ROLE OF INFORMATION TECHNOLOGY IN QUALITY TECHNICAL EDUCATION GIVES NEW DIRECTION OF EXCELLENCE—QUALITY AND QUANTITY CANNOT RUN SIMULTANEOUSLY—ODISHA AS A ROLE MODEL

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Abstract—Managing strategy for building excellent technical institutions in Orissa; with a perspective to quality is an important criteria for attracting students and stakeholders. Emergence of information technology has connected the world with the click of a mouse. There is a boom in technical education especially in engineering education in India during last ten years. In Orissa, there are 106 engineering colleges. Several reputed companies organize campus selection for these institutions. One hundred personnel’s from industrial houses, educationist from different institute, promoters of different technical colleges, policy maker, parents and students were discussed to know their opinions, views and attitudes towards technical education and engineering as a focus. Seeing the emerging globalization process & competition amongst the institutions IT plays a vital role for minimizing the gaps between campus & corporate to build excellent technical institutions in Orissa for attracting students and stakeholders.

Keywords—Technical Education, Information Technology, Knowledge Management, Re-Engineering, Emerging Globalization

I. INTRODUCTION

Managing strategy for building excellent technical institutions in Orissa; with a perspective to quality is an important criteria for attracting students and stakeholders. Competition amongst the institutions and the emerging globalization process has been inviting major players to jump into the fray. Parents treat technical education as a passport for their wards to enter into corporate houses with a handsome package. Government of India has framed rules to promote quality education in all the states of India and abroad and the momentum is pacing across. In order to develop the standards’ competition is the ultimate aspect. But the educational approach should not create an economic
II. TECHNICAL EDUCATION IN ORISSA
As a follow up of the National Policy on education, the Government of India initiated a massive effort for strengthening technician education and improving the quality of polytechnic pass outs in the country. The project was launched with the assistance of the World Bank as a State Sector project. In case of Orissa criteria relating population, literacy percentage, literacy rate, rank of Orissa in degree technical education, comparison to states where engineering colleges are in maximum and where it is minimum has to be evaluated. Analysis relating to the reasons of disparity thereby has to be mentioned. Moreover, issues like permission to open a technical institution, AICTE norms, university affiliation to open a technical institution, teacher students ratio, procedure of advertisement to attract outside students to come to Orissa, should be handled. The role of JEE (Joint Entrance Examination), CET (Common Entrance Test), AIEEE (All India Engineering Entrance Examinations) should be reviewed scrupulously delving in to the assessment tests and parameters adopted by benchmarking institutions. Factors like permission to allow outside students to appear JEE should emanate in the logical interpretations. Probing has to be made about the authenticity of guidelines fixed by AICTE and Central Government for selection of candidates to different colleges. Argument has to be developed to ascertain the merit and demerit of mark basis selection and common entrance test. Analogy relating to the difference between government and private engineering colleges and why government colleges in Orissa are decreasing day by day in comparison to private engineering colleges, are to be ascertained. For this, one can know it for certain the potentiality of technical education.

III. POTENTIALITY OF TECHNICAL EDUCATION
Visualizing the current trend it is observed that technical institutes are laying emphasis on education alone without stressing on the other aspects of education. Assessment of the facility of the students in a technical institution with respect to class room, computer accessibility, teachers, library facility, hostel accommodation, workshop availability, lab facility, seminar, different sponsored programs and collaboration with companies should be done. Other supplementing aspects like necessity of gymnasium, play ground, role of teachers, laboratory assistant, peon, ministerial staff, department in charge, hostel in charge should be elucidated. Nevertheless, areas like why the students are attracted towards technical education in capital cities compared to colleges outside the cityscape and how to improve these peripheral colleges situated in other districts should be evaluated. Points relating justified salary structure of staff in a technical institution, actual basis of AICTE and government to introduce new courses and open new colleges, bringing healthy
competition between colleges to fetch students from JEE, need of counseling to students, vacation period of students, study hour, classes, tutorial, improving the qualities of teachers, internal, sessionals and semester examinations, year back provisions, avoidance of unfair, practices like copy, avoidance of tuition, placement of students and training on personality development program of the students should be meticulously introspected. This would enhance the potentialities of technical education in Orissa to a great extent.

**Quality Improvement**

The training of all teachers in the project polytechnics for at least four weeks each year in the new technologies, education technology and industry was adopted. A batch of 39 polytechnic faculties was sent to Germany on foreign fellowship training for a period of three months from September to December, 2004.

- The setting up of learning resources utilization centers in all polytechnics and the use of media in teaching.
- Computer education for all students.
- The introduction of hi-tech courses and subjects especially in information technology, computer sciences, production technology, textile and garment technology and automobile maintenance.
- Introduction of course flexibility through MPECS.
- Industrial training provisions for every regular student.

**IV. TECHNICAL EDUCATION QUALITY IMPROVEMENT PROGRAMME OF GOVERNMENT OF INDIA**

Technical Education Quality Improvement Programme of Government of India (TEQIP) has been conceived in pursuance of the NPE, 1986 (as revised in 1992). The programme aims to upscale and support ongoing efforts of the Government of India in improving the quality of technical education and enhancing existing capacities of the institutions to become dynamic, demand-driven, quality conscious, efficient forward looking and responsive to rapid economic and technological developments occurring at national and international levels.

The broad objectives of the TEQIP are given below:

- To create an environment in which engineering institutions selected under the programme can achieve their own set targets for excellence and sustain the same with autonomy and accountability.
- To support development plans including synergistic networking and services to community and economy of competitively selected institutions for achieving higher standards.
- To improve the efficiency and effectiveness of the technical education management system in the States and institutions selected under the programme.

**V. QUALITY IMPROVEMENT PROGRAMME (QIP)**

For up-gradation of skills and for providing opportunity for exchange of knowledge, the AICTE operates a number of programmes for career development of teachers in technical education viz. the Quality Improvement programme (QIP), preparation of course material modules, short term training programmes, career awards for young teachers, schemes for awarding travel grants and seminar grants, etc. The AICTE has now extended the QIP scheme to teachers working in other disciplines of technical education like pharmacy, architecture and town planning, management and applied arts and crafts for pursuing Masters/Ph.D. degrees. Further, the scheme of QIP has been extended to polytechnic teachers also. Under the
scheme of Emeritus Fellowship, through award of a fellowship and a contingency grant, AICTE provides superannuated faculty members an opportunity to continue research work for a period of two years. AICTE is also operating a scheme of Early Faculty Induction Programme (EFIP) to attract young students towards the teaching career. The AICTE funds a scheme of National Technical Manpower Information System (NTMIS) for estimation of short term and long term requirement of technical manpower in different fields, for assessment of anticipated gaps in demand and supply and scientific analysis for forward modeling of activities. The NTMIS Scheme presently works from 20 nodal centres all over the country.

VI. INTERNATIONAL TECHNICAL COOPERATION

India has the largest scientific and technical manpower in the world. It has a huge educational infrastructure. A number of institutions like IITs, IIMs, IISc., ISM and universities like JNU, Delhi University, IGNOU, BHU are world famous. These can have collaboration on equal basis with institutions in advanced countries. India has indigenously developed infrastructures for development of education, planning and administration (like UGC, AICTE, NCERT, NIEPA, TTTIs and NCTE). Their facilities can be shared with other developing countries. Fifteen per cent of seats over and above normal intake in our professional institutions are reserved for foreign students. There is no limit in the general education side for admission of foreign students. These are to be effectively utilized.

VII. NEW INITIATIVES IN TECHNICAL EDUCATION SECTOR

For support to technical education sector in the country, all schemes relating to improvement of quality in technical education excluding the externally aided programme namely Technical Education Quality Improvement Programme (TEQIP) have been clubbed together under the scheme – Programme(s) for Quality Improvement in Technical Education (PQITE).

Whereas, some of the programmes namely National Programme for Earthquake Engineering Education (NPEEE) with an outlay of Rs.13.76 crore under the scheme Support to New and Emerging Technology Areas, National Programme for Technology Enhanced Learning (NPTEL) with an outlay of Rs.15 crore under the scheme Support for Distance Education and Web-based Learning, INDEST Consortium and Eklavya Technology Channel have already been launched. Others are in approval stages. Brief description of each of these ongoing programmes is given below:

VIII. MODERNIZATION AND REMOVAL OF OBSOLESCENCE

High priority has been accorded to modernization and removal of obsolescence in library / laboratories/ workshops/ computing facilities in engineering and technological, management, pharmacy, architecture institutions in the country. Modernization is undertaken to enhance functional efficiency of these institutes for teaching, training and research purposes.

- Removal of obsolescence in working machinery and equipment of laboratories for engineering and technological, management, pharmacy, architecture courses in Central Institutions including Regional Engineering Colleges;
- Modernization of laboratories and workshops by addition of new equipment;
• Augmentation of the library facilities;
• Support Projects involving new innovations in classroom technology, laboratory institutions, instructional material and charts, development of appropriate technology;
• Training and retraining for the teaching and supporting technical staff; and
• Up-gradation of computing and networking facilities.

IX. RESEARCH AND DEVELOPMENT
R & D activities have been considered as an essential component to higher education because of their role in creating new knowledge and insight and imparting excitement and dynamism to the educational process. The Ministry of Human resource Development provides project based financial support with the following objectives.
• Creating and updating the infrastructure for R & D effort.
• Supporting sponsored/ joint research projects in engineering and technology, pharmacy, architecture and management. Joint research projects with other technological institutions, research laboratories and industries of repute would be valuable.

X. IT REVOLUTION
While mentioning the IT human resource ‘revolution’ in India, should not forget the Gulf phenomena of the seventies when our skilled labour force – carpenters, technicians, plumbers, fitters, machinists, stenographers, etc. – excelled in the Gulf Countries and brought considerable foreign exchange to India. Same was the case with nurses, teachers, accountants etc.
Somehow the governments (State and Central) educational planners or the economists have not taken note of these unique achievements of Indians. Somehow considerations of economic growth in concrete terms and employment opportunities for ordinary Indians on a large scale have seldom interested the academia or the elite thinkers or perhaps even the government planners, though clichéd phrases are often used in Government documents.
The author believes, for ‘cold’ intellectual as well as emotional reasons, that empowering each Indian with right skills and knowledge (to enable him/her to add value) is crucial for national development. If people are poor, it is because they have not been empowered with right skills which can provide value education in the competitive world of market economics (which really exists and existed despite the government controlled licence – permit – quota-raj). Hence, to train our technical manpower to scale new heights,

A. The Issues
• The Quality of technical manpower.
• Lack of opportunities and environment both in the industry and in the institute.
• The reduced attraction to science and technology.
• Quality of faculty.
• To develop character, values, attitudes and mindset for technical education at the high school level. This encourages:
  • Inquisitiveness
  • Encourages students to ask questions.
  • To do lateral thinking and to be open minded in their thought process.
• Exchange of industry practitioners as guest lectures and teachers into the industry cross-fertilise the needs of industry with the institute.
• Focus on leadership training and communication skills.
Regional imbalance - In terms of admission capacity and number and distribution of technical institutes across the geographical region.

Imbalance in the outflow of students in different courses.

Up gradation of curriculum.

Investment in training and R & D is very vital for industrial growth.

Industry sponsored research in the country is very low.

XI. INNOVATION IN TECHNOLOGY

Whenever there was an invention in technology, there was a change in the Business Process. The first application area of computer was business. When only data was handled by computer, the business hours started Data Processing through it. When it was able to derive information from the huge volume of data, business houses started Managing Information Systems in kindly different departments. When technology went one step forward by developing Knowledge Based Systems, it was no longer kept aside but implement in business in the form of various Expert Systems. The present day changing business scenario with growing customer expectation, increasing competition and regulatory compliance have forced organizations to redesign their process of managing business with customer satisfaction and delight them as necessity. Organization would face much difficulty to survive in future, when they have to share their business processes, systems, organizational structure and culture towards achieving a pick performance in terms of costs, quality, speed and service. BPR is not meant for making a small improvement in the process or making a profit in short term basis. It starts with a clean sheet of the process from scratch, in order to achieve customer satisfaction, process improvement and profit optimization.

During the late 70’s many of the organizations opted, for computerization of their processes. The 80’s have seen a shift to automation. The early 90’s brought about a transformation in technology with the advent of Information Technology. Information Technology changed the overall concept of business. Things, which was unthinkable, ten years before, is a reality now. ‘Due to the new invention of information technology, the organizations were in a dilemma for a time being what to do next. They had already invested a huge amount towards computerization and automation. They could not afford to throw them out and adopt new technology overnight. Therefore, at that juncture it was a major concern to rethink about the situation. Technologist and business professionals worked together to sort out this problem and they came out with the new alternative and redesign the in earlier set up. Professor Michael Hammer’s principle of re-engineering for the implementation in any organization, is stated bellow:

i. Organize around outcomes, not tasks

ii. Identify those who use the output of the ‘process and perform/ modify the process accordingly

iii. Include Information Processing work into the real work, which involves any form of information

iv. ‘Treat geographically dispersed resources as centralized resources

v. Link parallel activities instead of integrating tasks

vi. “Put the decision points, where the work is performed and build control into the process

vii. ‘Capture information once and at the source.

viii. Now, let’s discuss about the re-engineering research in detail.
XII. ELEMENTS OF BUSINESS PROCESS RE-ENGINEERING.

XV. THE TECHNOLOGY
While technology is crucial to the success of any e-learning activity, it is not the driver of the initiative. It is there to serve an educational function as such; it is a tool for learning and teaching. However, it has to be robust, reliable and affordable. It is critical to ensure that this is so, just as it is important to ensure that in a classroom based educational setting, the classroom is available and it is comfortable, and it has the necessary equipment such as tables and chairs and other tools for teaching and learning to take place. Most teachers and students in such educational settings would take these facilities for granted and they will be unaware of what goes on behind the scenes to ensure that the classroom setting works in the way in which it is expected to work. Staff and students alike would be very agitated if the computer, the projector, or the lights in the classroom did not work, as that would be very disruptive to their learning and teaching activities. In the same way e-learning technology needs to work just as transparently and fluidly to allow teachers and students to concentrate on learning and teaching and not be distracted by the technology. If teachers and students have to be taught to operate this technology, then there should be processes and programs in place for this training to occur, routinely. For this, course design and development should be analyzed.

XIII. COURSE DESIGN AND DEVELOPMENT
Like any other organized educational activity, e-learning, is a team effort, as a number of people and a range of expertise need to be brought together to make e-learning work. In conventional educational systems, course design and development is the sole responsibility of the subject mater expert who is also the teacher. E-learning will require the delivery of that subject matter content in alternative forms such as online or on a CD-ROM. Some teachers are able to produce their content themselves. However, this might not be the best use of their time and expertise in most educational settings. A more efficient and effective model of course development is the team approach, which brings together people with subject matter knowledge and expertise in the development of technology enhanced learning materials. However, the establishment and nurturing of such a team process is not to be taken lightly as it has implications on where the boundaries lie for various types of expertise and on the costs of supporting it across a large organization. To verify this subject matter content management should be discussed and elucidated.

XIV. INDUSTRY & CII
In the context of globalization, the industry must come forward to provide necessary support to institutions in maintaining the desired quality of graduates. There is a need for active industry participation and involvement in the overall accreditation process, which should also cater to the changing requirements of the industry. Involvement of professors and teachers of technical education for consulting assignments. Joint research programmes
by industry and institute. The industry should be the major driving force in the content and delivery of technical education. There is a need for developing proper corporate governance in educational sector for which requisite and guidelines need to be framed by AICTE & CII for improving the overall efficiency and quality of technical institutions.

1. Design curriculum as per Market Trends.
2. Invite industry participation in course design.
3. A right balance between basics of the course & contemporary subjects.
4. Design Short courses as additional or over and above the curriculum.
5. Introduction of credit based system.
6. Overall, the change in whole approach to the education should be changed to do justice to curriculum. Hence decentralization & autonomy to the institutes is the need of the hour.
7. Industry should be involved in evaluation of the institute staff.
8. Industry experts to teach in the college.
9. Industry should adapt a department in the college.
10. Industry should help in developing the infrastructure by donating equipments.
11. Institutes should share the infrastructure.
12. Student projects should be more meaningful and faculty should have active participation. Evaluation of these projects should be done by industry. The projects could also take care of commercial parameters.
13. Exchange programme should be carried out on well-defined parameters.

Every good policy has its own limits which can be overcome by suitable alternatives.

**XV. LIMITATIONS PREVAILING IN THE AREAS OF TECHNICAL EDUCATION**

1. There is an imbalance in the demand-supply ration in the number of seats available in various Engineering Colleges in the Region.
2. Non-availability of Trained Faculty.
3. Appropriate industry focused curricula not available.
4. Industry is ignorant of the specialized courses being offered by the institute.
5. Not enough stress being put on entrepreneurship development.

At this stage, every stakeholder has a role to play to make this a success.

**A. What needs to be done ?**

1. The number of seats available in various disciplines in different Engineering Colleges in the Region needs to be reviewed in the context of projected demand.
2. Shortage of trained Faculty has to be must.
3. Corporate and Private Enterprises could play a more active role in financing Technical Education in terms of curriculum development.
4. Industry should specify to the Universities/Institutes about their exact requirements in terms of curriculum development.
5. Technical Institutes need to update themselves continually in terms of skills requirement, latest technological trends etc. Industry could play an important part in planning advanced courses.
6. Students need to improve on their soft skills stress management, sensitivity to different cultures, managerial and leadership skills, ethical and professional values etc., to serve Industry and the Country better.
7. Industry should have knowledge on the areas of specialization being attempted by the University/Institutes. There is therefore the need for a more meaningful Industry-Institute partnership.
8. Faculty/students should spend some time on Industrial training /visits, in order to understand the need of the Industry.

9. Teaching standards and curricula needs immediate revision; focus of the Institutes should shift from creating the "best" syllabus to the most "effective" syllabus.

Hence, a long-term perspective plan chart should be formulated to achieve long-term goals.

**B. The Long Term Perspective Planning**

1. Faculty Training Programmes to be implemented to take care of the issue of shortage of trained faculty.

2. Industry co-operation is needed for planning advanced courses. Technical Institutes should design appropriate curricula.

3. Suggested models of education should focus on developing a vision; the changing roles of teachers and Industry-Institute Partnership.

4. Focus on the 4D's:
   a. Define customer specifics
   b. Design module as per needs.
   c. Deliver module to customers.
   d. Develop module further based on customer feedback.

5. There is a need to identify partners in Technical Institutes and Industry who would benefit mutually. Super specialization has to be stressed upon to meet Industry needs.

6. Industry should induct students for long-term ongoing projects.

7. Quality assessment of Technical Colleges should be stringently monitored by regulatory bodies like AICTE and graduation awarded. Entrepreneurship abilities should be developed.

8. Industry in association with AICTE could keep aside a fund for student projects, stipends etc in order to promote quality Technical Education.

9. There should be a forum for regular interaction of Industry and Institutes to make this partnership more meaningful in future.

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