
Emergent Need of Quality assurance for Engineering Education : India's Perspective

¹S.Meenakshi, ²Amiya Kumar Rath

¹National Institute of Technology, Rourkela

²Department of Computer Science and Engineering

²DRIEMS, Tangi, Cuttack, Orissa – 754022, India

Email: ²amiyaamiya@rediffmail.

Abstract- The rapid growth of engineering and technology education globally require the proper maintenance of academic quality in educational institutions in order to withstanding competition in the global market. As a result, there is a strong need for the quality assurance in engineering courses. In this article, the authors endeavour to identify the role and important issues of quality assurance in engineering education

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I. INTRODUCTION

Engineering education occupy an imperative position in the social and economic development and welfare of the country. At present in india, private engineering educational institutions are burgeoning without sustaining requisite level of quality. Currently in india, totally more than 5000 universities and colleges offer engineering courses. India is now having more than 5000 engineering colleges that have more than 15 lakhs of intake capacity of students. Increasing trend of internationalisation and globalisation of higher and technical education and the emergence of a multicultural workplace environment entail the importance of quality assurance in engineering education. The concept of quality measurement was introduced in education in the late 1980s when the phenomenal growth of higher education began and the structure of the higher education became more complex. According to U.S.National Science Foundation(NSF) task force, quality engineering education is 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 of the twenty-first century [2].

II. QUALITY ASSURANCE AND ENGINEERING EDUCATION

Quality has become a decisive factor in attracting students and faculty to an institution. The education sector that produces human resources has a leading role in the quality movement. Quality education is the best way to develop a rich human resource.

Quality in the sense of achieving academic excellence has always been a central value in engineering education. Quality of engineering education and accreditation of engineering education programmes are closely connected with recognition of engineer's degrees and professional competencies which in turn is the precondition from international mobility of engineers.

As noted by Harman and Meek [8] quality assurance has been defined as the systematic management and assessment procedures adopted by a higher education institutions or system to monitor performance and to ensure achievement of quality output or improved quality. Schwarz and Westerheijden [9] quoted 'Accreditation is the element of quality assurance schemes that sets the standards for rating the "Right to exist" within the system (or, respectively, to reject the "right to exist") to an institution degree type programme (e.g., charter, license, accreditation)' Competition, customer satisfaction, Maintaining standards, Accountability, Improve employee morale and motivation,

Credibility, prestige and status are the important factors for quality assurance (QA) in any educational institution. The characteristics of quality assurance embedded with:-

1. QA embeds continuous improvement processes throughout faculties, programs and supporting units.
2. QA is the umbrella under which teaching, learning, research and administration are audited.
3. QA presents a performance-based “Measuring Stick” for universities and their programs.
4. QA brings accountability to the forefront and emphasizes professional responsibility.

While addressing quality issues in the service sector like education, the customer focus should be emphasized. Engineering education has a number of complementary and paradoxical customers. Student can be treated as customer, product and raw material under different perspective. Student receives the work output in the form of the lectures and discussions in the classroom and gains from number of different experiences and becomes a product of the system [3].

III. FEATURES of QUALITY

- a. QA is a “must” for an institution to become a global player

IV. PRINCIPLES OF QA

It is a complex concept that centres on three main principles, control, accountability and improvement.

1. Control refers to how resources are utilised and maximised for outcomes.
2. Accountability seeks ways in which stakeholders’ needs are met.

Improvement refers to how the necessary inputs, processes and outputs interact to meet goals and objectives [4]. In terms of institution, faculty and students, the major consideration to recognize quality are:

Institutions:

1. High ranking, good accreditation status
2. Prestige, reputation, public perception

Attraction and retention of quality faculty and students

3. Center of excellence
4. Excellent physical facility

Faculty:

1. Excellent teaching performance with satisfactory feedback of student
2. Good industrial consultancy, sponsor research, patent
3. Good research publications
4. Organization and attendance of good number of conferences, workshops, seminars, expert lecturers etc.
5. Awards, fellowship
6. Peer respect and recognition
7. Good mentors and counselor for student

Student:

1. Good educational experiences
2. Good academic ambiances
3. Value addition
4. Good employability

A. Role of Student

In some higher technical education Total Quality Management (TQM) models, students are treated as customers, but their role as customers is debatable issue. Higher technical education institutions are service organizations but their operation is like the flow of products in a production or a typical manufacturing organization. The flow of student through a higher education institution is shown below:

Higher education	Production
Secondary school	Suppliers
Admitted high school graduates	Raw materials
Student	Product-in process
Courses	Process stages
Graduates	Finished product
Employers	Customers
Number of graduate employed	Sales
Number of graduate unemployed	unsold product
Starting salary	Price

TQM has been most successful in manufacturing organization; hence this analogy may be useful in implementing TQM in higher education [5, 6].

The SWOT analysis of the technical educational institute is represented as follows

Opportunities (the institute has to utilize)

1. New course & curriculum
2. Employment demand characteristics
3. Distant education
4. Community services.
5. Industry-Institute interaction
6. Improved quality, motivation & Communication.
7. Potential alumni etc.

Threats (what institute has to anticipate & combat)

1. Design of new course & curriculum
2. New features in current subjects.
3. Fund & internal revenue generation.
4. Institutional sickness.
5. Finance & operational cost.
6. Change of Government policy etc.

B. Different needs of students:

1. Excellent faculty: In order to impart education effectively, excellent faculties in various specialization areas are required. The faculty must have proficiency of effective communication skill for motivating the students in pursuit of knowledge.
2. Infrastructure facilities: E-Library, excellent IT, buildings, reliable computers & necessary software, opportunity for self-development, self-expression, knowledge enhancement, skill acquisition & professional growth.

3. Practical orientation in teaching: Practical orientation in teaching helps to correlate theory & its practical relevance makes the study more interesting & motivates the students to learn more.
4. Modern Teaching Aids: Teaching Aids like LCDs, OHPs, DVDs/ VCDs, Video films, Simulations and physical models, encyclopaedias' etc. are useful.
5. State of the art syllabus: Knowledge up gradation is an important factor in deciding the technical competence of an institution.
6. Modern and well equipped library: In order to help the student to broaden their horizon of knowledge, sufficient number of new edition of text books, journals, DVD/CDs, reference materials etc. must be available in the library.
7. Strict adherence to schedule: The students and faculties both need to adopt practice of sincerity and punctuality..
8. Better job opportunity

**C. Role of Teacher in Achieving
Excellence in Technical
Education**

Characteristics of Good Teaching

A set of characteristics of good teaching can be short listed as follows:

1. Desire to share our love of the subject with students.
2. Understanding the subject in depth.
3. Capability to explain the subject plainly.
4. Every subject could be properly explained with a real life example.
5. Attract the attention of all students rather than a specific group.
6. Students must know in advance what a teacher is going to cover in a class.
7. Teach according to the course plan.
8. Use of teaching methods and academic tasks that require students to learn actively, responsibly, and co-operatively.
9. Showing concerns and respect for students.
10. Commitment for encouraging independence.
11. Desire to learn from students and other sources about the effects of teaching and how it can be improved.
12. Ability to improvise and adapt to new demands.
13. Use of valid assessment methods.
14. Give good feedback on student work

D. System Design requirements

1. Management system: A well accepted vision and mission statement, clearly defined specific goals, effective and efficient leadership, clear and specific policies and procedures, strategic and process management, clear organizational structure for TQM implementation, delegation of authority, empowerment, integration of continuous improvement activity, employees and student focus, quality councils, feedback and assessment, NBA Accreditation, TEQIP, ISO 9000:2000 QMS, budget priorities.
2. Technical system: State of the art syllabus, well defined curriculum design, planning and periodic review of policies, infrastructure competence, institutional competence, incorporation of modern teaching aids, adoptive resource allocation, adequate and competent teaching, practical orientation in teaching, modern and well equipped library, E-library, computing, networking, Internet and E-mail facilities, simulation and physical models, materials and hand outs, technical, administrative and support staff.

3. Social System: Attitude, employee participation, involvement and team work, work culture, value and ethics, quality circles and suggestion schemes, customer focus including student focus, need base approach, well defined channels of communication, respect for all, trust worthiness among all, cordial interpersonal relationship, self assessment, zero defects concept, community services [5].

V. CONCLUSION

Engineering education needs broad shoulders to carry the responsibilities being assigned to it today. The problems engineers will face in the future will be multidisciplinary and thus engineering programs will have to get themselves outside the box of teaching within silos. Quality assurance in engineering education regardless of the arena will continue to be of prime importance in current scenario. With pressures of accountability and credibility, the future seems to be moving towards quality assurance. Quality assurance in engineering education needs hard work, dedication and perseverance on the part of all stakeholders starts from students, teachers, parents, govt agencies etc. Only the state of mind of the people at every level will determine the success of the institution. Excellence is guaranteed if an institution can create a quality culture with the partaking of the entire team.

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Biographical Notes: Prof. S.Meenakshi born in Mumbai and brought up in Chennai and currently is the daughter of Odisha living in Bhubaneswar. She pursued dual masters MCA & MBA from university of madras in the year 2000 and 2004 respectively. She had a teaching experience of 10 years. Currently, pursuing her research work in Teaching & Learning process in engineering education.

Prof (Dr) Amiya Kumar Rath is working as professor in the department of Computer Science and Engineering of Dhaneswar Rath Institute of Engineering & Management Studies, Cuttack,Orissa, India. The author has obtained his B.E. degree in Computer Science & Engg. in the year 1990, MBA degree in Systems Management in the year 1993, M.Tech in Computer Science in the year 2001 and Ph.D in Computer Science in the year 2005 from Utkal University for the work in the field of Embedded system and Served as professor in different premier institutes since 20 years. He published over 50 papers and 4 books from top international publishing house. He has supervised ten PhD theses in different areas of machine intelligence. His current research interest includes Embedded System, Adhoc Network, Sensor Network,Power Minimization, Biclustering, Evolutionary Computation and Data Mining.