any country's economy. It is considered relatively tough in India as compared to the other courses such as Bachelor of art, Commerce, Law, religious, physical education and even different disciplines of the science. . The better opportunities have been created to join the course during the last decades but the infrastructure has .not been created or grown adequately for the proper growth of the students. Now the root cause of drawback of system lies in the Quality of Technical education. Now it is time to accelerate the reforms process to improve the quality of technical education. Government should regulate the number of graduates in a particular discipline according to the number of jobs available in that area and Affiliation should only be given to those colleges only which ensure the Quality standards of the discipline. Institutions failing to do so should be banned for approval. Not only focusing on institutions, government should improvise the Curriculum and make it more Industry friendly. Emphasis should be on the latest technologies and not be an outdated learning. Institutes should focus on more of practical work than the theory part as followed in developed nations.

Regulators can insure it easily without curbing the opportunity of students to join the technical education as the redundancy factor of the seats is very high in all the state as compared to the eligible number of students. The benchmarking may also be done to better tackle the issue. Institutions of national repute may be considered as role model. Intermediate and sudden in addition to scheduled inspection type of rules must come in effect to regulate the quality of technical education in the country.

TQM practices to be adopted by every institution may prove to be remedy for the declining Quality standards. Which will ensure institutions of being growth oriented have a good reputation and to be never out of market and to be capable of maintaining customer confidence. It may also make the system cost effective and will improve customer satisfaction and to develop confidence. TQM also strives to use the creativity of faculty and students, provides job satisfaction to all employees and enhances healthy competition for development of the institution. Moreover it serves as an example to other institutions and helps in eliminating the waste of resources at all levels.

On the basis of survey, the following improvement are being suggested to enhance quality of technical Education

- Job security for the faculties should be ensured.
- Proper rewards should be given to motivate the students
- More tie up's with Industries to provide better training and learning opportunities to teachers as well as students
- Emphasis on academics and strict follow up of the guidelines by the institute
- Motivating the faculty to play their multiple roles more effectively
- Attitudinal change in the management to work for efficiency, productivity, and excellence
- The student's evaluation system to made more practical rather than theoretical and must also be reliable
- Inspiring students and teachers to take more initiative in using better Teaching -learning practices
- Focus on learning and developing innovativeness and creativity in the institutions
- Providing self-learning facilities to students and yet make them successful
- Management responsiveness to the qualitative improvement improves the result.

By following these practices, we can improve the Quality of Technical education and hence make the system more efficient and eliminate the gap between supply and demand of technical graduates.

REFERENCES

[1] Prof. T. Sreenivas, "Quality in Engineering Education – A critical Review", International Journal of English Language Literature and Humanities (IJELLH), Volume III, Issue IV, June 2015, pp.674-693.

[2] Ramesh Unnikrishnan, and Shine N Das "Technical Education In India: Challenges And Prospects", International Journal of Research in Management & Technology (IJRMT), Vol. 4, No.1, February 2014,pp.20-23.

[3] MP Poonia and PK Tulsi, "Building Excellence in Engineering Education in India", IEEE Global Engineering Education Conference (EDUCON), 18-20 March 2015, pp. 624-629.

[4] Dr. Yog Raj Sood, Dr. RajnishShrivastava and Dr. Naveen Kumar Sharma, "Importance of Technical Education System in Present Scenario of Information Technology", International Journal of Information Technology & Computer Science (IJITCS), Volume No : 19 , Issue No : 2, March 27 – 28, 2015,pp.01-06.

[5] Prabhakar Tiwari, SN Singh and Omveer Singh "Challenges to Under Graduate Students in Deregulated Technical Education", IEEE International Conference in MOOC, Innovation and Technology in Education (MITE), 2013, pp.340-342.

[6] Dr. U.P.Kulkarni and Prof. K.C.Shindhe "Innovative Workflow for Accreditation Process to Ensure Quality

Engineering Education in India", IEEE International Conference on Teaching, Assessment and Learning for Engineering (TALE), Aug2013, pp.507-514.

[7] Dr. V.P.Gosavi, "Threat Of Vacant Seats In Engineering Colleges: Reasons And Remedies", American International Journal of Research in Humanities, Arts and Social Sciences, 2(1), March-May, 2013, pp. 75-80.

[8] Dr. Deepak B. Phatak, "Adopting Moocs for Quality Engineering Education in India", International Conference on Transformations in Engineering Education (ICTIEE), 2014, pp.1-11.

[9] B. Kumar and S. R. Paul "The Role of Academicians for the Betterment of Technical Education", International Journal of Engineering and Applied Sciences (ISSN: 2320-2491),Vol. 2, No. 7, Dec 2013- Jan 2014, pp.12-18.

[10] Ramachandran Mahadeven , N C Shivaprakash and S K, Bose "Quality Assessment of Technical Education In Indian Engineering Institutions", IEEE Global Engineering Education Conference (EDUCON),March,2013,pp.973-977.

[11] Prof. Shivani and Prof. Shashi Khurana "Technical Education System In India: Present Scenario", International Journal of Research in Economics & Social Sciences(IJRESS), Volume 2, Issue 10,Oct 2012,pp.39-49.

[12] Hemant Abhyankar, Deepak Tilak and SiddharthJabade "Enhancing Quality of Technical Education – Looking Beyond", International Conference on Engineering Education (ICEE), July 18–22, 2010

[13] Rajesh R. Jaware, V. P. Wani ,and Mukesh Kumar Pandey "Fostering Entrepreneurship through Technical Education for Sustainable Growth of Small and Medium Enterprises in India", IEEE IEEM,2008

[14] Pradeep Shukla and Bhuwan Gupta "Advances in Technical Education: Indian Scenario", International Journal of Research in Electronics & Communication Technology, (IJRECT), Dec- Feb (2011- 2012), Vol-1, No.2, pp.8-23.

[15] Anil R. Sahu, Dr R. L. Shrivastava and Dr R. R. Shrivastava "Key Factors Affecting the Effectiveness of Technical Education– An Indian Perspective", Proceedings of the World Congress on Engineering (WCE) ,Vol 2, July 2 - 4, 2008,pp.1232-1236.

BIOGRAPHIES

Rahul Malhotra
Director & Principal,
GTBKIET CHHAPIANWALI
MALOUT, Punjab, India

Kulbhushan Rassewatt
Assistant Professor,
Department of E.C.E,GTBKIET
CHHAPIANWALI,MALOUT,
Punjab, India

Harpreet Singh
M.Tech (Student), Department of E.C.E, GTBKIET CHHAPIANWALI MALOUT, Punjab, India