TOTAL QUALITY MANAGEMENT BASED IMPROVEMENT OF TEACHING AND LEARNING METHODOLOGY IN ENGINEERING EDUCATION

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ABSTRACT : *The teaching and learning methodology in engineering colleges is not the same as it used to be earlier.It has new perspective and dimension. The class room teaching in engineering colleges has changed dramatically due to technological advancements.It has gone beyond just the black-board teaching.The student feedback and others performance measures have been introduced to varify the quality of teaching and learning methodology. Total Quality Management was introduced as a new management technique to achieve excellence in industries.The paper presents the importance of adaptation of that proven improvement technique in engineering education.The highlight of research work is to spread out the philosophy of Total Quality Management into the new teaching and learning method of engineering colleges. The business world improvement technique TQM can gaurantee the cogency of the education process. The papers also presents PDSA model for quality assurance in teaching and learning process.*

Keywords: Quality, PDSA model, Total Quality Management, Continuos Improvement, Teaching and Learning methodology.

INTRODUCTION

In the business world, quality and quality management system are the two important words.Organizations quality levels can make their servival possible and the quality management systems assure those quality levels. Total Quality Management is the customer satisfaction focused approach of management for long term prosperity. Total Quality Management is directed towards continuos improvement of business processes at all levels with proper support,committment and involvement of management having intense focus on customer satisfaction involving effective employee participation.TQM is the integration of traditional management principles,technical tools and existing improvement attempts.TQM has an holistic approach of cultural changes.TQM is a philosophy which believes in assurance of quality at all levels of an organization for long term gains. Samsung, Motorola, LG Electronics, Ford, Toyota, Honda and other companies market image is the result of following the TQM principles.

The way the hospitals have come out as the health industry, Engineering education also is not an exception. The economic forces have made Engineering education system as profit making organizations (Van Der Westhuizen, 2002).And the result is the stiff competition. As the world has become market place for the business firms due to globalisation, engineering education is feeling the heat of race across the world (Freeman, R, 1993). Brigham was the opinion that educational system leaned towards TQM principles following the other businesses for quality management system. Resource constraints and increasing public pressure forced the introduction of TQM in education (DeCosmo et al.1991).Basically education differs from industry.However, people and resources management is similar for both(Siu and Heart,1992).The renowned TQM guru Deming advocated that the principles of TQM can extended to any organization, manufacturing, service and even the education system for its effective management and improvement (Deming,1994). The team work, customer satisfaction,cultural changes ,enhanced employee empowerment based TQM principles provide good help for any organizations servival (Horine, J.E.,1993).TQM is a means of making us better people, of developing our professional good manners, and providing us with a moral education (Williams,1993). Students can be treated like workers, and systems can be put in place to enable them to generate high levels of outputs with high level of quality and Demings TQM principles works (Gartner, 1993).

BASIC CONCEPT OF TQM

With the evolution of orgnaizations the concept of quality existed. But the meaning had undergone many changes. After the Word war II. Some of the quality gurus from USA and Japan gave different perspective to it.They were of the opinion that all the functions across different functional areas constituted for the quality and its poor quality costs.This broder view of quality encompassed the whole organization.By 1970, it was evident that a competitive advantage can be attained with high quality.That lead to intense focus on meeting and exceeding customer needs and quality excellence emerged as company

strategy.A proactive concept called as Total Quality Management gained importance later that builds quality into the product and process design. Total Quality Management is considered as a mastery of achieving the excellence by managing the entire activitities of the company. The British Standards Institution (BSI) defines TQM as the management philosophy and company practices that aim to harness the human and material resources of an organisation in the most effective way to achieve the objectives of the organisation (BS 5750).TQM is not simply following some procedures but is embracing new comprehensive philosophy of putting companywide attempt to enhance quality of products or services.

PRINCIPLES OF TQM

The principles of total quality management are the cornerstones and foundations and rules that must be followed to achieve the appropriate level of quality, both in products or services (Badawi, 2010).The following principles summarize the outstanding manner of running an organization.

- Customer Orientation
- Do it right the first time
- Continuos improvement
- Employee Involvement
- Leadership (Total committment of top management)
- Prevention rather than inspection
- Educate and train people
- Measure the work
- Fact-based decisions

If the education organization is built based on the important pillars of TQM viz, process, organization, leadership, commitment and product, the system can flourish definitely (Creech, 1994)

TAECHING AND LEARNING PROCESS WITH TQM APPROACH

Quality of teaching and learning method is crucial for engineering education as it gives birth to responsible citizens who build and improve the society standards. And that quality can be built and improved on continuous basis following the TQM principles. Implementation of TQM to the T&L process is one way to enhance quality in education (Tong & Han, 2003).The primary objective of TQM is to meet or exceed customer expectations. In engineering education the quality must meet not only the needs of the present customers but also the customers of the present customer i.e. the industry wherein the engineers work. There exists tremendous effort in engineering education with respect to this external customer. Due to diversified and contradictory expectations, there is confusion in the mind of public as for as quality of program and reputation of the institution (Edward, 2002). Long-term quality improvement is the focus of TQM approach undermining the short term gain and bringing the solid shift in the institutions cultural setup. Education is about learning. The engineering institutions who would like to adapt TQM principles must give attention to the issue of learning methods and needs to have strategies for individualization and differentiation in learning. Engineering Educational institutions are accountable for making the learners to be aware of various learning options available. Administrators, parents, teachers, students and stakeholders are the building blocks of the teaching and learning process (A. Zabadi, 2013).The present teaching and learning methodology, the course content, the provision of changing teaching methods and the self-critical assessment of the various methods constitute the elements of quality in engineering education for continuous improvement. The paper presents how the basic principles of TQM are applies in attaining the teaching and learning (T&L) objectives for students. The approach not only facilitates accomplishments for the institutions but also caters to the satisfaction of the faculty and students. Six sigma, QFD, Pareto Charts / Analysis, Cause and Effect, Ishikawa or Fishbone Diagrams, Focus Groups etc. could be the powerful TQM tools available for engineering educational set-up. One tool must be used in conjunction with other tools for better results. The successful implementation depends on 1) the support of everyone involved 2) proper identification of customers 3) focus on refining the process and 4) use Deming's 14 points as a checklist and guide during the implementation effort (Robert and Robert, 1998).

IMPLEMENTATION OF TQM IN TEACHING AND LEARNING PROCESS

According to Herman and Herman, 1994, there are three levels for the application of quality management system in engineering education .The first level encircles the management process involving elements like strategic planning, recruitment and development of staff, organizing resources, and configuration of what and how teaching is done and assessed. Teaching quality is the next level. Students are considered both as customer and worker in the educational system. Active involvent and interaction of students, Command over subject and communication skills of faculty, concern for students' learning and progress are some of the important elements to focus on (Venkatraman, 2007). Universal endorsement is the influential factor, on which the success or failure of the effort of TQM programme depends (Robert and Robert, 1998) .For better quality in teaching; suitable environment is a key factor for faculty to work in. Secondly, the system tools and procedure must facilitate proper teaching. Appreciation, encouragement and recognition play vital role in quality teaching and further achievements (Edward 3rd, 2002).Students need must be understood properly by the education providers to improve quality of teaching.(Jie & Idris, 2009). The TQM model transforms the students who are considered as internal customers into valuable manpower for the future students need (external customers as employers of university graduates) (Tong & Han, 2003).The cordial, interactive and personalized concern of faculty for students in T&L process provides the outputs i.e. skilled and educated graduates from the raw and unprocessed skills (Mukhopadahyay,2006). Shaping a mind as per set objectives involving development of right attitude of students, imparting knowledge, inducing an urge to learn are managed continuously by faculty. But the process invariably requires the support from other elements of institution and the external customer, the employers for engineering graduates. Infrastructure facilities, library, department, supporting staff, laboratories are vital institutional elements. Continuous improvement will have direct implication on T&L process (Venkatraman, 2007). The teaching-learning process effectiveness assessment is the basic for Continuous improvement. It brings higher standards to teaching quality. Deming's improvement cycle: Plan, Do, Study and Action (PDSA) is a simple but effective TQM tool for continuous improvement.(Sun, Ho, & Ni, 2008).Faculty can adapt this tool enhance the T&L process in small steps by soliciting feedback from the students and motivate the students to learn (Tong & Han, 2003). Faculty must be flexible enough and also update themselves on regular basis to learn and adopt innovative teaching methods (Rampa, 2004).Identification of proper activities and their monitoring is essential to produce good engineering graduates. Performance appraisal guarantees the conformance to students' expectations. The feedback method must be properly designed to provide quality information for the continuous improvement of T&L process. Course syllabus, in-class activities, suggestion boxes, Course grades, student critiques, examination/test papers, student performance on tutorial problems, peer and student feedback, class interview techniques, marks and others form part of the TQM teaching process to establish quality standards (Tong & Han, 2003).Various computer software make this process easy. The proposed Deming's improvement cycle: Plan, Do, Check and Action (PDSA), is as follows.

Plan: All the activities which support the process

Planning phase includes:

- Establish vision and mission for the institution
- Formulate quality policy for teaching and learning process
- Develop Strategic quality planning.
- Follow TQM approach

Do: Execute the activities in accordance with the developed plan and collect necessary data for analysis.

Do phase includes:

- Apprehension about TQM principles
- Focus on essential trainings
- Student (customer) centric actions
- Commitment & involvement of faculty
- Projects identification and development

Study: To find out whether the planned action worked as proposed or end results vary? .

Study phase includes:

- Effective monitoring and Extensive evaluation
- Regular follow up
- Appropriate Measurement
- Data collection and review of effectiveness of the improvement in teaching and learning process

Act: On the findings based on what did not worked as planned and what worked as per plan.

Act phase includes:

- Plan for the future
- Continuous improvement of teaching and learning process
- Appreciation, Recognition and motivation

DISCUSSION

Quality teaching in engineering education is imperative as Good teaching results in quality learning that produces quality engineers. And the institutions who are interested in providing quality education serve the society and the world economy at large. Teaching and learning methodology of engineering education can use TQM as one competent tool. This research work discusses how the TQM principles, which were originally, were developed for industry, can be effectively applied for engineering education. The Deming's PDSA cycle is also proposed for continuous improvement of the teaching and learning process. The TQM principles encompass the various aspects of the T&L process. The TQM principles facilitate attainment of higher quality levels in teaching and learning process for the recognition, ranking and benefit of the institutions. TQM approach fails to deliver good results in the situation of no commitment, involvement and support from the higher levels people in the institution.

CONCLUSION

The quality teaching brings the much needed active participations and interactions from the student and motivate them to learn. The T&L process must be designed in such a way that each and every student gets its benefit. The needed elements in the environment of total quality are proper resources, support, opportunity to learn, motivation and enough time. The proper attitude and approach with an objective to strive continuously for improvement are very much essential for appropriate implementation of TQM principles. One can be very much sure about making improvements in ranking and recognition through enhanced quality in teaching and learning process. The morale of students and faculty will also be high. TQM approach in teaching and learning process of engineering education assures excellent benefits to its customers and also to the society at large.

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