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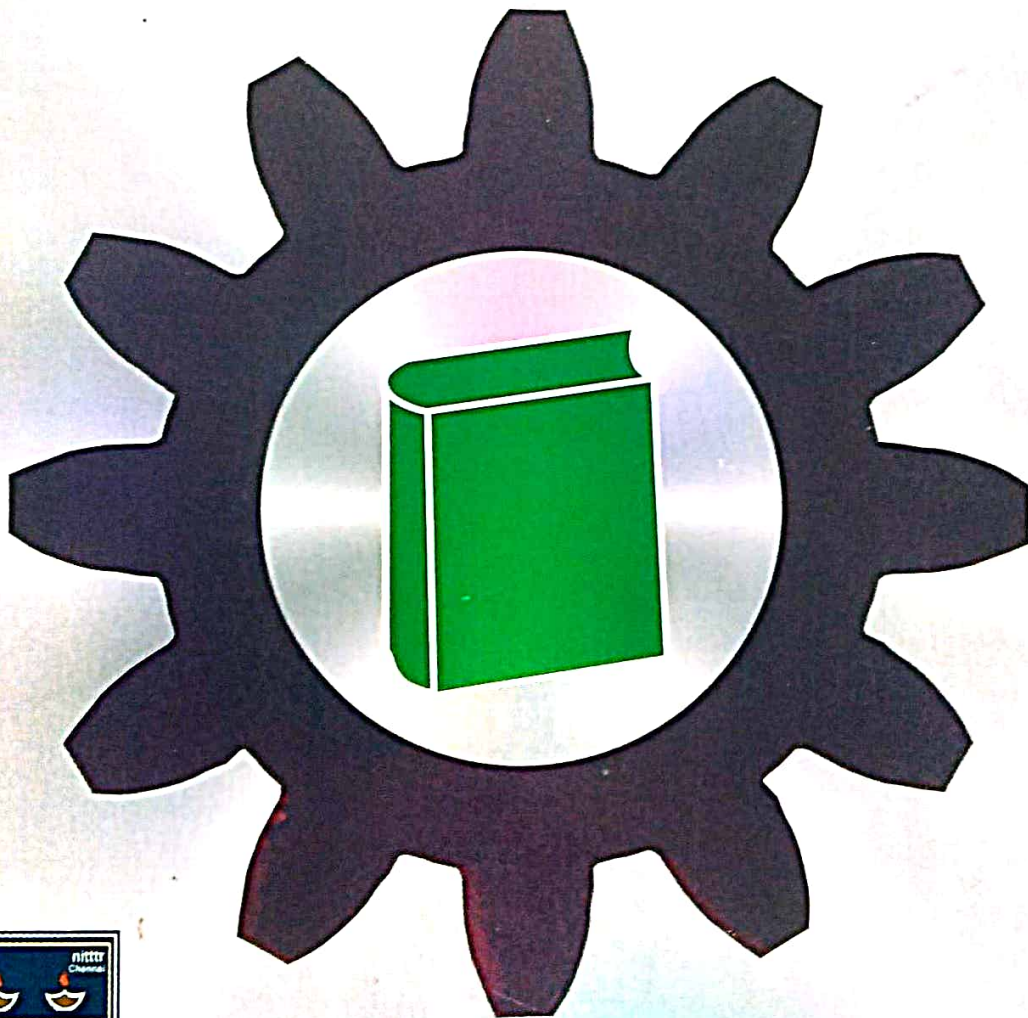
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TECHNICAL TEACHERS TRAINING AND RESEARCH**

(Ministry of Human Resource Development, Govt. of India)

CHENNAI

600 113

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EDITORIAL

We are extremely glad to bring out the Silver Jubilee Issue Volume 25 No.1 and 2 of the Journal of Technical and Vocational Education with a number of interesting articles and research papers contributed by eminent academicians, administrators, and researchers. We take this opportunity to thank all those who have been behind the publication of this journal for the past 25 years.

Dr. Dhanapal and Dr. Santhakumar in their article titled "Study of Impact of NITTTR's initiatives on the performance of polytechnics has highlighted the role of NITTTR towards improving the performance and quality of the educational process in polytechnics through Staff Development, Instructional Material Development, Curriculum Development, Consultancy and Research.

Dr. Sudharssanam in his article titled "Technical Education – Past, Present....." describes the status of technical education in the country. The article details some of the vital reasons which has affected the quality of technical education, with open-endedness to possible solutions.

Dr. Sivakumar and Dr. Srinath in their article titled "Comparative Study of three E-Learning Modes" have detailed the research study undertaken by them in comparing three E-learning modes for training teachers in pedagogical competency.

The article titled "Audit of Industrial training" by Dr. Gupta describes how industrial training plays an important role in developing technical competencies. The article describes at length the process of audit of industrial training.

The article titled "International Programme Structure for Internationalizing Indian Technical Institutes" by Ms. Anita and Dr. Thanikachalam has detailed the essentials of international programmes and strategies for implementation of global programmes.

The paper titled "Organizational Outcome in Health Care Sector through Organizational Learning" by Ms. Sumathi proposes a frame work that relates organizational learning to organizational outcomes in the Health Sector through OD interventions.

Dr. Mukhopadhyay in his paper titled "Emotional Intelligence in career guidance" explains the concept of Emotional Intelligence, the components of Emotional

Intelligence and ways of developing emotional intelligence through career guidance programs.

The study titled "Thinking and Learning Styles of Graduate students" conducted by Dr. Ramalingam and Shri Arun was aimed at investigating thinking and learning style of students. The knowledge of students' information processing style would enhance teaching techniques.

Dr. Renukadevi in her article titled "National Knowledge Commission Report on Engineering Education – A Faculty Development Perspective" has highlighted the working group recommendations on faculty training and development. The article highlights the role of NITTTR in the past and the present.

Dr. Rajarshi Roy and Ms. Anjana Paira in their article "Redefining Education at Hermeneutics of Social Development, Technology and Teacher in Indian Social Fabric" have explored the social base of education, existing socio educational fabric of education, impact and effect of technological education and system of teacher education in Indian social fabric.

Shri. Rajkumar and Dr. Suresh in their study titled "Influence of short-term courses in getting employment for the Mechanical Diploma Holders – A Study" have reported on the attempt made by them in finding the opinion of the polytechnic students on use of short-term programmes in increasing employment opportunities.

Shri. Suryakumar in his article "Engineering Education in Tamil Nadu – Present State and Future perspective" has critically examined the status of engineering education and he has highlighted the need for restructuring curriculum and the need for making core branches effective.

The paper titled "Comparison of Competencies in M.Sc (CS) and MCA Programmes on the 'First Principles of Instruction' " by Ms. Suryakala, Ms. Malliga and Dr. Sambanthan elaborates on how the response of students and teachers of MCA and M.Sc. Programmes will help in defining Instructional Objectives.

Dr. Panjabi Mala Devidas and Dr. Geetha Sankar have studied the perception of the students on the role of institutions in providing quality education to address the issue of democracy in diversity. Their study is reported in the paper titled "Higher Education Institutions as a site for Moral and Civic Education".

The paper titled "E-Governance Model for Secure Delivery of Digital Question Papers" by Shri Narayanaswami details the technology applied to transmit the descriptive type digital question papers in a secure manner from the University/Institution.

Dr. Kulanthaivel in his article titled "Mobile Internet Technologies for Healthcare and Education" has described the efforts made to develop a medical information system for mobile phones, which can also be used for health care education.

Dr. Angeline Sheba Albert in her article titled "Entrepreneurship Education : Need of the Day" discusses the importance of Entrepreneurship Education in the present world and she has also discussed the objectives and goals of introducing entrepreneurship in educational institutions.

Shri. Sadasivan in the paper titled "Personality Development programs to improve result in polytechnics" has narrated his own personal experiences as a placement officer, in transforming a polytechnic in terms of improvement in student performance and behaviour. The author has acknowledged the contribution of NITTTR in this regard.

Shri. Pradeep Gnanam in his article "Developing Web based Learning Environment using Web Engineering Process Model" describes the framework for understanding the challenges, potentialities, difficulties and complexity of web based learning.

We acknowledge the contribution of the authors in the present volume. We welcome papers and research articles for our future issues. We thank Dr.S.Renukadevi for shouldering the responsibility of editing of the journal.

- Editor

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Study of Impact of NITTTR's initiatives on the performance of Polytechnics

S. DHANAPAL AND R. SANTHAKUMAR

Rationale

The NITTTR Chennai offers various developmental initiatives for the polytechnic education system, oriented towards improving the performance and quality of the educational process in these Institutions. NITTTR offers various services which can be categorized principally into staff development, instructional material development, curriculum development, consultancy and research. Though activities like curriculum development and instructional material development benefit the whole system, the various services offered every year benefit about 350 institutions directly. About 2500 teachers upgrade their knowledge and skills through these services every year.

The major component of the services is the staff development programme. The programmes are conducted specific to the needs of the states expressed through need analysis and finalised in consultation with the state authorities. The curriculum development process is carried out

involving the faculty and reflecting the needs of industry. The instructional material development is based on the curricular needs.

One would expect the services offered by NITTTR to create an impact in these institutions in terms of direct benefit to the teaching learning process and a consequent change in the performance of the institutions. An evaluation of this impact would certainly benefit the planning and redesign of these services for further development of these institutions.

Methodology

An evaluation strategy based on the Kirkpatrick's model (Kirkpatrick) would suit the assessment of impact on the performance of polytechnics. The Kirkpatrick's model involves four levels of evaluation. The first two levels are concerned with the satisfaction and reaction of client and the knowledge and skill gained. The third and fourth levels fit very well for an impact assessment (Reeves and Hedberg). Level 3 involves an assessment of the transfer of

knowledge and skills in the job related activities. Level 4 involves assessment of the change in the performance of the institutions. Accordingly the present impact assessment is carried out.

Tool Development

In order to visualize the various services offered by NITTTR, their components, benefits to the teaching – learning process, and consequent change in the performance of the institutions, a Concept Map is prepared. The concept map is a technique for representing knowledge, concepts and ideas (Novak and Canas). The concept map depicts the concept related to a focus question and the relationship between the concepts in terms of propositions. The concept map is shown in fig 1. With the concept map as an aid, a questionnaire was developed, with items covering assessment of transfer of knowledge to the workplace and the consequent change in the performance of polytechnics. This questionnaire is meant to be responded by senior faculty and Principals of polytechnics.

It was planned to administer the questionnaire to Heads of department and Principals of polytechnics at specially conducted workshops, Meeting of Principals convened by the Directorates of Technical Education and any other opportunity when a number of principals/ senior faculty assemble.

Preliminary Results

Taking advantage of the Review Meeting conducted for Tamilnadu on 15th October 2008, the questionnaire was administered to the 15 principals who attended the meeting. The analysis of the questionnaire gave a preliminary insight regarding the impact of NITTTR, which is summarised below.

The highest number of jobs is provided by the Manufacturing Sector (with a mean of 1.4), followed by Civil Engg. Construction (mean 3.09), Automobile (mean 3.67) and Textiles (mean 4.17). The electrical equipment sector offers more jobs than electronics (with a mean of 4.78 and 5.67 respectively). The computer software and hardware offers the least number of jobs (with a mean of 5.17 and 5.67 respectively).

The Mechanical engineering diploma passouts get the maximum number of jobs (mean 1.2) followed by Civil Engineering (mean 2.78). Electrical, Electronics and Automobile diploma holders get reasonable amount of job (mean of 3.36, 3.5 and 3.43). Computer Technology and IT diploma passouts get the least amount of jobs (mean 4.5 and 5.88).

The Principals are highly satisfied with the following aspects related to the ability of the teachers as a result of NITTTR's initiatives (Mean value ranging from 3.0 to 3.39).

- Updation of knowledge of teachers for meeting the Curricular needs activities connected with teaching learning process (Mean value ranging from 3.0 to 3.46)
- Adequacy of lab practice provided to enable them to supervise practicals back at the polytechnics ➤ Set question papers which cover appropriately all the intended abilities (Knowledge, Comprehension, Application, etc.)
- Formulating and guiding meaningful project works for the students ➤ Set question papers which cover all the units of instruction with appropriate weightage as specified in the curriculum
- Tracking developments in technology and incorporating in Curriculum and development of laboratories ➤ Prepare and use OHP transparencies for classroom instructions

The Principals are highly satisfied with the following aspects related with the improvement in the performance of the students and consequent benefit to the institutions (Mean value range from 3 to 3.46):

- Improved academic performance of students ➤ Prepare handouts for topics in the Curriculum
- Improved placement opportunities for students ➤ Use the Internet to collect information and instructional material relevant for the Curriculum
- Consultancy and testing services offered to the industry ➤ Show willingness to undergo training
- Effective and efficient management of the institution ➤ The Principals consider that their faculty frequently do the following activities connected with student services (Mean value 3.23)
- Implementation of industry relevant curriculum ➤ Offer counselling to students on their personal problems
- Accreditation of programmes ➤ Offer Career/ vocational/ social guidance to students
- Conduct of continuing Education programmes ➤ The Principals consider that their faculty do the following activities often (mean value ranging from 1.83 to 2.85)
- Improved IRG for the institution ➤ Identify and procure educational video films for instruction

The Principals consider that their faculty frequently do the following

- Prepare CBT material with text, graphics and animations
- Prepare textbooks for publication by private agencies
- Organise competitive events pertaining to the subject matter
- Identify and suggest avenues for Internal Revenue Generation for the Polytechnic
- Conduct Continuing Education Programmes meeting the stated objectives of the programme

The Principals rate the following as good (mean value ranging from 3.0 to 3.71)

- The facilities and support for preparation of media/ aids by the teachers at the Polytechnic
- The ability of the teachers to construct meaningful objective type questions
- The ability of teachers to construct structured essay type questions
- The knowledge of teachers for preparation for NBA Accreditation
- The participation of teachers for preparation of NBA Accreditation
- The participation of teachers in the implementation of Strategic Plan

The principals feel that the curriculum meets the current demands of the industry only to a fair extent.

The principals also felt that the teachers who use innovative practices/ show better results are often rewarded

According to the Principals the aspect of NITTTR's initiatives which had the maximum impact on the performance of polytechnics is

- Staff Development Programmes (53% of principals)
- Training on NBA Accreditation (20% of the principals)
- Teaching Methodology (20% of principals)

According to the principals the following requirements of the polytechnics could NOT be met by NITTTR's initiatives

- Instructional Material (6% of the principals)
- Student Evaluation Methods (6% of the principals)
- Training for non-teaching staff on Communication and Team playing (6% of the principals)

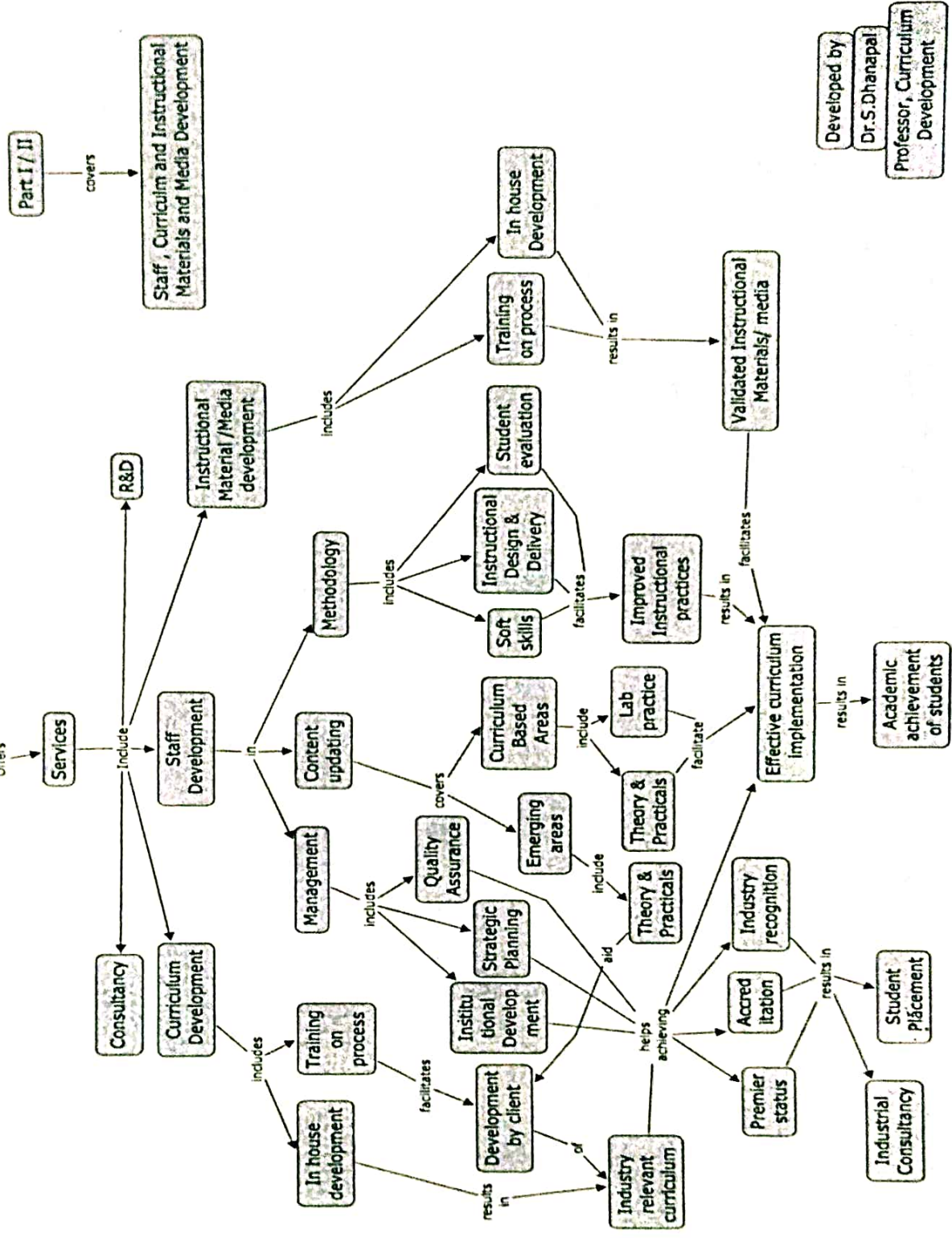
According to the principals, NITTTR faculty contributed directly in the following roles for the management of the polytechnics

- Staff Selection (20% of the Principals)
- Strategic Planning for the polytechnic (6% of the Principals)

According to the principals, polytechnics use the following

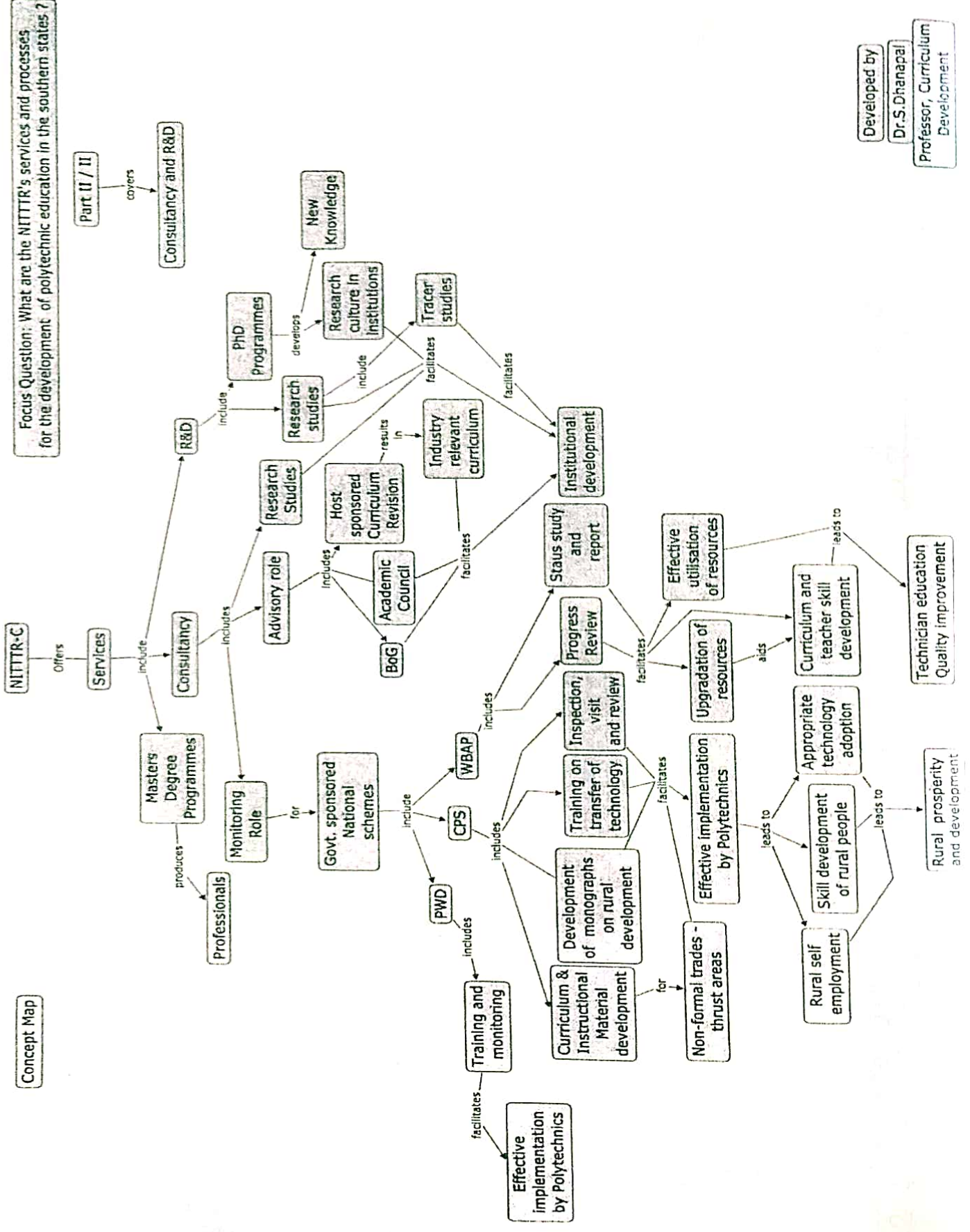
Focus Question: What are the NITTR's services and processes for the development of polytechnic education in the southern states ?

Concept Map



Developed by
Dr.S.Dhanapal
Professor, Curriculum
Development

Focus Question: What are the NITTR's services and processes for the development of polytechnic education in the southern states?



Developed by
Dr.S.Dhanapal
Professor, Curriculum
Development

Instruction Materials developed by NITTTR

- Video films (40% of the Principals)
- Print Material (73% of the Principals)

The principals, as part of open-ended suggestion stated the following:

- The participation in Staff Development Programmes conducted by NITTTR may be made mandatory by the DTE (33% of the Principals)

- An appropriate effective student evaluation process should be evolved as the present system fails to identify the level of comprehension of the students (13% of the Principals)
- The duration of training to be limited to 3 days (13% of the Principals)

Conclusion

The study when completed, covering a larger sample across various categories of polytechnics, has the potential to give further insight into the impact made by NITTTR's services.

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Technical Education - Past, Present.....

S. SUDHARSSANAM

In the last quarter century and more, one of the hot topics in the media and of concern of the educationists and society at large is the steady deterioration in quality and standards of technical education in India amongst new generation of mostly private institutions known as self financing institutions. There is a saying "Where there is quantity, there is quality too". This adage is proved to its futility in the case of technical education. Though there is uncontrolled, uncontrollable expansion in numbers of technical education institutions (engineering colleges, polytechnics, schools of business management, computer education colleges etc) catering to the public demand, quality has been a consistent casualty with such unabated expansion. This paper gives pointers to few of the vital ones which contribute to such deterioration, with open endedness to possible solutions.

It is pertinent to note that in the last 3 decades large number of conferences, seminars etc were conducted, sponsored by ministry of HRD, ISTE, CII etc. related to quality

issues in technical education. From the present status of quality of technical education, it only makes us to infer that majority of the recommendations made in those conferences/seminars remain on paper, occupying space in libraries. Had actions been taken on those, the present status of production of large number of unemployable, untrainable engineering graduates could have been avoided.

India is the second fastest growing economy in the world and so, it certainly holds a lot of promise for the future. Technical education contributes a major share to the overall educational system and plays a vital role in societal and economic development of the country. In India, technical education is imparted at various levels such as craftsmanship, diploma, degree, postgraduate and research, catering to various aspects of technological development and economic progress.

Indian Institutes of Technology (IITs) are premier institutions established by Government of India by an act of parliament. IITs produce world class engineering graduates

(B.Tech), Post Graduates (M.Tech) and Ph.Ds. Quality of output from these prestigious institutions is certainly world class. Next to IITs and on par are Central Institutes like, Indian School of Mines, School of Planning and Architecture etc; and National Institutes of Technology (NITs). NITs were earlier

known as Regional Engineering Colleges (RECs) one in each state, which were set up as a joint venture of the Govt. of India and the respective State Government. These RECs, in addition to producing high quality graduate engineers (B.E / B.Tech), also played a prominent role in producing M.Techs and Ph.Ds in various engineering disciplines. On the strength of the achievements made by RECs, as per the recommendations of a National level review committee, the RECs have now been made on par with IITs, being rechristened as NITs, and fully funded by Government of India.

Next tier is that of Govt. Engineering Colleges and Government Aided Engineering Colleges. Govt. Engineering Colleges are established by the respective State Governments, as fully funded Govt. institutions (College of Engineering, Guindy; Govt. College of Engineering, Pune; Govt. College of Technology, Coimbatore; etc).

Government Aided Engineering colleges are established by philanthropists/charitable trusts with

the support of the respective State Governments. These colleges, managed by respective Governing Councils, receive grant-in-aid in agreed proportion through the respective State Governments (90:10, 80:20, 75:25; etc.; former by the State Govt. and the latter by the management of the trust). Colleges like, P.S.G college of Technology, Coimbatore; B.M.S.College of Engineering, Bangalore, etc. come under this category.

By and large except for rare exceptions, State Governments stopped establishment of Government Engineering Colleges and Government Aided Engineering colleges, after the 1970s. Both these two categories of Engineering Colleges produced quality engineers who occupied various positions in Government, Government undertakings and Private industries. Several of the pass outs, became successful entrepreneurs too.

By early 1960s in the state of Karnataka, followed by Maharashtra "Capitation fee Engineering Colleges" were established as purely private institutions. To begin with, these colleges collected capitation fees (lump sum amount for building up infrastructure) from the students and collected tuition and other fees as obtained in Government Engineering Colleges. Of course between then and now, there is a changed scenario, due to the several Acts passed by the various State Governments towards

abolition of capitation fee, and several judgments of High Courts and the Supreme Court of India. Any further detail on this front is beyond the scope of this paper.

In the mid' 80s, more and more Engineering Colleges, called self financing colleges were established in Karnataka, Maharashtra, Andhra Pradesh and Tamilnadu. In the 1990s, to avoid exodus of students to these states, almost all other States started self financing engineering colleges. During late 1990s and 2000s the number of such colleges has grown to astronomical figure. Several of them are with very poor infrastructure coupled with poor quality of staff members including lack of faculty members in adequate numbers, as per norms and standards of All India Council for Technical Education (AICTE). AICTE is a statutory body of Government of India set up for coordinated development of Technical Education in the country.

In the past 10 years there was a phenomenal expansion (mushrooming) of technical institutions, namely Engineering Colleges and Polytechnics in the country. Based on the popular demand, AICTE, having become a statutory body, approved large number of privately managed Engineering Colleges and Polytechnics. In the early years of post independence era (post 1947), graph of growth of Engineering Colleges was

very much flat and employment was a certainty either immediately after graduation or within a reasonable period of 6 months to 1 year. In the whole of India number of engineering colleges in 1947 was 44 with intake capacity of 3,200 at B.E / B.Tech level. In 1980 number of engineering colleges rose to 157 with intake capacity of 28,500 respectively. Whereas in the Academic year 2005 - 2006, the number of Engineering Colleges and intake capacity jumped to 1,346 and 439,689 respectively. During 2007-2008 number of engineering colleges and intake jumped further at galloping speed to 1,668 and 653,290 respectively.

Till late 1960s unemployment of engineering graduates was not an issue at all. In the last 10 years, there is a steady growth of pass outs of Engineering Colleges, not able to get placements through Campus interviews to the extent of about 60%.

Table A gives the growth of Engineering Colleges in India from 1940 onwards. Very high, sudden growth had taken place, a quantum jump, from 1997 onwards and the rate of increase became much more pronounced in the 2000s.

Table - B (1) gives the intake in Engineering Degree programmes (B.E/B.Tech) based on population. All India average intake in B.E/B.Tech was 506 per million population in 2006 admissions. Intake capacity as of 2006 in Tamilnadu was 1609 per

million population. It can be seen that this is the highest among all the States ,where as the largest state of UP has an intake of only 230 per million population.

Table A Growth of Engineering Colleges in India

Year	Number of Engineering Colleges	Approved Intake
1940	11	600
1947	44	3200
1961	113	16500
1971	139	18200
1975	145	24000
1980	157	28500
1985	280	58500
1986	287	59500
1994	375	90773
1995	416	101451
1997	566	135067
1999	665	156665
2000	776	185758
2001	1069	292939
2002	1208	359721
2003	1265	380803
2006	1346	439689
2007	1668	653290

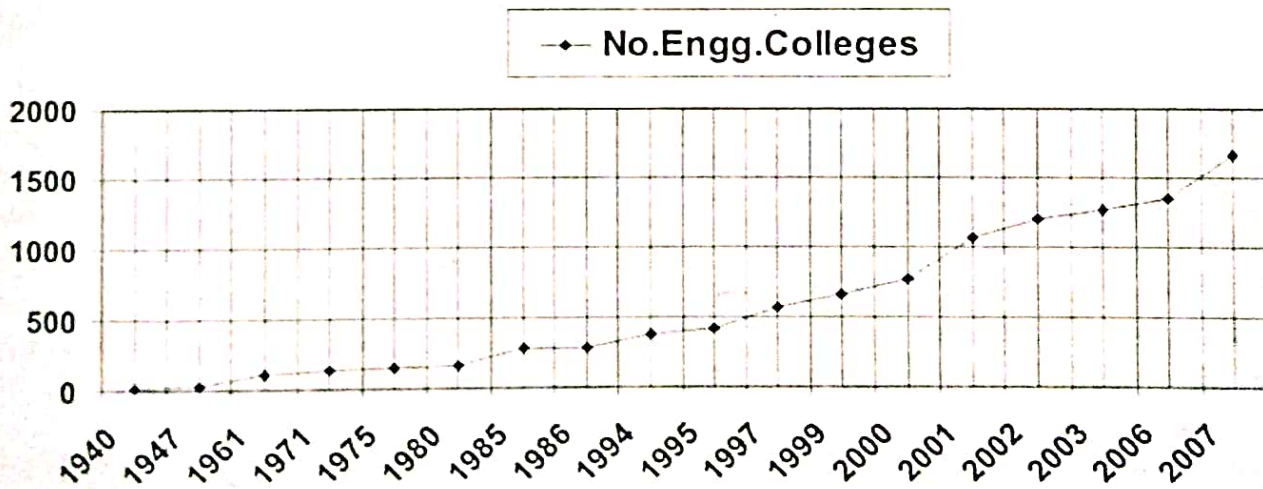


Table – B - Relative Status of Engineering Degree Intake

Sl No.	State	Population	Intake	Intake/Million	Ratio for state To National Intake
(All India Average 506 per million)					
1.	Tamilnadu	63.6	102325	1609	3.17
2.	Andhra Pradesh	77.8	113522	1459	2.88
3.	Karnataka	53.6	55541	1036	2.05
4.	Kerala	33.0	28985	878	1.74
5.	Maharashtra	93.9	57750	615	1.22
6.	Haryana	20.4	17286	847	1.67
7.	Punjab	24.2	18192	752	1.49
8.	Orissa	37.3	15982	428	0.85
9.	New Delhi	14.5	6769	467	0.92
10.	Madhya Pradesh	83.0	32654	394	0.78
11.	Gujarat	54.2	15915	294	0.58
12.	Rajasthan	55.8	18669	335	0.66
13.	Uttar Pradesh	180.6	41487	230	0.45
14.	West Bengal	81.4	18965	233	0.46
15.	Bihar	105.0	2122	20	0.04
16.	Assam	27.3	1150	42	0.08

If we take a look at the norms and standards of technical education promulgated by AICTE starting from mid 80's to the latest, there is a clear message that standards expected from such private institutions are being diluted.

Because of such uncontrolled expansion, initially by and large in the states of Karnataka, Maharashtra, after long deliberation in the then advisory AICTE and as enshrined in NPE 1986 (modified in 1992), AICTE became a statutory body having teeth to control mushrooming of technical institutions. Statutory AICTE came into being in March 1988 and the approvals given for large number of institutions as a continuous process remains a reality,

rather than expected controllability of mushrooming and that too substandard institutions.

Recently the Standing committee of parliament (2) has given report after reviewing the functioning of AICTE, wherein the committee has stated,

“The very objective of the proper planning and coordinate development of technical education system throughout the country in the backdrop of evolving AICTE from an advisory body to a statutory body seems to have been defeated”

The committee further added, “...The committee was constrained to note that the AICTE till date has failed

to undertake any survey whatever in any field of technical education leaving thereby the critical mandate, of making forecasts about the needed growth and development in technical education, unattended so far”

Hence the crux of the result of AICTE becoming a statutory body has not only, not yielded expected dividends but has been instrumental in opening flood gate for establishment of more substandard institutions in large measure as a continuum.

Several instances are reported in the media that some of the unscrupulous institutions make a mockery of inspection by AICTE/ Affiliating University by producing fake faculty members. The organizational set up of AICTE is not geared to handle these even after 20 years of its existence. Had AICTE been a body, unapproachable, with stringent, strict, objective and uncompromising yardsticks, such mishaps cannot happen.

It is interesting to note that Dr. U.R.Rao committee (3) which reviewed functioning of AICTE, in its report submitted in 2003 has recorded as under.

“Assuming that total all India intake capacity of 359,721 engineering under graduates in 2002-03 remains constant, the number of engineering under graduates for the four years would be 1,438,884. The total

requirement of teachers, for teacher student ratio of 1:15 in engineering colleges alone would be 95,924 composed of 13,703 professors, 27,406 Assistant professors / Readers, and 54,812 lecturers. The shortfall to meet the minimal requirement based on specified qualification norm is 26,000 Ph.D's, and over 30,000 M.Techs or a total of over 56,000 teachers”

In the above back drop, one can extrapolate the shortfall of Ph.D and M.Tech holding academicians as per the intake capacity sanctioned as of 2007-2008 of 653,290, an increase of about 45% in 5 years.

Prof.J.P.Shrivasthava (4) in his paper titled , “ Demand and supply of Engineering PhD Personnel in India by 2010”, has stated,“The AICTE may note that the sanction of every 100 seats in any subject(branch of Engineering)will generate a need of 10 teachers with Ph.D degree in that subject in teaching profession alone.....”

Hence it should not be surprising to see flying academicians presenting themselves at the time of inspection by the concerned authorities to satisfy AICTE's norms for teachers

There is no visibility of any concerted project/ Mission oriented mode of approach to enable motivating graduates of engineering colleges to opt for research and teaching with the same galloping

speed on par with addition of newer engineering colleges.

Training and Retraining

Prior to implementation of Madan committee report (5), there was large number of teaching cadre in engineering colleges and polytechnics like. Junior instructor, Senior instructor,

Associate lecturer, Lecturer, Asst professor, Professor, Head of Dept, etc. In late 80's while revising pay scales of teachers of engineering colleges and polytechnics, keeping in mind recommendations of Madan committee, lowest formation of teacher was revised as lecturer. But another vital recommendation that there should be "leave and training reserve" to the extend of 10% of the cadre strength, in every institution so that class works do not suffer due to teachers going on leave, training, higher studies etc. remains yet to be accomplished. This cannot be implemented because, as of now, across the board about 30% of the sanctioned teaching posts are vacant across all institutions, there are no takers nor qualified candidates with apt academic & research background to man these positions. Unless a mission mode is created to attract talents to teaching cum research, the situation cannot be remedied.

In this context it may be interesting to note the recommendations of Acharya

Ramamurti committee which reviewed National policy on Education that

- "In order to enhance the quality of teachers in the university system, pre induction training for a period of one year after recruitment should be organized..."
- make recruitments to teaching positions strictly on merit by open competition and on all India basis"
- Develop engineering faculty members through the effective use of study leave, summer training, and consulting and research opportunities.
- Teachers should be provided with opportunities to participate in a wide range of activities that are crucial to the growth and development of the institution they serve. In specific terms, participation of teachers should be encouraged in, planning and resource mobilization, curriculum design and development, formulation of institutional strategies for development, etc,

Meaningful implementations of above are yet to take place in full. Rather it would be interesting to see advertisements in dailies calling for teaching positions through "Walk in interviews" due to acute shortage of candidates.

Admission in engineering colleges

A review of admission in engineering colleges in Tamilnadu in the last 3 years revealed that more than 30% of the self financing colleges could not fill up even 50% of the sanctioned intake for want of takers.

It is worth appreciating that the awareness of quality colleges is high in the mind of parents and students which had taken place in the last 10 years. Now people visit the colleges before admission season, talk to alumni and then choose the college.

Admission year	No. of Non Govt. Engg. Colleges	% Seats filled up in Self - Financing Engineering Colleges					
		100%	91% to 99%	51% to 90%	21% to 50%	11% to 20%	≤ 10%
2007	254	15	98	111	23	4	3
2006	236	12	39	116	42	14	13
2005	223	14	57	98	33	12	9

Such non filling of seats has a cascading effect on further reduction of teachers by the managements to fulfill AICTE's requirement of teacher – student ratio of 1:15. But the fact remains that even if there are only 10 students in a particular class we need a teacher to teach a particular subject and the number game of 0.3 teacher(TS ratio 1:15) is a fiasco. Lack of qualified merited teachers has given rise to market forces in developing lot of entrepreneurs to give help in project work or rather project work, which is expected to nurture creativity, has become a purchasable commodity.

Management of Technical Education

Though statutory AICTE has completed 20 years of existence, except in regional offices at below officers' level, AICTE does not have system of its own cadre of officers(except a very few). AICTE mostly

functions by inducting mostly academicians from engineering colleges on deputation for 3 years or so. This is a severe weakness in terms of memory system in the organization.

CABE committee on policy 1992 has a resolution which reads as under:

“Emergent steps should be taken to ensure that regional offices of the AICTE are fully staffed and that adequate authority and function are devolved on these offices”. It could be seen that this has not taken place.

Indian Education Service

NPE has recommended an exclusive All India Cadre of Officers for education, the IES. This is yet to come into existence. Whereas the advisory cadre which was an exclusive outfit in Govt. of India for managing technical education was abolished in the beginning of this century by converting these posts to

be manned by generalists or other cadre of officers. This is certainly a disadvantage while looking from the perspective of proper memory system in management of technical education which worked effectively till then. Reviving the advisory cadre in education could be a far cry in wilderness but the demerit of abolition of such a cadre has its own adverse effects. At least AICTE should have its own cadre of officers as obtaining in UGC etc.

Commercialization of Technical Education

So far the Govt. has not recognized commercialization of technical education. Because of that the system could produce large number of unemployable, untrainable pass outs! Once the system gets fully commercialized (in part it is a reality) then the institutions become answerable to the quality of the pass outs.

There are several other parameters which subscribe to deterioration of quality of technical education, needing detailed discussion.

Conclusion

In conclusion, it has to be recognized that today technical education is in crossroads. Yet there are islands of successes. About 20% of the new breed of private technical institutions might perform to optimum level to produce quality products. But what about the rest? What happened to the wasted resources of students? Uncontrolled, added mushrooming of 100s of engineering colleges year after year, because of popular demand from promoters of engineering colleges, is harmful to the system and society at large.

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Comparative Study of Three e-Learning Modes

P. SIVAKUMAR AND M.V. SRINATH

1.0 Preamble

With rapid advancements in technology – particularly Information and communication technology, the focus of pedagogy is fast changing from teacher-centred approaches to more learner-centred approaches with considerable freedom to learners to experiment on their own. These factors necessitate suitable interventions through in-service teacher training programmes for teachers of Engineering Colleges. Because of the various limitations in the traditional methods of training there is a felt need to provide training at door steps.

1.1 Need for the Study

Teachers should know the psychology of their students, principles of learning, and methods of designing and delivering instruction. Pandey (1999, p.17) calls this specialized body of knowledge as "Pedagogical Content Knowledge". Teachers of engineering colleges enter the teaching profession with merely a Bachelors' or Masters' Degree in Engineering / Technology /

Computer Applications. They have very little exposure to knowledge and skills in pedagogical areas. Subject matter knowledge alone is insufficient for teachers' work.

NITTTRs provide in-service training for teachers of engineering colleges and polytechnics. As on March 2007, there are about one lakh teachers, teaching in Engineering Colleges in India and 52,725 of them are in the southern region. Number of pedagogical training programmes conducted for these teachers by the NITTTRs is in fact too small to create a significant pedagogical impact on the large number of teachers of Engineering Colleges.

Mr. Joe Miller, President and Chief Learning Officer at KnowledgePlanet.com says, "e-learning allows learners to displace the teacher / trainer at the center of the learning experience." The instructional methodology and the standards are emerging now for an individual to be at the center of the experience, instead of being at the end of a flow of information from a subject matter expert or teacher. That not only

energises the learner, but also shortens the time to mastery, making teaching / training time more efficient.

2.0 Statement of the Problem

Offering teacher training through e-learning environment would be highly cost effective and it is possible to reach all the Engineering Colleges and Polytechnics. There is an immediate need to develop training materials for e-training for providing in-service training in pedagogy to teachers of technical institutions.

The research project envisages a Comparative study of three different modes of e-training. For each mode three separate packages with the same content were developed. The three modes of e-training selected for comparative study are

1. Mode 1 (Content presented with Text, Graphics, Animations, Audio & Video)	M1
2. Mode 2 (Content presented with Text, Graphics & Animations)	M2
3. Mode 3 (Content presented with Text only)	M3

2.1 Objectives of the Study

To study the relative effectiveness of the three different e-learning modes.

2.1.1 Enabling Objectives

1. To develop the e-materials for training on pedagogical content namely, Developing Instructional Objectives.
2. To deliver the developed training materials, M1, M2 and M3, as

separate packages each containing different combinations of multimedia elements

3.0 Samples for the Research Study:

The sample for training through the three packages consisted of 95 teachers working in three Engineering Colleges. The details are listed in the Table 3.1.

Table 3.1: Sample for the Study

College ↓ \ Packages →	Sample			
	M1	M2	M3	Total
1	11	10	10	31
2	12	12	12	36
3	9	9	10	28
Total	32	31	32	95

4.0 METHODOLOGY

4.1 Approach to the Research Design

Keeping in view the three objectives of the research project, the study was designed to consist of the following five phases.

- Phase I: Training Content Development
- Phase II: Developing multimedia material with the Training content
- Phase III: Customising with LMS
- Phase IV: Converting the Training Content into PDF
- Phase V: Study of the effectiveness of learning through the three packages

➤ Each of the packages were validated by using a One Group, Pre-test – Post-test design on a

sample of 95 teachers of Engineering Colleges.

- The relative effectiveness of the three packages on the achievement of the objectives of the packages was studied.
- Demographic profile of the teachers constituting the sample and level of satisfaction in using the three modules were also surveyed using two separate Questionnaires.

4.2 Steps Involved in the Conduct of the Study:

The steps followed in carrying out the research study are depicted in the form of a flow chart presented in Fig. 4.1.

5.0 Data Analysis and Findings:

- (i) Mean gain percentage of the learners was calculated for each of the three packages.

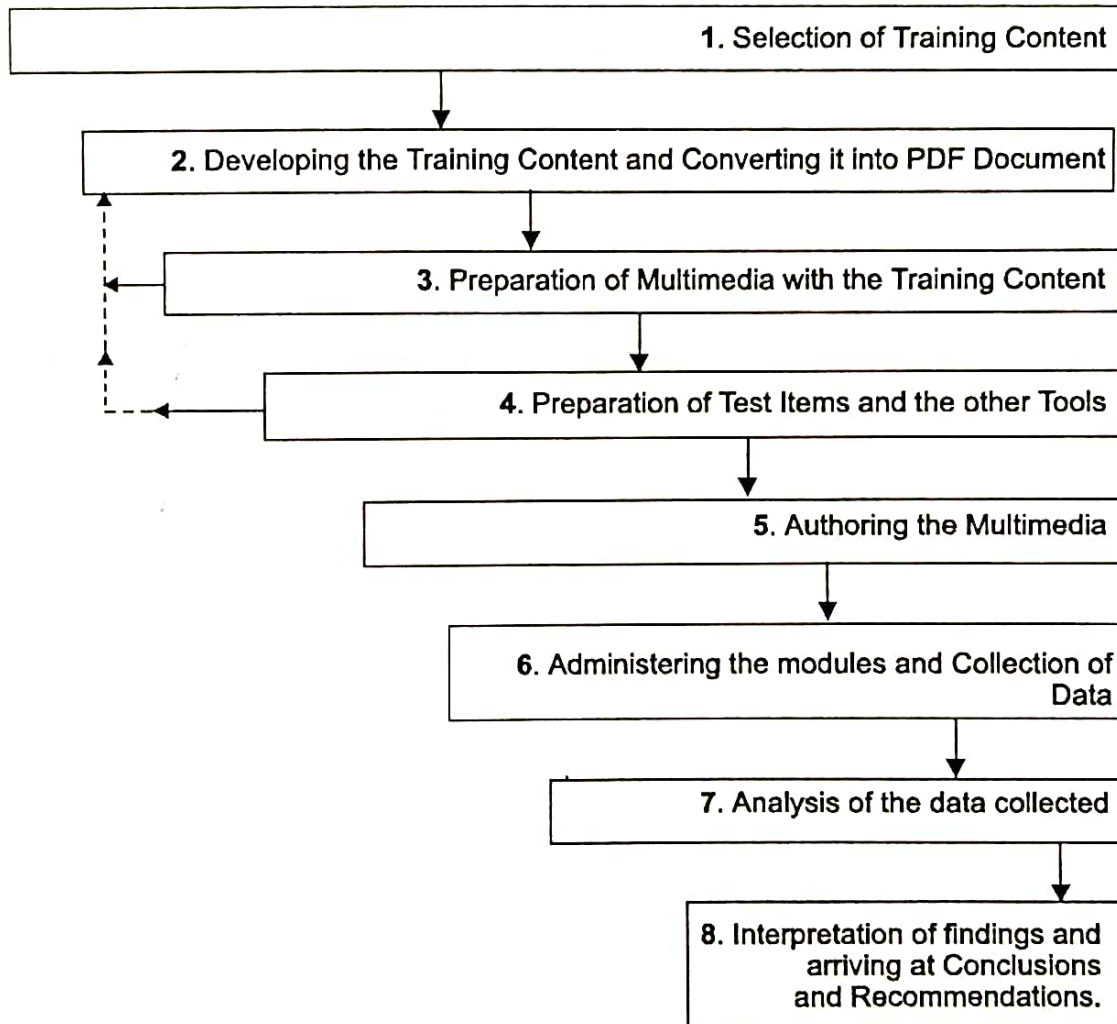


Fig. 4.1. Steps followed in carrying out the research study

- (ii) Relative effectiveness of the three modes were computed using 't' test.
- (iii) The responses to the questionnaire on satisfaction survey were analysed for each of the mode.

5.1 Finding of the Analysis of Effectiveness in Terms of Gain Percentage:

The Gain Percentages for the three packages were calculated using the Pre and Post-test scores for each student. From this Mean Gain Percentage for each of the three packages were computed. The procedure followed is described below.

- (i) Actual gain was determined using the formula:

$$\text{Actual Gain} = \text{Post-test Score} - \text{Pre-test Score}$$

- (ii) Maximum possible gain was found out using the formula:

$$\text{Maximum Possible Gain} = \text{Maximum Possible Score in the Post-test} - \text{Actual Score in the Pre-test}$$

- (iii) Gain percentage was found using the formula:

$$\text{Gain Percentage} = \frac{\text{Actual Gain}}{\text{Maximum Possible Gain}} \times 100$$

The training offered through all the three modes was effective and the effectiveness of the three packages as indicated by the gain percentages are listed in the increasing order as listed below.

1. Package	M2	(Mean	Gain
Percentage =	74.7)		
2. Package	M3	(Mean	Gain
Percentage =	76.2)		
3. Package	M1	(Mean	Gain
Percentage =	83.2)		

5.2 Findings of the Analysis of Relative Effectiveness using 't' Test:

The relative effectiveness between the three packages were computed using 't' test.. The 't' values were calculated using the formulae given below.

$$t = M1 - M2 / \sigma D$$

$$\sigma D = SD_{\text{Comb}} \{ \sqrt{[(N_1 + N_2)] / [(N_1 \times N_2)]} \}$$

$$SD_{\text{Comb}} = \sqrt{(\Sigma x_1^2 + \Sigma x_2^2) / [(N_1 - 1) + (N_2 - 1)]}$$

$$df = [(N_1 - 1) + (N_2 - 1)]$$

Table 5.1
Results of 't' Test done for Comparing the relative effectiveness of the three packages

Package	Sample Size	Mean of post test scores	$SD_{Comb} = \sqrt{\frac{(\sum x_1^2 + \sum x_2^2)}{(N_1 - 1) + (N_2 - 1)}}$	$\sigma_D = \frac{SD_{Comb} \times \sqrt{\frac{[(N_1 + N_2)]}{[(N_1 \times N_2)]}}}{\sigma_D}$	$\sqrt{\frac{t^2 = (M_1 - M_2)}{\sigma_D}}$	Remarks
M1 Vs M2	32	26.375	2.202	0.555	3.000	The performance of the teachers trained through M1 package is better than that of the teachers trained through M2 package.
	31	24.710				
M2 Vs M3	31	24.710	2.266	0.571	0.673	There is no difference between the performance of the teachers trained through M2 package and M3 package.
	32	25.094				
M3 Vs M1	32	26.375	2.244	0.561	2.284	The performance of the teachers trained through M1 package is better than that of the teachers trained through M3 package.
	32	25.094				

M1 Vs M2:

The 't' value (3.00) obtained is more than table value(1.96) with a degree of freedom 61 and at 0.05 level of significance. Hence, there is a significant difference between the achievement of the teachers trained through M1 package and M2 package. The achievement of the teachers trained through M1 package is better than that of the teachers trained through M2 package.

M2 Vs M3 :

The 't' value (0.67) obtained is less than table value (1.96) with a degree of freedom 61 and at 0.05 level of significance. Hence, there is no difference between the achievement of the teachers trained through M3 package and M2 package.

M3 Vs M1:

The 't' value (2.28) obtained is more than table value(1.96) with a degree of freedom 62 and at 0.05 level of significance. Hence, there is a significant difference between the

achievement of the teachers trained through M1 package and M3 package. The achievement of the teachers trained through M1 package is better than that of the teachers trained through M3 package.

The media elements (Text, Graphics and Animation) have been appropriately used to reinforce the learning For Package M2

The media element (Text only) used is sufficient to reinforce the learning For Package M3

5.3 Learner satisfaction on each of the package:

The teachers were asked to consider the following Statement(s):

The media elements (Text, Graphics, Sound, Animation and video) have been appropriately used to reinforce the learning For Package M1

They were asked to rate it on the basis of degree of satisfaction they derived while using the package.

Rating assigned by each teacher was given a score as per the following Scoring Key: Strongly Disagree – 1; Disagree – 2; Agree – 3 and Strongly Agree – 4. The findings are tabulated in Table 5.2.

Table 5.2: Satisfied Percentage of Learners for Each Package

Package	Sample	Statement	Percentage of Learners Satisfied
M1	32	The Media Elements (Text, Graphics, Sound, Animation and Video) have been appropriately used to reinforce the learning.	91
M2	31	The Media Elements (Text, Graphics And Animation) have been appropriately used to reinforce the learning.	90
M3	32	The Media Element (Text Only) used is sufficient to reinforce the learning.	94

5.4 Summary of Findings:

The findings through the data analysis are consolidated in the Table 5.4

Table 5.4: Consolidation of Findings

Package	Mean Gain Percentage	't' Value	Satisfied Percentage of Learners
M1	83.2	3.00 (>1.96) [M1 Vs M2]	91
M2	74.7	0.67 (<1.96) [M2 Vs M3]	90
M3	76.2	2.28 (>1.96)* [M3 Vs M1]	94

* 1.96 is the table value for 0.05 level of significance

Mean Gain percentages indicate that M1 is highly effective than M2 and M3; among M2 and M3, M3 is better than M2.

't' values indicate the following:

The achievement of the teachers trained through packages

M1 and M2 – there is a significant difference (M1 is better than M2)

M2 and M3 – there is no significant difference

M3 and M1 – there is a significant difference (M1 is better than M3)

The percentage of teachers satisfied, indicate that the teachers trained through the Package M3 is satisfied than the teachers trained through the Packages M1 and M2; and the teachers trained through the Package M1 is satisfied than teachers trained through the Package M2.

6.0 Conclusion:

Training teachers in the pedagogical competency, namely, Developing Instructional Objectives with three different packages was taken up. On analysis all the three packages were found to be effective. However, the comparative study of effectiveness of three packages in training teachers on developing Instructional Objectives revealed that M1 Package is highly effective than

M2 package and M3 package; M3 package is more effective than M2 package. The relative effectiveness of the three modes are listed in the decreasing order.

- Mode 1 (Content presented with Text, Graphics, Animations, Audio & Video) [M1]
- Mode 3 (Content presented with Text only) [M3]
- Mode 2 (Content presented with Text, Graphics & Animations) [M2]

The teachers trained through all the three packages have expressed satisfaction in learning through the package. However, more number of teachers trained through M3 Package expressed satisfaction than the teachers Trained through the Packages M1 and M2.

7.0 Recommendations: Based on the findings and considering the institutional facilities the following recommendations are being made.

The packages with different combinations of Multimedia elements have to be deployed depending on the infrastructure facilities available with the individual institutions.

With the validated content, the packages for all the three modes be prepared and deployed judiciously to reach maximum number of teachers.

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Audit of the Industrial Training

B.L. GUPTA

Abstract

The industrial training of students, teachers and instructors plays an important role in developing and refining the competencies. The industrial training should be organized professionally to take full advantages of it. In this paper need and importance of industrial training, learning from industrial training and process of audit of industrial training is described precisely. The role of the teachers and industry resource person is described to effectively and efficiently organize the training. A format for auditing the industrial training is suggested. The outcomes of audit are used for improving the quality of industrial training of students, technicians and teachers.

NEED AND IMPORTANCE OF INDUSTRIAL TRAINING

Students having no exposure to learning in industry take longer time to understand their roles to perform professionally. They do not understand the work situation holistically and the importance of quality, effectiveness and efficiency.

They do not willingly come forward to accept new responsibilities and challenges. They do not appreciate the complete role to be performed. They perform what is told to them and in due course it becomes their habit. They depend on other persons for trivial decisions and activities.

Management of learning in industry plays a significant role in refining the competencies of the students. They get an opportunity to come out from the campus and see the world of work. They see the application of theory in real life situation. They experience the importance of real life challenges, risk and problems. They get an opportunity to see the development trends in the industry. They see the complexities involved in the industrial processes. During industrial training students appreciate the need of positive approach, high value for quality of products and services, and performing professionally.

Another aspect of learning in industry is that the institutions and industries supplement and complement the business of each

other. They are not separate entity. The industries share the responsibility to develop professionals and share the cost of learning through extending their resources for learning of students. The institutions have their own limitations of resources, hands on experiences and expertise. These limitations are also overcome through industrial training. The industrial training of students establishes a strong link between industry and institution to take up collaborative assignments for mutual benefit.

LEARNING FROM INDUSTRIAL TRAINING

The industry provides variety of learning opportunities for students. They get opportunities to develop and refine all types of competencies such as technical, professional, social, managerial etc.

They get an opportunity to see the use all types of technology and techniques to produce the products effectively and efficiently. The technical competence such as product design, selection of machine and tools, performing the job with accuracy, assuring the quality at every stage, taking measurements and recording them, improving the efficiency of performance and applying checks for quality etc.

They develop managerial competencies such as planning the work for achieving the targets, role allocation, communication, coordination, mobilization of

resources, problem solving, risk taking, supervising, monitoring and evaluation, taking remedial actions, working without stress, working in uncertainties, rewarding and punishing the employees etc in real life situations.

They develop social competencies such as establishing relationship with people at shop floor, leadership, followership, effective communication, asking questions, clarifying doubts, extending help, cooperation and support to fellow members, trusting people, sharing experiences, and so on.

They develop attitudes such as concern for quality, safety, saving, serving, house keeping, respect for others, cleanliness, record keeping, tolerance of undesired behaviour of others, positive approach to learning, and so on.

If students are placed for long duration training they learn to transfer the skills in new and different situations. They do projects, experimentation and research work. Students use all the senses in coordinated manner for completing the task and learning. The learning in industry incorporates various modes of learning such as learning by doing, learning by observation, learning through feedback, learning by mistakes, learning by experimentation, learning by thinking, learning by problem solving and so on. In fact, the initiation of competency development

in students takes place in the campus and proficiency is developed during industrial training. The preference for a particular job is developed during the industrial training.

The industry resource persons use variety of methods of training such as demonstration, exhibition, role play, case study, hands on experience, problem based learning, discussions, presentations, assignments, projects etc during the industrial training. The students are put under learning and thinking situation giving problems, assignments and projects such as prepare a production plan, design a product, modify the product, refine the process for improving the efficiency, reduce waste, study and chart a complex process, design market strategy, reduce drudgery, design network, conduct failure analysis, diagnose problem, develop management information system, develop alternative solutions to achieve objectives, analyze risk involved, prepare presentation, design website, conduct audit of use of energy, conduct surveys, do comparison etc. These methods of training develop the hard competencies in the students. At the same time soft competencies are also developed because of use of these methods without investing time and effort.

The assessment of development of skills and competencies can be integrated with the industrial training.

There is no need to take assessment tests because the progress on learning can be observed in natural setting on well-defined criteria. The learning is assessed on process of performance and quality of outputs prepared by students during the training.

AUDIT OF THE INDUSTRIAL TRAINING

The audit of industrial training is crucial to assure the quality of learning and development of threshold competencies so that students can take up the job right from the very first day. The industrial training is organized for students of all the branches. The quality of learning is assured having well designed system for organizing industrial training. The poorly organized industrial training may result in waste of time, efforts and resources. It may not serve the purpose of learning. The industrial training is audited on the criteria stated in Format 1. The audit of industrial training is conducted every year by a team of teachers. The audit experiences are shared with all the teachers of the institution to improve the quality of industrial training of students. It is also used to improve the collaboration, networking and cooperation with industries.

ROLE OF TEACHERS FOR MANAGING INDUSTRIAL TRAINING

The teachers should be trained to manage the industrial training of students. The trained and experienced

teachers can better manage the training. They perform the roles stated below:

- Analyze the curriculum and identifying the industrial training needs,
- Set learning objectives for industrial training,
- Identify the industry where students can learn effectively,
- Negotiate with industry and plan training,
- Orient the students on ways of learning, norms to be followed, learning parameters, expected learning outcomes, format of report, material to be collected, criteria for assessment of training, etc,
- Assure quality of learning in industry through monitoring and review,
- Develop learning resources such as case studies, handouts, assignments, role plays, simulation, games, models, handouts on latest technology and practices, learning packages, and the like based on industrial training of students,
- Update the library, laboratory and workshop,
- Undertake collaborative assignments.

ROLE OF INDUSTRY RESOURCE PERSONS FOR MANAGING INDUSTRIAL TRAINING

The resource persons from industry play significant roles in transferring learning and developing right competency in the students during industrial training. In fact they transfer their whole life learning to students in a limited time. They transfer the cream of the cream to students. They are the persons who create interest in students to enter in professional life with full energy, enthusiasm and creativity. They perform roles stated below:

- Appreciate and understand the learning needs and interest of students,
- Study the plan prepared for industrial training and design strategy to implement it,
- Organize orientation session and explain the industrial training plan to students and receive their comments, suggestions and expectation,
- Inform your expectations, rules regulations and norms to be followed by students during training and seek their commitment to it.
- Provide the written copy of the specific terms used in industry.
- Plan and organize learning events professionally.
- Assess the learning after each learning event and provide

- immediate knowledge of results that works as reward and source of taking corrective action.
- Demonstrate what and how of competency. During the demonstration use actual machine site and exhibit your competency on it. Take the help of graphs, process diagrams and figures for demonstration.
 - Explain all types of body movements and senses working to perform the task. After demonstration of set of skills provide an opportunity to ask questions. Then invite students to perform the task under your guidance. Provide opportunity for practicing the skills to students. Assess learning of skills on the basis of process and product.
 - Provide opportunity to master one set of skills and then move to next difficult set of skills and so on. Simultaneously integrate the previous learning with present learning.
 - Create demanding and challenging learning situation having high expectations.
 - Create learning opportunity to think creatively and apply knowledge, skills and attitudes to perform the task or solve the problem or to do small innovations.
 - Always create suspense in learning process to increase interest and curiosity for learning.
 - Promote intensive learning through stimulating assignment, problems and projects.
 - Demonstrate, guide, support, help, and coach the students when it is necessary.
 - Inculcate positive attitudes for confronting the problem, accepting the challenge, managing the crisis, planning and implementing innovations etc.
 - Provide constructive feedback for improving the competency and behaviour.
 - Share the experiences of professional life with students.
 - Review the progress of learning every day and ensure that students are maintaining diary on learning.

CONCLUSION

The industrial training is organized to develop and refine threshold technical, managerial, social and professional competencies in students. The students get an opportunity to have a feel of real world of work. They integrate all the information, skills and attitudes to perform the task in real life situation. All the new models of curriculum emphasize on developing competencies using hands on experience approach. The industrial

training creates ample opportunities for enriching the learning process. The institutions are expected to network, collaborate and cooperate with industries on various issues including industrial training of students, technicians and teachers. The audit of industrial training will assure the quality of learning on threshold competencies of students so they become employable at right position at right time.

References

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Audit the Industrial Training

Instructions for auditors: The process of industrial training is audited on the criteria stated in Format 1. During the audit of the process of industrial training if you come across deficiencies/ gaps/weaknesses, note down the extent of the gap in column 3 and description of the gaps in column 4 of the format. After examining the complete process of industrial training against each criteria and noting down the deficiencies/gaps/weaknesses, think about the strategies to bring improvement in the industrial training and note it down in column in 5. You can think about value additions with respect to criteria under consideration even if you do not find any weaknesses and mention it in column 5. Please use following scale for indicating the extent of deficiencies/gaps/weaknesses, in column 3.

- 5 - indicates very high deficiency/gap/weakness,
- 4 - indicates high deficiency/gap/weakness,
- 3 - indicates medium deficiency/gap/weakness,
- 2 - indicates low deficiency/gap/weakness,
- 1 - indicates very low deficiency/gap/weakness, and
- 0 - indicates no deficiency/gap/weakness.

AUDIT OF THE INDUSTRIAL TRAINING

Format 1: Audit of the industrial training

Sl No.	Criteria	Extent of Gaps	Description of Gaps or scope for improvement	Strategies to bring improvement
1	2	3	4	5
A Planning of industrial training				
1.	Are the objectives of industrial training aligned with the curriculum and clear to teachers, students and resource persons from industry?			
2.	Are there well-designed industrial training guidelines available in the institution?			
3.	Is the industrial training well planned according to guidelines?			
4.	Are the guidelines and training plan communicated to students and industry?			
5.	Are the students given orientation and instructions for stay, safety, discipline, learning methods, documents to be collected from industry, undertaking projects, report writing, and presentation?			
6.	Are the formalities such as consent of industry for training, agreement on schedule of training, role of different resource persons in industry during training, problem solving mechanism, monitoring the progress of learning etc have been completed?			
7.	Are the departments maintaining directory of industries related to their discipline?			
B Imparting industrial training				
8.	Overview of industry on its: Vision, core products and services, clients, brand image, organizational structure, size, turnover, profit, significant achievements etc.			
9.	Quick visit of the industry to familiarize the students with its departments, sections, people and technology.			
10.	Training as per schedule using different methods of learning such as exposure visit, demonstration, opportunity to practice the psychomotor and affective domain skills, assignments, project, problem solving, etc.			
11.	Quality of learning assignments, projects and problems assigned to students during training. Quality of output on assignments, problems and projects.			
12.	Opportunities given to students for asking questions, clarifying doubts, giving suggestions, notes taking etc			
13.	Opportunities given to students for developing affective skills such as concern for safety, house keeping, concern for saving the energy, material and environment, mutual respect, concern for cleanliness, concern for quality, tolerance etc.			

Sl No.	Criteria	Extent of Gaps	Description of Gaps or scope for improvement	Strategies to bring improvement
14.	Diagnosing learning problems through monitoring and removing learning gaps.			
15.	Quality of training, guidance, support and feedback provided to students in industry.			
C	Evaluating outcomes of industrial training			
16.	Assessment scheme clear to students and industries.			
17.	Quality of report prepared by students on industrial training General quality: Complete, precise, logic, way of presentation, use of graphs, tables and figures, case study etc Technical quality: Variety of learning events, problems and challenges of the industry and their solutions, opportunities for growth and development, technology and processes, specific project details etc.			
18.	Quality of oral presentation on confidence, flow, linkages, language, use of media, handling questions of audience etc.			
19.	Quality of learning of core competencies.			
20.	Quality of learning on associated competencies.			
21.	Documents such as policies, manuals, work instructions, technical specification, process description, organizational structure, various formats, books, and material collected from industry.			
22.	Behavior of the students during training.			
23.	Quality of feedback given to students for refining the competencies.			
24.	Remedial treatment given to students by teachers for removing learning gaps.			
25.	Learning resources such as case studies, handouts, assignments, role-plays, simulation, games, models developed based on industrial training of students.			
26.	Consultancy projects such as continuing education programmes, problem solving, learning resources development, research projects obtained by institution.			
27.	Collaborative work such as organizing seminars, conferences, training programmes, research started by institution.			

International Programme Structure for Internationalizing Indian Technical Institutes

S. ANITA AND V. THANIKACHALAM

Synopsis

The fast emerging economic future of India requires a strong force of human capital to establish and sustain it. Indian institutes need to gear up to meet the demand. Around 60% of India's one billion plus population is below the age of 25. Concerns arise to meet their needs with quality education and their employability when they emerge from the domestic higher education system. Internationalization is an imperative component and structuring such programmes based on the present successful institutes and with a vision for the future is the need of the hour.

INTRODUCTION

India has been able to develop highly competitive private companies, high tech and high skilled manufacturing, rising stock market and a well organized financial sector. Of the fortune 500 companies around 125 have their research and development bases in India, an evidence of India's knowledge - human capital. Software and business

process outsourcing exports and high-tech manufacturing have been able to reach billion dollar levels. The constraining factors lies with the educational system to produce employable graduates [6].

Thomas Farell, deputy assistant secretary in the U.S. Department of State's Office of Education and cultural affairs estimated that of 206,000 Americans currently studying abroad only 1,700 are in India due to India's low capacity to receive more foreign students [5].

Students from US, and UK are interested in Study abroad programmes in India. Student teams from Yale and Simmons College have been to India, in 2006 and 2007. Regular study tours bring in students from Wharton and Harvard business schools to India. Exposure of faculty and students to a cutting-edge, global vision with the presence of foreign students in Indian campuses would positively have its impact on this and future generations. George Joseph, Assistant Secretary for International affairs at Yale University sees an

opportunity to enhance research collaborations and scholarships based on positive developments for entry of foreign educational institutions in India.

The president of Yale University, Prof. Richard Levin, speaking at Jawaharlal Nehru University in 2005, said: "The globalization of the university is in part an evolutionary development...But creating the global university is also a revolutionary development – signaling distinct changes in the substance of teaching and research, the demographic characteristics of students and scholars, the scope and breadth of external collaborations, and the engagements of the university with new audiences. When I speak of becoming a global university, I envision a curriculum and a research agenda permeated by awareness that political, economic, social and cultural phenomena in any part of the world can no longer be fully understood in isolation..." [11].

BARC is in need to establish a university to cater to India's nuclear research establishments and ISRO has also established an institute in Kerala. This invokes the need not only for foreign education bill but also for domestic universities to compete effectively. Allowing differentiation in fees, pedagogy and faculty compensation, coupled with assured access for all eligible students, is

essential to build world class universities. [8]

From the above it is clear that the required potential is available and industrial development is favorable and we need to strengthen our institutes to international expectations.

Corporate and Research Orientation in Technical Education - Current Global Phenomenon

Reforms in developed countries include doctoral programs providing off-campus internships, opportunities for interdisciplinary research experience, teaching and mentoring skills, complementary course work, and awareness of changing career opportunities and emerging employment categories.

Chinese research universities are expanding through more self-support from close alliances with, or ownership of, high-technology industries, and through international loans. In Japan and Brazil, industry's growing interest in graduate education has increased support for university-based research. Greater emphasis is on course-based doctoral degrees as opposed to career-based degrees. Sweden, has established special research companies attached to universities and introduced special postgraduate programs for industry. Many countries are pushing universities and other research institutions to become more engaged with and derive greater financial

support from industry. Most of the European countries, beginning with Britain, have undertaken efforts to make research and graduate training more relevant to socio-economic objectives. In the European Union (EU), there is an interest in more structural financial input on part of industry. The World Bank is increasingly involved in supporting programs that do not just support, but try to reform higher education in countries such as Chile, Brazil, China, and Thailand. Other regional development banks in Latin America, Africa, and Asia are becoming increasingly involved in efforts to reform higher education and promote R&D [7].

International universities are more oriented towards research areas at global levels for their sustenance and in fact an element for survival in this technology era.

This understanding of the need for industry and research orientation and need for qualified work force has its pressure on the technical education system. A need for global engineers who need to work for multinationals in India and a need to provide training for the foreign work force catering to the needs of Indian industry abroad. Programmes offered in India must be in an international format accommodating for these rising concerns through out the world.

Initiatives in India

Industry and academia have been taking initiatives to forge a mutually beneficial relationship. A workshop was organized by the American Chamber of Commerce (AMCHAM) recently to identify the gap between the expectation of academia and industry. Over 20 CEOs, Presidents and Managing Directors of American companies operating in TamilNadu brainstormed over 100 students and faculty from colleges all over the State (14). Wipro technologies has introduced Mission 10X, a workshop for faculty to enhance the teaching learning process so as to obtain employable graduates. Anna University is likely to adopt the programme to train faculty in all the engineering colleges under it in TamilNadu. Tata Consultancy Services conducts one day workshops for conveying teaching learning methods for life long remembrance of concepts. Infosys conducts workshops for faculty and campus-connect training for students through partnerships.

The Action Planning Session of the Indo-US Collaborative for Engineering Education (IUCEE) has recommended the creation of Regional Indo US Engineering Faculty Institutes with four thrust areas: Curriculum Development, Pedagogy and Delivery; Research and Development; Quality and Accreditation and Innovation and Entrepreneurship, with strong Industry partnership. These Regional

Indo-US Faculty Institutes plan to foster collaborative networks and exchanges through course offerings for engineering faculty. The resulting networks are expected to lead to mutual benefits to India and to the US, including global experiences for faculty and students, collaborative research, development and entrepreneurship in technologies of global relevance, as well as access for US and Indian universities and companies to be ready to employ engineering graduates.

The American Society for Engineering Education (ASEE) has partnered with the Indian Society of Technical Education (ISTE) to further advance global engineering excellence through the publication of the Journal of Engineering Education (JEE) in India. The benefits of this collaboration are 1) Increased membership in ISTE by offering JEE as a member benefit, and cost effective access to engineering education research for ISTE members; 2) Increased readers, authors, and reviewers for JEE from India, and increased research collaboration between the two nations; and 3) Increased awareness between the two nations of the aspirations of each other's engineering education societies. [1]

Deemed universities have taken positive steps towards internationalization. In TamilNadu,

three universities have made notable progress:

1. Vellore Institute of Technology (VIT) has obtained national and international accreditation from ISO, NBA, NAAC and IEE and Energy Institute (UK). Several MoUs have been signed in areas of mutual interest. International bachelor degree, master degree and top-up programmes are offered in collaboration with institutes in Germany, Canada, Netherlands and China. An internal relations office caters to the progress and well-being of the foreign and non-resident Indian (NRI) students in the campus. The academic programmes are popularized through the office in Africa, Middle East, South East Asia, China and other neighboring countries. Academic partnership and faculty exchanges are established through linkages with Australia, France, Germany, Korea, Netherlands, Singapore, UK and USA. Students carry out projects in advanced nations through mutual exchange arrangements. VIT has also been able to work as a beneficiary partner along with some European Universities to develop curricula and courses at Undergraduate and Graduate levels with European Union funding under Asia Link Programme [16].

2. SRM Institute of Science and Technology (SRMIST) has an active study a semester abroad programme with some of the world's most prestigious universities, including the Massachusetts Institute of Technology, the University of California, Daris, US and the University of Warwick, United Kingdom. The initiative is designed to help students harness the benefits of international education, understand cross-cultural differences, develop self-confidence and equip themselves to measure up to the expectations of global opportunities. The Office of the International Relations helps international students adjust to and fully participate in the SRM University campus community. The International Student's Office (ISO), a subsidiary of the Office of the International Relations, functions as the nodal office favoring foreign students in various aspects [13].

3. Amrita Vishwa Vidyapeetham has signed historic agreement with Columbia University, New York and Uppsala University, Sweden, Harvard, Yale and other top US universities. Students from University of Texas, Austin and Amrita, US work on cross continental projects. The institute was selected as a partner university for exchange of

students, faculty and researchers with top European universities to establish a Eurasian academic mobility network, for achieving excellence in research and education in a global context, by identifying key themes for cooperation, leveraging on the complementary competencies and providing synergies essential for the progress and mutual benefit of the targeted Asian countries as well as the European Union. The consortium comprises of 16 prominent educational institutions (9 from Europe and 7 from Asia) and is coordinated by Malardalen University, Sweden [2].

The factor of success of these deemed universities are that they have autonomy and have oriented towards international vision choosing appropriate strategies including the key elements of global networking and linkages involving students and faculty and implementing the strategies with commitment.

Essentials in International Programme Structure

India provides various types of system of higher education which can favorably cater to the national and international needs. Focus is required on short term as well as long term programmes in vocational education and technical skills in collaboration with the private sector maintaining quality, accountability and

transparency [4]. Internationalization requires programme and organizational strategies to enhance and sustain the international dimensions of university / institute functions. The major elements of programme strategies include international academic programmes, research and scholarly cooperation, domestic and cross border relations and extracurricular activities with international and intercultural dimension.

Programmes need to represent different strategy areas like -collaborative education programmes (sharing knowledge across sectors), interdisciplinary collaboration (new perspective and cultural change), practice-based research (embed researchers in industry to study in practice), generational exchanges (sharing knowledge directly between people), technical skills development programs (linked directly to R&D activities), industry / sector mentoring schemes (across traditional industry boundaries), broad-based communities of practice (across industry boundaries) and cross-sector exchange programs (moving people into other industries). These strategies which are generally under-represented require imagination and a willingness to overlap the boundaries of the different sectors of education, industry and government. The partnering will be successful only if the differences among the partners are genuinely bridged [10].

With many institutes trying to obtain accreditation, a rigid and mandatory accreditation process incorporating the above elements and committed stakeholders could possibly make these components in the programme achievable.

A flexible curricular framework is required to suit the aptitude and career goals of the students.

An appropriate two dimensional matrix form of curricula with skills and competencies like investigation, planning, design, prototype production, testing, improvement, improved product and management forming one dimension and the second dimension comprising of basic courses, core courses, applied courses, advanced courses and electives could probably provide the required flexibility. Since, international technical programmes are very costly to develop and implement, appropriate care has to be taken to incorporate total quality and transfer value to the foreign students. The curricular structure should include scope for substantial contents in arts, humanities, social and management sciences, engineering sciences, workshops, technical arts, foreign languages, communication skills, etc besides the professional core and elective subjects, [3]. The programme of study could include alternative pathways for obtaining degrees like double degrees-science and engineering, integrated master degree,

distance learning and certificate courses with credit transfers to mainstream regular programmes, twinning programmes and transfer of credits to other universities where the specialization of interest is available etc. Initiatives are required for teaching about, and learning from the international context. Specialized undergraduate and graduate courses, seminars and conferences should be organized with an international dimension. Seminars and short term courses offered by faculty from abroad universities and visiting professors will contribute to appreciation of international concerns and issues. Faculty and student exchanges across universities will help develop appreciation for practices world over and international awareness.

The programmes should provide scope for obtaining diploma to post-graduate level in engineering and technology, based on the interest and capacity of the learner. Substantial opportunities for trans-disciplinary qualifications should be provided to students to obtain engineering and science qualifications. Continuing education facilities to acquire value adding qualification in the form of certificate, diplomas and degrees in the areas of interest without any restrictions in the nature of disciplines or duration through regular, distance learning and on-line modes should be made available, [3].

From the above the following could be taken as the essentials to establish successful international programmes:

1. Analyzing needs based on value systems, culture, national environment and upbringing
2. Designing courses with flexible curriculum framework, credit based approach, contents with greater scope, compatible time pace of learning and customized qualification pathways based on credits / grades obtained and time frame.
3. Networking for electives, specialized courses and language resource centers. Consortia approach for resource sharing and global updates.
4. Forming a part of global technical grids for outreach programmes and research.
5. Industry institute partnerships at national and international levels for research, consultancy projects, training and academic consultations.
6. Awarding degrees with mutual recognition, equivalence and transferable credits
7. Financial support through government contribution, scholarships, internal revenue generation, public-private partnerships, corporate involvement, alumni contributions.

8. Student services at national and international levels. Essentially including basic requirements of accommodation, food, local transfers, and medical insurance.

Readiness of the Engineering Institutes for Implementing Global Programmes

The following provide a broader view of the various factors for considering the readiness to implement the international programmes.

(a) Exogenous factors:

Ministry of Human Resource Development (MHRD) Policy, University Grants Commission (UGC) Policy, All India Council for Technical Education (AICTE) Policy, University Policy, State Government Policy.

(b) Endogenous factors:

Governing Council's Policy, Academic Council's Policy, Department's Policy.

(c) Departments Preparedness:

Goals reflecting global views, Programmes in emerging technology, Collaboration with the global industries, Motivated faculty, Infrastructure, Equipment, Learning resources (Library, Journals, and Classrooms, Labs, Workshops), Foreign student services, facilities, associations.

Industrial training, Assistantships, Transfer of credits, Visa regulations.

(d) External facilitators:

International Development Agencies (World Bank, UNDP, UNESCO...), Bilateral agreements, Private donors, Industrial assistance, banks, Indian missions.

(e) Local Facilitators:

Industrial associations, Community associations, Student associations.

A coherent policy from the various divisions with proper coordination and cooperation is required for making internationalization a reality. A bottom up approach could provide the required flexibility and autonomy in the implementation process.

Major strategic steps in conducting the programmes

- > Vision statement incorporating the global programmes
- > Set of Mission statements providing guidelines for planning and implementing the global programmes
- > Identification of global competencies expected in the graduates.
- > SWOT analysis of the institute for developing an appropriate programme.
- > Advertising the programmes to reach the intended audience and creating awareness of availability,

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features and utility of the programmes to the target group.

- Programme details to be made available to Indian missions and technical attaches. Visa regulations and country details to be made available to the students
- Acceptable fee structure for the global programmes
- Obtain accreditation from ABET or similar accrediting agencies
- Establish foreign student service unit with adequate expertise, foreign student association and appropriate hostels and food arrangements.
- Facilitate foreign student to undergo industrial training
- Continuous focus on global standards
- Degree recognition and credit transfer facilities

The successful institutes like VIT, Vellore, Amrita institute, Coimbatore have been able to implement the above strategies which project the feasibility for other institutes to fall in line.

Strategies for implementation of global programmes

Develop a vision for educating global engineers with global professional competencies.

Major objectives:

- Meeting needs of faculty, student and administrators for a global approach.
- Developing international collaboration research capacity
- Ensuring teaching learning, research and services that are abreast with the global demands
- Attracting students and faculty of high caliber to the institute.

This involves setting up of center for international programmes with specialized units basically for 1. Academic affairs, 2. Research, 3. Student and faculty exchange. Assign administrative roles in the international context to achieve place in international ranking, involve in international development projects, identifying areas of excellence and establish collaborations with world class institutes having advanced and complementary research areas.

At the base level awareness of the internationalization needs to be ensured with a high level of visibility within the institution. Ensure removal of barriers to international participation for faculty, staff and students.

Based on the strategic plans for internationalization and strengthening by University of Western Ontario and Purdue University, the following are considered as major initiatives for internationalization:

1. *Substantiate university wide culture to internationalize*

- The plan to internationalize is to be developed based on cooperation and consultation with all major stakeholders within the university / institute.
- Assign responsibility for implementing recommendations of the strategic plan
- Encourage full participation in implementation
- Review institute policies to ensure coherence, support and enhance provisions to implement strategies

2. *Faculty*

- Facilitating linkages with researchers at other institutions worldwide
- Research work should be well funded with faculty aware of funding opportunities and facilitate them to explore new opportunities for funding in conjunction with other administrative units.
- Encourage departments to create opportunities for international travel and research through alternative workload mechanism or other means.
- The international research should be fully recognized, the faculty appreciated and rewarded.

3. *Students*

- Provide additional resources, staffing to allow maintenance and expansion of student exchange and related activities
- Establish selective focus on the range and type of exchanges with planned research target areas or discipline or programme
- Enhanced two-way student exchange flows between partnered institutions.
- Facilitate grade / credit transfers between institutions
- Develop multi-disciplinary programmes which focus on international issues.
- Incorporate international content in all courses offered
- Establish faculty exchanges for the primary purpose of teaching and learning
- Establish programmes which require overseas residency for a determined period to enhance hands-on international experience

4. *Research*

- Aggressively identify opportunities for enhancing collaboration with researchers and key institutions around the world within areas of existing and emerging research strength.
- Establish database and base-line level of activity / success in current areas of research strength.

- Identify key constellation of research and project areas and conduct annual reviews.
 - Identify key partner institutions possessing complementary strengths and establish cooperation agreements.
 - Identify and actively facilitate faculty exchange activities with international partner institutions in each project area.
 - Develop new internal funding mechanisms to provide seed money for international projects in project areas.
 - Encourage and financially support international conferences, academic journals of international scope and for international travel for collaboration with colleagues
 - Identify and disseminate widely information regarding international research funding opportunities and provide central support and assistance with the generation and refinement of funding proposal for international research.
 - Develop focused means of disseminating information regarding international research activities on campus, within the community and beyond.
 - Key investment areas include promotions and advertisement, travel grants to support faculty, student programmes and publication materials.
5. *Attract international students*
- Establish minimum target for enrollment of foreign students
 - Selectively target students from particular areas of strategic importance and develop partnership agreements with universities and selected high schools of high academic quality in such areas.
 - Develop means for interacting international students in research, learning and community service.
 - Develop informal opportunities for students from abroad to spend limited periods of time in the institute as part of their course of study at their home university.
 - Actively recruit post-doctoral fellows from selected countries in support of specific programmes of international significance. [15]

Possible Difficulties in Implementation:

It is necessary to orient the stakeholders if institutional priorities and structures are to change. The change is not immediate. Shifts occur and outcomes are realized on long term pressures. Getting the vision across the society, funding, network building, initiating inter and multi-disciplinary research, resolving policy conflicts with existing policies, reflecting and clarifying the themes at all levels, reinforcing pressures and providing new impetus are hurdles,

crossing which internationalization becomes reality.

Possible Evaluation Metrics and Indicators:

The progress in the process can be measured through the metrics fixed during planning and the indicators based on the performance.

Metrics for partnerships- number of long-term degree partnerships with foreign universities, extent of formal joint degree and certificate programmes, establishment of fully functional campus abroad, number of foreign university affiliations, number of multi-national industrial partners .

Metrics for student mobility - number of international students, number of students abroad, number of participation in international short-term visits, Number of students participating in global projects

Faculty Involvement - Number of international publications, number of participation in international short-term visits, faculty in international research, number of faculty teaching abroad, extent of global issues raised in coursework. [9]

Indicators developed within the context of an institution's own effort at strategic self definition to reveal and evaluate effectiveness substantially contributes to effective leadership and decision making rather than following universal measures of achievement [12]. Hence data obtained from students in terms of their

opinions regarding quality of education received, skills and knowledge gained, changes in their academic interest, evaluation of administrative offices and services in the international perspective and data from faculty in the areas of teaching learning and research can be indicated in strategic, key, proportionate, comparative or in trend line form based on the context to evaluate quality and performance.

Other Major Modules for Conducting the Programme:

(a) Admission Procedure for Admitting Foreign Students:

The current policies of the government of India for admission procedure has been taken as base here with inclusion of required validating and reliability factors.

- (i) Announcement of the programmes offered should be published well ahead of the starting of the academic year through:

Institutes' own website and brochures, Indian mission -websites, local newspapers, education fairs, announced weekly seminars, Government accredited network contacts in the foreign countries, EdCIL websites and Foreign embassies in India.

Application can be made available online.

- (ii) Programme information published should include: programmes offered, levels at which they are offered, eligibility criteria –academic marks and TOEFL or similar accepted test score, selection procedure, duration and fee structure, availability of financial aids, Important dates, Information about the country, important national website addresses. compatible and essential additional facilities for the international students.
- (iii) Validate nationality and eligibility to shortlist the candidates.
- (iv) Selection procedure as stated in the information to candidates based on academic marks and TOEFL or similar accepted test score, state ranking and selection list. Convey procedures to selected candidates. A copy of the same can be e-mailed to the candidates.
- (v) Facilitate visa procedures through Indian Missions and EdCIL. Provide process tracking provision on EdCIL website.
- (vi) Provide orientation in the home country through Indian mission and In-house orientation after reaching India.
- (vii) Offer student services from selection till lifetime (alumni).

(b) International Infrastructure Requirements:

The facilities offered by foreign institutes and a few Indian institutes were referred to arrive at some

Apart from the basic classroom and laboratory requirements as specified by the quality assurance standards the institutes can host additional facilities like Modern conference facilities, Videoconferencing facility to interact with faculty members abroad, Special learning environment, with a touch screen white board, projector, computer, DVD/CD player, Video Cassette Recorder/Player and Document Camera Reader to enable Smart Classrooms. Library and information centre, digital library and online resources, Computing facilities to provide an opportunity to learn modern application tools and methods to deploy them. Separate comfortable hostel facilities for men and women students, Apartments for married students. University schools (primary, middle, and high schools) for the children. A modern centralized kitchen that caters to the needs of the various hostels. Canteen for refreshments. Foreign Students Associations. Part-time programmes for the spouses of the foreign students. Provision for indoor and outdoor games, personality development training, fitness center, yoga and meditation, Provision for extension activities through NSS, NCC and various clubs, Medical insurance and medical facility with a dispensary functioning for all the twenty four hours in the premises with a qualified

doctor on-call, Stores to buy books, drawing instruments, domestic goods, toiletry and basic provisions, Banking facilities with an extension counter and ATMs, Reprographic and STD Services, and Transport facilities.

(c) Sample Framework for the Programmes Brochure

The various levels of programmes offered – Research, Post Graduation, Under graduate, Diploma, Certificate and On-line / Distance learning programmes need to be cited with information about the courses, eligibility, fees and duration, credits, university partnerships, Industry partnerships, and current project areas to facilitate the students to select programmes that suit their career requirements.

Summary

The perspective of international programmes in the current scenario of

technology development and orientation of the world universities has been considered to provide the competencies in an international programme. The major possible factors are to decide the programme structure, basic features of the programme and basic supporting modules. A draft of possible strategic management is also suggested.

CONCLUSION

International programmes are evolving concepts that need to be flexible and adaptable. Rigid boundaries need to be avoided but rigidity should be enforced in the activities to attain objectives and fall in line with the vision. The world is expecting a developed India which is possible only if the knowledge capital is strengthened at the international level through international universities and institutes that shoot up in the world ranking.

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Organizational Outcome in Health Care Sector through Organizational learning

G N SUMATHI

Abstract

As people are more concerned about their health, today health care sector is becoming an area of research. Learning and sharing knowledge is the key for the sector's success. The present article addresses how organizational learning in health care sector brings out organizational outcomes. The focus here is to look at the learning that take place when the organizations incorporate Organization Development interventions. The article proposes a framework that relates organizational learning to organizational outcomes. The research can be extended to adopt different set of change intervention to bring organization outcomes.

Key Words: Organizational Development, health care, management, performance outcomes.

Introduction

The present day organizations are keen in developing their people. They knew people are invaluable assets who cannot be imitated. They wish to meet the invisible, unknown demands

that lie in the heart of their stake holders. So they focus more on developing people. By developing people, the organization develops itself. The concept of organization development is popular quite a few decades back. Organization Development (OD) has advanced to organizational transformation, the second part of OD. Richard Beckhard defines OD as a planned effort, organization-wide, managed from the top, to increase organization effectiveness and health, through planned interventions in the organization's 'processes', using behavioural science knowledge'. According to Warren Bennis, Organization Development (OD) is a complex strategy intended to change the beliefs, attitudes, values, and structure of organizations so that they can better adapt to new technologies, markets, and challenges. Warner Burke emphasizes that OD is not just "anything done to better an organization"; it is a particular kind of change process designed to bring about a particular kind of end result. OD involves organizational reflection,

system improvement, planning, and self-analysis. In Organizational development (OD), learning is a characteristic of an *adaptive* organization, i.e., an organization that is able to sense changes in signals from its environment (both internal and external) and adapt accordingly. It is clear that, without learning there is no development.

Organisational learning is a process of increasing the capacity for effective organisational action through knowledge and understanding²⁻⁴. The learning "process" is a cycle of action and reflection—that is, doing and thinking, performing and conversing⁵⁻⁷. March and Olsen (1975) attempt to link up individual and organizational learning. In their model, individual beliefs lead to individual action, which in turn may lead to an organizational action and a response from the environment which may induce improved individual beliefs and the cycle then repeats over and over. Learning occurs as better beliefs produce better actions. An organization must learn so that it can adapt to a changing environment. Organizational learning is a social process, involving interactions among many individuals leading to well-informed decision making. Thus, a culture that learns and adapts as part of everyday working practices is essential. From the above discussion it is evident that learning is the key for organization success. For a sector like health care, learning and sharing

knowledge is a must for its survival. In the recent times, people show greater concern in their health. The health care form an enormous part of a country's economy, consuming over 10% of GDP of a developed country⁸.

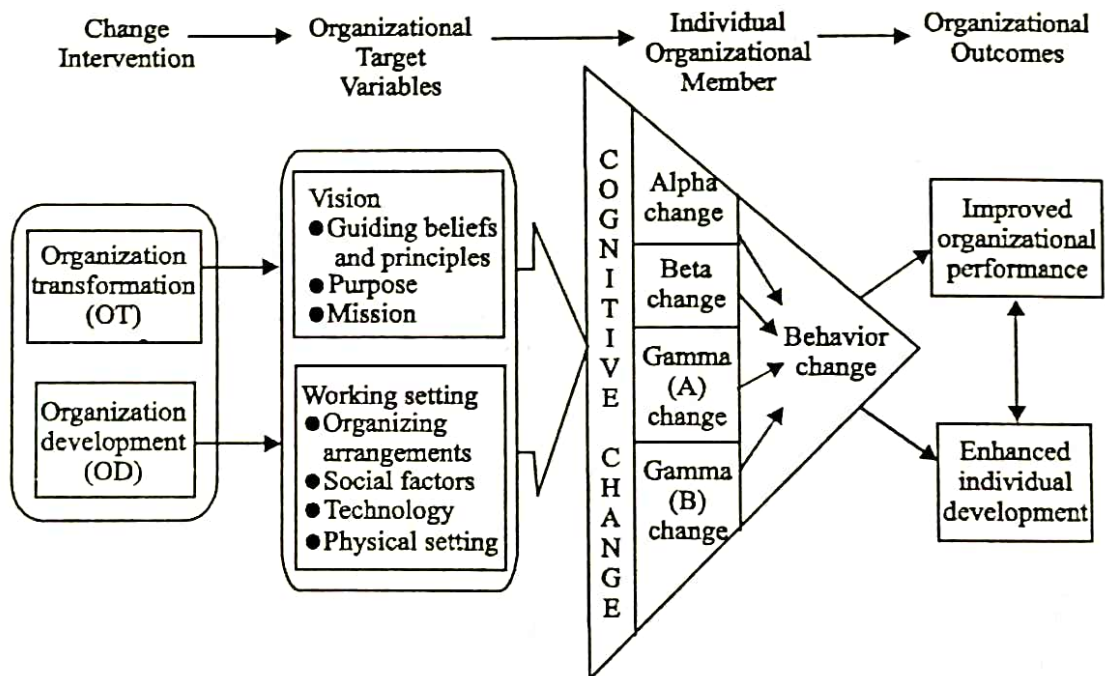
According to the World Health Organization, health care embraces all the goods and services designed to promote health, including "preventive, curative and palliative interventions, whether directed to individuals or to populations"⁹. The future of health care looks bright in the hands of technological advancements. In this sector, the information has to flow seamlessly across departments, facilities, regions and even nations. The modern health care depends on trained professionals who come together as an interdisciplinary team¹⁰. It goes beyond face-to-face treatment. Learning and sharing knowledge become its key principles. The present article aims to find the relation between organizational learning and business outcomes in health care sector using OD interventions. In health care, the typical goal is to improve the quality of people health, along with improving the business outcome. Here the business outcome refers to performance, safety, quality and environment¹¹⁻¹³

Porras(1987) and Porras et al. (1990) proposed a new model of change process(Fig. 1). His model consists of four identifiable interrelated components :(a) a change

intervention that alters (b) key organizational target variables that then impact (c) individual organizational and their on-the-job behaviors resulting in changes in (d) organizational outcomes. The change interventions can be of any type, OD or OT. Accordingly the components follow to implement the change process. When OT is chosen as a change intervention, it addresses vision of the organization to bring out

changes in individual behavior that finally results in organizational outcomes. Similarly when OD is chosen as a change intervention, it addresses the work setting to change individual behavior to result in organizational outcomes. This article takes this frame work as a base to build on the relation between organizational learning and organizational outcomes.

Fig. 1. A Model of Planned Change

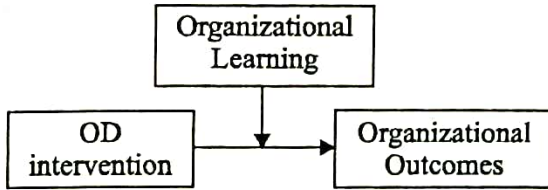


For the present study, the author selects Organizational Transformation as the intervention that targets to change the vision, mission, and purpose of the organization which finally leads to organizational outcomes. In this article, the author proposed the learning relational outcome model (Fig.2) where organizational learning is chosen as an intervention to produce organizational

outcomes. In any organization learning takes place first at the individual level. Such learning is shared among the organizational members for better performance of routine or specialized tasks. In the proposed learning relational outcome model, the author looked at OD interventions used in health care sector. There must be some sort of organizational learning while using

those interventions. Therefore the present objective is to link those learning (that are gained by the health care organizations) with the organizational outcomes.

Fig. 2. Learning relational outcome model



Argyris defines intervention as follows: "To intervene is to enter into an ongoing system of relationship, to come between or among persons, groups or objects for the purpose of helping them¹⁴". More specifically, the term OD intervention refers to the

range of planned, programmatic activities clients and consultants participate in during the course of an organization development program. There are different types of OD interventions. The OD interventions are classified based on the type of use. Wendell L. French and Cecil H. Bell, Jr., in their book on Organizational Development: Behavioural Science Interventions for Organizational Improvement, 6th ed. gave Typology of Interventions Based on the Size and Complexity of the client Group. For the study, the author looked only at the types of interventions from their typology. The list of types of interventions is in Fig. 3.

Fig. 3 Types of Interventions

Source: Modified from Wendell L. French and Cecil H. Bell, Jr., Organizational Development: Behavioural Science Interventions for Organizational Improvement, 6th ed.

Types of Interventions

Life and career-planning activities	
Role analysis technique	
Coaching and counseling	
T-group (sensitivity training)	
Training to increase technical skills, relationship skills, group process skills, or decision making, problem-solving, planning, goal-setting skills	
Training in decision making, problem, solving, planning, goal setting in group settings	
Transactional analysis	Behavior modeling
Process consultation	Third- party peace making
Interviews or questionnaires	Team building
Responsibility charting	Survey feedback
Process consultation	Appreciations and concerns exercise
Role negotiation	Role analysis technique
Grid OD phase 1	Collages
Gestalt OD	"Start- up" team building activities
Grid OD phase 2	Appreciative inquiry
Visioning	Intergroup activities
Organizational mirroring	Third party peace making at group level
Grid OD phase 3	Sensing
Confrontation meetings	Grid OD phase 4, 5, 6
OD strategy planning	Quality of work life programs
Future search conferences	Large scale system change interventions

The health care sector uses few types of interventions from the above list of interventions. There is a definite learning from every intervention. And the learning leads to organizational outcomes. Most of the activities in health care sector are interdependent. This interdependency makes people to work in teams. A case in the box 1, clearly pictures how learning takes place in team¹⁵.

Box 1: Learning as a team process

In a study of 16 hospitals implementing a new technology for minimally invasive cardiac surgery, those in which surgeons empowered the operating room team-explicitly recognizing the importance of each member's role and contribution to the learning effort-had better outcomes. The cardiac surgery department of one of the most successful of these hospitals had recently hired a young surgeon who wanted to pursue innovation and he led an operating room team in the technology implementation effort. He recognized that the new procedure would require the team to adopt a very different style of working together, explaining that "the ability of the surgeon to allow himself to become a partner, rather than a dictator, is critical". "For example, you really do have to change what you're doing [during an operation] based on a suggestion from someone else on the team. This is a complete restructuring of the [operating room] and how it works."

Team members were picked because of their experience of working together and they responded enthusiastically to this approach. One noted that the "hierarchy [has] changed", creating a "free and open environment with input from everybody". Another said: "I'm so excited about [the new procedure]. It has been a model, not just for this hospital but for cardiac surgery. It is about what a group of people can do." He explained that the team got better because "the surgeon said: 'You guys have got to make this thing work'. That's a great motivator.

Learning in Organization

Organizations learn by creating opportunities for information flow and knowledge creation using a wide range of learning mechanisms such as after action reviews, audits, problem investigations, performance appraisals, simulation, and benchmarking¹⁶. In general, learning takes place when staffs interact with each other over the routine task. It can be in the form of verbal or non-verbal feedback. Other learning can be carried out by participants after performing a task, or by outside auditors or researchers who report their observations and insights. Organizations typically use the results of these activities to standardize work practices, make knowledge more explicit, and control learning¹⁷. Minneapolis Children's Hospitals and Clinics made patient safety a strategic goal and built

learning mechanisms such as focused event studies, safety dialogues, and blameless reporting of problems into their work practices, explained in Box 2¹⁸.

Empowering Local leadership

At Minneapolis Children's Hospitals and Clinics, a clinical nurse specialist and a pharmacist in hematology/ oncology wanted to do something about patient safety at the local level. With support from the pharmacy manager, the nurse and pharmacist started a safety action team of cross-functional front line service workers to meet monthly to discuss medication safety issues. The consistent and frequent message from senior leadership that patient safety was a priority allowed these employees to overcome numerous barriers such as status differences, already heavy workloads, and general resistance to changes in how things get done in the hospital setting. The concept spread to other departments and then became an organizational initiative for every clinical unit manager.

colleagues when they work as a team. This shared knowledge improves their performance that further enhances the quality of service they provide to people. They gain confidence of their patients and provide a conducive environment for all the organizational members to share knowledge. This open environment creates trust among individuals. Trust is more important between patients and doctors, between doctors and staffs, between staffs and workers, etc.

Healthcare organizations can improve quality and safety by enhancing their capabilities for organizational learning. Organizational learning is a process of increasing knowledge and innovating work routines through the interplay of action and reflection that is more extensive than individually focused training and repetition. Learning in organizations is inhibited by such factors as tradition, outdated procedures, values, structures, and tacit "mental models" about how work gets done. Effective organizational learning is supported by cultural values of openness and excellence; learning mechanisms that encourage information flow, challenge assumptions, and aid systems thinking; and commitment of resources. Organizations have to balance incremental improvements and standardization based on existing knowledge with more radical and uncertain innovations¹⁹

Organizational outcomes

In health care sector, outcomes are measured in terms of performance, safety, quality and environment¹¹. The performance analyzes the results of surgeons, doctors, staffs and other individuals who are part of the sector. The surgeons, doctors share their knowledge, experience with their

Scope for further research

The paper needs strong evidence to further support the relation between organizational learning in health care sector and its outcomes. There needs a clear description of outcomes, the way how the outcomes are measured. Also, the interventions

that health care sector adopts can be studied in great detail. The area can also be extended to look at organizational transformation in health care sector. Further the behavior changes at individual and team level can be addressed.

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Emotional Intelligence in Career Guidance

BANBEHARI MUKHOPADHYAY

[The concept of emotional intelligence came into existence during 1990's and found to be very important in job performance and working in a team. The future technicians and engineers need to be trained in developing emotional intelligence during their colleges days through career guidance programme to enable them to become employable graduates. In the present article an attempt has been made to explore the ways and means towards developing emotional intelligence.]

Recent research on academic intelligence have observed that a high IQ is no guarantee of prosperity, prestige, or happiness in life but still our academic institutions fixate on academic abilities ignoring emotional intelligence (Goleman, 1996). The mismatch between training in academic institutions and demand in corporate sector organizations become obvious when more than a decade ago, Gopal Srivastava, (1998) Vice President, HRD Crompton Greaves, Mumbai said "I would give 70 percent weightage to EQ and 30 percent to IQ. Even if the candidate is not very

brilliant but is still able to carry others with him, it is an asset".

Emotions are sources of motivation. They drive the individual to action by adding excitement. But for this the individual should have control over emotions i.e. the individual should have emotional maturity. Psychologist and career counsellors have been using the term emotional maturity before the term emotional intelligence came into existence.

EMOTIONAL MATURITY

According to Walter D. Smitson (1974) emotional maturity is a process in which the personality continually strives for greater sense of emotional health. There are several criteria which reflects the emotional maturity of the individual.

Bernard (1965) has stated some characteristic of mature emotional behaviour. These are as follows:

- Inhibition of direct expression of negative emotions
- Cultivation of positive, up building emotions

- Development of higher tolerance for disagreeable circumstances
- Increasing satisfaction from socially approved responses
- Increasing dependence of actions
- Ability to make a choice and not brood about other choices
- Freedom from unreasonable fear
- Understanding and act in accordance with limitations
- Awareness of the ability and achievement of others
- Ability to err without feeling disgraced
- Ability to carry victory and prestige with grace
- Ability to bounce back from disappointing experiences
- Ability to delay the gratification of impulses
- The enjoyment of daily living

CAUSES OF LACK OF EMOTIONAL STABILITY

The major predisposing cause of emotional instability is the feeling of insecurity or uncertainty. Insecurity and uncertainty are the results of several social factors. If certain social factors which lead to emotional instability are either controlled or changed then it is possible to achieve emotional maturity. Several social factors have been identified in this connection. These include, unfavourable family relationship, conflict with family and friends,

situations in which the individual feels inadequate, social expectations of more mature behaviour, adjustment to work/academic environment, and career problems. Emotional conflicts are the result of emotional instability.

Emotional conflicts if not properly handled by the individual may lead to emotional outburst. Emotional conflict produces tension, anxiety and stress within the individual. Emotional conflict is a painful mental state in which opposing or contrary wishes, thoughts and needs are raged against each other by pulling the individual in opposite directions. The individual loses control over his emotions. Whether you are preparing for a career or already you are in a profession, emotional stability is the means towards success.

EMOTIONAL INTELLIGENCE

Fulfillment of emotional needs empowers the individual with emotional maturity. Further, emotional maturity largely contributes towards Emotional Intelligence (EI). EI refers to an assessment of affective domain skills, capabilities and competencies that influence a person's ability to succeed in coping with environmental demands and pressures. EI includes empathy, self-control, self-awareness, pragmatic sensitivity to the situations, persistence, self-motivation and optimism. According to Daniel Goleman (1996), emotional intelligence refers to the capacity for recognizing

our own feelings and those of others, for motivating ourselves, and for managing emotions well in ourselves and in our relationship. It has been found that self-awareness is the corner stone of emotional intelligence. It reflects the ability of a person to be able to know the reasons for his emotional response, thus improving his chances of handling it in an appropriate manner.

METHODS OF FOSTERING EMOTIONAL INTELLIGENCE

To develop emotional intelligence, the individual should have control over his emotions. Several steps can be followed by the individual to have emotional control. Once control over emotions are achieved, the individual is automatically becomes emotionally mature. Emotional maturity is the core component of emotional intelligence. To develop emotional intelligence is a matter of practice. At first one can go through the list given by Bernard (1965) on characteristics of

mature emotional behaviour. On the basis of the list one can have self evaluation. He can initiate steps to overcome a few limitations observed by him. This is one of the simplest way which requires little perseverance.

The following prescription may be followed to develop emotional intelligence.

- Developing philosophy of life

- Inculcating achievement motivation
- Eradicating personal inadequacy
- Developing competencies and skills in human relations
- Developing logic and application of reasons
- Use of relaxation strategies
- Practice of meditation
- Enjoyment of daily living

Auto. Vincent (1998), VP, Human Resources, Mahindra Ford, Chennai observed that emotional intelligence is inherent in Indians. This may be because of our strong family ties. He has suggested only to combine this inherited potential with the western concept of EI to arrive at the correct balance.

Dr. A P J Abdul Kalam says, "To aim small is a crime". Swami Vivekananda in his book on Thoughts of Power says, "throughout the history of mankind, great people are not born". Born with the consciousness they are to be great and they became great. What is required is, to have a goal in life or to have a sort of life philosophy. The individual should be sure, "what he or she wants to become" or "what he or she is aspiring for." Consistently striving to achieve the goal in life will make him or her to aspire more and more, and success will be at the door step.

Self awareness is one of the basic ingredients of emotional intelligence.

Individual needs to be aware about his strength and weakness i.e. personal inadequacy. Next step is to plan for getting rid of each of the weakness one by one, over a period of time. Awareness Training strategy as developed by William Schutz (1967) can be of great use in exploring self awareness.

A person having high EQ is often human relationship oriented and competent to adjust in social situation. To apply human relation skills, common sense accompanied by emotional maturity may be enough, but it is suggested to undergo a short training programme in Transactional Analysis developed by Eric Berne (1961). Some times training in Class Room Meeting model developed by William Glasser (1965) can be useful in gaining competency in human relationship. Further, one of the suggestions given by Goleman (1996), is to include team problem solving exercises in the Curriculum.

Frequent application of logic can help the individual to get rid from brooding over certain matters which disturb frequently. Reason can help many times, to have control over anger. Hilda Taba (1967) developed a series of models to help students to learn to reason inductively. Practice of relaxation and undergoing meditation help the individual in breaking worry cycles and gaining control over anxiety and stress. Here, the problem is we know but we do not practice.

Relaxation and meditation have tremendous effect on improving mental health and thus to have higher and higher emotional intelligence. A survey of the existing practices of relaxation techniques reveals that the technique developed by Benson (1985) is the easiest and fruitful.

A number of meditative techniques are available for the practice of common man. Any one of the techniques which suits to the individual may be practiced regularly to get the benefit. Many secondary schools and professional colleges in India have introduced yoga - meditation in the school and college curriculum.

Enjoyment of the daily living appears to be the easiest and best way of achieving sound mental health and thus emotional intelligence. In this process of daily living, the individual lets out his or her agony, frustrations with his family members, near and dear ones. Thus catharsis takes place (Freud, 1949).

On contrary to this what an individual does, he frequently uses the defense mechanism known as repression in which threatening thoughts or desires are inhibited or made unconscious. Unconscious sphere of mind has certain capacity to accommodate these thoughts, and once the capacity exceeds, in this may result emotional outburst or stress.

In conclusion, let us remember the historical statement given by Daniel Goleman (2000), author of Emotional Intelligence which says "Emotional Intelligence based capabilities are twice as important for star performance as IQ and technical skills combined".

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Thinking and Learning Styles of Graduate Students

PANCH. RAMALINGAM AND T. ARUN

Abstract

The present study was aimed at investigating thinking and learning styles of graduate students. The thinking styles questionnaire and learning styles questionnaire were used to collect data from 200 students studying in five colleges in Puducherry. Data were analysed and the findings are: There is a significant positive relationship between visual/verbal learning style and analytical thinking style ($r=.153$). There is a significant positive relationship between sequential/global learning styles and innovative thinking style ($r=.145$). With regard to thinking styles are concerned, 33% of students are quadrant 'C' dominant, This implies a strong preference for the interpersonal, feeling based, emotional and spiritual thinking modes. 28.5% of students' quadrants 'A' dominant, with a preference for analytical, rational and logical process. 20% of students are quadrant 'B' dominant with a preference for controlled, structured and organized thinking modes. 18.5% of students are quadrant 'D' dominant with creative,

logistic and synthesizing modes. As far as the findings of learning styles are concerned, 56.5% of the students are active learners, they learn by trying things out, enjoy working in groups. 43.5% of them are reflective learners. They learn by thinking things through, prefer working alone or with one or two familiar partners. 61.5% of the students are sensing learners; they learn by concrete, practical means oriented toward facts and procedures, they using common sense in learning. 38.5% are intuitive learners, they learn by conceptual, innovative, oriented toward theories and underlying meanings. 76% are visual learners; they prefer visual representations of presented material, such as pictures, diagrams, and flow charts. 24% are verbal learners. They prefer written and spoken explanations. 56% of students are sequential learners, they learn by linear thinking process, learning in incremental steps; 44% of the students are global learners, they learn by holistic thinking process.

Keywords: Thinking Styles, Learning Styles, Graduate Students

Introduction

Thinking represents the most complex form of human behavior, the highest form of mental activity. What do we do when we think? We are mentally or cognitively processing information. We might say that thinking consists of cognitive rearrangements or manipulation of both information from the environment and the symbols stored in the long term memory. Thought is symbolic and can have wider content than other kinds of activity; it incorporates present perceptions and activities into its topics. But it deals with their meanings which goes beyond the present, hence thought reflects upon and elaborates what is given in perception.

There is also agreement on the concept of dominance; eye dominance, hand dominance, foot dominance, ear dominance, and brain dominance. While the body is symmetrical in terms of organ duality, that is, humans have two eyes, two ears, two hands, two feet, and two hemispheres, experts agree that in the use of these dual organs there exists a general asymmetry. In other words, we use one to a greater degree than the other. When combined, the concepts of specialization and asymmetry of dominance produce within each human being a distribution of specialized preferences that affect general behavior. Specifically included is the individual's uniqueness. Most

individuals who have been tested have been found to use only one thinking style. A few have learnt to use several styles. A very few use multiple styles to decision-making. Those who are adept at recognizing and using different thinking styles as is relevant to the circumstance and their other communication skills are consistently better communicators.

It is vital to recognize your thinking patterns and be cognizant of these patterns' strengths and weaknesses in dealing with information. If you are a right-brain dominant, you must recognize the usefulness of left-brain thinking and appreciate the need to pause and pay attention to planning and organizing data and systems. If you are a left-brain dominant, you must allow right-brain input into your methodical approach to providing quality. When people cling to their comfortable thinking processes, they restrict themselves in the manner by which they will be able to define a problem or situation (Dew, 1996)

The Felder model of learning styles (Felder & Silverman, 1988) focuses on aspects of learning styles significant in engineering education, and is very popular among engineering educators even though the psychometric instrument associated with the model, the Index of Learning Styles (ILS) (Felder & Soloman, 2001), has not yet been fully validated. In brief, the model has five dimensions:

Processing (Active/Reflective), Perception (Sensing/Intuitive), Input (Visual/Verbal), Understanding (Sequential/Global) and Organization (Inductive/Deductive). Felder recommends the inductive teaching method (i.e., problem-based learning, discovery-based learning), while the traditional college teaching method is deductive, i.e. starting with fundamentals and proceeding to applications. Thus the last dimension was removed from the ILS, so as not to provide incentives for a continuing use of the traditional deductive instructions. (Felder, 2001)

The concept of learning styles has been applied to a wide variety of student attributes and differences. Some students are comfortable with theories and abstractions; others feel much more at home with facts and observable phenomena; some prefer active learning and others lean toward introspection; some prefer visual presentation of information and others prefer verbal explanations. One learning style is neither preferable nor inferior to another, but is simply different, with different characteristic strengths and weaknesses. A goal of instruction should be to equip students with the skills associated with every learning style category, regardless of the students' personal preferences, since they will need all of those skills to function effectively as professionals.

Students are characterized by different learning styles, preferentially focusing on different types of information and tending to operate on perceived information in different ways (Corno & Snow, 1986). The ability to measure different thinking and learning styles provides the teacher/trainer, a distinct opportunity to understand the styles of the students they teach. One way to measure these styles is through the use of an assessment tool. Many assessments exist in the marketplace. Our research has used the HBDI (Herrmann Brain Dominance Instrument) which is an instrument designed to measure an individual's preferred mode of thinking. With the sponsorship and funding of GE, the HBDI was developed and extensively validated. It is a paper and pencil / online questionnaire that provides a personal profile representing a metaphor of that individual's thinking preferences.

Those preferences cross the total spectrum of mental options that comprise the four parts of the brain described in the Whole Brain Model. To date, close to one million individuals have been profiled and thousands of participants in a variety of workshops show an equal distribution of preferences across all four quadrants, both in the US and around the world. Therefore, considering the world at large, our assumption must be that people's learning preferences are equally

distributed throughout the teaching and learning model. Learning style preferences of numerous students and faculty members have been determined using the Index of Learning Styles. What happens to us in life depends on not just 'how we think, but 'how well' we think and learn. Of all the factors that influence an individual, his styles of learning and thinking play a major role (Kalpana & Mridula, 2007).

Ramalingam (2006) examined thinking preferences and application of ICT of teachers of technical education and found that the teachers in technical education are having different preferred thinking styles and having rich knowledge about ICT, there is no significant relationship between thinking styles and application ICT of the teachers in technical education, there is no significant difference between polytechnic and engineering teachers with regard to thinking styles and application of ICT, there is no significant difference between male and female teachers in technical education with regard to thinking styles and application of ICT, there is no significant difference among different age group of teachers with regard to thinking styles and application of ICT, there is no significant difference among the teachers based on their experience in teaching with regard to thinking styles and application of ICT and this study promises effective use of ICT with

whole brain concept of teaching and learning in technical education.

Gridley (2006) in a research on thinking styles in a sample of women engineers, The Gregorc Style Delineator was administered to 26 full-time, professional engineers, all women. Participants preferred concrete thinking styles. This tendency is similar to scores on other measures in much larger samples of engineers for whom sex was not specified. There are a number of studies on Singapore adolescents' learning style. The findings are significant and show a core of learning style preferences and a certain trend in the cognitive profiles that can distinguish the different achievement groups (Yeap, 1987; Lee & Yeap, 1998; Yeap, Chong & Low, 1998; Lim, 2000); the high and low mathematics achievers (Lee, 1998; Yeap, Chong & Low, 1998); and the types of achievers across the different disciplines (Yeo, 1992; Chan, 1994; Lee & Yeap, 1998; Lee, 1998; Ho, 1999; Tan, 1999; Tiey, 2001). Lee and Tsai (2004) in their study about the Internet project-based learning environment: the effects of thinking styles on learning transfer and found out significant differences between the near transfer of the Executive Group and the Legislative Group, no significant differences in far transfer are found among groups of different thinking styles, the near transfer of the Mixed Group is superior to that of the Legislative Group and the Judicial Group, and the far transfer of the

Mixed Group is superior to that of the Legislative Group. Kalpana and Mridula (2007) in their paper, styles of learning and thinking, suggested that there is a significant difference in the right hemisphere and left (brain) hemisphere preference for information processing among children. Boys are more right hemisphere oriented and girls are more left hemisphere oriented in information processing

Objectives

Thinking preferences allow a person to learn more about how one's brain functions and their thinking and learning preferences. The objectives of education is to help students to build their skills in both their preferred modes of thinking and learning , in order to study the thinking and learning styles of students, the following are the major objectives .

1. To explore the relationship between thinking and learning styles of graduate students.
2. To explore the difference in the thinking styles among graduate students.
3. To explore the difference in the learning styles among graduate students.

Hypotheses

1. There is a significant relationship between thinking styles and learning styles of graduate students

2. There is a significant difference among the brain quadrants of graduate students
3. There is a significant difference among the learning styles of graduate students

Method

Sample

In this present study, data was collected from 200 students studying in five colleges in Pondicherry. Students from each college chosen on random sampling from five colleges were included in this study. Among them 165 were below 19 years and 35 were above 20 years. 50 students belong to Engineering, 50 belong to nursing and 100 belong to Arts and Sciences College. Among them 140 students were female and 60 were male.

Tools

The following standardized questionnaires were used in the survey along with the personal data sheet:

(i) **Vijayakumar Thinking Preference Inventory:** It was designed by Vijayakumar (2002). It is the Indian adaptation of instrument based on the Ned Herrmann Brain Dominance Instrument (HBDI). To emphasize the metaphorical status of the model Ned Herrmann named the quadrants alphabetically to de-emphasize their connection with the cerebral limbic

brain. The upper left (cerebral) quadrant is designated A, followed by B, C and D in a counter clockwise direction. Each quadrant has very distinct clusters of thinking abilities or ways of learning and knowing. The instrument consists of 60 activities which are listed and presented in 15 sets of four activities in each set. The subject was asked to read each set, and within each set rank the four activities in terms of how frequently those activities the subject do or how much the subject likes to do.

(ii) **Index of Learning Styles:** The ILS consists of four scales, each with 11 items: active-reflective, sensing-intuitive, visual-verbal, and sequential-global. Felder and Soloman summarize the four scales as follows: Sensing (concrete, practical, oriented toward facts and procedures) or intuitive (conceptual, innovative, oriented toward theories and underlying meanings), Visual (prefer visual representations of presented material, such as pictures, diagrams, and flow charts) or verbal (prefer written and spoken explanations), Active (learn by trying things out, enjoy working in groups) or reflective (learn by thinking things through, prefer working alone or with one or two familiar partners), Sequential (linear thinking process, learn in incremental steps) or global (holistic thinking process, learn in large leaps)

Results and Discussion

Table 1 Correlation between Thinking and Learning Styles of students (N=200)

	Quadrant A	Quadrant B	Quadrant C	Quadrant D
Active/ Reflective	-.056	-.021	.039	.017
Sensing/ Intuitive	-.040	.088	.037	-.062
Visual/ Verbal	.153*	-.034	-.122	.026
Sequential/ Global	-.005	.073	.075	.145*

The above table 1 indicates that there is positive relationship between visual-verbal learning and analytical thinking style ($r=.153$). It is true that the analytical thinking style of students will prefer verbal learning and visual learning styles. Likewise the students of imaginative thinking styles are having positive relationship with sequential and global learning styles ($r=.145$). It reveals that the imaginative type of thinkers may have global out look and learn by sequential and global learning styles. The results clearly indicate that there is a significant positive relationship between verbal learning styles and analytical thinking styles of students. It also indicates that there is a significant positive relationship between imaginative thinking style and global learning style of the students.

THINKING AND LEARNING STYLES OF GRADUATE STUDENTS

Table 2 Different Thinking Styles of the students (N=200)

Sl No	Quadrant	Score	Percentage (%)
1	Quadrant A	57	28.5
2	Quadrant B	40	20
3	Quadrant C	66	33
4	Quadrant D	37	18.5

The above table 2 indicates that 33% of students are quadrant 'C' dominant, 28.5% of students' quadrants 'A' dominant, 20% of students are quadrant 'B' dominant and 18.5% of students are quadrant 'D' dominant. The data shows that majority of the students are quadrant "C" dominant. The A-quadrant style is logical, analytical, and often bottom-line tough. No decision is made without the facts and reality is now. The B style is very detailed, structured, solid, down-to-earth with no equivocation and ambiguity. Things are done according to procedure and on time, and delivered as promised. Neatness and protocol count, and time costs money. The C-quadrant style is highly participative and team-oriented, and people are considered to be the most important asset. Human values and feelings are paramount and, if push comes to shove, people come first. The D style is intuitive, holistic, adventurous, and risk taking. In contrast to it's diametrically opposed B-quadrant neighbour, its credo is, "If there is a better way, let's try it out," as opposed to "If it aim's broke, don't fix it." Experimentation is highly

valued. And it is normal for a D-quadrant student to try out several approaches at once. The style is a very open one, with very little structure. Seeing into the future and avoiding shortsighted solutions in a common trait. The Impact of preferences indicates that brain dominance leads to the development of preferences, which in turn establish our interests, which then, lead to our development of competencies, and influence our career choices and ultimately the work we do.

Table 3 Different learning styles of students (N= 200)

Sl. No	Learning style	Frequencies	Percentage %
1	Active learners	113	56.5
2	Reflective learners	87	43.5
3	Sensing learners	123	61.5
4	Intuitive learning	77	38.5
5	Visual learners	152	76
6	Verbal learners	48	24
7	Sequential learners	112	56
8	Global learning	88	44

The above table 3 indicates that 56.5% of the students are Active learners, and 43.5% of them are Reflective learners. In the second style, 61.5% of the students are Sensing learners and 38.5% are Intuitive learning, In the third learning style, 76% are Visual learners and 24% are Verbal learners. In the fourth style, 56% of students are Sequential learners and 44% of the students are

Global learning. Active learners tend to retain and understand information best by doing something active with it – discussing or applying it or explaining it to others. Reflective learners prefer to think about it quietly first. Everybody is active sometimes and reflective sometimes. Your preference for one category or the other may be strong, moderate, or mild. A balance of the two is desirable. If you always act before reflecting you can jump into things prematurely and get into trouble, while you spend too much time reflecting you may never get anything done. Sensing learners tend to like learning facts, intuitive learners often prefer discovering possibilities and relationships. Sensors often like solving problems by well-established methods and dislike complications and surprises; intuitors like innovation and dislike repetition. Sensors are more likely than intuitors to resent being tested on material that has not been explicitly covered in class. Sensors tend to be patient with details and good at memorizing facts and doing hands-on (laboratory) work; intuitors may be better at grasping new concepts and are often more comfortable than sensors with abstractions and mathematical formulations. Sensors tend to be more practical and careful than intuitors; intuitors tend to work faster and to be more innovative than sensors. Sensors don't like courses that have no apparent connection to the real world;

intuitors don't like "plug-and-chug" courses that involve a lot of memorization and routine calculations.

Everybody is sensing sometimes and intuitive sometimes. Your preference for one or the other may be strong, moderate, or mild. To be effective as a learner and problem solver, you need to be able to function both ways. If you overemphasize intuition, you may miss important details or make careless mistakes in calculations or hands-on work; if you overemphasize sensing, you may rely too much on memorization and familiar methods and not concentrate enough on understanding and innovative thinking.

Visual learners remember best what they see- pictures, diagrams, flow charts, time lines, films, and demonstrations. Verbal learners get more out of words – written and spoken explanations. Everyone learns more when information is presented both visually and verbally. In most college classes very little visual information is presented; students mainly listen to lectures and read material written on chalkboards and in textbooks and handouts. Unfortunately, most people are visual learners, which mean that most students do not get nearly as much as they would if more visual presentation were used in class. Good learners are capable of processing information presented either visually or verbally.

Sequential learners tend to gain understanding in linear steps, with each step following logically from the previous one. Global learners tend to learn in large jumps, absorbing material almost randomly without seeing connections, and then suddenly "getting it." Sequential learners tend to follow logical stepwise paths in finding solutions; global learners may be able to solve complex problems quickly or put things together in novel ways once they have grasped the big picture, but they may have difficulty explaining how they did it.

Many students who read this description may conclude incorrectly that they are global, since everyone has experience bewilderment followed by a sudden flash of understanding. What makes you global or not is what happens before the light bulb goes on. Sequential learners may not fully understand the material but they can nevertheless do something with it (like solve the homework problems or pass the test) since the pieces they have absorbed are logically connected. Strongly global learners who lack good sequential thinking abilities, on the other hand, may have serious difficulties until they have the big picture. Even after they have it, they may be fuzzy about the details of the subject, while sequential learners may know a lot about specific aspects of a subject but may have trouble relating them to different aspects of the same subject or to different subjects. In the present study visual learning style is

more. It indicates that students are learning by seeing.

Based on the results obtained, the following are the important findings made in the present study. There is a significant positive relationship between thinking style and learning style

- There is a significant positive relationship between visual/verbal learning style and analytical thinking style ($r=.153$)
- There is a significant positive relationship between sequential/global learning styles and imaginative thinking style ($r=.145$)
- 33% of students are quadrant 'C' dominant, This implies a strong preference for the interpersonal, feeling based, emotional and spiritual thinking modes.
- 28.5% of students' quadrants 'A' dominant, with a preference for analytical, rational and logical process
- 20% of students are quadrant 'B' dominant with a preference for controlled, structured and organized thinking modes.
- 18.5% of students are quadrant 'D' dominant with creative, logistic and synthesizing modes.
- 56.5% of the students are Active learners, they learn by trying things out, enjoy working in groups.

- 43.5% of them are Reflective learners. They learn by thinking things through, prefer working alone or with one or two familiar partners
- 61.5% of the students are Sensing learners, they learn by concrete, practical, oriented toward facts and procedures, They are using common sense in learning
- 38.5% are Intuitive learning, they learn by conceptual, innovative, oriented toward theories and underlying meanings
- 76% are Visual learners, they prefer visual representations of presented material, such as pictures, diagrams, and flow charts
- 24% are Verbal learners. They prefer written and spoken explanations
- 56% of students are Sequential learners, they learn by linear thinking process, learn in incremental steps
- 44% of the students are Global learners, they learn by holistic thinking process, learn in large leaps

The outcome of any research depends upon the extent to which it has widened the existing frontiers of

knowledge. It also depends upon the degree of its social relevance and utility. The present investigation has shown that the thinking styles and learning styles of students can be significantly related with each other. Therefore, teachers who teach at the graduate level should try to enhance the proper development of thinking preferences and learning styles. In order to enhance the effective thinking styles and learning styles of students, the teachers could identify the pros and cons of the problems and aware of the advantages of learning and thinking styles. In the light of the findings of this study, the thinking styles and learning styles of the students may be enhanced by providing comprehensive guidance and counselling in effective thinking skills and learning skills.

To conclude it is essential to identify the styles of learning and thinking of students in order to facilitate the process of learning and teaching. The knowledge of the student's information processing styles would enhance teaching and make the exercise fruitful. The teaching techniques in the colleges can be undertaken in consonance with the students' style of learning and thinking.

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National Knowledge Commission Report on Engineering Education - A Faculty Development Perspective

S. RENUKADEVI

Introduction

The 21st century has been acknowledged world wide as the "knowledge century". Knowledge and information are vital components of the formation of any society. In a knowledge society, knowledge is a primary resource instead of capital and labour. The ability of a nation to use and create knowledge capital determines the prosperity and well being of its citizens. The National Knowledge Commission was constituted by the Prime Minister of India. This paper highlights features of Engineering faculty development issues and recommendations.

Knowledge Commission

In the next few years, India will have the largest number of young people in the world. To have knowledge oriented development, The National Knowledge Commission (NKC) was constituted on 13th June 2005 with a time frame of 3 years from 2nd October 2005 to 2nd October 2008.

As a high level advisory body to the Prime Minister of India, the

National Knowledge Commission was expected to guide policy and direct reforms, focusing on key areas such as education, science and technology, agriculture, industry, e-governance etc.

The approach and methodology followed by the commission is path-breaking. There is an honest attempt to think out of the box (Thangamuthu, 2007).

Knowledge Commission Report on Engineering Education

Engineering Education is one of the key areas of National growth. The intake in Engineering institutions currently is 5,00,000 in Bachelor's Programme, around 30,000 in Masters programme and less than 1000 in Ph.D. programme. The number of institutions also have grown rapidly. The rapid increase has raised serious concerns about the quality of engineering education. The problems of engineering education are complex and deep rooted.

According to the chairman of the NKC, Sam Pitroda, "A glaring

regional imbalance has emerged in the availability of engineering education”.

The most serious challenge in engineering education is the dearth of well qualified faculty. Several measures must be undertaken in this direction. Teachers can be vital lynchpins between student learning, industry and the community (Schukoske, 2007).

The NKC constituted a working group of experts and from academia and industry & under the chairmanship of Prof. M.S. Ananth, Director, IIT, Madras for Engineering Education. The group considered the inputs provided by the earlier committee on this subject. Based on inputs from the working group and consultations with other stake holders, NKC proposed a set of initiatives.

Working group report on Engineering Education

Teaching is a unifying activity, a commitment to create a community of learning in which students join in discovering knowledge and in putting it to use.

The most, serious challenge, reported by the committee is the dearth of qualified faculty.

The committee has quoted four principles of teaching by Aurobindo. (“Sri Aurobindo and Mother on Education”, Sri Aurobindo Ashram, 1997).

The four principles are:

1. Nothing can be taught; the teacher is a helper & a guide. He does not impart knowledge, but shows the student how to acquire it.
2. Education cannot be forced on an unwilling mind.
3. Work from the near to the far. Examples should be drawn from the students own environment.
4. Suppleness and comprehensives of the mind are increased not by the number and variety of subjects for the study but by diverse approaches to the same subject.

According to the working group, “We have not been successful in implementing the second and third principles although they are clearly important.” The academic environment is the most forgiving of environments - one in which mistakes are the true stepping stones to Learning.

In Institutions of higher learning, emphasis is on resource generation. The most successful, faculty are likely to be those who can write proposals and generate research funds rather than those who are knowledge driven and can enthuse students into learning and creative research activity. Teaching is likely to be neglected.

Table 1. Description of Engg. Institution – Faculty Development

Key Characteristic	Private Unaided	Private Grants-in-aid	State Govt. Aided (DTE))	University Constituents
Faculty Resources	Market driven, Hire and Fire Inexperienced, Temp hand.		Myriad of Restrictions, Vacuum at the top, General Shortage.	
Support Services	Relatively Poor	Relatively Poor	Old and Outdated	Old and Outdated
Leaving Resources	RECENT IN IT, ITES	RECENT IN IT, ITES	Old and outdated	Old and outdated
Laboratories	Ok in IT, ITES, Else very poor		Old Laborarories Not upto Mark.	
Internet Bandwidth & Nodes	Marginal/ Ok	Marginal/ Ok	Ok/Marginal	Ok/Marginal
Research & Development	Nil	Some	Little	Better

Working Group Report on Faculty Training

The biggest challenge in the development of Engineering Education is the dearth of qualified and motivated faculty. Teaching does not appear in the list of priorities of engineering graduates in India. Most

Engineering colleges employ fresh graduates, who themselves are trained by indifferent teachers and have no role models to follow.

There is virtually no training programme for teachers.

Table 2. Esitmates of Supply and Demand for teachers

Degree	No of eng graduates/year from		Supply of Teachers from			Demand for Teachers			
	IITs	Others	IIT/IISc	Others	Total	Ph.D	M.Tech	B.Tech	Total
Ph.D	500	500	250	450	700	14000	9000	-	23000
M.Tech	4000	9000	200	7000	8200		9000	32000	41000
B.Tech	3500	250000	-	-	250000	-	-	21000	21000

From the above table, it is clear that the major issues are improving the quality of M.Tech manpower and developing strategies for increasing the Ph.D production without compromising on the quality.

Highlights of the recommendations on faculty training

1. Short term measures to improve quality

2. Quality enhancement through Continuing Education in Distance mode
3. NITTTRs which were set up for the purpose of quality improvement are essentially in the business of qualification improvement
4. Long term measures to increase Ph.D production

5. Professional development of the faculty
6. Teacher training
 - (a) One day workshops to focus on aspects of teaching
 - (b) Induction Training programme for two weeks by senior faculty
 - (c) NPTEL to put up such a training
 - (d) Organising refresher courses
7. Teaching-Learning Process
 - (a) Emphasis on finding, evaluating and using information, not on memorizing
 - (b) More emphasis on transferable skills (Problem solving and Interdisciplinary teamwork)
 - (c) Teachers should concentrate on teaching concepts and application of these towards problem solving.
 - (d) Additional skill set required for modern day engineer should be integrated as part of the subjects. Eg. Project Management or Communication and Presentation skills should be integrated into some or all courses.
 - (e) Teacher evaluation and course evaluation should be conducted scientifically and the results should be made more public for greater accountability
- (f) Teachers should be encouraged to use audio-visual aids including computers in classrooms to improve communication between them and students.
- (g) Videotaped feedback should be provided to help faculty improve their teaching methods.
8. Laboratory Education
 - (a) Laboratory teaching is considered a second rate job by teachers
 - (b) It is largely boring and repetitive
 - (c) Students are given no opportunity to think for themselves
 - (d) Students should be taught Technical Communication skills in lab courses
9. Teacher-Student Relationship
 - (a) The university can provide forums for teachers and students to interact with each other outside the classroom.
 - (b) The Institution can provide forums for teachers and students to interact with each other outside the classroom.
 - (c) The Institution should identify faculty who will willingly provide them to

- discuss matters relating to teacher-student relations and counsel and interact with students on general matters.
10. Teacher Evaluation/Performance feedback
 11. Faculty should have the freedom to experiment with evaluation systems
 12. Counselling/Placement issues

Engineering Faculty development at NITTTR, Chennai

NITTTR, Chennai has been offering short-term programmes for engineering college teachers for the past decade. For the past 8 years, it has been intense. On an average of 2000 engineering teachers have been trained in the past 8 years, covering the whole of southern region.

NITTTR, Chennai has been involved in mostly quality improvement through short term programmes than qualification improvement.

The short term programmes in pedagogy are offered in 3 modes : a 3-day programme , 6-days programme and 2-weeks programme. 3-days programme offered include IDDS (Basic Pedagogy), and student evaluation, 6-days programme on IDDS covers Basic pedagogy and Advanced Pedagogy. 2-weeks programmes on IDDS is sponsored by AICTE.

Sometimes a one-day teaching workshop is also organized at the host institutions. As cited in the report, many of the senior faculty participate in these programmes and also in the workshops.

The main target of these programmes is to improve the teaching-learning process in the institutions and the feedback is overwhelming. There has always been a large number of requests from Institutions to conduct these training programmes throughout the year and specially during the beginning of the academic year and during vacation.

The content for a 3-day programme includes

1. Teaching – learning process
2. Student Psychology
3. Instructional Objectives
4. Instructional Methods
5. Instructional Planning
6. Teaching skills
7. Micro-teaching (Video Feedback)

The 6-day programme content includes in addition, Instructional Media, Student evaluation and Introduction to Guidance and Counselling.

As cited in the report, the contents of the programmes cover Classroom communication Skills, Project method of teaching, problem based Learning.

The Microteaching (Video feedback) sessions offers a platform for teachers to encounter themselves and many of them have stated that they were able to see and rectify many of the problems in their presentation which were not reported to them by students or peers. Importance is given to laboratory demonstration, Oral Communication, Chalkboard writing and questioning.

A feedback analysis by NITTTR clearly establishes the need for importance of faculty training programmes. The Board on Faculty development Constituted by AICTE, New Delhi in its report on "Promoting Excellence in Technical education" (2004) has recommended that "All the freshly appointed teachers in Government /Aided and self financing colleges must be made to undergo atleast one week training course on "Teaching Methodology" at the NITTTR or similar institutions within one year of joining teaching profession". While many of the Institutions are organizing training programmes solely for the faculty improvement thereby teaching improvement, some colleges do not take it very seriously and they want these programmes from the point of satisfying AICTE/NBA.

NITTTR, Chennai has been offering the Ph.D programme in Engineering Education mainly for the development of engineering college and polytechnic teachers. The Institute

is offering both part-time and full time programmes. The Institute is planning to start full time fellowships. The part-time Ph.D programme is a highly flexible one and many of the teachers in the southern region have joined these programmes.

NITTTR, Chennai has been offering Guidance and Counselling programmes. This programme is conducted for a period of 3-days. The contents include Principles of Guidance and Counselling, Student Characteristics, Educational Guidance, Career Guidance, Emotional Intelligence, Stress management etc. Since the concept of mentoring is present in many institutions, these programmes are useful to teaching faculty and Training & Placement officers.

Some of the other programmes offered for teachers of Engineering colleges include Accreditation, Strategic planning, Multimedia development, E-content development, Institutional development and Project Management.

There is not much demand for Performance Appraisal and development programmes, which in future should be taken care as recommended in the report.

Conclusion

From all the above deliberations, it is obvious that NITTTR, Chennai is in the right direction as far as engineering faculty development is

concerned. The institutions should come forward to depute their faculty for short term programmes as well as

long term programmes as cited in the report.

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Redefining Education @ Hermeneutics of Social Development, Technology and Teacher in Indian Social Fabric

RAJARSHI ROY AND ANJANA PAIRA

Abstract

Education necessarily a social phenomenon, having strong bondage with prevailing culture, within which the process of education takes place. As such, culture appears as an intervening factor in the educo-sociological research and thereby keeps tremendous impact upon the objectivity of ongoing educational researches.

In its pre-phase, the paper aims to explore the social base of education in the midst of educosociology in consonance with research on 'social aspects of education'. Methodologies and approaches, as appears as a trend in Indian academia is highlighted in this phase.

The section is followed by the culture-driven approach of education. Existing socioeducational fabric of India is critically synthesized in this phase.

Third section of the paper thrives to explore the status of 'Education' in a 'disciplinary' perspective.

Global effect over education vis-à-vis gestalt social development is analyzed in the immediate next section of the paper with the help of few quantitative indicators of educational development, following juxtaposition approach in Asian context, supplemented by the experience of the Asia and Pacific region in this new millennium.

Fifth section of the paper is devoted to explore impact and interactive effect of education, technological-education and socioeconomic-development in close association with manpower planning, which is felt as an urgent need at the present juncture of time to enhance the income-potentiality and in consonance, life-condition of the cross-section of the mass-population in the region.

Penultimate section of the paper hinges over various pertinent issues relating the system of teacher education in Indian social fabric, which addresses the issues like the conceptual conflict of considering teaching as a profession in one hand

and as mission in other, the mechanized approach of preparing teacher, skill-aspect of teaching, assessment of prior learning, impact of technology over teaching and the like.

Key words: Educosociology, Technological Education, Manpower Development, Human Capital, Skill, APL, Soft Skill.

"Existing educational institutions were created to meet the need of a society that is fast disappearing. We need new educational organizations that can exploit the new technologies to meet the need of twenty-first century. Economic development will depend as much on the success of creativity and supporting such organizations, as on establishing the technological infrastructure. It is critical to get this right because those countries that harness the power of multimedia communication for education and training purposes will be the economic powerhouses of twenty-first century. The development of modern communications and information technologies is becoming a major instrument for widening access to education and training on a cost-effective basis while also enhancing its quality." -Tony Bates

1.0. INTRODUCTION TO EDUCOSOCIOLOGY

Education, being a broader connotation, defined by different scholars in different ways, in different approaches and from different perspectives. It is closely related to

society as well. Eminent sociologists and educationists categorically establish the function of education and its close association with the society, where they opine that education is a social process [Ashley et. al., 1969]. Feinberg, way back to 1983, in his book 'Understanding Education: Towards a Reconstruction of Educational Inquiry' opines, "... Education is best understood by recognizing that one of the functions of any society is that of maintaining intergenerational continuity – that is, of maintaining its identity as a society across generations and even in the context of many possible and significant changes, and that is the activity and institution of education, both-- formal and informal, that carries on this function."

Nowadays it is widely accepted that any inquiry into educational process necessarily incorporates the society within which the process of education takes place. Present practice of social science research is oriented towards positivistic approach, resulted due to mere imitation of the west. Shifting its attention from positivism, social science research in our country ought to emphasize much over the humanistic approach where interrelationship among values, interests, actions and power of the social atom (i.e., human individual) is to be taken into consideration along with the process of changes in society. Since the outset of the last decade, many alternative approaches to study 'social processes' and 'research in the

field of education' have emerged across the globe, resulting to numerous confusions, opinions, counter opinions and conflicts. All these happen due to their motto to compete against one another to establish their superiority and in search of acceptance from scholars and researchers [Myrdal, 1969].

2.0. EDUCATION AND CULTURE

Whitehead (1962), the ever-recalled educational thinker utters in his well-known book, 'The aims of education and other essays', "...Culture is activity of thought, and receptiveness of beauty and human feeling. Scraps of information have nothing to do with it. A merely well informed man is the most useless bore on God's earth. What we should aim at producing is men who possess both culture and expert-knowledge in some special direction. Their expert-knowledge will give them the ground to start from, and their culture will lead them as deep as philosophy and as high as art."

He also considered culture as the basic aspect of education, which is obviously having its root in the society within which an individual is born and grows up. This advocates that the process of education as well as the product of the very process coexist with society.

Irrespective of societies, culture possesses its own value. Being a component of education, it transmits value to education. Therefore, in

respect of education in general and to be more specific, in educational research, especially in social sciences, an attempt to carryout value-free research is hardly possible, if not completely impossible [Roy, 2004]. An attempt of mere quantitative research on social aspects of educational process may contribute specific information, but may hardly contribute to knowledge until and unless those are generalized in the greater society [Hansen, 1967]. However, one has to agree about the restriction of imposing personal values in the process of observation and recording the findings of research in education because of the reason of ethical consideration. Ethnocentrism acts as a hidden current and often influences the social aspects of educational research and it is more true in our country India. The tendency needs to be avoided.

Higher education in India witnessed phenomenal growth during last thirty-five years and the extent of growth is much more in the recent past [Selected Educational Statistics, MHRD, Govt. of India, 1999-2007]. As a result, the scope of educational research in India has expanded a lot. [Experience reveals that this expansion helped enrich other allied disciplines such as sociology, social anthropology etc., much more, as compared to that of education] ¹. Handful number of training organizations are also available today in almost each and every part of the country, extending

training programmes to enrich the human effort to pursue research in educosociology with sophisticated methodologies. Expansion of higher education in course of time helped people interested in education to pursue formal research programmes and training (i.e., M.Phil. etc.) in education. Right now, as many as eighty-nine higher learning institutions, if not more, across the nation, extending the scope of such training to the scholars, emphasizing over various dimensions of education, including technical and engineering education, with largest share towards educosociology².

In spite of all these efforts, unfortunately the field of educational research failed to establish 'education' as an independent discipline of study [Roy, 2005]. This may be due to the nature of interpretation of 'education,' where cognitive-set of the researches in the field are mostly enriched by other allied disciplines than that of education. The basic requirement of establishing a discipline, as we all know, depends upon the 'number' and 'quality' of research in the field, which, in turn, enrich the number of theories in the discipline, help evolving stable methodology, and also offers (more or less specified) boundary for the discipline [Peters, 1983, Roy, 2005a]. Statistics says that thousands of doctoral and post-doctoral research studies has been completed during preceding five years, out of which two hundred and

eight (208) research studies (up to June, 2008) hinge over the area of educational research in relation to social process³. However, except a very few hand counted, none of those contributed, neither for forming theory, nor for evolving methodology. It is crystal clear that most of the researchers are habituated to adopt methodologies from allied disciplines. The result reveals a dearth of 'sound methodology', leads to less number of 'theories' and lack of 'more or less specified boundary' for the discipline 'Education', which are the pre-requisites for the emergence of a discipline. Apart from the exceptions, to be more frank, the domain has become an attractive platform for those who failed in their respective disciplines and thereby oriented themselves with this very platform for their own survival as 'academician' [Roy, et. al., 2004]. Neither they are inclined to contribute for developing theory and evolving methodology of education, nor are they capable enough of doing so⁴. Another trend is also noticeable which reveals that a handful number of eminent scholars in education perceive pedagogy and education synonymous, which is mere misconception. As a result, 'education' remains an inter-disciplinary approach in which a Ph.D. is produced in every eighteen (18) hours (or may be even less than that)⁵. Controversial issues prevail without any feasible solutions.

3.0. GLOBAL EFFECT AND DEVELOPMENT

It should be accepted by almost each and every hand that at the present juncture we are supposed to think in global perspective. The world is 'expanding' due to advancement in communication technology. From economic point of view, the world is polarized in two extreme poles - 'the developed world' and 'the developing world'. Economically self sufficient countries are termed as developed countries, where as the rest became known as developing countries. Self-sufficiency of a country depends on the economic stability⁶. Therefore every nation thrives on enhancing their economic condition. Today it is an axiom that economic self-sufficiency is the precondition of development⁷. Various research studies⁸ and statistics reveals that developed countries posses almost a cent percent literacy among their population. However exceptions are also there. A glance perusal of the situation of the Gulf countries reveals that though they are rich, but not always developed, due to lack of literacy⁹. Recent history of those countries advocate that due to lack of education, they failed to keep up their economic stability and richness. Lack of education is one of the major causes of wastage and deteriorated economic condition. So it may be assumed that education among the mass leads to development and enhance economic condition, which is further necessary to keep up and thereby to enjoy the

developmental effect¹⁰. The argument may be more clear if we can have a comparative sketch of index of education and index of economy¹¹ of a bunch of nations in Asia as given in the following table, where a high positive correlation is visible between the two major indicators of human development.

Table 1: Education and Economic development in Asian countries

Country Name	Education Index	GDP Index
Bhutan	0.33	0.45
Bangladesh	0.38	0.39
Pakistan	0.41	0.46
Nepal	0.45	0.40
India	0.54	0.47
Cambodia	0.64	0.43
Maldives	0.66	0.89
Myanmar	0.74	0.41
Indonesia	0.78	0.59
China	0.78	0.57
Malaysia	0.79	0.73
Vietnam	0.82	0.47
Sri Lanka	0.82	0.54
Thailand	0.83	0.70
Honking	0.83	0.92
Singapore	0.85	0.94
Philippines	0.90	0.59
Japan	0.94	0.92
Korea	0.95	0.82

Source: UNDP, Human Development Report-2001, Oxford University Press, New Delhi.

4.0. THE EXPERIENCE OF ASIA & PACIFIC IN 21ST CENTURY

The region of Asia and the Pacific consist of huge number of small and large countries over a vast area of the world. As a result, a diversified culture, people, and developmental patterns can be observed here. The region covers almost half of the world population and almost 70% of the population of the developing countries¹². However it accounts for only around one-tenth (1/10th) of the world's gross national product (UNDP, 2000). The region includes the largest countries of the world (viz. China, India) and some of the smaller countries such as Bhutan. The region also includes countries with varied economic condition. The poorest countries (such as Bhutan and Cambodia) and the affluent countries viz. Singapore, Japan, Korea are also included in the very region.

So far the economic potentialities of these countries are concerned, a change is pursued in due course of history, which is mostly guided by colonial rule [Tilak, 2001]. Most of the models of educational development in the region are either borrowed or imposed by colonial rulers¹³. The existing system of education and development in China and India, respectively, advocates the fact. However most of the countries in this region can adopt the imported models to their local environments, purely due to effective market pressures in

some countries, and partially a more authoritarian approach to education in others [Papanek, 1988]. Irrespective of wave of globalization, several of these countries are by nature religious and remains tradition-bound societies in modern, technologically developing world. Besides, most of these countries are having their own historical and unique cultural background, bracketing their respective social, political, and economic institutions to inspire and guide its developmental goals [Huq, 1975].

5.0. EDUCATION, TECHNOLOGICAL EDUCATION & SOCIOECONOMIC DEVELOPMENT:

Engineering education ought to encompass basic sciences, technology and human studies in a complex amalgamation to create new products, machines, structures and processes. Such a diverse and rich field of study would be expected to attract self-motivated and truly committed students. But experience has shown this is not always the case, especially for new entrants who need to deal with subject of basic sciences, which seldom make sense to them for their future career.

In Indian educational scenario, engineering education is yet to be defined (Tilak, 2002). It is often amalgamated with the concepts of Technician Education and Technical Education in consonance with definitions imposed by the organizations like World Bank and

International Monetary Fund (IMF). However in reality, all these segments of education possess differing objectives. While Technician Education is supposed to prepare a cadre of well equipped workforce to extend service for the development of nation and thereby towards developing economy of the nation concerned, Engineering Education is expected to prepare the executives especially in terms of intellect to contribute ideas and designs in the respective branches. As a buffering agent, technician education is supposed to prepare a cadre of experts, having knowledge base as well as skill base to bridge between engineers and technicians and to act as a cadre of supervisors. Unfortunately, in the present juncture of time, all the segments of education have lost their specified objectives and are often amalgamated in the broader sphere of Technical Education. This is due to massive and sudden proliferation of the formal engineering education system at different levels, which is ultimately breaking the objective-oriented pyramidal structure. As a result, it is not a rare phenomenon where the graduate engineers are occupying the position of diploma holders with smiling face, whereas the diploma holders are forced to opt for the jobs specified for the certificate holders, even with stringent job-conditions.

Right now, countries in Asia and Pacific region are possessing varying stages of socio-economic development

from developed, to newly industrializing, to still under developed; where some of the countries are characterized as 'modern' some are still 'traditional'. They differ on various developmental indexes; for example, on the economic indicators, such as their market potentiality, ¹⁴ standard of living (measured with the help of gross national product, abbreviated as GNP), per capita income, social indicators like life expectancy, health status, and other major developmental indicators viz. poverty and income inequalities-which widely differs across sub-region, and between the countries. Demography and political situations also varies significantly in the region, all of which possess a tremendous impact over the system of education in general, and over various segments of education, in particular, with a synergic impact. In its existing scenario, even developing countries can also afford to make appropriate investments in education and thereby achieve economic miracles [Tilak, 2001]. However one of the most notable differences can be pressured so far the quality of education prevails in the region. The experience of majority of the developing countries reveals a comparatively high pupil-teacher ratio, which ultimately leads to high dropout, low retention, and lower promotion rates, and finally lowers the level of students' achievement.

In the gamut of technological education, a trend of sudden proliferation is prominent to enhance the number of colleges and universities for quantitative growth of technological education and thereby to project more technologists per thousand population. Obviously this helps the nation to rank higher in terms of development, as the technocrats-population ratio is accepted as a basic indicator for measuring development by UN. However in specific studies (Roy, et. al, 2007) it is observed that even ignoring the inflation of economy, average per capita income of a newly graduated engineer of the day has drastically been slashed down compared to those became graduates a decade ago, which pinpoints the true development of the nation.

5.1. DEVELOPMENTAL PROBLEMS

Though education, as often argued, is the vehicle for development, however there remain various problems in the process of its social execution. Priority towards education – in terms of level is not well thought of in India, as like of many nations in the Asia and Pacific region. A major disparity prevails among them so far gross enrolment ratio is concerned.

5.2. TECHNICAL EDUCATION

Irrespective of conceptual conflicts, one has to agree over the phenomenon that the very gamut of

education thrives to develop the technical skill-component among the learner, may be it at certificate level, diploma, degree or doctoral levels. Up till date, studies in this area may be classified into two broad categories such as the education in the respective trade in one hand and development of methodology in the process of imparting content knowledge in other hand. Unfortunately in the Indian scenario, research in the second dimension is till in the stage of infancy¹⁵. This may be due to the reason of non-familiarity or lack of familiarity of those involved in the process to imparting training and research methodologies to the technical teachers. The scenario is not much different in other gamuts of education, where also teachers need to be trained with a view to develop a cadre of specialist-technocrats.

5.3. MANPOWER DEVELOPMENT

With a view to raise the standard of manpower and thereby to enhance their potentialities, the so-called developing countries in Asia and Pacific need to adopt appropriate policies for expansion of (skill) education, keeping in view the emerging needs of the respective nations and the region as well. Therefore the technology education, which comes under the preview of higher education, need be given proper weightage. Sudden and huge-expenditure, massive proliferation of the technical education

system, and enhanced enrolment without carrying out any future manpower survey should no way be helpful for enhancing the standard of human resource. Rather such attempt will invite different sorts of problems with different magnitude (which is presently experienced by the country like India)¹⁶. Proper planning is inevitable so far education in science and technology is concerned. It has been observed, while East Asian economy have successfully build up huge stock of human capital and utilizing those for national development, India being the third largest reservoir of scientific and technical (and also technological) manpower in the world, is yet unable to reap sizable economic benefits. Science and technology education will become futile, until and unless it is tagged with social research and development (R&D) activities. Therefore apart from supplying sufficient 'fresh-blood' on technical education, research and innovation should also be enhanced in this direction. Experience of Japan can be taken up as a model by the rest of the world, which, even being an Asian Country, excelled its economy, and is much ahead, not only of other countries in Asia, but also of other developed countries in the world¹⁷. This becomes possible with an investment of nearly 3 percent of GNP over R&D activities, along with a strong feeling of nationalism among the cross sections of the population.

5.4. HUMAN CAPITAL

In contemporary economic analysis, the emphasis has, to a considerable extent, shifted from perceiving capital accumulation in primarily physical terms to viewing it as a process in which productivity of human beings is integrally involved [Sen, 2000]. For example, through education, learning and skill-formation, people can become much more productive in course of time, and this contributes a lot over the process of economic expansion. In recent studies of economic growth, often influenced by empirical readings of the experiences of Japan and the rest of East Asia as well as Europe and North America, there is much greater emphasis over 'human capital'. Human capital helps in enhancing the human capability, and in consequence, enhances the social and economic indicators of human development [Backer, 1964]. Technical education directly contributes for human development; on the other way it may be said that technical (as also technological education) possess sufficient tangible impact over the process of development in comparatively restricted span of time. This is the very segment of education, which has its immediate impact over the society at large. Research in the very domain also helps to bring *structural change* in the society¹⁸. Therefore with a view to achieve development, proper attention is

needed over technical education and research.

Education (including both soft and hard skill) makes the human beings more efficient in production of commodity or in extending services, which is also a human capital. These should add value to economy and also to the income of a person. But even with the same level of income, a person may benefit from education--in reading, communicating, arguing, in being able to choose from alternatives in a more informed way, in being taken more seriously by others. The benefit of education thus exceeds its role as human capital in producing commodity [Sen, 2000]. In consequences, if a person can become more productive in making commodities through better education, better health and so on, it is not unnatural to expect that s/he can, through these means, also directly achieve more and have the freedom to achieve more to lead his/her life. In this way, the process of development follows a rotating cycle and thereby accelerates the rate of development.

In the twenty- first century, not only the people of the Asia and Pacific, but all over the world having high hopes that new technologies, mostly in the sphere of information technology, will lead to the healthier lives, greater human freedom, increased knowledge (not mere information) and more productive livelihoods. Though at the end stage

of the last century, (to be more specific, since 1990s), massive gain was achieved by some nations in the wave of globalization, which was the output of technological breakthroughs, but time has come to rethink over the supremacy of market and technology. No doubt, market is a powerful vehicle of technological progress; but not powerful enough to create and thereby to defuse the technologies needed to eradicate poverty in SAARC and other zones. Affluent societies may gain especially high rewards from new technologies, but they also use to face several challenges in managing risks. And it is mostly the so-called third world countries who are the worst sufferer of technological risks due to their poor safety, health and environment [SHE] measures.

6.0. EDUCATION AND TEACHER: THE HRD APPROACH

Irrespective of levels and types of education, teachers play a pivotal role in the process of implementation of the policies, formulated to achieve the desired goal in the qualitative improvement of education. *Effectiveness* and *performance* of the teachers depend upon a sequel of factors and variables, some of which can be grouped under psychoeducational attributes. Teachers' interest towards teaching is one such major psychoeducational factor, which possesses a tremendous impact over the entire process of teaching-learning [Roy, et. al, 2005].

Education of the day, as is apparent in India, facing sequels of problems to sustain without creating sufficient space for diversity within the curricula frame as well as students and teachers. Though it is argued by the predominant occidental psychopedagogical thinkers that the days will come, converting teachers into 'learning-assistants' and transforming students into 'clients' however irrespective of levels and types of education, the traditional oriental 'guru-sishya parampara' [i.e., the tradition of the teacher and disciple] still prevails in our academic scenario [Basu, 1972]. Obviously, teachers are expected to be the co-learner with the students, the mentors and facilitators, especially when the nature of learning involves a major share of acquisition of skill [Barr, & Tagg, 1995]. Technical education, in its middle level, much emphasizes over developing skill among the students, which fall under the psychomotor domain of taxonomy of learning.

As like in other sphere of education, in technical education system too, teachers play a pivotal role in the process of implementation of the policies, formulated to achieve the desired goals for the qualitative improvement of education. In fact in educational scenario, teachers act as a 'pivot' on which the entire process of education rests on [Roy, 2005]. Therefore the quality and psychological makeup of the teacher

possess tremendous impact over the process of teaching, which spreads among the 'level of acquisition of knowledge and skill' of the student too [Biswas & Roy, 2004].

6.1. TEACHER EDUCATION FOR HUMAN RESOURCE MANAGEMENT (HRM)

Human resource management (HRM) is mere utopia until and unless human resources are 'developed' by processing existing population through 'appropriate' education and training. The task mostly stands with the system of education. To run the system effectively, it is essential to have a standard reservoir of teachers. Within the sphere of education, responsibility to develop well-equipped teacher is assigned to 'Teacher Education System' [Roy, et. al, 2004]. As such, it is the most important factor; often influence the process of human resource management (HRM) within the paradigm of a given social set up, especially in the so-called developing nations like India.

Since its inception, formal programmes of teacher education in India perused sequential changes in course of time. Such changes took place mostly in the 'forms' as well as in 'content', keeping in view the need of Indian society and cliental groups, for whom the programmes were made. In consonance with changes in society at large and in the sphere of education, in specific, educational and training programmes for teachers

accorded modifications. Some specific changes are suggested to enhance effectiveness of existing teachers' training programme to well-address the needs of the society in the present juncture of time with a view to develop human resources, and society as well.

6.1.1. TEACHER EDUCATION DEFINED

Teacher education may be defined as the formalized activity to induct the very group of professionals, either involved in, or desirous to be the professional group to pursue their livelihood through teaching. As such it comes under the very domain of professional education. Education, as it stands for a much broader connotation, therefore instead, with a view to enhance the potentiality to successfully perform in the specified profession, much emphasis needs to be placed over imbibing skill in relation to the profession [Roy, 2002]. Therefore it is judicious to supplement the word 'education' by 'training' as the latter is much focused over the activity of generating skill.

6.1.2. TEACHING- THE PROFESSION VERSES MISSION?

The controversial and much debated issue stands in the way of Indian educators, whether teaching needs to be considered as a profession or be taken as a mission? Our history of Indian education advocates it to be keen to mission, where much emphasis was placed over developing

affective domain of learning, apart from cognitive development. In course of time, however a paradigm shift has taken place over psychomotor domain, than to affective one. As such we need to keep a judicious focused attention over the very debate and should not try to sail against the tide of the present day.

6.1.3. CAN TEACHER BE 'PRODUCED' THROUGH TRAINING?

This very pertinent question needs an immediate answer in view of day-to-day deterioration in the frame of instruction. As is felt, for proper and optimum use of human resources, teachers need to be trained properly so as to enable them to transmit their duties and responsibilities in the *real work situation*. Unfortunately, whatever existing trend reveals is not to be considered as absolute-desirable¹⁹.

6.2.0. WHAT THE TEACHER IS EXPECTED TO PERFORM?

Basic task of a teacher is to act as a bridge between the student and the curricula, which, in course, reflects from the output of the system, i.e., the students. As such, variety of curricula is the basic intervening factor that needs to be taken in to consideration while imparting instruction. More efficient the teacher is in doing the sequel of function, better the teacher is [Reynolds, 1990]. So far the methodology of teaching is concerned, a uniform approach at every level of

instruction will not give expected result. Specialized approach is therefore essential. Prevailing concepts in relation to higher education in our country – ‘teachers don’t require training’- needs to be changed. As such, in the very inset of entering in the profession, training needs to be considered as a basic prerequisite. To address the issue, the immediate question arises is irrespective of levels and types, what teachers use to do? Teachers use to teach the students. Those who are having much affinity with western pedagogic concept will say to help the learner to learn. In course, teacher helps the learner to KNOW about FACTS/PHENOMENON, those can be observed or experienced. Teacher helps the learner to guide to THINK CRITICALLY, CREATIVELY and PRACTICALLY. These thinking rest on ideas, which require explanation and prediction in an interpretative perspective from the teachers end initially, and also from the students.

For understanding and shaping one’s self, ideas, facts, phenomenon and concepts supposed to be interconnected by identifying similarities and finding interaction. Here the task of the teacher is to help the student to CONNECT all those.

Teacher should be well equipped to help the students in understanding and interacting with others. These may be termed as ACTING WITH SOFT SKILL, which should cover

PHYSICAL, INTELLECTUAL and PSYCHOLOGICAL AWARENESS about the learning environment.

Finally in the process of learning, teacher is to be CARING enough towards the students in terms of FEELINGS, INTEREST AND VALUES.

6.3.0. TEACHING -THE SKILL

The dictionary meaning of the word skill refers to expertness, a craft, or accomplishment. A skill is the capacity to perform a task competently. In teacher education, as like in technical and vocational subjects, skill development is a part of curricular experiences. Skill development comes under psychomotor domain. Here learning-outcomes hinge on motor skills, which require the ability to carry on (manual) works. Teaching is expected to be based on the three basic skills as follows:

Manipulative skill → Hands on practice

Observational skill → Capacity to observe

Drawing skill → Capacity to draw.

While the manipulative skill requires the ability to handle and keep the equipment properly and follow precautions during handling with equipments, observation skill demands recording the observations faithfully, assessing activities with accuracy, and to deduce inferences

correctly. In skill training, deliberation of the content will be such so that the student should fill the urge to learn the skill. There should be specification about time and accuracy to perform certain job. Apart from these, safety rules should be strictly followed. The concept of skill development is based on 'Learning by doing' as well as on 'hands-on-practice'.

Active involvement of the learner in the process is essential. Skill refers to a physical, mental or social ability that is imbibed through practice, repetition and reflection; and in which it is probably always possible for the individual to improve upon the skill.

6.3.1. DEVELOPING SKILL IN ACTUAL ENVIRONMENT

Existing teachers' training, as often said, has become much more theoretical. In these training, on one hand, scope of 'practice' is inadequate; on the other hand, existing scope of practicing-teaching is not well utilized, which is mostly caused due to over-mechanization of practice. Justification of practicing-teaching thus becomes a futile exercise for the trainee. Actual classroom/institutional condition is often ignored. The tendency needs to be changed.

6.3.2. WHY SKILL LEARNING?

Now a days it is felt by the Indian government the need to implement a systematic approach to develop highly qualified and skilled human resource for the overall

development of the economy and standard of living of the countrymen. Parallely it is necessary to develop skilled management of human resources. Both these developments can be facilitated by a wholehearted commitment at employer and employee level to acquire skills in the recognition and assessment of prior and experiential learning as a means of providing effective human resource management.

6.3. ASSESSMENT -WHAT?

The usual meaning of the word assessment is to estimate the size, quality, amount or value of certain thing(s). However in educational perspective the word assessment connotes the level of acquisition of knowledge or skill about certain content or task, which is mostly psychological or behavioural in nature. While measurement or evaluation takes place in estimating the potentialities of an individual related to his/her cognitive domain, assessment is related to the estimation of capabilities involved with affective and / or psychomotor domain.

6.3.1. ASSESSMENT OF SKILL

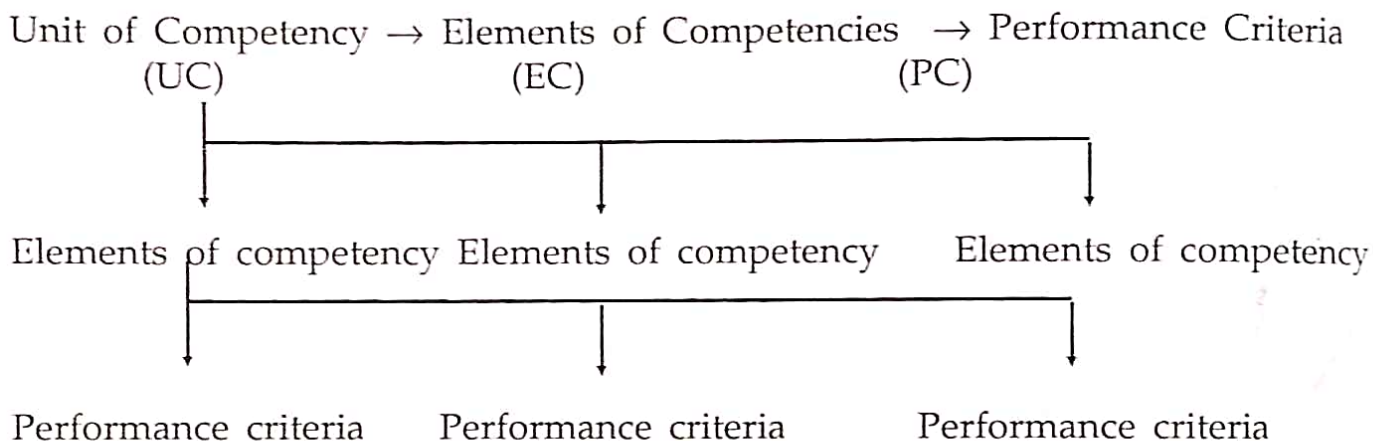
The system or the methodology of skill learning supposed to be followed by a systematic sequence. Skill components require to be specified in terms of 'unit competency' abbreviated as UC and further classified in 'elements of competency' and 'performance criteria' abbreviated

as EC and PC respectively. While assessing the skill, the basic consideration for the assessor should be, whether the trainee has achieved the performance criteria or not. There is no further scope, neither to qualify nor to quantify the performance criteria, as it is pre specified at the stage of identification.

Considering teaching as skill, teacher educators need to give a second thought over the existing practice of assessing a 'trainee'.

Almost each and every hand should accept it that in final teaching sessions, the method of assessing 'teaching-skill' of the trainee is not well judged. Difference of marks assigned by different evaluator to a specific trainee in a specific session is most common phenomenon, where offering an average of marks is usual practice.

Experience reveals, assessing skill, which is supposed to be a continuous process, is hardly assessed continuously. As such, 'effective' and



'agreeable' feedback from the assessor to the trainee is a rare phenomenon. Even sometimes situation appears, where assessors themselves are not in agreement while assessing certain skill. All these occur due to our reluctance to develop a standard list of 'performance criteria' in relation to teaching at various levels and subjects. Availability of such subject and level specific list of 'performance criteria' will surely help us to assess teaching skill in a more objective manner.

6.4. LET US RECOGNIZE TECHNOLOGY

Emergence of new technology in the process of imparting information has changed the teaching of the day. Power-point-presentation, graphic-art-designing, animation-effects over slides, programmed instruction are some of the new forms of technology. Today's teacher, as often argued, has become a more learning assistant, with these techno-devices. If the technological devices really help (and techno-devices often help) to comprehend the concepts, facts, knowledge, obviously those will be

utilized. Assuming an ideal situation of availability of modern technological gadgets, 'trained teachers' are supposed to be familiar with the application of such devices, not just only out of interest, but as a compulsory component of teacher-education curricula, preferably in an integrated way, without introducing a new subject-paper. Does our existing curriculum offer such scope to our trainees?

The need of the day is to offer method, subjects/papers orienting with IT applications to enable trainee to apply the knowledge of IT oriented teaching in his/her professional setup.

6.4.1. TECHNOLOGY- IS IT A THREAT TO TEACHERS?

On contrary, irrespective of levels and types, the basic task of teacher is to teach the student. Those who are having much affinity with western pedagogic concept will hold, 'to help the learner to learn'. In fact, the task of teacher is to help the learner to KNOW about FACTS/ PHENOMENON those can be observed and experienced. Teacher is supposed to help the learner to THINK CRITICALLY, CREATIVELY and PRACTICALLY. Those thinking rest on ideas, which often requires explanation and prediction in an interpretative perspective from the trainer initially, and also from the trainees.

For understanding and shaping ones' self, ideas, facts, phenomenon and concepts supposed to be interconnected by identifying similarities and finding interaction. Here the task of the teacher is to analyze and synthesize and thereby RECONNECTING all those in a gestalt fashion. No technological devices have yet been invented to perform the task, on behalf of the teacher.

6.5. ASSESSMENT OF PRIOR LEARNING (APL)

Trainees are mature enough and possess substantial knowledge. However it is often observed that PRIOR-KNOWLEDGE of the trainee is hardly taken into consideration while offering training programmes and a sizable proportion of resources and energy is wasted in almost entire span of training. The trend needs appropriate rectification through assessment of prior learning at the very outset of the training to minimize the wastage of resources in various forms in teacher-education programmes.

6.6. SOFT SKILL

Teachers should be well equipped to 'understand' students, and also to help them in understanding and interacting with others. These may be termed as ACTING WITH SOFT SKILL, which covers PHYSICAL, INTELLECTUAL and PSYCHOLOGICAL AWARENESS

about the learning environment. Irrespective of possessing 'sufficient teaching skill', the trainee can't be a good teacher until and unless s/he acquires these soft skill, which also incorporates enough CARING ATTITUDE towards students in terms of FEELINGS, INTEREST and VALUES. Teacher educators need to emphasis these aspects, which are hardly uttered in the curriculum, and even spelt out somewhere, rarely practiced in the teacher education programmes.

6.7. POSTSCRIPT

Relevance of any programme largely depends upon its contribution towards contemporary society. In case of a 'subject of study', recognition for the subject is strongly tide with its 'base discipline'. Therefore need of the hour is to make the existing teacher education programmes, especially technical teacher education programmes more need-based and demand-driven to enable it to hold command in the sphere of human resource management by catering the changing needs of the contemporary society and of the nation, failing which not only the programmes will loose their relevance in the process of HRM, but also will become ornamental. Simultaneously it is essential to strengthen the base discipline 'education' with a view to gain feedback for the enrichment of teacher education programmes in course of time.

Apart the identity crisis and Professional Duality Identity Syndrome (PDIS) of the teachers in engineering education need to be addressed properly and redressed appropriately. It is often observed that engineers, who opt for teaching profession, mostly suffer from such syndrome. This may be due to their transitional professional identity as in one hand they are engineers and on the other hand involved in teaching. Such syndrome needs proper HRM planning to sustain the HR reservoir for social development too. Sooner such issues addressed, better it would be for the domain of Engineering education.

NOTES & REFERENCES

Notes

1. In Indian universities, educational research mostly initiated in an interdisciplinary approach, where the outcome of such studies contributing theories and methodologies to allied disciplines much more, compared to education.
2. Data in this context are available in the website: www.education.nic.in, the official website of MHRD, Government of India.
3. The study was initiated with the financial support of Indian Council of Social Science Research [ICSSR], New Delhi, to bring up a doctoral dissertation abstract in social aspects of education.

4. Though the issue is much debatable, however well-recognized by the stalwarts in Indian higher education.
5. Data in this context are explored from the reportings depicted in 'The theses of the month' columns, periodically published by Association of Indian Universities, New Delhi in its journal 'University News'.
6. Apart from human resources, as Professor Sen perceives, economic stability helps in maintaining congenial climate, within which fruits of self-sufficiency ripe.
7. Development depends upon four basic components- viz. Independence, cooperation, enhanced skill and growth in production rate.
8. Most of these studies are carried out in the disciplines- Economics and International Relations.
9. Though literacy is one of the major indicators of formal education, however it cannot be considered synonymous with education.
10. 'Welfare-Economics' stressed the very concept.
11. Among many others, gross domestic product is a component of economic-index, which estimates human development.
12. Please refer to world development reports.
13. History of colonial East advocates the fact.
14. Two major countries in the region -China and India hold a sizable proportion of world market.
15. Though data in this context is yet to get a published form, however trend of existing data, pooled by the author (as a member of a small group), establish the fact.
16. Such attempts of expansion of technical education without proper manpower survey drastically reduced the per capita potential earning of newly graduate engineers since last eight years [i.e., 1998 onwards].
17. Please refer to World Development Indexes.
18. Change is the law of nature; absolute social staticity is not natural and hence against nature. Such social phenomenon prevents dynamism in the society in terms of functional changes (i.e., change in polity and governance), which further leads to structural change; consequence thereof may even worse than the existing social setup, however an outcome of such static society.
19. Experience reveals the fact.

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Influence of Short Term Courses in Getting Employment for the Mechanical Diploma Holders - A Study

R. RAJ KUMAR AND E.S.M. SURESH

1.0 Introduction

According to Tobias.S (1990)^[1] for effectively functioning in the workplace, newly graduated engineers require competencies beyond the traditional knowledge of engineering principles. They need skills that help them function in multidisciplinary teams and work with complex systems of products and services. They also remain under pressure of the rapid technological changes that will require continuous learning throughout their adult lives. This new workplace reality has a profound impact on the universities, because they must meet the expectations of real-world corporate and professional environments, as well as those of students, in order to deliver relevant education. Studies indicate that traditional classroom teaching no longer addresses the needs of today's students in undergraduate science and engineering education.

At present there are approximately 230 polytechnic institutions in TamilNadu conducting diploma programme in various

discipline like Civil Engineering, Mechanical Engineering, Electrical & Electronics Engineering, Electronics and Communication Engineering, and Automobile Engineering etc. For all the courses, Directorate of Technical Education develops the curriculum and syllabus. Several agencies are conducting short term certificate courses. These short term courses mainly concentrate on enhancing the skill of a student. The curriculum and the duration of these courses are framed by the agencies themselves. Even though the government departments for employment do not recognize the certificates, many agencies are conducting courses. In this paper an attempt is made to find the opinion of the students studying diploma program and passed out students who are at present working as technicians in industry, about short term courses and whether they are actually increasing the employment opportunities of diploma students.

2. Methodology:

The sample for this study was collected from students studying diploma program in Mechanical Engineering and Mechanical Allied program in polytechnics and diploma technicians in industries. The sample selection is given Table 1 and Table 2. The questionnaire was prepared and circulated to the respondents and they were asked to rank on a five-point scale their opinion about

1. Entry level qualification of the students joining diploma program
2. The branch they have selected (Mechanical or Mechanical allied)
3. Reasons for joining short term courses conducted by external agencies
4. The influence of short-term certificate courses in getting employment.

2.1 Sample selection for students studying Diploma program:

A sample of 152 students studying diploma program of mechanical and allied branch were selected using stratified sampling technique. The variable educational qualification of students before enrolling diploma was used to stratification.

The particulars of sample of students from where the data was collected is given in the table 1

Table 1: Details of sample of students of diploma students of Mechanical and Allied branch (N= 152)

S. No	Variable	No of Sample	No of Sample	Total
1	Educational qualification	10 Standard	97	152
		+ 2 Standard	55	

2.2 Sample selection for Mechanical Technicians working in industry

Samples of 266 technicians were selected using stratified sampling technique. The following variables were used for stratification.

1. Nature of Course
2. Branch studied

The particulars of sample of diploma technicians from where the data was collected is given in the table 2.

Table 2 Details of sample of diploma technicians working in industries (N= 133) Questionnaire No.3

S. No	Variable	No of Sample	No of Sample	Total
1	Nature of Course	Regular	33	133
		Sandwich	35	
2	Branch of study	Mechanical	40	133
		Mechanical allied		

2.3 Reliability:

The internal consistency and the reliability of the instruments used for data collection were determined by calculating Cronbach's alpha reliability estimate (Cronbach I.J. 1951). The

Cronbach's alpha reliability estimate for the instruments are given in the table 3.

Table 3 Cronbach's alpha reliability estimate for the instruments used for data Collection

S.no	Instrument type	Cronbach's alpha coefficient
1	Questionnaire administrated to the Diploma students	0.79
3	Questionnaire administrated to the technicians working in the industry	0.88

The reliability of the information collected by using the instruments was also determined by triangulation method. For this purpose, information on the same aspect was collected from the respondents. The multiple responses on the same aspect were compared for their consistency. The information collected was found to be highly reliable.

3 Analysis of data:

3.1. Educational Qualification of students opting diploma program in Mechanical / Allied branch:

Students can join in the diploma program in different categories. In one category the students can join in the first year of the program with 10th standard qualification. The second category is lateral entry scheme in which the students with +2 qualification can join in the second year of the program. The details of educational qualification of the students before joining diploma course

from whom the data was collected is given in the Figure 1

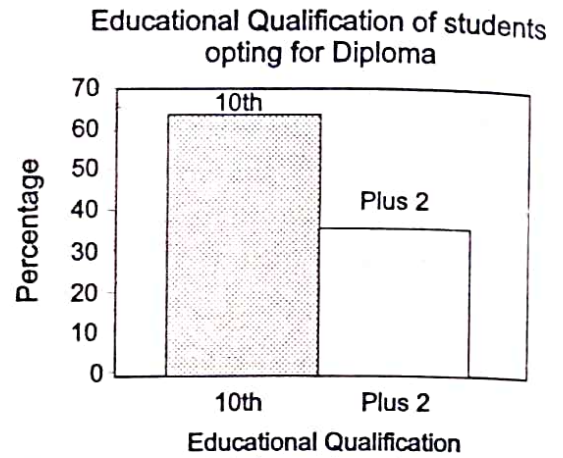


Fig. 1 Entry level Educational qualification of students

It can be seen that a majority of 63.7% of the respondents after completing 10th standard are opting for diploma program. Only 36.2% are joining the diploma course as lateral entry students directly joining the diploma program in the second year of the course after completing +2.

3.2. Branch of study of the students joined in the diploma program in Mechanical / Allied branch:

The study was conducted in students studying in following diploma programs

1. Diploma in Mechanical Engineering
2. Diploma in Automobile Engineering
3. Diploma in Refrigeration and Air-Conditioning
4. Diploma in Tool and Die Design

The courses mentioned above other than Mechanical Engineering are

known as Mechanical Allied Programs. The details of branch of study of the students from whom the data was collected is given in the Figure 2

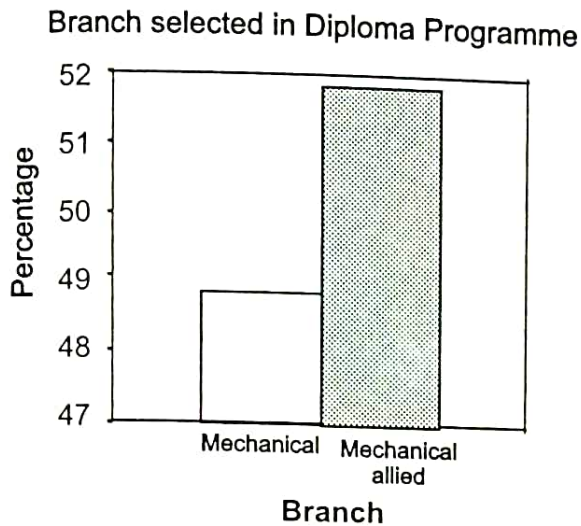


Fig. 2 Branch of study

It can be seen that 48.7% of the students prefer Mechanical branch and 51.3% prefer Mechanical Allied branch.

3.3 Short term courses undergone during Diploma programme:

Short-term courses are being conducted by several agencies. The duration of these courses generally vary from one month to one year. The curricula of these courses are being framed by the course conducting agencies depending upon the industrial needs. Both computer oriented courses and non-computer oriented courses are being conducted. The duration of the courses is flexible in nature. Figure 3 explain the awareness of the students studying in Mechanical Diploma Program about

the short-term certificate courses conducted by the external agencies.

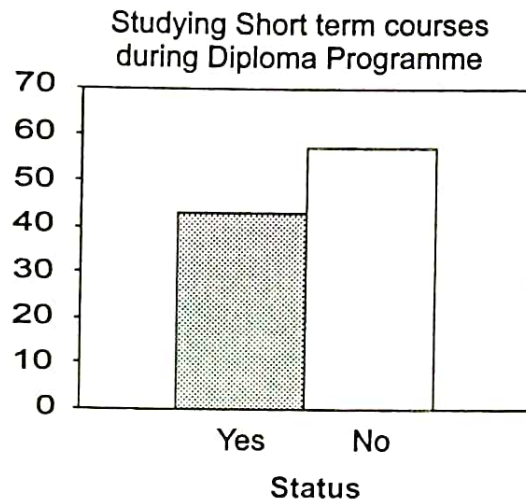


Fig. 3 Short-term courses undergone during Diploma programme

It can be seen that 42.8% are studying short-term certificate courses during their diploma program and 57.2% does not give any importance to short term certificate courses.

3.4 Reasons for studying short term certificate courses:

Figure 4 and explains the reasons for undergoing short-term courses by the diploma students.

It can be seen that 89.23% of the respondents' opinions that short term certificate courses enhance employment opportunities. 4.6% of the respondents feel that even though they are studying short-term courses, these courses will not influence much in their employment opportunities.

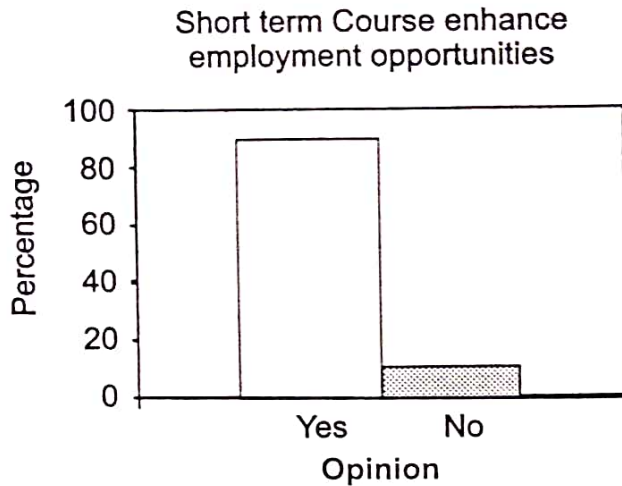


Fig. 4 Reasons for undergoing short term courses

3.5 Nature of short-term courses:

Figure 5 explains the nature of short term certificate courses undergone by the students.

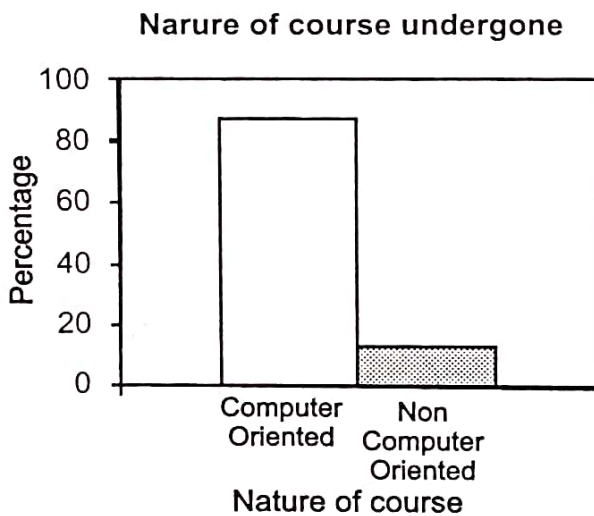


Fig. 5 Nature of short-term courses

It can be seen that 87.69% of the respondents are studying computer oriented short term courses and 12.31% of the respondents are studying non computer oriented short term courses.

3.6 Influence of short-term certificate course in getting employment

Figure 6 explains the influence of short-term certificate courses in getting employment after completing diploma.

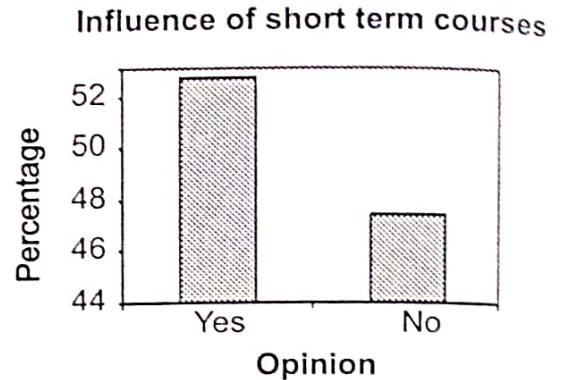


Fig. 6 Method of getting employment

Only 52.6% of technicians have studied some sort of certificate course for employment and 47.4% does not study any certificate course for employment. It can be interpreted that the various short-term certificate courses offered by several agencies does not influence students in getting employment.

3.7 Short term course studied Related to the branch of study:

Short term courses studied related to the Branch of study

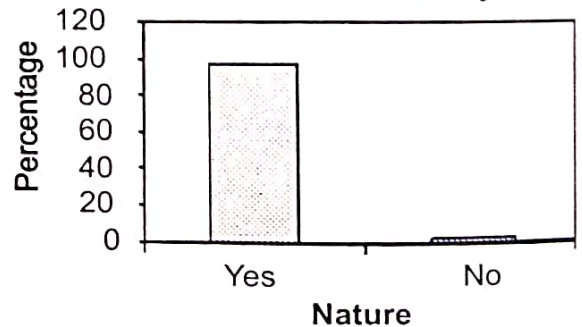


Fig. 7 Short-term course studied Related to the branch of study

Figure 7 explains the relationship of short term certificate courses studied to the branch of study.

It can be seen that 97.14% students have studied short-term courses relative to their branch of study.

3.8 Nature of additional course undergone:

Figure 8 explains the type of course the technicians studied during their diploma course.

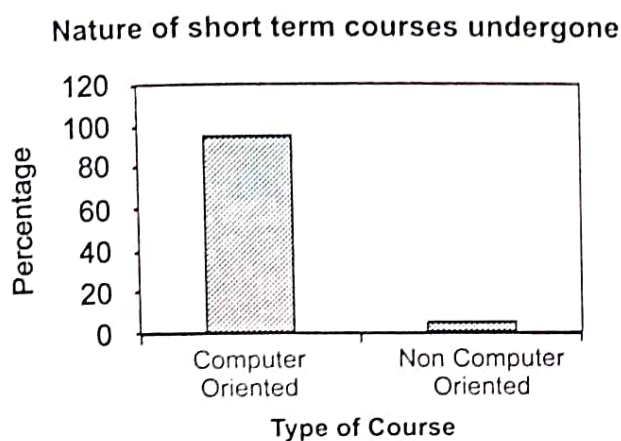


Fig. 8 Nature of additional course undergone

It can be seen that 95.58% of students' have undergone computer oriented short-term courses. Only 4.42% students studied other type of certificate courses.

3.9 Research question: Is there is any significant difference in the mean of qualities acquired after completing diploma between the technicians belonging to groups based on employment obtained due to influence of short term certificate courses.

Table 4 Group Statistics

	Certificate course studied	N	Mean	Std. Deviation
Qualities acquired after acquiring Diploma	Yes	70	3.3924	0.66923
	No	63	3.3598	0.55797

Table 5 Independent Samples Test

	t	Dof	Sig. (2-tailed)
Qualities acquired after acquiring Diploma	0.303	131	0.762

Result: There is not much difference in mean of the qualities acquired after diploma between the technicians who got employment due to influence of short term courses and the technicians who got employment without studying any short term courses.

3.10 Research question: Is there is any significant difference in the sufficiency of diploma curriculum between the respondents belonging to groups based on employment obtained due to influence of short term certificate courses.

Table 6 Group Statistics

	Certificate course studied	N	Mean	Std. Deviation
Depth of curriculum of diploma courses	Yes	70	2.4905	0.97632
	No	63	2.1032	0.80457

Table 7 Independent Samples Test

	t	Dof	Sig. (2-tailed)
Depth of curriculum of diploma courses	2.480	131	0.014

Result: The technicians who got employment due to influence of short term certificate courses have a higher mean of 2.4905 and the t value is 2.480 when compared to the technicians who got employment without studying any short term course. This is because the short term courses are being conducted by the external agencies with course content satisfying present industrial needs. The technicians who got employment due to influence of certificate course feels that the present depth of curriculum is not satisfying the industrial expectation and the curriculum has to be revamped to suit the present industrial scenario.

4.0 Findings and Conclusion:

- From the study it was observed that, the number of students joining the polytechnic program with 10th standard qualification is more when compared with the students with +2 qualifications.
- There is not much difference in preferring either Mechanical Program or Mechanical allied program by the students.
- Similarly nearly 50% of the students are undergoing some sort of short term courses during their course of study.

- Majority of students studying short-term courses is of the opinion that studying of short term course will enhance employment opportunities.
- Short-term computer courses are preferred more by the students than non computer courses.
- Significantly and interestingly, merely enrolling short term courses will not enhance employment opportunities. This can be seen that only 50% of the students who have studied short-term courses getting employment due to the short-term course they have studied.
- From the study it was observed that studying of short-term courses would not change the qualities acquired by the technicians.
- It can be seen from the study that the agencies conducting short-term course are revising the curriculum depending on the industrial needs. Whereas the curriculum of the diploma programs are revised or updated once in three years. Hence the technicians who got employment due to the influence of short term course feels that the present curriculum is not sufficient and has to be updated to suit present industrial demands.

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Engineering Education in Tamil Nadu - Present State and Future Perspective

P. SURYAKUMAR

ABSTRACT

Engineering education is passing through critical times. Most of the jobs at the present time in India are in the Information Technology area. This has resulted in a waning of interest in hardware related work among students. Attracting them to "hard-core engineering" is proving to be difficult. At the same time, changes taking place in technology are so rapid that keeping pace with them through curricular changes has become challenging. There is a far greater emphasis now, on imparting to students, skills for life-long learning and on the need to make the curriculum broad and flexible to meet the greatly increased diversity of needs in the job market.

Introduction

Man has engineered a lot ever since he evolved on this planet. Engineering activity, like the other great profession of Medicine, is prescriptive in nature and in its practice, diverse skills are required, e.g., a capacity to work in overlapping

areas between disciplines and a flair for self-learning new skills. An engineer of the future has to emerge as a creative problem solver. Mere analytical skills are not enough. An "engineering design" integrates mathematics, basic sciences, engineering sciences and complementary studies in developing elements, systems and processes to meet specific needs."

"The nation's competitiveness depends, in part, on the skills of tomorrow's engineers"

The purpose of this article will be to analyze the current status of the field of engineering & technology in the EDUCATION sector.

The last few years have seen the birth of numerous engineering colleges in the state of Tamil Nadu. So much has changed that Engineering Colleges mean big business these days in the state. To what extent do these engineering colleges help the engineering industry in finding their required WORK FORCE is truly a serious question to be answered and

this article will aim at finding an apt answer.

The Computer tag

In the last 3 - 4 years, massive technological awakening has taken place and new business ("Software Business") was established. Because of this, the entire job scenario has changed because of two factors: "High Salary" and "Abroad opportunities".

Because of this there is a massive demand created for courses that have the tag "Computer". Does learning computer science give you a ready job? Are other courses for namesake?

Peer pressure and media hype all point to the fact that Computer Sciences and Electronics and Communications engineering are the flavours of the current season.

Information Technology, Electrical and Electronics engineering or Electronics and Instrumentation Engineering are distant second choices.

Mechanical or Civil or even Automobile engineering are not really the big hits of the season.

Analysis of the recruitment trends during 2007 in Tamil Nadu

An analysis of the recruitment trends in the four constituent colleges of Anna University in Tamil Nadu (College of Engineering-Guindy, A.C Tech, Madras Institute of Technology and the School of Architecture and

Planning) gives a revealing picture. Infosys came headhunting to these four colleges and offered jobs to 596 young men and women. But what is unsaid is the fact that nearly 140 of these came not from the predictable ECE, IT or Computer sciences branches — rather they emerged from branches including architecture, automobile, ceramic, civil, industrial engineering, leather technology, manufacturing, mechanical and production engineering, rubber and plastics technology and even textile technology. Interestingly, 13 offers for IT jobs went to students of industrial biotech branch.

This story also repeats in the case of Cognizant, which offered jobs for another record number of 572 candidates. This number included three aeronautical branch students, four B. Arch students, 9 in automobile, 4 in ceramic, 5 in chemical, 12 in civil engineering, 15 in geoinformatics, 13 in mining, and 28 in mechanical engineering, among others.

Similar stories emerge from other affiliated colleges too.

Analysis of the admission trends during 2008 in Tamil Nadu engineering colleges

Three weeks after engineering admissions began in the state, about 70 per cent of the available seats have been allotted through the counseling sessions.

When counseling under the unified single window system began,

a little over 34,000 seats were up for grabs in different branches, across 148 engineering colleges out of which over 24,000 seats had been allotted in electronic and I.T related branches.

In such a situation, it is hardly surprising that many colleges have reduced the strength in or dropped traditional branches like civil or production engineering. Less than 1,000 civil engineering seats were available and less than 600 students have opted for this branch.

Mechanical engineering - once the most sought-after branch - has now lost much of its charm. Available figures show that there has been demand only for less than half of the 4,900 total seats offered.

All these point to the craze for the expanding electronic, I.T. and communication fields, which offer exciting career opportunities in India and abroad.

All that exist for long NEED NOT BE right

Realistically speaking, in Tamil Nadu, not one system of education is in force, but many. Almost all the colleges are brought under one university. Some high-profile colleges are granted the DEEMED UNIVERSITY status which enables them to have their own syllabi for the courses and gives them the right to evaluate their students.

Teaching methods solely depend upon the *COMPLETION OF*

PORTIONS and not the *comprehension of subjects*. The lecturers run through the syllabus in an urge to complete their 'portions' making way for the most philosophically idiotic teaching methodology- *THE TEACHING IN THE EXAMINATION POINT OF VIEW*.

Students have marks but lack technical knowledge. Remembering formulae and scoring marks are not what employers expect. They expect the abilities to innovate and create. This is the reason many engineering graduates are left unemployed.

"Most students wrongly assume that 'circuit branches' will stand them in good stead"

Choosing a course because of the attractive jobs it might offer could be a good reason for many but whatever be the choice of study, even though it might not fetch lucrative offers during its initial stages, when pursued with interest and hard work, will surely bring success at some point.

It is a common belief that success is a monetary parameter. Most forget that there is a defined vast region in success termed as satisfaction. Today, this region is vaguely visible to most students. They do not seem to be affected by the fact that this style of living very often spoils the basic unit of the society — the family. It would do well for people to realize this and diverge into various other fields of work where they will be truly needed and recognized, where there is a

requirement and plenty of scope for development.

These days one sees many engineering colleges including popular institutions conduct job fairs. It is a welcome trend, but also disconcerting in one way as most participants are from the IT sector.

Why should one study engineering disciplines such as civil, electronics and communication, mechanical, and chemical and end up with a common job of software preparation? If this trend continues, the very purpose of imparting engineering education may get defeated.

Role of Institutions

The expert view is that there is no point in research and development if it cannot deliver products for society's use. Students of engineering are not informed of the valuable opportunities in the core engineering branches. It is the duty of the placement wing of engineering colleges to explain the values and challenging prospects in core engineering and not simply give statistics of who have joined the IT industry, forgetting that the real purpose of giving education in engineering colleges is to mould core engineers.

Prospective students are looking at short-term benefits and not the future. If only a majority of them enter and excel in the field of their

respective core branch, the technical engineering excellence in this country would have reached a much higher level.

As the manufacturing sector grows at around 12 per cent, the industry requirement for mechanical engineers or civil engineers is high. In the days to come, industries and companies may prefer intellectuals with knowledge in core engineering and talent to apply Information Technology in their respective fields.

Sadly, bright students have forgotten the IES (Indian Engineering Service) also. And, bright young engineering graduates even apply for IAS.

Army, Naval and Air wing of Defence do have challenging work for bright core engineers. If engineering in Japan or China has grown to an amazing level, it is due to the real involvement of engineers in their respective branches of study.

Making core branches more attractive

In order to make the core branches more attractive restructuring of the present system is essential but this is likely to have little effect unless we understand the need for the restructuring of our teaching assumptions and methods. The most basic form of restructuring is the redefinition of learning within educational practice. This shift requires the need for restructuring the curriculum, the learning resources and

the teaching – learning process as well.

Restructuring the curriculum

Unfortunately what educational institutions principally teach is a curriculum of content – the facts and procedures of a subject matter. Overwhelmingly, textbooks purvey the facts of history, the algorithms of arithmetic and the formulas of science. What is missing is the “higher order curriculum that deals with good patterns of thinking in general and in the subject matters”.

How then, to develop such thinking patterns in students?

One solution is to offer special courses focused on the art of thinking. In my view, well – designed interventions of this sort are worthwhile. But they are not likely to prove feasible on a wide scale in the already crowded curriculum. And they are not enough. I feel the subject matters desperately need a direct injection of thoughtfulness, a ‘booster shot’. I am an advocate of what is often called “infusion” – integrating the teaching of new concepts in a deep and far reaching way with subject matter instruction.

The marriage of curriculum and teaching of concepts in a deep and far reaching manner can provide students the subject matters more understandable, thought provoking and connected with their lives. (Perkins, 1991)

Towards Holistic Curriculum

The aim of the Holistic Curriculum must be to capture the brilliant insights and reveal how ideas have been studied and sometimes realized in modern research. On the whole Holistic Curriculum extends a substantial “Integration of Theory and Research”.

Restructuring learning resources

Students learn best when fascinated with the learning material. The learning material must present a general, connected and reflective approach to thinking with evaluation and integration emphasized as the text proceeds.

The learning material must strive on “*Connectedness, Interrelatedness and Integration*” of concepts as relevant to important issues in their own lives and in society. (Clark, 1991).

Important features of a good learning material

The focus of any learning material must be on the **Intellectual content** rather than on **Dead – end approaches** which are of minor interest.

➤ Classic to Current ideas:

The learning material must show how classic ideas have led to current research in each perspective.

➤ Self – Understanding:

The learning material must give sample assessment techniques for students to try out.

➤ **Famous Personalities:**

The learning material must illustrate select concepts with well known personalities.

➤ **Sharpen your thinking:**

The learning material must raise current controversies to enthuse students about the implications and help them learn to apply the concepts to practical situations.

➤ **Evaluating the perspectives:**

The learning material must describe the main strengths and weaknesses of each theoretical approach.

➤ **Applications:**

The learning material must include extensive use of real – world examples and applications.

In sum, the emphasis of a good learning material are on being clear and articulate, coherent and balanced, theoretical yet empirically accurate, sensitive yet scientific, integrated and applied and on promoting critical thinking. These aspects will reinforce learning material geared up towards learning and critical thinking.

Restructuring the Teaching/Learning Process

The restructuring at the classroom level must be based on the understanding that high levels of learning require a systematic and

intense affective and cognitive interaction between teacher and students. It is the quality and intensity of this relationship that facilitates student learning. If this is to be provided to students, teachers likewise must have higher levels of emotional, physical, and fiscal support.

Examples of the key principles to be incorporated into the restructuring of the teaching/learning process include the following:

- All learning begins with the affective; strong interpersonal skills
- Language development is the essential element for academic and life achievement; all effective teaching must focus on the explicit teaching of vocabulary and conceptual understandings;
- Instructional methods are culturally and experientially biased; teaching heterogeneous groups of students requires the systematic use of instructional methods that meet the varied needs of students;
- There is a systematic sequence of instruction that is essential if all students in the class are to learn; this requires a systematic provision of review, overview, presentation, exercise, and summary;
- Teaching students how to process information requires an interactive, process approach to

learning; teaching must help students understand their own thoughts and creativity through speaking and writing; and

- A major task of educational programs is to extend the world view of the student; this should include a view of careers, of the community, of our nation and our global community.

Conclusion

To check, alter and enforce alone is not the matter; to maintain it is equally important.

These principles can be applied in any number of ways-and there must be a core understanding and implementation of the principles outlined above. We are supposed to learn that things change over a period of time and we should change accordingly. Nothing is wrong in checking our system and altering it as per the current needs.

Change must occur if institutions are to achieve their contract with society to prepare youth for a future world.

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Comparison of Competencies in M.Sc (CS) and MCA Programmes on the 'First Principles of Instruction'

M. SURYAKALA, P. MALLIGA AND T.G. SAMBANTHAN

1.0 Introduction

Most of the Universities in South India, conducts courses on MCA and M.Sc (CS - Computer Science) by themselves and through their affiliated colleges. While the MCA course is generally believed to be a job-oriented terminal course, the M.Sc (CS) course, like other PG courses of the University leads to higher degrees of research like M.Phil and Ph.D. Most of the students desiring Higher Education in Computer Science select their courses based upon the job opportunities available in the employment market and as per their basic qualifications needed for further higher education. In general, students who have completed B.Sc. Computer Science normally expect to choose their future study as M.Sc (CS), M. Phil and Ph.D, of which around 90% may opt for teaching and research. Those who desire to opt for teaching, would like to complete the entrance examinations conducted by University Grants Commission (UGC) based National Educational Testing (NET) and State Level Educational Testing (SLET)

resources, and the rest may enter the departments of R&D in the industry. But most of the stream of students who have B.C.A as the basic graduation, are expected to pursue M.C.A and 80% of this category may settle in the industries where as the rest 20% may opt for M.Phil followed by Ph.D. to engage themselves in research sectors in the R&D departments and teaching. Today's educational development does not follow this pattern. Students who have completed M.Sc (CS) also opt for ICT industries. Similarly, a few of the M.C.A. students take up the NET/SLET examinations for pursuing a career in teaching. The crux of the above problem is due to the lack of Instructional Objectives infused in the curricula of these programmes.

This paper elaborates on two issues: viz., 1. To arrive at required benchmarks for both these programmes on the values of abilities defined by (David) Merrill's (2002) First Principles of Instruction and 2. To obtain opinions on the abilities of the same principle, from Teacher and

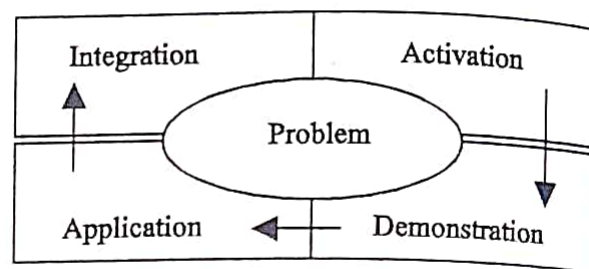
Student respondents of these two programmes, so as to compare the results. This should greatly help in defining Instructional Objectives for these two programmes.

1.1 David Merrill's First Principles Of Instruction

Merrill's approach of putting a real-life problem into the centre of the instructional episode is particularly suited to any problem-based learning approach (Nordhoff, Helga, 2002). As Information and Communication Technology education is problem-based, Merrill's theory is best suited for it (Merrill, 2002). In the Merrill's design theory, First Principles of Instruction is emphasized along with the following aspects: the value of using the real-life problems in the instructional event; the importance of activation of existing knowledge of the learner; the role of demonstration; guided problem solving and the integration of new knowledge with existing knowledge. Merrill's theory is explained through his model.

Merrill divides the instructional event into four phases, which he calls Activation, Demonstration, Application and Integration. Central to his instructional model is a real-time problem-solving theme, called 'Problem' or 'Task'. Merrill suggests that fundamental principles of instructional design should be relied on and these apply regardless of any instructional design model used. His model is depicted in Figure 1.

Figure 1. David Merrill's Instructional Model



Each phase is elaborated below:

Problem: Learners are engaged in solving real-world problems. Learners are shown the task that they will be able to do or the problem they will be able to solve as a result of completing a module or course.

Learning to solve problem involves four levels of instruction: the action-level, the operation-level, the task-level and the problem-level. Too much instruction is limited to the action or operation level and does not involve the student in the more integrative task or problem levels. (Merrill, 1994)

Activation: New knowledge builds on the learner's existing knowledge.

Demonstration: New knowledge is demonstrated to the learner and the learner observes.

Application: New knowledge is applied by the learner in practice phase where learners are required to use their knowledge and skill to solve the problem.

Integration: New knowledge is integrated into the learner's world.

This is the transfer phase where people apply or transfer their new-found knowledge or skills into their workday practices.

Using these abilities of the First Principles of Instruction, this paper presents the research findings from the two programmes mentioned earlier.

2.0 Sampling

Both 'Purposive' and 'Random' samplings have been adopted for the study. The actual samples for both the studies are elaborated below.

2.1 Samples for Benchmark Design

A total of 35 eminent experts both from Software industries in the senior levels (as they are concerned with employing both M.Sc (CS) and MCA pass outs of Madras University) and 30 eminent professors and academic decision makers of the University have been considered for the samples. The instrument used for the above study was part of an interview schedule. The sampling is based on "Purposive Sampling" referred by Sharma (1988). The purposive sampling is selected by some arbitrary method, because it is known to be representative of the total required data, or it is known that it will produce well matched groups.

2.2 Respondents

The survey also includes the design of Interview Schedule and questionnaires followed by collection

of feedbacks. The respondents belong to the institutes affiliated to University of Madras and who offer M.Sc (CS) and MCA programmes.

The respondents include two categories namely:

1. Students
2. Teachers/Faculty

The number of respondents from the two programmes is presented in the Table below:

Table 1 Samples considered for Responses

Sl. No.	Study	Category	Number of Respondents	sampling
1	Perceptions on abilities	M.Sc Students	60	purposive
2	--do--	MCA Students	60	random
3	--do--	M.Sc Teachers*	35	purposive
4	--do--	MCA Teachers	40	random

* some of the M.Sc teachers also teach MCA students.

The respondents are broad based and non specific.

Through these samples, the responses have been collected and the results after analysis are presented next.

3.0 Benchmark Design

The research work concentrates on the instructional objectives in M.Sc (CS) and MCA programmes. Hence benchmarks on instructional objectives

must be arrived at for these two programmes. The analytical studies performed are elaborated in this section. As elaborated in section 2.1, two types of experts were considered for obtaining benchmark values. They are the respondents for the interview schedules designed by the researchers. The averaged out values obtained from 'Industrial Experts' on the four abilities required in M.Sc(CS) as well as MCA are presented in Chart 3.1. The averaged out values obtained from 'Academic Experts' are presented in Chart 3.2. It is to be noted that both the categories of respondents such as 'Academic Experts' and 'Industry Personnel' cannot be treated differently due to practical difficulties

although they have opined differently. Hence, both the values are superimposed, averaged out and presented in Chart 3.3 for M.Sc(CS) and MCA programmes.

Analysis on M.Sc (CS) & MCA from Industry Experts

The Benchmark shown in chart 3.1 clearly indicates that the most required ability from the M.Sc (CS) outputs is the 'Integration' ability and that required from the MCA outputs is the 'Application' ability. The 'Demonstration' ability is expected next from the M.Sc (CS) outputs, while the 'Activation' ability is the one which is expected second from the MCA outputs.

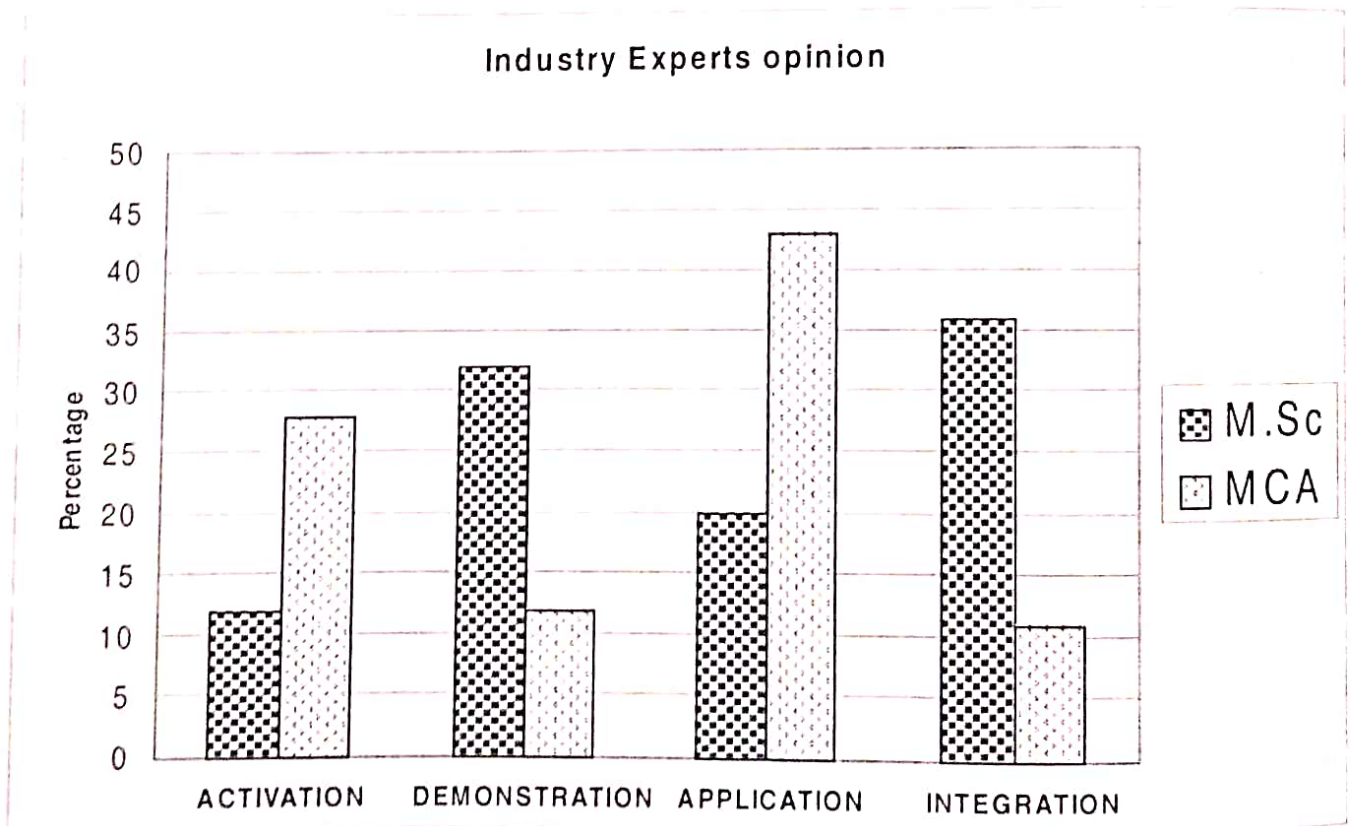


Chart 3.1 Benchmark for M.Sc (CS) & MCA from Industry Experts

Analysis on M.Sc (Computer Science) & MCA from Academic Experts

The Benchmark in chart 3.2 clearly indicates that the most required ability from the M.Sc (CS) outputs is the 'Integration' ability while it is the 'Application' from the MCA outputs similar to that of Industrial Experts' opinion. The 'Demonstration' ability is the one which is expected second from the M.Sc (CS) outputs similar again as that of Industrial Experts' opinion. The 'Integration' ability is the one which is expected second from the MCA outputs as per the opinion of 'Academic Experts', but it was

'Activation' for the Industrial Experts. The combined, superimposed and averaged out values are shown in Chart 3.3

Benchmark for M.Sc (Computer Science) & MCA

The MCA outputs are expected to be inclined towards 'Application'. Even though the second highest requirement being 'Activation' which activates prior knowledge obtained by the learner, it would lead to 'Application' again. Hence MCA has to be an 'Application' oriented course. The M.Sc (CS) outputs are expected to have 'Integration' ability, followed by 'Demonstration' ability, which clearly

Academic Experts Opinion

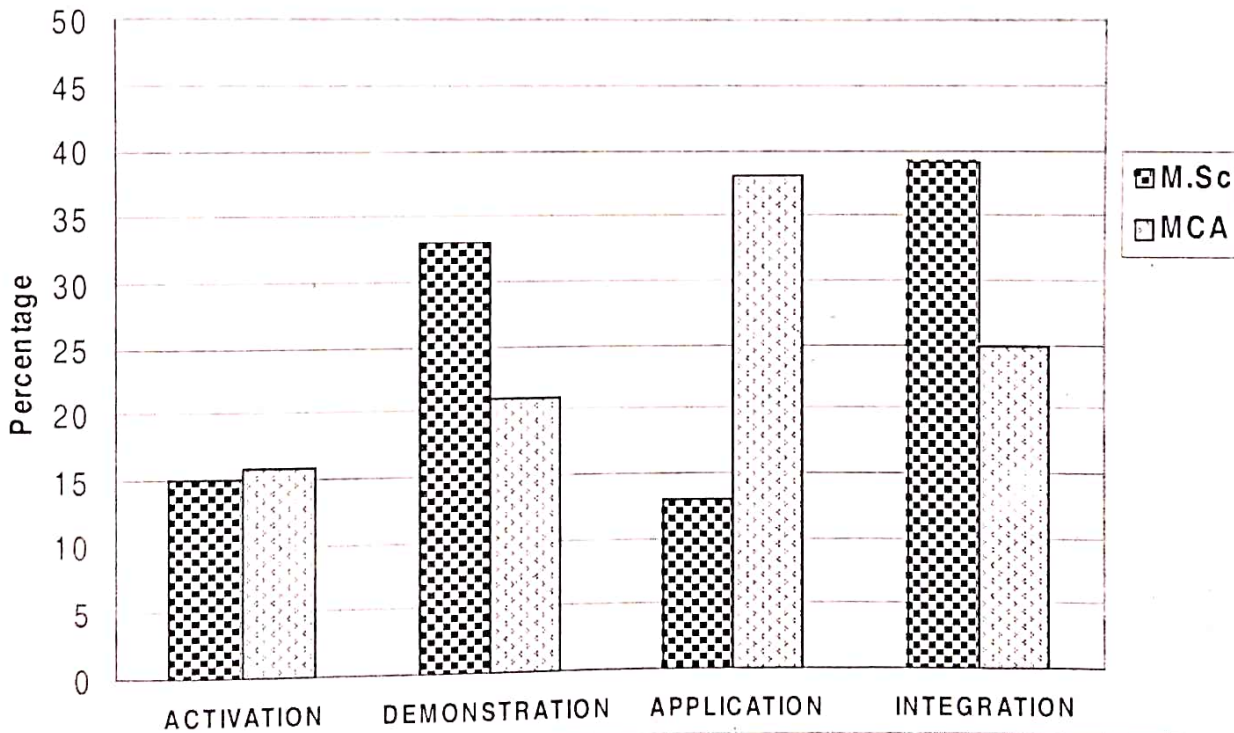


Chart 3.2 Benchmark for M.Sc (Computer Science) & MCA from Academic Experts

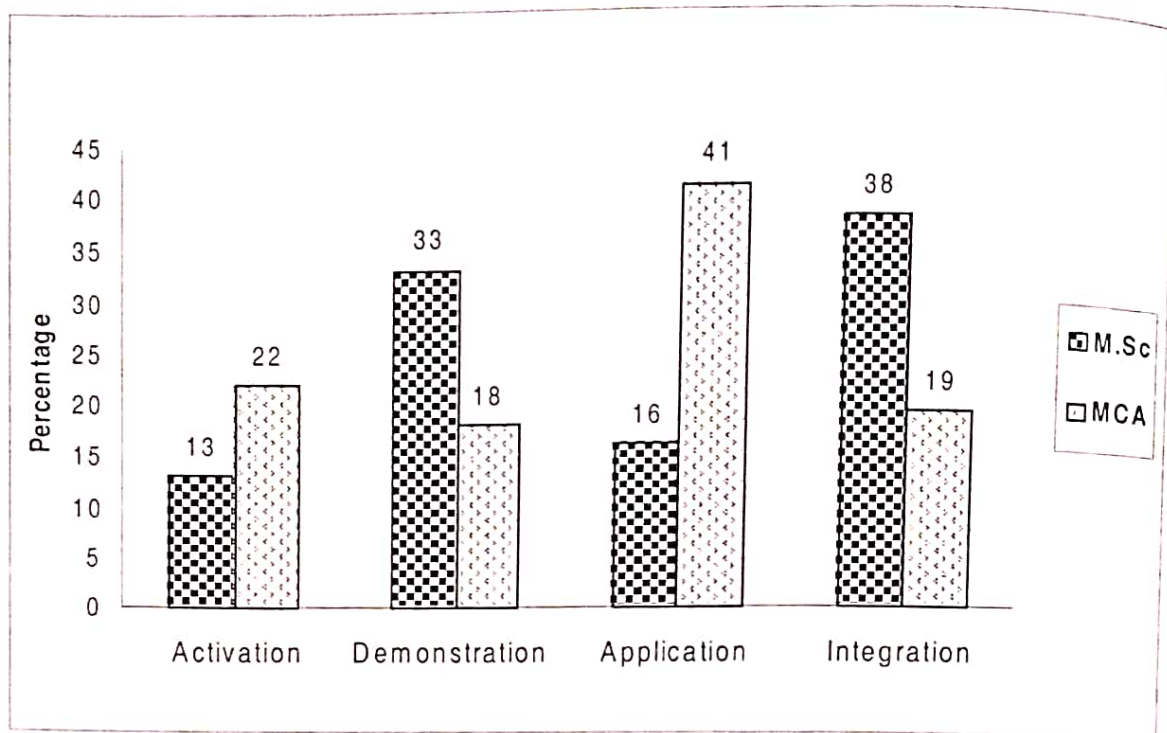


Chart 3.3 Benchmark for M.Sc (Computer Science) & MCA

indicates that the programme would lead to Research and Development and Teaching rather than pure Industrial 'Application'.

These established and combined values (benchmarks) for the four abilities are considered to be the standard benchmark requirements for the M.Sc (CS) and MCA programmes.

4.0 FEEDBACK ANALYSIS

4.1. Perception of Teachers on Students and Vice Versa of M.Sc (CS) on the Problem Solving Abilities

Responses were received from Teacher respondents of M.Sc (CS) programme on their opinion about M.Sc (CS) students usage of action verbs pertaining to the First Principles of Instruction of David Merrill, during their interaction with teachers, in

laboratory practices etc., The statistical data (samples) related to this social study has been presented in Section 2.2 Similarly, the responses received from Student respondents of M.Sc (CS) programme on their opinion about M.Sc (CS) teachers' usage of action verbs pertaining to the same abilities of David Merrill have also been studied. The averaged out and consolidated results are presented in the following two subsections.

Table 2 Consolidated Presence of Problem Solving Abilities from Teachers' Perception on Students of M.Sc (CS)

Ability	M.Sc (CS) Teachers' Opinion
Activation	4 (Good)
Demonstration	3(Fair)
Application	2(Moderate)
Integration	3(Fair)

Teachers Perception on Students of M.Sc (CS)

It may be seen clearly from Chart 4.1 that students of M.Sc (CS) use mostly action verbs pertaining to 'Activation' ability. But, at the same time the usage of verbs pertaining to 'Demonstration' and 'Integration' also seem to be good. The lowest ability seems to be 'Application'. It is interesting to note that 'Integration' is more than 'Application', which reveals that most of the M.Sc (CS) students may be from urban parts of Chennai and their undergraduate studies and their prior schooling might be more sophisticated than their rural counterparts.

Table 3 Consolidated Presence of Problem Solving Abilities from Students Perception on Teachers of M.Sc (CS)

Ability	M.Sc (CS) Students' Opinion
Activation	4 (Good)
Demonstration	4(Good)
Application	3(Fair)
Integration	1(Poor)

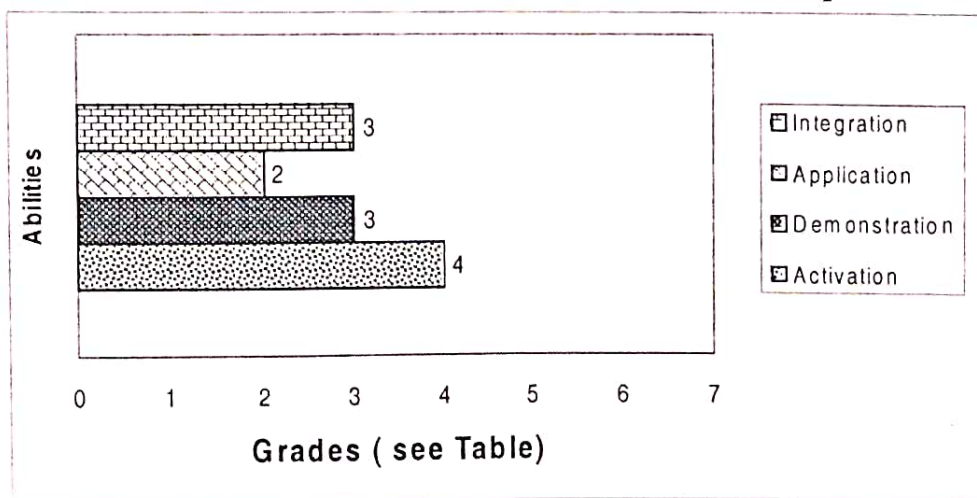


Chart 4.1 Teachers Perception on Students of M.Sc (CS)

Students' Perception on Teachers of M.Sc (CS)

It may be seen clearly from Chart 4.2, that the teachers of M.Sc (CS) use mostly action verbs pertaining to 'Activation' and 'Demonstration' abilities. The lowest ability seems to be 'Integration'. The 'Integration' is more than 'Application', in the case of students' usage.

4.2 Perception of Teachers on Students and Vice Versa of MCA on the Problem Solving Abilities

Responses were received from Teacher respondents of MCA programme on their opinion about MCA students' usage of action verbs pertaining to the First Principles of Instruction of David Merrill, during their interaction with teachers, in laboratory practices etc., The statistical data (samples) related to this social study has been presented in Section 2.2. Similarly, the responses received from Student respondents of MCA

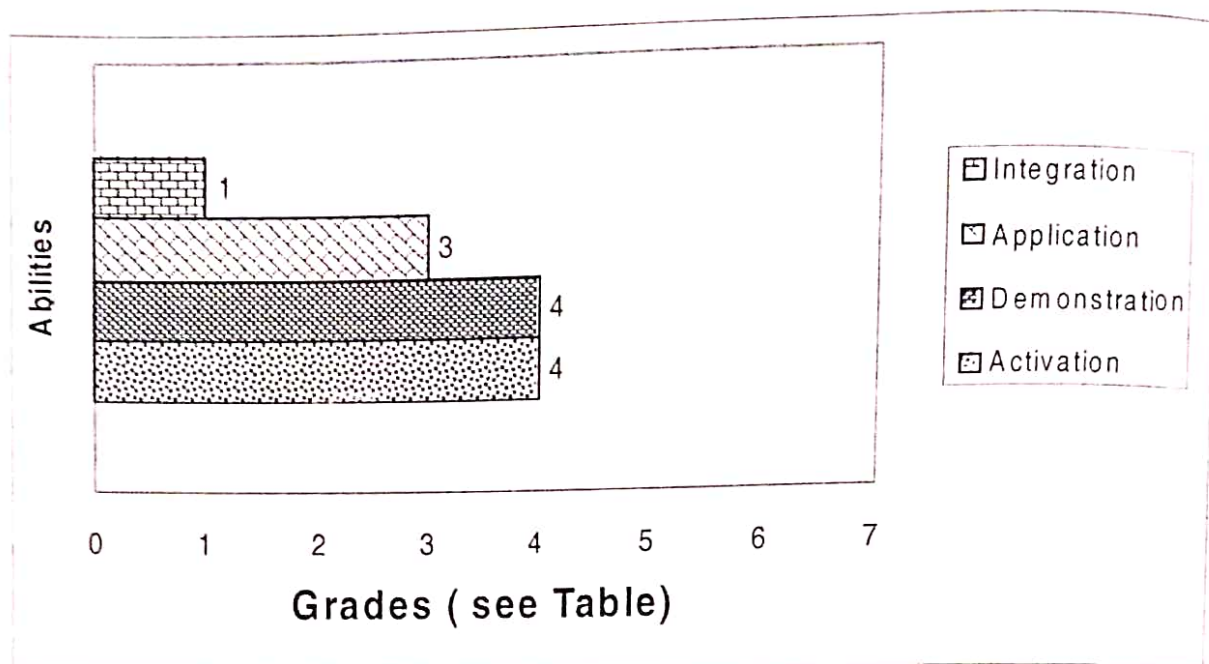


Chart 4.2 Students' Perception on Teachers of M.Sc (CS)

programme on their opinion about MCA Teachers' usage of action verbs pertaining to the same abilities of David Merrill have also been studied. The averaged out and consolidated results are presented in the following two subsections.

Table 3 Consolidated Presence of Problem Solving Abilities from Teachers' Perception on Students of MCA

Ability	MCA Teachers' Opinion
Activation	4 (Good)
Demonstration	3(Fair)
Application	3(Fair)
Integration	2(Moderate)

Teachers' Perception on Students of MCA

It may be seen clearly from Chart 4.3 that the students of MCA use mostly action verbs pertaining to 'Activation' ability. But, at the same time the usage of verbs pertaining to 'Demonstration' and 'Application' also

seem to be good. The lowest ability seems to be 'Integration', unlike the students of M.Sc (CS). This may be due to the fact that the psychological feelings of MCA students may be more towards jobs and "Application".

Table 4 Consolidated Presence of Problem Solving Abilities from Students' Perception on Teachers of MCA

Ability	MCA Students' Opinion
Activation	3 (Fair)
Demonstration	4(Good)
Application	3(Fair)
Integration	2(Moderate)

Students' Perception on Teachers of MCA

It may be seen clearly from Chart 4.4 that the teachers of MCA use mostly action verbs pertaining to 'Demonstration' ability, followed equally by 'Activation' and 'Application'.

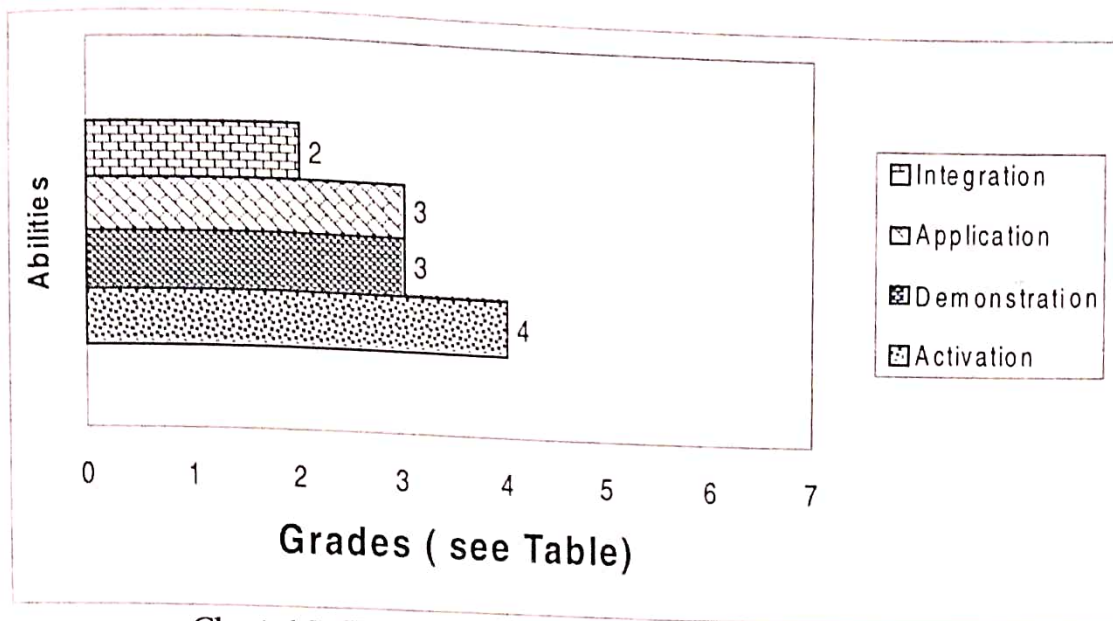


Chart 4.3 Teachers' Perception on Students of MCA

5.0 Concluding Remarks

The David Merrill's First Principles of Instruction insist on problem centric approach while designing instructional objectives. The primary aim of this research is to find out the fitness of the above mentioned model in M.Sc (CS) and MCA programmes. It is to be noted at this juncture that this model is based on information processing theory and hence would fit very well for Information and Communication Technology courses. On the other hand, Bloom's (1984) model insists on the distribution of taxonomies in a pyramidal form with wider representation of lower level taxonomy (Knowledge) to narrow representation of higher level taxonomy (Evaluation). Although Bloom's model may not fit well for M.Sc (CS) and MCA programmes, these programmes also have not been designed from Merrill's model as well.

The most important conclusion drawn in this research finding is the adaptability of David Merrill's First Principles of Instruction to both M.Sc (CS) as well as MCA programmes.

5.1 Other Findings

1. A gradual reduction of quantity in the abilities from lower order to higher order is reported by the teachers through their perception on Students of MCA programme.
2. 'Demonstration' ability is found to be the major domain as reported by the students through their perception on the Teachers of MCA programme.
3. Although 'Activation' is the highest ability shown by students of M.Sc (CS), 'Integration' is also seems to be fairly represented.
4. Teachers of M.Sc (CS) lean mostly towards the lower order abilities namely 'Activation' and 'Demonstration'.

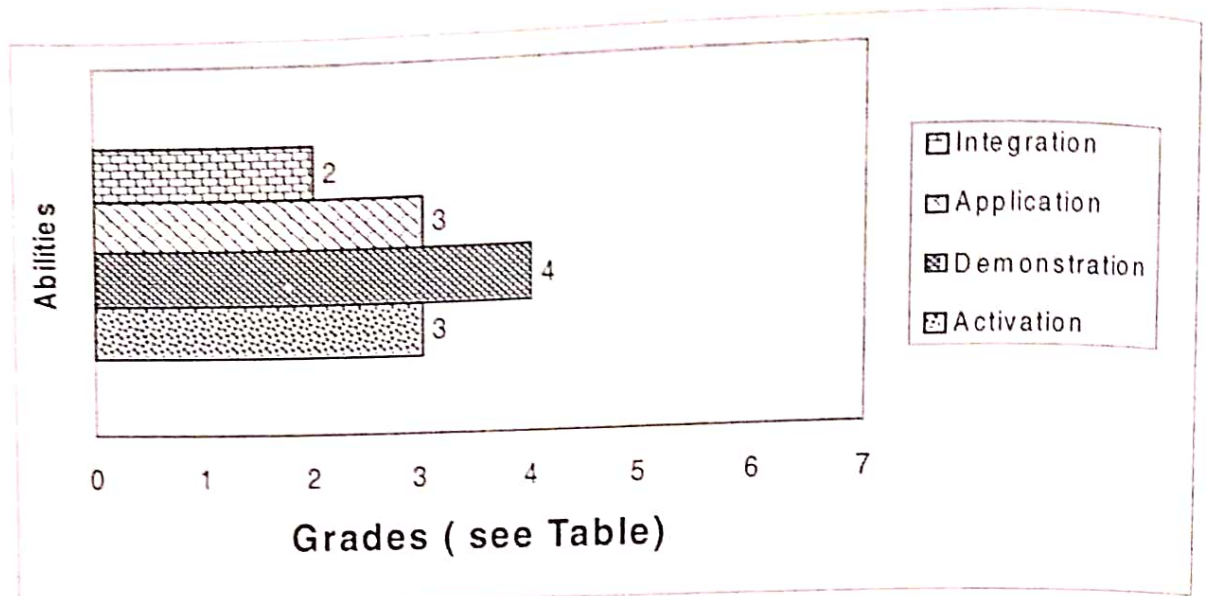


Chart 4.4 Students' Perception on Teachers of MCA

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Higher Education Institutions as a Site for Moral and Civic Education

PANJABI MALA DEVIDAS AND GEETHA SANKAR

It is now a truism that college graduates will live and work in a world where national borders are permeable; information and ideas flow at lightening speed and communities and work places reflect a growing diversity of cultures, languages, attitudes and values. Nor is it a new idea that higher education must produce graduates who will be productive contributors to civic life both locally and globally and who understand that the fates of nations, individuals and the planet are inextricably linked.

With the rise of English as a global language and services (education in specific) included in the list of agreements of WTO, the future holds a lot of challenges to the students. It is hence necessary that students navigate the difficult terrain of cultural complexity through a good system of higher education.

Education is basically a personality building process. It has always been linked with society. It has both a personal and social dimension

and like the two sides of the same coin, these are inseparable.

Essential education must lead to internalisation of the obligation on the part of each human being to be value conscious in word, thought and deed. Lack of value education has been an important factor in the global scenario of growing violence and terrorism, pollution and ecological imbalances. These ideas are now being incorporated and are central to the national education policy of our country.

Hence it is in such an environment that this study finds its relevance for every institution which believes in building character and a strong social orientation by sensitizing the students through moral and civic values. Students too need to perceive correctly the role of the institution and the ideology it stands for.

Today's education is teaching students through machines, closed circuit-TV and language laboratories. The personal relationship of the teacher and the taught is being

replaced by machines. As a result the younger generation faces psychological collapse due to break down of the bicameral mind through the negligence of inner spiritual culture. This can be imparted only through the presence of an elevated teacher. When society offers them electronised-individualised-audio-visual-multi-instructional consoles, the mechanical attempt to correct a living organism deepens into an 'air-conditioned nightmare', leaving the inner child untouched.

SIGNIFICANCE OF THE STUDY

With GATS in education sector being introduced by 2005 in India it is anticipated that the country would grow more diverse and several challenges becoming unavoidable. How does one live with and learn from people who think, believe and behave differently from others. How does one teach children to respect such differences?. The ways in which the next generation of citizens see the world and their place in it will be shaped in today's college classrooms, conversations and extracurricular activities. Hence it becomes imperative at this juncture to take stock of the extent of diversity present in the institutions so that the transition towards cultural diversity is smooth, tolerant and gradual. Hence institutional climate be shaped towards diversity through moral and civic development of students.

MORAL & CIVIC VALUES

It is believed that moral and civic values are inseparable.

Civic responsibility is inescapably threaded with moral values, so higher education should aspire to foster both moral and civic maturity.

Some of the core values of moral and civic education for the study are intellectual integrity, concern for truth, and academic freedom. By their very nature, it is important for colleges to foster values such as mutual respect, tolerating others point of view and expressing disagreement if warranted and public discussion of contested issues.

The leaders of many colleges and universities in the country have asserted that the issue of cultural diversity and multiculturalism would be prominent in the 21st century due to inclusion of education in the purview of GATS of WTO in 1996. Hence the teaching and learning missions of the institutions suggest educational outcomes like students' moral and civic development.

GLOBAL SCENARIO OF HIGHER EDUCATION

In 1960, 13 million students enrolled for higher education world wide & in 1995 it increased to 82 million. In 1996 export of education services ranked 5th amongst the services exported by the U.S.A. 58% of the export was to Asian Countries (Japan, Korea, India etc.,). U.S ranks

first amongst the countries exporting higher education followed by France, Germany, England, and Australia.

According to WTO sources, till July 2001, 51 countries had made specific commitment for education services. Of these commitments in relation to higher education had been made by 42 countries -27 developed countries; 8 countries with transitional economies and 7 less developed countries. Out of these commitments 27 relate to cross border supply, 29 consumption abroad and 18 pertain to commercial purpose.

INDIAN SCENARIO OF HIGHER EDUCATION

Traditionally higher education has predominantly been a government supported service. However after it lost its elitist form and acquired an egalitarian character, governments found it difficult to garner adequate finances for it. Most countries have started to withdraw from their commitment to higher education and private interests are taking over. Today higher education has taken the form of business with commercial interests becoming important at both the national and international levels.

India has exported US \$4.6 billion service in 1990 and in 1998 it was US \$ 11.1 billion and the percentage of services in total export was 20.4 in 1990 and 24 in 1998.

INTERNATIONAL STUDENTS IN INDIA

International student's mobility (both incoming & out going)data is invaluable because it allows an appraisal of the quality of education provided by a country viz-a viz international requirements. It also indicates the adequacy or inadequacy of the indigenous international higher education system to meet local demands & moreover serves as an index of growing economic prosperity of a nation & its people.

India received in 2000-01, approximately 6896 students of whom 240 were from US, 51 from the UK, 19 from Germany, 23 from France & 44 from Australia. Allocation of funds for Research in 1998-99 for higher education institutions was only 2.9% where the share of it must at least be 10%.

Table 1. National Allocation For Research To Different Sectors (Rs in Crores)

Category of Institutions	1998-99	1999-2000	2000-2001
Central	8,706	10,151	11,835
State	1,027	1,178	1,351
Private	2,790	3,365	4,059
Higher Education	339	396	415

Source: University News, 43(27), July 04-10, 2005

It is seen from the data that the role of higher education in research is not anywhere in the domain of significance. Higher education sector which should make a substantial contribution to promote innovation &

the development of new technologies is not yet an important contributor in this effort. Therefore a substantial improvement in the capacity to innovate & develop new technologies is called for from university research.

Table 2. Student Mobility to India in 2000-2001

Country	Number
United States	240
United Kingdom	51
Australia	44
Germany	19
France	23
Europe	180

Source: University News Vol 45 issue 05 January 31-February 6,2005.

It is believed that the student mobility to India is declining. The issues identified for this are, lack of effort on the part of Indian universities to market their programs, lack of co-ordination between universities & Indian missions abroad & failure to attract foreign students, a differential fee structure for foreign students & well organized & aggressive marketing strategies by other countries. Competitiveness is the prime need & strategies adopted can focus on creating awareness about our educational programs, creating a conducive environment for foreign students & offer courses tailored to the needs of students as well as offer scholarships & job opportunities to attract students to study in India.

Table 3. Institutions & Enrolment in Higher Education in India, 2000

Universities (nos)	178
Deemed Universities	039
Institutions of National Importance	011
Research Institutions	065
Total Institutions	293
Total students in Higher Education (nos)	58,37,606
Enrolment in BA /B.Sc./B.Com. degree course	89.59%
Enrolment in Engineering/Technology degree course	6.03%
Enrolment in Medical degree course	2.23%
Enrolment in Teacher Training Degree	2.13%

Source: University News, 41(31), August 04-10, 2003

The above table shows that there are 293 Universities and others in India, total enrolment of students for higher education in 2000 was 59 lakhs and enrolment was highest 89.59% in BA/B.Sc./B.Com., courses.

Table 4. Enrolment of Foreign students in Institutions in Chennai

Year	UG(nos)	PG(nos)	University Depts(nos)
1998-1999	108	4	6
1999-2000	115	5	5
2000-2001	124	3	5
2001-2002	250	6	9
2002-2003	164	4	3
Total	761	22	28

Source: Student Advisory Bureau, University of Madras.

The above table shows a gradual increase in number of foreign students

enrolled in Chennai for higher education.

THE MULTI CULTURAL PATH

Different but Equal: This is the essence of multiculturalism. While living with differences is a fact of our social existence, multiculturalism reflects upon the status of different cultural communities accommodated as equals in the public arena. Certain answers need to be received for the issue stated. Do they receive equal respect & equal treatment in the state? Does the civic culture reflect the heterogeneity of these diverse ways of life? These will help examine the subject of a democratic citizen within a society. To study the extent of equality ensured to such cultural communities in political & public domain. To be effective in reality, non discrimination entails that all public places be opened to all categories. They should be able to use public transport, live in neighbourhoods of their choice and enter educational institutions.

Hence an attempt is made to study the extent of diversity of students in selected educational institutions for women in Chennai.

THE CAMPUS PICTURE

Colleges and Universities have an enormous task ahead if they are to internationalise their curricular and student experience. Financial constraints, other reform agendas that clamour for attention, the current

absence of the public or student insistence and the paucity of Government funding make the work all the more difficult. It is no wonder that progress has been slow in this direction.

However there are institutions/campuses committed to the idea of providing quality higher education, serving both as a model and as a cause for optimism.

The Vision is to transform the institution into a citadel of learning with global recognition and participation characterised by quality and excellence along side with Indian tradition and culture.

The Mission is to empower women students through academic and extra curricular pursuit into responsible and respectable citizens to face life and to stand out through the strength of their character and excellence of their achievements.

OBJECTIVES OF THE STUDY

The objectives framed are:

1. To study the extent of diversity of students among a few selected educational institutions for women in Chennai
2. To ascertain the moral and civic maturity level of students.
3. To determine the role of institutions in providing value based education.

METHODOLOGY ADOPTED

Selection of Units

The selection of the institutions catering to the cause of education for women in Chennai is most appropriate. These institutions have a cosmopolitan outlook at the point of entry of a student despite following the reservation policy norms of the Government. These also have the ability to incorporate change and enable students to smoothly adapt to them.

Sample Size

The sample size comprises of 66 students belonging to different states of India wanting to pursue higher education in Chennai. The questionnaires were distributed to students of Humanities and Sciences departments of institutions promoting the cause of education for women. The sample size comprised of 0.05% to 2% of the population of students of such institutions.

Period under study

The period of administering the questionnaire is December 2006.

Questionnaire

The questionnaire comprises of 2 sections, the first part covers the personal profile of the student while the latter consists of questions which bring out the perceptions of the student's moral and civic maturity level and the role of institutions in providing value based education.

Statistical Tools Used

Mean scores were determined to study the moral and civic values of students and their perceptions on the role of institution in providing quality education. Correlation technique was used to study the analysis between Moral values, Civic Values & Role of institution. Chi-Square test was also used to find the significance between the Moral and Civic values and demographic variables. Analysis of variance was calculated to ascertain any significant difference between the variables under study & selected demographic variables.

ANALYSIS OF THE STUDY

Table 5. Classification of students on basis of region

Area	Frequency	Percent
Foreign Students	35	53
Eastern States	25	38
Others (kerala, w.bengal and nic)	06	09
Total	66	100

The above table shows that 53% of the sample of students come from Foreign Students, while 38% of the students are from Eastern States & 09% of the sample comprises of those students coming from Other States to pursue higher education.

Table 6. Annual Income of Parents of Students

Income (p.a.)	Frequency	Percentage
Less than Rs 75000	30	46
Rs 75,001-Rs1,50,000	22	33
More than Rs 1,50,000	14	21
Total	66	100

This table shows the earning capacity of the parents of students' who sponsor their ward's education in institutions. It is observed that 46% of them earn an annual income of less than Rs 75,000, while 33% of them earn Rs75,000 to Rs 1,50,000 p.a and the remaining 21% of them more than Rs 1,50,000 p.a.

Table 7. Classification of students based on Discipline of study

Discipline	Frequency	Percentage
Humanities	57	86
Sciences	09	14
Total	66	100

It is seen from the table that 86% of students belong to the Humanities discipline while 14% of them are in the Science stream.

Table 8. Interest shown in pursuing Higher Education

	Frequency	Percentage
Abroad	24	36
India	38	05
Foreign Universities in India	04	06
Total	66	100

This table shows that 58% of the respondents prefer to pursue higher education in India while 36% of them show keen interest to study abroad & 6% would like to pursue their higher education in foreign universities which set up their study centres in India.

Table 9. Mean Values of Moral Values, Civic Values & Role of Institution

MEAN VALUES

Moral Values	4.15	Civic Values	4.33	Role of institution	4.32
Tolerate others views	3.89	Exercise one's vote	4.59	Ethics & Civic sense	3.52
Truthfulness	4.41	Vote for contested issues	4.06	Outreach activities	3.18
				Assoc & groups	0.036
				Role of instn	3.52

The mean scores of the overall Moral Values, Civic Values & Role of Institution are calculated. There is insignificant difference in the values determined. Hence subsequent analysis has been done to study the relationship more clearly.

Table 10. Correlation Values Between Moral, Civic Values & Role of Institution

Pearson Correlation	Moral Values	Civic Values	Role of instn
Moral Values	1.000	.116	.215
Significance	.	.354	.083
Civic Values	.116	1.000	.368*
Significance	.354	.	.002
Role of Institution	.215	.368*	1.000
Significance	.083	.002	.
No. of cases	66	66	66

This table shows the inter correlations between Moral, Civic &

Role of Institution. There is significant relationship between Civic Values & Role of Institution. Hence inference can be drawn that an institution can improve civic values of students.

Table 11. Chi-Square Test- Moral Values & Civic Values & Role of Institution

The hypothesis framed is that there is no significant association between Moral Values, Civic Values & Role of Institution.

Pearson Chi-Square Value	Value	df	Asymp.Sig (2-sided).
Moral Values	61.705	44	.040
Civic Values	60.292	33	.003
No. of Valid cases	66		

Ho: Role of Institution is not affected by the Moral Values & Civic Values of the students.

Ha: Role of Institution is affected by the Moral Values & Civic Values of the students.

The above table indicates that there is an association between Role of Institution & Moral values & Civic values of students at 5% level of significance. This result shows that moral & civic values of students play an important role in determining the role & functions of an institution. The institution creates an environment to improve & provide value based education to students on one hand & help create an awareness of their rights and duties as a citizen of the state.

**Table 12. Parent's Education Level
Father's Education Mother's Education**

Qualification	Number	Percent	Number	Percent
Professor	17	26	10	15
Post Graduate	08	12	11	17
Graduate	25	38	24	26
SSLC	11	16	18	27
Diploma	05	08	03	05
Total	66	100	66	100

This table shows that on an average 36% of the student's parents are graduates, 22%(average) of the parents' are SSLC, 21% of them are professors, 15% are post graduates & 7% are diploma holders.

Table 13. Chi-Square Test-Mother's Education & Moral Values & Civic Values of Students

Pearson Chi-Square Value	Value	df	Asymp. Sig (2-sided)
Moral Values	35.883	44	.803
Civic values	23.678	12	.022
No. of Valid cases	66		

Ho: Mother's education does not affect the Moral Values & Civic Values of students.

Ha: Mother's education does affect the Moral Values & Civic Values of students.

The above hypothesis framed indicates that there is no association between Moral values & Civic Values of students and extent of Mother's education at 5% level of significance. This result shows that Mother's education does not influence the

moral values of their children. It is very heartening to know that irrespective of the level of education a Mother imparts good values to her child. However Civic values are associated with the level of Mother's education. An educated mother probably with increased exposure also imparts civic values to her child.

Table 14. Chi-Square Test-Father's Education & Moral Values & Civic Values of Students

Pearson Chi-Square Value	Value	df	Asymp.Sig (2-sided).
Moral Values	17.261	16	.369
Civic Values	14.584	12	.265
No. of Valid cases	66		

The above table shows that there is no association between Father's education and Moral Values & Civic values of students. Hence the hypothesis is accepted that moral & civic values of students are not formed on the basis of the level of education of their father.

Table 15. Language Preferred by Students

Language	Frequency	Percentage
Tibetan	16	24
Hindi	11	17
German	08	12
Manipuri	05	08
Others	26	39
Total	66	100

The above table shows that 39% of the students prefer foreign languages like Japanese, Korean &

Hebrew. 24% of the students speak Tibetan, 17% learn Hindi, 12% German and the remaining 8% learn Manipuri.

Table 16. Type of Family of Students

Type of Family	Frequency	Percentage
Joint	19	29
Nuclear	47	71
Total	66	100

The above table shows that 29 % of students live in a Joint Family & 71 % live in Nuclear families.

Table 17. Type of Family & Moral Values among Students

Family /Moral	Low	Moderate	High	Total
Nuclear	01	09	37	47
Joint	-	02	17	19
Total	01	11	54	66

Cross tabulation is prepared to determine the extent of moral values of students & type of family they live in. Based on the scores of the students for moral values 3 categories are ascertained low, moderate & high. It is believed that moral values of students is shaped based on the type of family they grow up in. Students whose Moral values are High (37/66 i.e.56%) belong to Nuclear families where personalized attention is given for the development of the student, while only 17 students (26%) whose Moral values are High are from Joint families. It could be suggested that parents play an important role in shaping and emphasizing moral values among their children.

Table 18. Type of Family & Civic Values among Students

Family Type /	Low	Moderate	High	Total
Nuclear	-	03	44	47
Joint	-	03	16	19
Total	-	06	60	66

It is the intention to ascertain any relationship amongst the students and the type of family which promotes civic values among their wards. From the sample it can be noted that 44 of the 60 respondents (73%) having high civic values come from nuclear families while only 16 students i.e. (27%) with high civic values come from joint family. Hence it could be suggested that parents play an important role in shaping and emphasizing civic values among their children due to personalized attention provided.

Table 19. ANOVA- Moral Values, Civic Values & Role of institution

Moral Values	Sum of Squares	df	Mean Squares	F	Sig.
Between Groups	.141	1	.141	.127	.723
Within Groups	70.844	64	1.107		
Total	70.985	65			
Civic Values					
Between Groups	4.024	1	4.024	5.728	.020
Within Groups	44.961	64	.703		
Total	48.985	65			
Role of					
Between Groups	2.067	1	2.06	.353	.555
Within Groups	374.918	64	5.858		
Total	376.985	65			

Ho: There is no significant difference in the Moral & Civic values of students & Role of Institution

Ha: There is significant difference in the Moral & Civic values of students & Role of Institution

The above table shows that there is significant association between Civic values & Role of institution. An institution can play an important role in moulding the values of its students.

FINDINGS OF THE STUDY

Profile of the Students

The above study shows that 53% of the sample of students come from Foreign Students, while 38% of the students are from Eastern States & 09% of the sample comprises of those students coming from Other States to pursue higher education.

Earning capacity of the parents of students' who sponsor their ward's education in institutions is noted. It is observed that 46% of them earn an annual income of less than Rs.75,000, while 33% of them earn Rs.75,000 to Rs.1,50,000 p.a and the remaining 21% of them earn more than Rs 1,50,000 p.a.

On an average, 36% of the student's parents are graduates, 22% (average) of the parents' are SSLC, 21% of them are professors, 15% are post graduates & 7% are diploma holders

86% of students belong to the Humanities discipline while 14% of them are in the Science stream.

Further 39% of the students prefer foreign languages like Japanese, Korean and Hebrew, 24% of the students speak Tibetan, 17% learn Hindi, 12% German & the remaining 8% learn Manipuri.

It is noted that 58% of the respondents prefer to pursue higher education in India while 36% of them show keen interest to study abroad & 6% would like to pursue their higher education in foreign universities which set up their study centres in India.

Moral & Civic Values & Role of Institution -A Report

The mean scores of the overall Moral Values, Civic Values & Role of Institution are calculated. There is insignificant difference in the values determined.

Inter correlations has been done to study the relationship more clearly between Moral, Civic & Role of Institution. There is significant relationship between Civic Values & Role of Institution. Hence inference can be drawn that an institution's role is associated with the civic values of students.

While conducting the Chi-square test, it is seen that there is an association between Role of Institution & Moral values & Civic values of students at 5% level of significance.

This result shows that moral & civic values of students play an important role in determining the role and functions of an institution. The institution creates an environment to improve and provide value based education to students on one hand and on the other help create an awareness of their rights and duties as a citizen of the state.

The hypothesis framed indicates that there is no association between Moral values & Civic Values of students and extent of Mother's education at 5% level of significance. This result shows that Mother's education does not influence the moral values of their children. It is very heartening to know that irrespective of the level of education a Mother imparts good values to her child. However Civic values are associated with the level of Mother's education. An educated mother probably with increased exposure also imparts civic values to her child.

An association between Father's education and Moral Values & Civic values of students was determined. The outcome was that there was no association between Father's education and Moral Values & Civic values of students. Hence the moral & civic values of students are not formed on the basis of their father's education.

Cross tabulation was prepared to determine the extent of moral values of students and type of family they live in. It is believed that moral values

of students is shaped based on the type of family they grow up in. Students whose Moral values are High (37/66 i.e.56%) belong to Nuclear families where personalized attention is given for the development of the student, while only 17 students (26%) whose Moral values are High are from Joint families. It could be suggested that type of family plays an important role in shaping and emphasizing moral values among their children.

It is the intention to ascertain any relationship amongst the students' type of family which promotes civic values among their wards. From the sample it can be noted that 44 of the 60 respondents (73%) having high civic values come from nuclear families while only 16 students i.e. (27%) with high civic values come from a joint family. Hence it could be suggested that parents play an important role in shaping and emphasizing civic values among their children due to personalized attention provided.

The above table shows that there is significant association between Civic values & Role of institution. An institution can play an important role in moulding the values of its students to a large extent compared to Moral values.

CONCLUSION

The above study reveals that the students perception of the role of an Institution in providing quality education is very primary to address the issue of democracy in diversity. Hence the institution can play an important role in focusing on the views and the dimensions of moral and civic maturity.

If institutions have to meet today's challenges and those of future, they must ensure that succeeding generations gain the understanding, motivation and skills needed to preserve and promote one's moral and civic life as the global turmoil preoccupies and underscores the importance of such core values.

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e-Governance Model for Secure Delivery of Digital Question Papers

N. NARAYANASAMI

ABSTRACT

This paper describes the technology applied to transmit the descriptive type digital question papers in a secure manner from the University/Institution to the examination centers. Further, it covers the procedures, secure access mechanism, software requirements etc. The proposed technology is scalable, portable and saves man power, cost and time with increased efficiency. This approach reduces the chances of malpractices of leakage of question paper.

Key Words: e-governance, Examination, Question paper, Key, Encryption, Decryption

1. INTRODUCTION

India has more than 350 Universities and 19400 higher education institutions in which the examinations are being conducted for various courses at regular interval^[1]. The conduct of examinations involves stringent, complicated process, much repetitive and fussy. Leakage of question paper defeats the main purpose of examination^[2]. Question

paper leakage not only forces cancellation of examination and re-examination, but also delays the timely declaration of results which results in duplication of entire process apart from monetary loss to the institution and saps the examinees' morale. The paper leakage is always a threat to the institutions.

Preparation of question papers, delivering it to the authorised officials, preserving it in safe custody till the conduct of examinations are the difficult tasks faced by the institutions and the examination centers. The efforts for effective security measures to be built, cost and time spent on preserving the question papers are increasing day-by-day.

Electronic Governance is the application of Information & Communication Technology. The E-governance brings in a SMART Governance viz., Simple, Moral, Accountable, Responsive and Transparent Governance. The proposed system brings the Institution closer to the examination centers and examinees offering efficient and

effective services. It is evolved with the following objectives.

- To provide an affordable, quicker and efficient interface between the institution and the examination centers thereby minimize the cost, time & risk.
- To provide cost effective service and at the same time improving the quality of service.

2. CONVENTIONAL METHOD

The question papers (QPs) are prepared by the experts, sent to a security press for printing and then kept sealed in strong rooms before being sent to the examination centers. The copies of the question papers are then sent from the institution to the examination centers through authorized agencies. On the examination day, the authorized representatives of examination centers open the seals before distribution to examinees.

The manual process has a great degree of risk as the number of human resources involved is directly proportional to the number of institutions/examinees. Here the QPs are printed and sent to the examination centers depending upon the number of examinees appearing for the examination subject-wise.

3. PROPOSED SYSTEM

In the proposed system, the QPs are sent from the institution and printed at the examination centers.

Technology helps to deliver the digital question papers in a safe manner to conduct the examinations successfully.

3.1 PREPARATION OF QUESTION PAPERS

Three to five sets of question papers are obtained from question paper setters, composed in an A4 standard template along with unique question paper code, verified, scrutinized and converted into Portable Document Format (pdf) duly authorised using digital signature. The pdf file enables high quality printing with precise page layout, rich file integrity, virus-free, self-contained and secure.

The question papers are selected at random through software, bundled day-wise Forenoon/Afternoon session-wise as per the examination Time-table with two/three level automatic encryption, on the penultimate working day of the examination.

3.2 QUESTION PAPER BUNDLE DELIVERY

The examination centers have to tune their wall clock's time with the SEQUEL server time and list of contact phone numbers, mobile numbers, FAX number to be on hand to contact the institution.

The encrypted digital question paper bundle for the next examination are uploaded on the dedicated web server on the penultimate working day of the examination. The authorized officials in the examination

centers download the encrypted question paper bundle at the examination centers from the institution's secured web server. As the access is not IP based, the download can also be done in any cyber café or neighbourhood examination centers. The download can be restricted to only once per examination center and automated Short Message Service (SMS) can be sent from the institution to the examination centers saying 'download is complete'. The institution shall ensure whether all the examination centers have downloaded the QP bundle, and if not, the SMS reminder will have to be sent to the examination centers till the download is complete in that examination centre.

The question paper bundle stored in the electronic media shall be kept in the examination centers itself. The encrypted QP bundle can be opened only after decrypting the QP bundle using 2/3 levels of keys.

3.3 ON THE DAY OF EXAMINATION

The examination centers have to keep a list of question papers required subject code-wise, so as to make required copies for each question paper quickly. To bring transparency, the question paper bundle can be decrypted and printed in the examination hall in the presence of the examinees.

The examinees are to be seated in the examination hall half-an-hour

before the commencement of the examination. This time can also be effectively utilised by the examinees to read the instructions and to complete the examination procedures such as verification of hall ticket, getting signature from the examinees, checking the register number written etc. In fact, by then, the examinees also could calm down and get themselves ready for examination.

The two/three keys are delivered exactly half an hour before the commencement of examination through secured web server and SMS. The email, FAX/telephone can be used as standby to notify the keys. The examination centers have to decrypt the question paper bundle, immediately on receipt of the keys and print one QP using laser printer.

The required copies of QP have to be printed using copier for all the subjects for which the examinations are scheduled in that session viz., Forenoon/Afternoon at the examination centers.

During the examination, any correction in the question paper can be informed instantly through SMS to the respective examination centers. Online certificate to be filled up by the examination centers to the effect that question papers are decrypted and required number of copies are taken in the presence of authorized officials.

Two Internet Service Providers with load balancing and two mobile

phone service providers ensure uninterrupted connectivity. The software delivers the concerned question papers to each center depending on their user-id and all the operations take place transparently without much manual interaction after secure login.

4. ENCRYPTION ALGORITHM

The National Institute Standards and Technology (NIST) announced that Rijndael encryption algorithm (named after the two researchers Joan Daemen and Vincent Rijmen) has been selected as Advanced Encryption Algorithm (AES) based on its Security, efficiency, Design philosophy and Extensions on 02.10.2000^[3]. The IEEE 802.11i standard is AES method which is unbreakable^[4]. The US Government announced that AES-256 has to be used for its classified information on June 2003^[5].

The AES algorithm is the symmetric-key cryptography mechanism, identical keys are used to encrypt and decrypt the QP bundle. The encryption algorithms are considered secure which depends on the length of the key. The longer the

key length, the longer it takes to discover which key actually decrypts. Specifying a long enough key length makes a brute-force attack (finding a key by trial and error) non-feasible. A QP bundle encrypted by one specific symmetric key can only be decrypted by using the same key.

There is a metronome for technological progress called Moore's Law which states that; "the number of components that can be packed on a computer chip doubles every 18 months while the price stays the same". Using a derivative of this above law one can also say that, if a key length of x is considered safe today, in 18 months the key length would have to be $2x$ to keep on par with the computing power. Recent studies performed by independent scientists have shown that key lengths should be not less than 90-bits long to ensure complete security for the next 20 years^[6].

Cracking the AES algorithm is highly difficult which may even take 149 thousand-billion (149 trillion) years to crack a 128-bit AES key^[4]. The AES-192 has 6.2×10^{57} possible

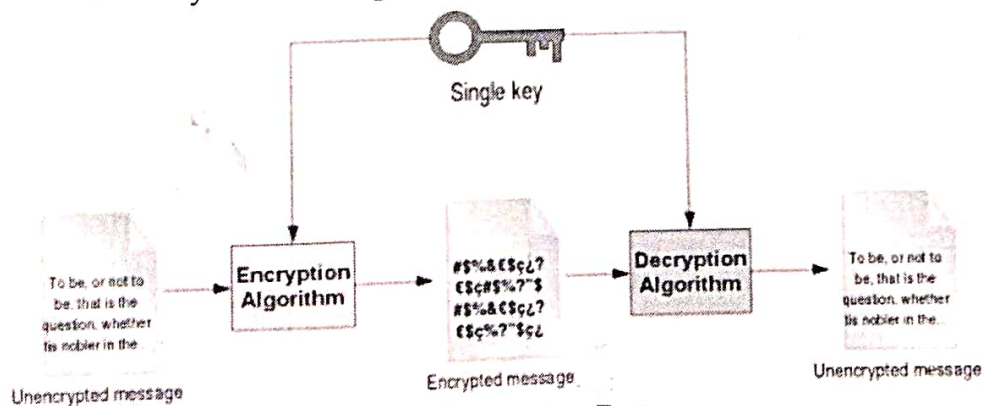


Fig 1. Encryption Process

192-bit keys^[7]. The proposed system uses AES-192, the key length varies anywhere around 16-24 rounds of permutations & combination of uppercase, lowercase alphabets, numbers and special characters.

The preferred platform for the software is Open Source Tools. The open source, java with MYSQL has been deployed on the SEQUEL server. In order to ensure the security and process applied, the software has to be

audited by the authorized Information Security Auditors^[8].

5. SYSTEM SPECIFICATION

Fig 2 depicts the Data flow diagram of the proposed system.

Fig. 3. shows the entire process of preparing and delivering the Digital Question Paper.

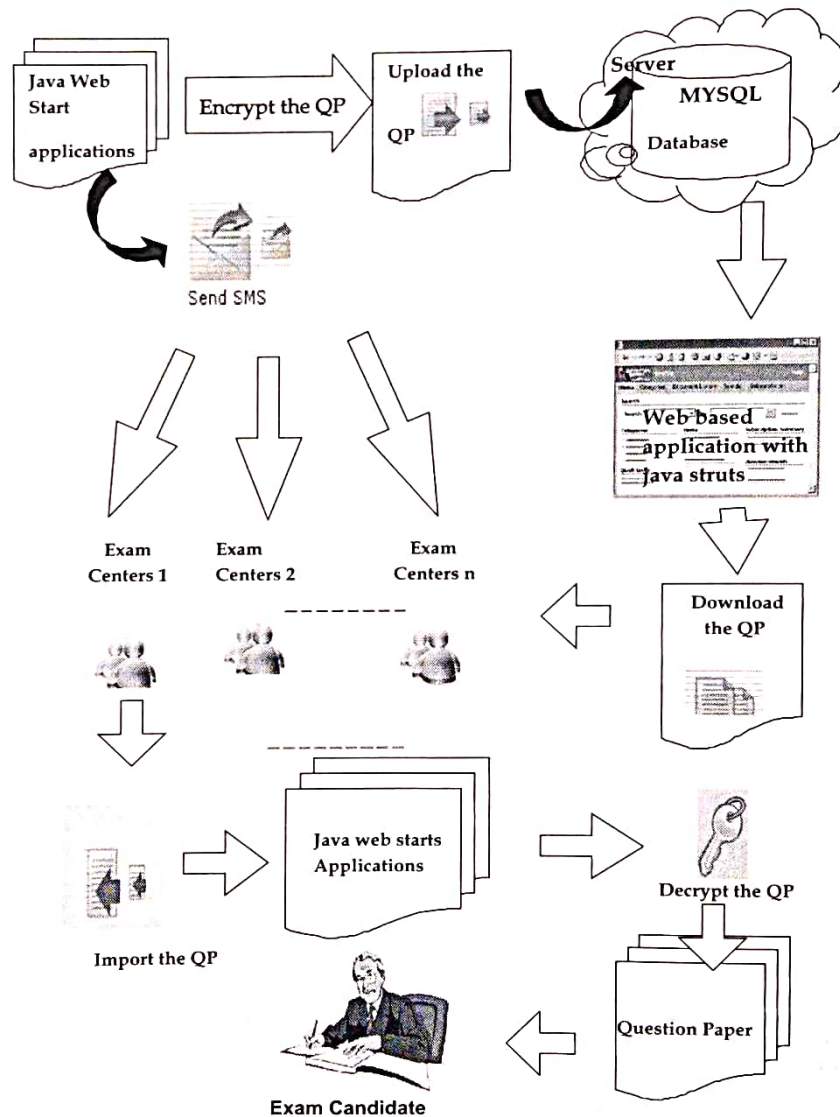
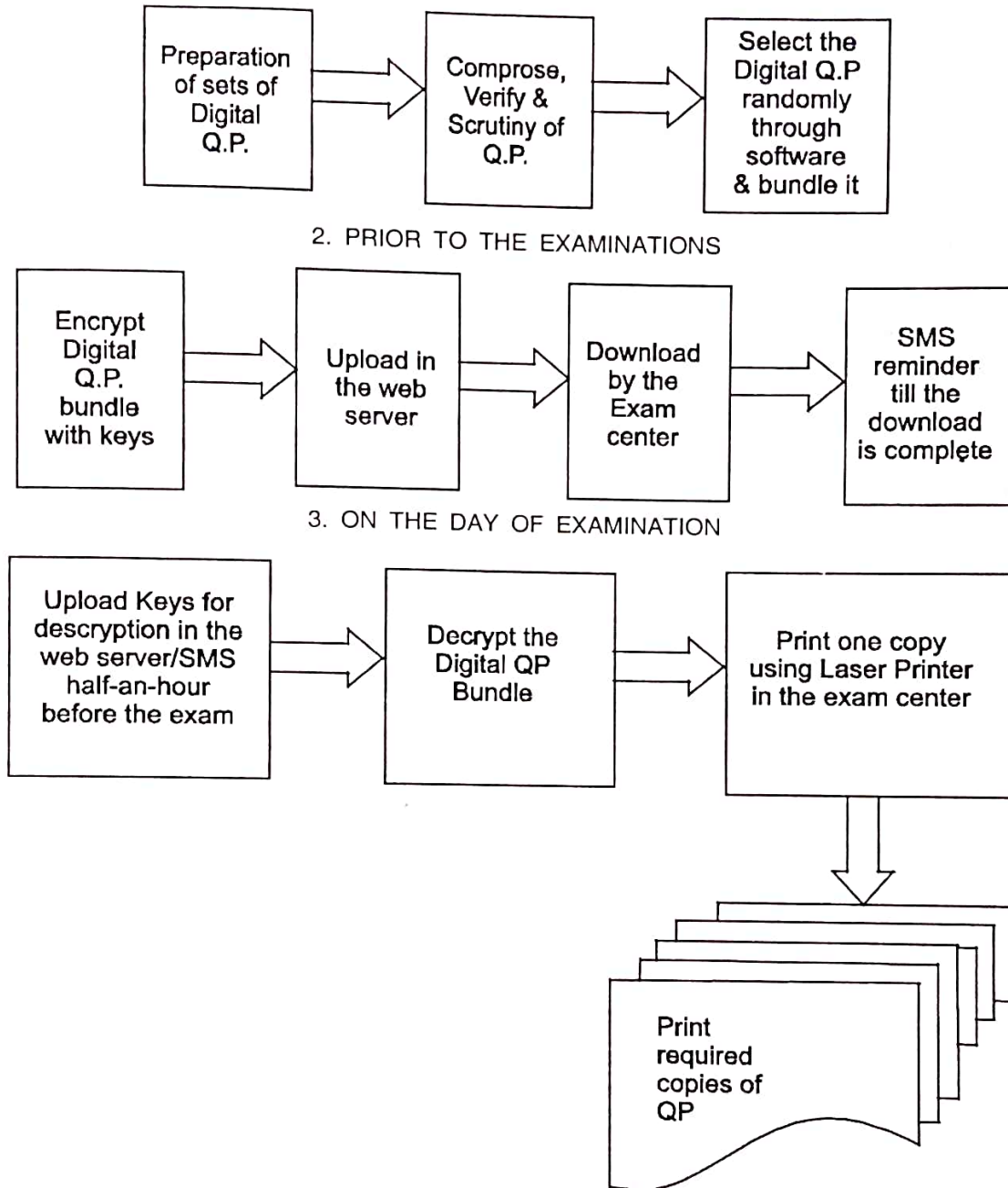


Fig 2. Data Flow Diagram

Fig 3 PREPARATION / DELIVERY OF DIGITAL QUESTION PAPERS (Q.P.)

Fig 1. PREPARATION OF DIGITAL QUESTION PAPERS



7. CONCLUSION AND RECOMMENDATION

Implementation of proposed technology requires decisive leadership, courage, top-level support, technology availability, manpower and examination centers co-operation.

Onsite verification at the examination center, necessary training for the officials of the examination centers and minimum of two trial runs along with training materials ensures

smooth and successful implementation of the system.

The Tamilnadu Dr. M.G.R. Medical University, Chennai, Rajiv Gandhi University of Health Sciences, Bangalore, Jawaharlal Nehru Technological University, Hyderabad and NTR University of Health Sciences, Hyderabad have achieved tangible success on the novel method of transmitting the university examination question papers digitally to the examination centers.

The State Data Centre (SDC) has been identified as one of the important element of the core infrastructure for supporting e-Governance initiatives of National eGovernance Plan (NeGP). The State Data Centre may be deployed for SEQUEL web hosting services.

Considering cost and time savings, the proposed system of secure delivery of digital question papers may be adopted in all the Universities and higher education institutions for the benefit of institutions, examination centers and the examinees alike. The benefits are higher for distance education examinations through the proposed system.

Sending the descriptive type question papers for any examinations by using the SEQUEL system, the cost incurred thereon is saved to a larger extent and ensures avoiding any room

for leakage of question papers/malpractices etc.

E-Governance applications provide transparency, efficiency, effectiveness in decision-making and savings in terms of effort, cost and time. This technology gives great relief to the organizers of the conduct of the examinations both at the institution and at the examination centers to deliver the question papers digitally in a secured manner. The technology is simple, affordable, fast, economic and secure.

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Mobile Internet Technologies for Healthcare and Education

KULANTHIVEL G

ABSTRACT

The introduction of telecommunications technologies in the healthcare environment has led to an increased accessibility to healthcare providers, more efficient tasks and processes and higher quality of healthcare services and education. Telemedicine is a rapidly developing application of clinical medicine where medical information is transferred via telephone, the Internet or other networks for the purpose of consulting, and sometimes remote medical procedures or examinations. The use of mobile technology in healthcare has been widely documented. While significant advancements have been made to address a number of challenges faced by health providers, little thought has been given to the role mobile technology can play in supporting how each individual could engage more effectively in their healthcare and education. An attempt has been made to develop a medical information system for mobile phones similar to a webpage, which may be used as an e-learning material also.

INTRODUCTION

Computers and biomedical equipment have now come into use in every aspect of modern medicine. Computers are used widely in medical research, where an important need is for better microelectronic sensors for data acquisition. In medical practice, data acquisition from patients as well as subsequent storage, the computer enhances retrieval and manipulation of data. In medical decision-making, computers improve accuracy, increase cost efficiency and advance the understanding of the structure of medical knowledge and of the decision-making process itself. Powerful, new non-invasive diagnostic instruments including x-ray computerized tomography scanners and ultrasonic imaging systems are based on computers. Telemedicine may be as simple as two health professionals discussing a case over the telephone, or as complex as using satellite technology and video-conferencing equipment to conduct a real-time consultation between medical specialists in two different countries. Telemedicine

generally refers to the use of communications and information technologies for the delivery of clinical care. Telemedicine is most beneficial for populations living in isolated communities and remote regions and is currently being applied in virtually all medical domains. The internet and mobile phone have revolutionised how people, across a wide demographic spectrum, communicate, interact, access and exchange information. These technologies combined offer a significant opportunity to transform how consumers engage in their healthcare through providing greater access to health information and communities of care, supporting the management of chronic diseases and enhancing the effectiveness of delivering public health messages. With an increasingly mobile society and the worldwide deployment of mobile and wireless networks, mobile infrastructure can support many current and emerging healthcare applications. The use of mobile technology in our every day lives is almost taken for granted, with some estimating that there will be 1 mobile phone for every 2 people on the planet. The evolution of this technology is characterized by a rapid increase in adoption; significant increases in network speed; smaller, lighter, more powerful mobile devices and the convergence of the internet with the mobile environment. This will effectively improve the healthcare and education.

ACCESS TO HEALTH INFORMATION ANYTIME, ANYWHERE

The growth of mobile communications has been unprecedented. In less than 20 years, global mobile subscriptions have grown from 11 million in 1990 to over 3.3 billion in 2007, representing over a 40% increase, year on year. Mobile penetration has reached over 100% in a large number of developed countries and is rapidly rising in the emerging economies of China, India and South America. Likewise, the internet has experienced similar levels of growth, with total global users rising from approximately 3 million in 1990 to over 1.4 billion in 2007. Mobile internet penetration is expected to grow rapidly over the next 5 years providing a global audience in excess of 1 billion to deliver public health messages. Although in a limited scale, telemedicine, or the use of telecommunications technologies for medical diagnostics, treatment and patient care, has been in operation for several years. Currently, mobile devices such as Personal Digital Assistants (PDAs) with 802.11 wireless LAN access are being used to upload and download schedules for patients and doctors. People can be reminded of their appointments in their PDAs by displaying short text messages. It is likely that mobile telemedicine services would be offered and used significantly. The reasons behind this optimism are the following: increasingly mobile savvy society with

more than one billion hand-held devices worldwide, deployment of wireless-based solutions in developing countries where 'wire-line' infrastructure is minimal or impractical and portability and usability of mobile hand-held devices combined with an increasingly sophisticated workforce and more. The mobile internet provides consumers with ability to access health information anytime, anywhere.

Handheld computers have the advantage of portability making the technology more accessible to physicians while practicing. As physicians are increasingly using Personal Digital Assistants (PDA) for personal management and patient care, physicians should consider using PDA's for clinical information such as medication interactions and anticipatory guideline compliance. The PDA is a pocket-sized, lightweight and can be a useful computer tool to track patient information, independent of what the main information system in the office contains.

Studies suggest that a more effective clinical practice in medicine require some use of technology in order to quickly evaluate and diagnose a patient. The PDA is a special boon to doctors as it provides a wide range of applications that can make their practice more efficient and effective. These handheld computers can be equipped with commercial or tailor-made software that consist of a

group of templates which corresponds to previously collected data in the paper-based system. An attempt has been made to develop medical information system, initially for renal information system to be viewed in computer system and PDA. Networks can be small or large, permanently connected through wires or cables, or temporarily connected through phone lines or wireless transmissions. The largest network is the Internet, which is a worldwide group of networks. Any PDA or mobile phone with the technology to view internet pages is enough for accessing the medical information system.

MOBILE BASED MEDICAL INFORMATION SYSTEM

The developed mobile base medical information system(MIS) is hosted on the web server connected to the Internet. MIS includes the information about anatomy and physiology of human body, which is given with text, graphics, animation and audio. Renal information system contains details necessary about renal lesion, causes, symptoms and diagnostic procedures. The renal information system developed as a first process will be useful for students, faculties, doctors, patients and people who are living in the rural area also for those who are on the move. A separate website www.medical-ids.com has been developed and hosted using the implemented web server. Whenever a

new user visits the homepage, it will give two links, one for PC and another for PDA. When PDA link is clicked, it will give details for MIS and another for Medical Diagnostic System. MIS will give medical information system details with text, graphics, animation and audio as described. The video portions are removed in PDA sites to reduce the delay time and also to reduce the cost as the charges are more for mobile internet access in India as on date are high. In future, as technology improves and cost reduces, more videos also can be included. The developed web server is connected to 2Mbps-leased line using VSNL/BSNL connectivity, which can be accessed anytime through mobile phone with internet access from anywhere in the world. The services of the medical fraternity can be extended to the rural sector through online medical information system for PDA. The advent of "client server technology" has made integration of systems easy in the development of online-medical server. The functionality of mobile based medical information system is based on the client-server paradigm. The web server is a dedicated computer currently located at the Institution. The client system may be any PDA or mobile phone with a facility to view web pages. The communication between the client and the server is through mobile connectivity (GSM/CDMA with GPRS connectivity). The web server is

connected to the 2Mbps leased line connectivity using which it can be accessed for 24 x 7. Figure shows the Home Page of Medical Information System for PDA.

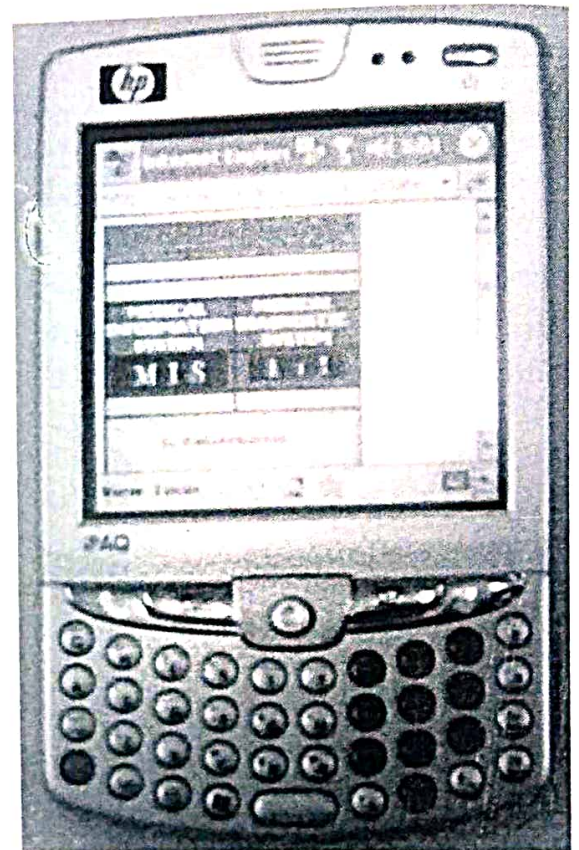


Fig. Home Page of MIS for PDA

The development of the mobile based medical information system with necessary data will be boon to the physician and other personnel who can use this while on move from anywhere anytime. The physicians and all personnel are provided with real time access to the most current electronic compendium data and medical information through this technology. With increased pressure on health professionals due to global

workforce shortages, the value of healthcare initiatives such as using the mobile internet will need to be understood from both a consumer and healthcare provider perspective. Further work is still required to understand the impact of increased consumer engagement on healthcare resources and work practices, particularly in the area of telemedicine and the remote management of chronic conditions. In continuation of this work, lot of interactive information can be developed and shared. Even diagnosis of diseases for the patient at remote location can be tried out in the mobile phones with the internet technology. By referring these type of latest educative e-learning material even on the move using the mobile internet technology, will speeden up the treatment process for the patient. These mobile phones with internet technologies will become major tools for physicians for improving quality of care and communicating better with patients and the fellow staff members.

CONCLUSION

The internet and mobile phone have revolutionised how people, across a wide demographic spectrum,

communicate, interact, access and exchange information. These technologies combined offer a significant opportunity to transform how consumers engage in their healthcare through providing greater access to health information and communities of care. The training of healthcare professionals to effectively utilise mobile technologies would be a less complex issue as an increasing number of those are using hand-held devices. A major issue is how to reduce the cost of delivering healthcare services to as many people by using mobile internet services. In future, using mobile website-building tools, the user could build a mobile website from the PC and build mobile websites from their mobile phones also. The role of mobile internet technology healthcare application is expected to become more prominent with an increasingly mobile society and with the deployment of mobile networks. The development of the mobile based medical information system will provide quality healthcare and education for all people, especially the rural communities, through the use of online Information and Communication Technology anywhere and anytime.

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Entrepreneurship Education: Need of the Day

ANGELINE SHEBA ALBERT

ABSTRACT

Entrepreneurship is the attempt to create value through recognition of business opportunity, the management of risk-taking appropriate to the opportunity and through the communicative and management skills to mobilise human, financial and material resources necessary to bring a project to fruition. In other words, entrepreneurship is the act of being an entrepreneur. Entrepreneurship is a process involving various actions to be undertaken to establish an enterprise. Innovation and risk-bearing are regarded as the two basic elements involved in entrepreneurship. The study of entrepreneurs has relevance today, not only because it helps entrepreneurs better to fulfill their personal needs but because of the economic contribution of the new ventures. Today's economy demands more on entrepreneurs. This paper discusses the objectives and goals of introducing entrepreneurship in the educational institutions.

Introduction of Entrepreneurship in Education

What causes an individual to take all the social, psychological and financial risks involved in starting a new venture? At first there was limited research on this aspect of entrepreneurship, but since 1985 there has been an increased interest in entrepreneurial careers and education. As our political system promotes free market policy there is a wide scope for entrepreneurship. The economic policies of the government and other financial institutions and the opportunities available in a society, in play a crucial role in exerting direct influence on entrepreneurs. Now economists, businessmen and government accept that small firms have a crucial role to play in the economy. Small scale units are essential part of our future economic prosperity and will also create the badly needed new employment opportunities. Entrepreneurial development is looked at as a vehicle for employment generation through promotion of small business.

Although there exists a common perception that entrepreneurs are less

educated than the general population, this opinion has proved to be more myth than reality. Studies have found entrepreneurs overall, and female entrepreneurs in particular, to be far more educated than the general populace. However, the types and quality of the education received sometimes do not develop the specific skills needed in the venture creation and management process. For example, some female entrepreneurs are at more of a disadvantage than their male counterparts in this respect as they frequently do not take significant business or engineering courses.

In colleges few future entrepreneurs realise that they will pursue entrepreneurship as their major life goal. Even among the minority that do, relatively few individuals will start a business immediately after graduation, and even fewer will prepare for a new venture creation by working in a particular position or industry. This mandates that entrepreneurs continually supplement their education through books, trade journals, seminars, or taking courses in weak areas. Generally skills that need to be acquired through seminars or courses include creativity, financing, control, opportunity identification, venture evaluation and deal making.

Entrepreneurship education is a fast growing area in colleges and

universities in the United States and Europe. Many Universities offer at least one course in entrepreneurship at the graduate or under graduate level, and a few actually have a major or minor concentration in the area.

In our country, the Government policies and economic environment greatly encourage the establishment of new and small enterprises. The introduction of Entrepreneurship to students is based on all these needs which can be summarised as follows :

1. The increasing employment problems has forced Indian policy makers to explore new avenues to lead students towards self employment/ entrepreneurship in their early career.
2. This will also carve out part of students from taking up higher education towards self dependency and self sufficiency.
3. The study of entrepreneurship has relevance today, not only because it helps entrepreneurs better fulfill their personal needs but because of the economic contribution of the new ventures.
4. The study of entrepreneurship and the education of potential entrepreneurs are essential parts to strengthen innovation, development and economic growth so essential to a country's economic well being.

Objectives

The entrepreneur always searches for a change, responds to it and exploits it as an opportunity. He is a dynamic agent of change who transforms increasingly natural and human resources in the corresponding production possibilities. In other words entrepreneurship means initiation and successful operation of an economic activity. EDP aims at motivating, developing and counseling potential entrepreneurs to establish their own enterprise and develop their own entrepreneurial skills, knowledge and competencies.

Qualities of a Good Entrepreneur

An entrepreneur should have the following qualities.

An entrepreneur should be :	
<ul style="list-style-type: none"> • Creative • Innovative • Risk Taker • Capital Generator • Leader • Motivator • Adaptive to Suggestions • Energetic • Committed • High Perseverance person • Able to assume responsibility • Able to deal with failure • Tolerant for Ambiguity 	<ul style="list-style-type: none"> • Good Manager • Self Confidence • Flexible to Changes • Dynamic • Profit oriented • Optimist • Versatile • Knowledge in Technology • Intuitive • Achiever • Resourceful • Goal Directed • Problem solver • Peripheral Area aware • Low need for status and power

Entrepreneurship development thus encompass efforts to develop entrepreneur, new enterprise and human resources. Linking this to the education means reorienting present education to a specific result oriented objective. The present education by itself lacks this comprehensive approach.

Entrepreneurship Development Training Programmes are being organised all over India, which try to involve educational institutions. Many Colleges expressed their desire about such year round activities involving students, so that the message of entrepreneurship can reach the students. Since the students are not familiar with industrial atmosphere/ entrepreneurial career, the introduction of entrepreneurship in education will facilitate them to know functions and responsibilities of an entrepreneur.

There should be industry – Institute interaction. This linkage between institute and industry, trade, agriculture, etc. will help students because they will finally be establishing and managing their own enterprises. Introduction of entrepreneurship in the field of education will be ideal solution to motivate students for self employment.

Thus the objectives of introduction of entrepreneurship in education are :

- To develop entrepreneurial skills, competency, confidence and knowledge to students.
- To make students aware of entrepreneurial activities and develop spirit of entrepreneurship amongst students.
- To motivate students towards self employment by becoming entrepreneurs and make them aware of entrepreneurial career opportunities.
- To make the entrepreneurial activities in the country strong.
- To help in individual development of the student.
- To understand the role of new and smaller firms in the economy.
- To understand the relative strength and weakness of different types of enterprises.
- Assess the student's own entrepreneurial skills.
- Develop an ability to form, organise and work in interdisciplinary teams.
- Understand the aspects of creating and presenting a new venture business plan.
- To know how to identify, evaluate and obtain resources.
- To know the essentials of
 - ➔ Market planning
 - ➔ Financial planning

- ➔ Operations planning
- ➔ Organization planning
- ➔ Venture launch planning

- Know the management challenges and demands of a new venture launch.
- Understand the role of entrepreneurship in existing organizations.

Skills required in Entrepreneurship

The skills required by entrepreneurs can be classified into three main areas:

I. Technical skills

- Writing
- Oral Communication
- Monitoring environment
- Technical business management
- Technology
- Interpersonal
- Listening
- Ability to Organize
- Network building
- Management style
- Coaching
- Being a team player

II. Business Management skills

- Planning and goal setting
- Decision making
- Human relations
- Marketing
- Finance
- Accounting
- Management
- Control
- Negotiation
- Venture launch

III. Personal Entrepreneurial skills

- Inner control/ disciplined
- Risk taker
- Innovative
- Persistent
- Visionary leader
- Ability to manage change

These skills and objectives form the basis of the modular approach to an entrepreneurship curriculum. By

laying out the modules, a course or sequence of courses can be developed, depending on the needs, interest, and resources of the particular university. This modular approach helps to ensure that the most important areas of the field are covered in the courses offered, whether on a quarter or semester basis or involving one or a series of courses.

An interesting trend in entrepreneurial education has evolved in the last five years with some entrepreneurs finding the need for and having the desire to obtain MBA degrees. Today's advanced technology sophistication, telecommunication, computer usage and hyper competition have changed that attitude. Entrepreneurs are recognising the need to learn some of the 'science' of management in MBA program to compete and grow their business effectively in today's global environment.

Strategy of Implementation

The objectives can be achieved through well planned programme, where major emphasis will be on individual development, so that students are able to evaluate their competencies and capabilities in a realistic manner. The qualities hidden inside the students are carved out to become a successful entrepreneur.

1. The curriculum should be set taking into consideration the requirements of entrepreneurship

development in students. A special subject on entrepreneurship can be introduced in the existing syllabus.

2. Separate courses on entrepreneurship can be started in education.
3. Entrepreneurship is to be more person oriented and not only information or knowledge based. It is a combination of skills, attitude and knowledge. Teachers should be trained to achieve such results.
4. Teaching entrepreneurship focuses more on learning and development rather than only teaching. This needs suitable teaching aids, material and methods which includes text books, manuals, case studies, video films simulation games etc. These teaching aids should be developed properly and made available in adequate quantity.
5. Individual counseling – Apart from formal class room teaching and group training the individual counseling is also required to make EDP really successful in education.

Institutional Build UP for ED

National and regional level institutions were developed in India that were committed to training, research and organising educational

programmes for development of entrepreneurs.

I. The National Institutes

- National Institute of small Industry Extension Training (NISIET)
- Entrepreneur Development Institute (EDI)
- National Institute for Entrepreneurship and small Business Development (NIESBUD)
- Indian Institute of Entrepreneurship (IIE)

II. Supporting Institutions

The following institutions are offering financial assistance to new generation entrepreneurs for setting up of small enterprises.

- Nationalised Banks
- Co-operative Banks
- Small Industries Development Bank of India (SIDBI)
- Industrial Development Bank of India (IDBI)
- Industrial Credit and Investment Corporation of India (ICICI)
- State Financial Corporations (SFC)
- National Bank for Agriculture and Rural Development (NABARD)
- Khadi and Village Industries Commission (KVIC)

III. The State/ Regional Institutes

- Centers/Institutes for Entrepreneurship development were established in 14 states of the country.
- Technical consultancy organisation (TCOS)
- Commission rates of industries
- District industries centers (DICS)
- Industries Corporations
- Small Industries service Institute (SISIS)
- National small industries Corporation (NSIC)
- Non Governmental Organisations (NGOs)

Educational institutions are also participating to tap the students' talents to induce them with entrepreneurship spirit at education stage. Entrepreneurship Development cells (EDCs) were established in selected Engineering colleges with the assistance of the Department of Science and Technology. Entrepreneurship has been introduced as a subject in colleges. MBA institutions and Engineering college in the country, Premier Institutions of the country like Indian Institutes of Management (IIM), Indian Institutes of Technology (IIT) and Indian School of Business (ISB) have included Entrepreneurship as a subject for the benefit of prospective student community.

Entrepreneurship Development Cell

ED cells within the institutions are launched with a view to encourage students in educational institutions to consider self – employment as a career option, provide training in entrepreneurship through modular course and increase the relevance of management particularly in the non-corporate and under managed sectors.

ED cells are expected to promote entrepreneurship related activities such as entrepreneurship development programmes on full time / part time basis for final year students, alumni, educated, unemployed and working professionals. ED programme (EDP) of 6-8 week duration aims at training the technical graduates and diploma holders to launch an enterprise successfully. This EDP includes identification of business opportunities preparation of a technically feasible and economically viable project report.

Faculty Development programme (FDP) is also conducted by ED cell to train and develop professionals in ED so that they can act as resource persons in guiding and motivating the students to take up entrepreneurship as their career.

Present Status

Entrepreneurship plays an important role in the development of economy. Every developed nation have benefited from their entrepreneurs in building the

economy. Bill Gates in USA is one such entrepreneur who steered the software industry to new heights through his Microsoft Company. In India, numerous examples exist for successful entrepreneurs, who successively built empire of their corporate structure. Dhirubhai Ambani grew to a phenomenal height through Reliance Industries. Tata, in steel Industry, Powar in computer education are few other examples of successful entrepreneurs. Government is also keen to develop the entrepreneurship skill in emerging technocrats. For this, elective courses are available in many engineering disciplines. Concept of industrial estate has emerged during recent years. Many big industries and engineering institutions have industrial estates in near vicinity. For example, near National Institute of Technology (Formerly Regional Engineering College) at Allahabad and Jamshedpur, industrial estates have been established for giving entrepreneurial opportunities for upcoming technocrats.

After 25 years of experimentation the concept that “the entrepreneurs are not only born but can also be developed” is now accepted. Entrepreneurship Development Programmes have developed and promoted first generation entrepreneurs. Entrepreneurs are business leaders. They are persons with vision. They have the drive and talent. A systematic approach to

develop individual first generation entrepreneurs involve identification, selection, training and follow-up of potential entrepreneurs to assist them to establish their venture and to equip them to run it profitably. The trained trainers, training modules and institutional infrastructure are quite well developed though not yet adequate. But all over India, the percentage of success from the EDP is some where around 20% or less. Again if you take review of those who are successful, it is observed that majority of them are from traditional business community. This again proves that the EDP should be spread to the masses and social environment should be developed to support entrepreneurial career. Recent awareness and attempt to introduce entrepreneurship in education has opened up a new arena.

Conclusion

The future for entrepreneurship appears to be bright. We are living in the age of entrepreneur, with entrepreneurship endorsed by educational institutions, governmental units, society and corporations.

Entrepreneurial education has never been so important in terms of courses and academic research. The number of universities and colleges offering at least one course in entrepreneurship increased from 16 in 1970 to over 1000 by 2007, with at least 100 universities offering four or more courses in the area of entrepreneurship that allow students to take concentrations, majors and degrees. Taking into consideration the future challenges, economic, liberalization, unemployment problem etc, introduction of entrepreneurship is necessary in colleges. The colleges are having potential to help the productive activities of the country. These young minds should be developed and moulded to enter business. But implementation of this programme should be carefully planned and strategies should be properly decided. Most universities in the country did research on entrepreneurship followed by training courses and then education courses. Government is also very much interested to promote the growth of entrepreneurship and focus the contributions of the entrepreneurs to the society.

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Developmental Programs to improve results in Polytechnics

K.K. SADASIVAN

Introduction

The article presents the experiences of me (the author) as a placement officer of a polytechnic, and with the co-operation of all stakeholders, how we were able to improve the results of the polytechnic through Developmental programmes.

In 2004, I worked in a Polytechnic College in Kerala. I joined as a lecturer in Mechanical Engineering Department, but I was asked to take Industrial Management for final year students and Engineering graphics for first year students as there was no Mechanical Engineering branch in the college.

Just walking down the corridor was hazardous. Frequently, students would rush up behind me shouting out and pushing the furniture out of the classroom. However, even the best teachers flounder when there is no law and order. When I complained to my head, he said he will cooperate in whatever way he can to improve the situation.

The infrastructure of the institution was very poor. We were

working in a temporary building. Even after nearly half the academic session, the college continued to grapple with the shortage of staff. We have given a number of representations to the department about the shortage of teachers. At times, teachers of other subjects took classes for other branches.

Certain branches had no takers and seats remained unfilled. The workshop and laboratory facilities were not up to the mark. The result of the final year students was below 50%, which was less than the state average and there was no campus placement.

We, staff members were forced to think about new strategies to avert this scenario. In the academic year 2005, a meeting was convened with Parent Teachers Association, Political leaders and local body members and I was chosen as the placement officer. We also set a bench mark of 100% result in the year 2008.

“We realized that the key here is cooperative effort”.

"To achieve great things, two things are needed; a plan, and not quite enough time"

- Leonard Bernstein

Wishes only become goals when there is a plan made to attain them ... a plan with specific targets. In order to achieve our goals, we organized the following programs.

Staff Development Program

This process is designed to improve job understanding, promote more effective job performance, and establish future goals for career growth.

The objective of the Staff Development Program is to provide staff members with feedback on their performance and accomplishments for the previous year. This program also assists staff members in understanding their job responsibilities and supervisor's performance expectations. Performance goals for the upcoming year and specific plans to help staff members meet those goals were also established through this process.

Awareness Program for Parent-teacher association

PTA is a formal organization that consists of parents, teachers and staff that is intended to facilitate parental participation. The goal of all parent-teacher groups is to support their college, encourage parent involvement, support teachers, and organize family events.

The program highlighted the possibilities of diploma holders in various fields, the importance of communicative English, the necessity of seminars from subject experts and the importance of campus selections.

A word with Political Parties

Campus politics was at its worst. Unwanted strikes, political clashes and alcohol consumption among students were common. A disciplinary committee involving all local politicians, student leaders, PTA and staff came into existence to look after the political crisis. This was very effective and promising. We also organized an all party polytechnic promotion committee to promote the construction of new building block and their help was remarkable.

Student Development Program

The Student Development Program aims to assist students in making positive and informed personal, life and career-related decisions. A variety of services and programs were offered for students to help promote personal, intellectual, social, and cultural development outside the classroom. It offers a foundation for understanding individual differences and applying that understanding to the ways people think, communicate, and interact.

Personality Development Program for Students

Certain attributes required for effective personality are confidence, impressive looks, proficient communication skills, etc. The personality development program believes that, strength and success of individual desire is within them, so everyone needs to turn their inner eye for evolution. The personality development program helped the students in opening their inner eyes for development. The program gave emphasis for providing the right environment for personality development along with intellectual development.

Students were trained in different topics like Goal setting, Time management, Behaviour Dynamics, Transactional analysis, Stress management and Emotional Intelligence.

TECHNO VISMAYA – An innovative Exhibition

This was an idea suggested by some of the final year students to make the public and school going students aware of the technical aspects taught in polytechnics. The slogan of TECHNO VISMAYA was "transfer of technology to everybody". Our students exhibited disassembled computers, T.V, telephones, C.D players, mobile phones and other electronic gadgets and explained their working procedure. Over 4000

students and local people visited this event making it a grand success.

As a result of the overwhelming response, exhibitions were organized in the following years as well. This helped us to come into main stream, with more students opting for our institution.

Exercise of Discipline

With the help of the management team, we check in all the time, yanking out miscreants if they step out of line. Even though the college has more or less the same intake – more or less all of the children come from deprived homes – their behaviour couldn't be more different.

Conclusion

In the year 2008, the results were outstanding. Around 75% students passed in all branches which is remarkable for a institution. More than 25 students got placed in different companies and now this is a model polytechnic for those who are looking for well trained and committed candidates.

Instead of rioting, they line up quietly for lunch; instead of desperate teachers yelling for order, there is a studious hush in lessons; instead of books being flung around the head of a depressed librarian, there is silent working among the bookshelves. Results have sky-rocketed. From having the worst results in the

country, the college now has some of the best.

Aside from loving and being loved, there are no experiences as intense and rewarding as when you achieve your goals.

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Developing Web Based Learning Environment using Web Engineering Process Model

S. PRADEEP GNANAM

Today's Information technology product development is undergoing a paradigm shift from applying traditional software engineering methodology to web engineering methodology since most of applications are web based. With the advent of computers there is also a phenomenal development in all the fields of education, research, inventions, innovations and also living styles of human life and their social status. These developments with the evolution of computers are learning methodologies being e-learning, web-based learning, multimedia learning etc. The construction of Web applications has made a lot of improvements, but there is a lack of a disciplined engineering approach for building Web-based systems. To successfully develop a large Web System we need a team of people with wide ranging knowledge and skills. But still, much of the development of Web-based learning is carried out without a true understanding of requirements that are proper to Web-based learning, resulting in bad analysis and design, poor quality, and

maintainability. The applications become increasingly complex and the development process still remains ad-hoc. Many organizations and developers have successfully developed large, high-performance Web sites and applications, but others have failed and facing the possibility of major failures. A survey on Web-based application development by the Cutter Consortium highlights the problems plaguing large Web-based projects are 84% of the time delivered systems didn't meet business needs, 53% of the time delivered systems didn't have the required functionality, 79% of the time schedule delays plagued the projects, 63% of the time projects exceeded the budget. The primary cause of web system failure is a flaw between design models and the implementation model of the web has been recognized to be one of the main reasons for the low acceptance of disciplined development in the Web. As a result, Web engineering is still struggling to establish itself as a reliable engineering discipline. The cost of poor reliability and

effectiveness has serious consequences for the acceptability of the systems. Web engineering education still focuses on technologies, rather than on critical skills that facilitate engineers to solve real-world problems effectively. However it lacks two important considerations for developing Web Based Learning environment (i) It is obvious that it lacks the type of specialized methodologies that exist for more traditional software development applications. Likewise, evaluation of Web-based learning cannot be done in the same manner as traditional software development, because it is embedded in an on-line learning environment and must include issues that are proper to Web-based learning, in particular pedagogical considerations and (ii) Integration of the user interface design with Instructional design. To meet the challenges of Web engineering, current education must be aligned with a pedagogical model capable of empowering and supporting the acquisition of critical skills. To do this, a new learning environment must be created that promotes change in both pedagogy and course material, in effect, altering the role of the teacher, the expectations for students, and many other educational aspects.

1.0 Rationale

The growth of Internet, Intranets and the World Wide Web has already had a significant impact on business,

commerce, industry, banking and finance, education, government, entertainment sectors, and our personal and working life. Many legacy information and database systems are being migrated to the Internet and Web environments. In the last few years, we have seen web sites that initially started as a few Web pages, which grew in size and after a while became unmanageable. We have seen that to develop web sites for any organization, we cannot get the web site they wanted to develop in a timely manner within a reasonable budget. Another common occurrence is that large web sites become unmanageable after some time. After sometime, if we want to make some changes in the information, it will be very difficult or impossible. The real value of Web-based learning is to help students acquire knowledge in order to function as active, self-reflected and collaborative participants in the information society. Changes caused by academic institutions, course content, ethical, legal, cultural issues need to be considered in the development of Web-based learning (Said Hadjerrouit, 2006). These experiences made us to explore a disciplined, systematic way to develop large and maintainable web based information systems that must constantly evolve in order to ensure the relevance and completeness of the content on the web. Web Engineering needs a multidisciplinary approach that must rely on knowledge and

expertise from different disciplines such as software engineering, hypermedia engineering, human-computer interaction, cognitive science, ethics etc.

1.0 Introduction

There is a need for a process model to follow while developing a large Web based information system. This process consists of a set of manageable activities that are needed to be carried out to develop the web site and then to keep its information upto date. Also, from time to time, we need to add new functionality and information resources (Ginige, 2001). Moreover, web-based applications run in a heterogeneous computing environment that includes components and multimedia support. This environment has languages and technologies, such as Java, HTML, Javascript, Web servers and databases, Microsoft front page, Macromedia Dreamweaver etc that provide support for the development of web-based applications. The important aspect is to select the appropriate components to create the Web site based on the information maintenance requirement and the complexity of the Web site. These components then need to be arranged in a logical architecture. In addition to this, the construction of web-based system is affected by engineering issues, eg. process models, object oriented approaches, hypermedia and multimedia engineering, usability engineering,

web design guidelines, software reuse, design patterns, architectural frameworks and modeling languages (Bleek, Jeenicke & Klischewski, 2004; Conallen 1999, Hadjerrouit 2001, Lowe&Eklund 2002, Pressman 2001). The choice of a process model depends on many factors. Some of these are, the scale of the application, the nature of the information, frequency at which information needs to be changed or added, experience of the development team and clients of developing similar systems, computer literacy level of the users, available time to develop the application and the budget.

Finally, Web engineering is affected by marketing, cognitive, ethical, legal and cultural issues (Murugesan & Ginige 2001). A significant part of any web application concerns aesthetical issues, legal constraints, ethical conventions, security, copyright, disability discrimination, etc. These issues can be widely used for the development of web applications than the traditional system. Thus, engineering for the web should relate to diverse cultural contexts.

All these issues has to be considered to explore Web-based systems development and practices and presents multidisciplinary perspectives that help shape this dynamic area of Internet and Web application development.

2.0 Approaches for Developing Web-based Learning

Pedagogical Foundation

Pedagogy embodies knowledge and skills, classroom management, and overall effective teaching practices. It is a complex blend of professional knowledge and practitioner skills. A teacher's own pedagogical beliefs and values play an important role in shaping Web-based learning environment. Research has shown that the appropriate use of learning theories can catalyze the paradigmatic shift in both content and pedagogy which is the heart of any educational reform in the 21st century. If designed and implemented properly, especially computers and internet technologies can promote the acquisition of knowledge and skills that will empower students for lifelong learning. These new ways of teaching and learning are underpinned by constructivist theories of learning and constitute a shift from a teacher-centered pedagogy to one that is learner-centered.

Literature reviews suggest that theories can be related to three main commonly accepted paradigms: Behaviorism, cognitive constructivism, and social constructivism (Gros, 2002; Phye, 1997; Piaget, 1971; Skinner, 1976; Steffe & Gale, 1995; Vygotsky, 1978; Wilson, 1998).

Behaviorism

The goal of instructions in behaviorism model assumes that the learning is to efficiently transmit knowledge from the instructor to the learners. Learning is seen as largely as a passive process. In a behaviorist setting, instructors are clearly central to learning activities. Students are passive recipients of knowledge, rather than constructing their own knowledge. The behaviorism promotes stability and certainty with respect to knowledge transmission, there are a few opportunities for learners to express their own ideas, because behaviorism teaching does not engage the mind appropriately to go beyond prior knowledge.

Cognitive Constructivism

The cognitive constructivism is the product of passive transmission of active construction. It is a framework where learners can acquire knowledge from the environment and can construct their own knowledge based on their prior knowledge and experience. The knowledge construction process requires cognitive skills, such as analysis and reasoning skills, meta-cognitive skills such as reflection and self-evaluation, and analogical thinking. In addition, Constructivist learning theory paves the way to a multi-dimensional view of communication. Constructivist practice facilitates reciprocal communication and a more balanced participation between educational

participants. Using this approach, teachers can employ collaborative learning techniques that allow students to combine efforts at solving a problem, or in task management. In this constructivist approach, teachers become guides rather than dispensers of knowledge and helps to create learner-centered environment that promote active, independent and self-reflected knowledge construction (Said Hadjerrouit, 2006).

Social Constructivism

Social constructivism focuses on groups and their learning within socio-cultural contexts. Vygotsky argued that the way learners construct knowledge, think, reason and reflect on is uniquely shaped by their relationships with others. Accordingly, learning emerges through interaction of learners with other people, e.g. instructors, fellow learners. Learning occurs as learners exercise, test, and improve their knowledge through discussion, dialogue, collaboration, and information sharing. This means that knowledge is created as it is shared, and the more it is shared, the more it is learned.

3.0 Characteristics of Web Based Learning Applications

The development of Web-based learning is different from traditional software development in a variety of ways:

(i) Web-based applications are integrated with numerous distinct

components (eg. Fine grained interpreted scripting language like Java, HTML, XML, multimedia files, database, graphical images) distributed, cross-platform applications and structuring of content using navigational structures with hyperlinks. More attention need to be given in the selection of pedagogical models and learning theories so that the Web-based learning environment can be fully developed (Westera, 2005). By doing this, a new learning environment must be created that promotes change in both pedagogy and course material, because they are more important than the choice of technology.

(ii) Web-based application encompasses content that are itself dynamic in nature. It consists of different educational paradigms: e-learning, m-learning, Distance learning and integrated learning. Web-based learning may be used as online resource for e-learning and m-learning to students who are not keeping a fixed location through the use of mobile or portable technology. The rapid growth of ICT makes it possible to develop new forms of this education. Secondly, Web-based learning may be used as distance learning at any time, any place, and for any student. Thirdly, Web-based learning can suggest a

- hybrid, integrated, or blended mode of learning. Such a model can take the strength of ILT, CBT, and WBT at the same time and avoid the pitfalls of each. There are various permutation and combinations that can be used in hybrid or blended learning. This is highly relevant in developing countries. This educational paradigm concludes that which solution has the potential to improve the quality of education.
- (iii) Web-based learning development has a broader context and many specific issues, principles which are to be incorporated to meet the specific requirements of the user. Web-based learning is a combination of software engineering, hypermedia, requirements engineering, usability engineering, information engineering, learning theories, instructional design, graphics design etc., and wide ranging knowledge and skilled experts like web designer, programmers, graphic designer, librarians, database designer, project managers, network experts, web architects, instructional designers etc., needed to show how individual parts are put together to create the web system in an effective way and people who has the knowledge to plan a web development project and manage it in an agreed time and budget.
- (iv) Web-based learning environment has to be user-friendly. Quality is considered as the highest priority than time, reliability, usability and security. Web-based learning systems are multi-functional systems and transcend the institutional boundary. They must be developed with a user view inside and outside the academic institutions (standing, 2002).
- (v) Web-based learning environment need to be updated frequently without specific releases, maintenance cycles of days or even hours and impact will be brought about by the changes in technology, pedagogy, subject specific, legal, social and ethical issues. Web systems need to be designed and built for scalability and maintainability; these features can't be added later. Successfully building, implementing and maintaining Web systems depend on how well we address the requirements of scalability and maintainability. In constantly changing environments, they must evolve rapidly in order to ensure the relevance, correctness and completeness of the content available online (Pahl, 2003).
- (vi) Web-based learning environment development needs to reuse components from existing online courses, so that developers are not forced to start over again

when they design web-based learning for new courses. Developing the overall standardized system architecture for the web - based system that meets the technical and non-technical systems will help in constantly, refining and updating the system.

4.0 Web-Based Learning Development Approaches: State of Research

The development of Web-based learning environment lacks the type of specific methodology as clearly indicated by the researcher. Authoring tools are used to produce and document Web-based learning and monitor some activities but they do not form the integrated tools for the development process (Standing, 2002). Web-based learning environments are entirely different from the software development because it is embedded in the online environment and it should mainly focus on scalability, maintainability, learning theories, technical, legal, cultural and social aspects. Web-based systems evolve from static, content-driven applications to dynamic interactive and ever-changing ones. Hence there is a need to identify many sound methodologies throughout the development process and maintenance.

More specifically, there are two main research goals addressed in this study, and these goals aimed to improve the design process of the

Web Based Learning Environment. First, this study offered a systematic approach to the design, development, and evaluation of a user-centered, Web Based Learning Environment for supporting MCA courses. Second, this study evaluated the design process model by assessing the overall quality of the WD2L environment prototype in terms of 1) students' learning performance and 2) the quality of resources implemented in the WD2L environment.

Approaches that use conventional software engineering models are not suitable for developing web-based learning environment. Table 1. given below describes the potential deficiency of conventional software engineering models.

Table 1. Deficiency of conventional software engineering models

S.No	Existing models	Deficiencies
1.	Waterfall model	Lacks flexibility for adoption.
2.	Spiral model	More complicated for adoption.
3.	Prototype model	Time consuming.

More specifically, most course Web sites provide little support to achieve flexibility and learner-centered instruction, because they are static and rarely updated and maintained, diminishing the indisputable character of the Web (Lazarinis, 2004; Kirshner & Paas, 2001). The primary cause of web system failure is a flaw between design models and the implementation model of the web

which is recognized as one of the main reasons for the low acceptance of disciplined development in the Web, since as a result, Web engineering is still struggling to establish itself as a reliable engineering discipline.

5.0 Proposed Pedagogical Model

Constructivism is a theory of learning, not a description of instructional techniques. A pedagogical model is a conceptual construct that can be used by teachers as a framework for instruction using a specific learning theory (Nunes & McPherson, 2003). Thus, the starting point for developing a pedagogical model is the constructivist learning theory and research work related to the design of constructivist learning environments (Bradley & Oliver, 2002; Duffy, Lowyck, & Jonassen, 1993; Gros, 2002; Hirumi, 2002; Honebein,

1998; Honebein, Duffy, & Fishman 1993; Wilson, 1998).

This pedagogical model encompasses a learning management process and many learning phases. The goal of learning management process is to enable instructors to monitor the entire learning process through providing feedback, e-mail, communicating, asking students, etc. The learning phases are an orderly set of interdependent learning activities moving from context analysis to the communication of learning results. The model consists of eight phases as shown in Figure 1.

Managing the Learning process occurs throughout the whole learning process. As learning shifts from the "teacher-centered model" to a "learner-centered model", the teacher holds less authority and acts more as a facilitator, mentor and coach—from "sage on stage" to "guide by the side".

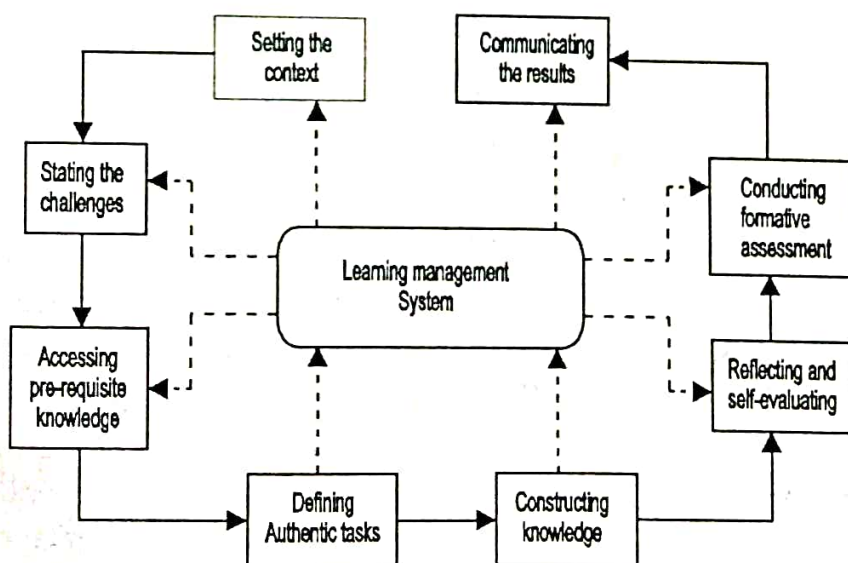


Figure 1: Pedagogical Model

The teacher's primary task becomes to teach the students how to ask questions and pose problems, formulate hypotheses, locate information and then critically assess the information found, in relation to the problems posed. This process refers also to the fact that a group of students work together and collaborate on a task.

Setting the Learning Context is a process of gathering data from the real environment. The structure of a course determines the flow of instruction through pre determined instructional events. The course map is like a plan for the sequence of instruction. To develop the course map, the instructional designer reviews the source materials, interviews subject matter experts, and examines the learner analysis, tasks and objectives, learners, pedagogy, technology, and organizational and institutional climate.

The primary challenges and learning goals are (Hadjerrouit, 2003):

1. To enhance the comprehension of Web engineering development processes.
2. To use the Unified Modeling language (UML) for modeling Web-based applications.
3. To carry out Web engineering projects using the object-oriented development methodology.

4. To use a variety of Web technologies to construct Web-based applications.
5. To modify, extend, and eventually reuse knowledge from various sources.
6. To acquire communication, reading, and writing skills.
7. To reflect, evaluate, explain, and justify Web engineering solutions.
8. To understand ethical, legal, cultural, and social dimensions of Web engineering.

To analyze students' prerequisite knowledge and skills involve talking to and gathering information from a range of people such as potential learners, IT professionals etc., To gather information from them, data collection methods such as questionnaires, interviews and observations are used. The purpose of learner analysis is to determine the current ability level of the learners to identify learner characteristics and make decisions about how to teach effectively so that the course is designed to meet the learner's needs.

Evaluation involves measuring learner's skills, knowledge, and behavior to verify that they are at the expected proficiency level at the end of the course. The ultimate aim of evaluation is to collect valid, relevant and reliable information about the learner and make informed decisions. Evaluation is performed using test items. The purpose of test items is to

(i) Provide an opportunity for interaction (ii) Check and reinforce learning intermittently (iii) Check for mastery at the end of the course.

Assessment can be done in three stages (i) Formative evaluation is conducted at several points during the development of the course to improve the course (ii) Summative evaluation is conducted at the end of the course to measure the degree to which the course has achieved its objectives (iii) Confirmative evaluation is conducted a few months after the course completion to assess learners retention of knowledge and skills over a period of time.

6.0 User Interface Design for Learning Environments

For a Web-based supplemental learning environment to be successful, it is also important to effectively facilitate learner interactions with the learning environment. An effective user interface in Web-based learning environments is important, because it determines how easily learners can focus on learning materials without having to make an effort to figure out how to access them (Lohr, 2000). There are a number of design approaches to the user interface, each of which has its own strengths and weaknesses. To review the current user interface design practice, this study borrowed Wallace & Anderson's

(1993) classification: the craft approach, enhanced software engineering approach, technologist approach, and cognitive approach.

In the craft approach, interface design is described as a craft activity in which the skill and experience of the interface designer or human expert factors play an important role in the design activity (Dayton, 1991). For successful design, this approach relies on the designer's creativity, heuristics, and development through prototyping. The enhanced software engineering approach claims that formal HCI methods such as task analysis should be introduced into the development life-cycle to support the design process (Shneiderman, 1993). This approach attempts to overcome the short-comings of structured software engineering methods that ignores issues involved in human-computer interaction and user interface design. The technologist approach claims that designers produce poor quality interfaces because they have to spend more time in performing time-consuming tasks, such as programming an interface, than in doing design activity during development (Cockton, 1988). To allow designers to concentrate on design, the technologist approach attempts to provide automated development tools (e.g., the User Interface Management System) and

rapid prototyping tools (e.g., HyperCard and Multimedia Toolkit). The cognitive approach applies psychological knowledge, such as theories of information processing and problem solving to the interface design (Barnard, 1991). This most theoretical approach to interface design is characterized by an attempt to build precise and accurate users' cognitive models that represent their interaction with computers.

In order to design user interfaces that are easy to use and intuitive to anyone, it is important to have good design skills as well as some knowledge of psychology, methodologies and prototyping. Therefore, all four approaches are fundamental to successful design of Web-based learning environments. However, designing a usable interface that is also learner-centered is not trivial. Thus, this study suggests employing a user-centered design process that takes human factors into account. Gould & Lewis (1985) provide three principles of user-centered design: 1) an early focus on users and tasks, 2) empirical measurement of product usage, and 3) iterative design whereby a product is designed, modified, and tested repeatedly. Rubin (1994) also suggests several techniques, methods, and practices that can be used for the user-centered design. Some of the

examples include participatory design, focus group research, surveys, design walkthroughs, expert evaluations, and usability testing.

7.0 Proposed Web Engineering Process Model

Web-based learning environment needs a disciplined, systematic approach, which focuses on content, learning theories, instructional design, reusability, hypermedia, scalability, maintainability, technical and non-technical aspects and deliver the system as quickly as possible. This is not a shifting process from traditional software development but embedded in the on-line environment, so proper attention and iterative process has to be done between the requirements and design phases, design and implementation phases.

As a result, web-based learning needs a unique process model and some aspects can be incorporated from other existing process model. Firstly, iteration and structured process model has to be identified which deals with change and evolution. Secondly, reuse components has to be identified. Thirdly, more attention has to be given for the requirement analysis and design phases. Finally, the model must incorporate the evaluation of learning and pedagogy models as shown in Figure 2.

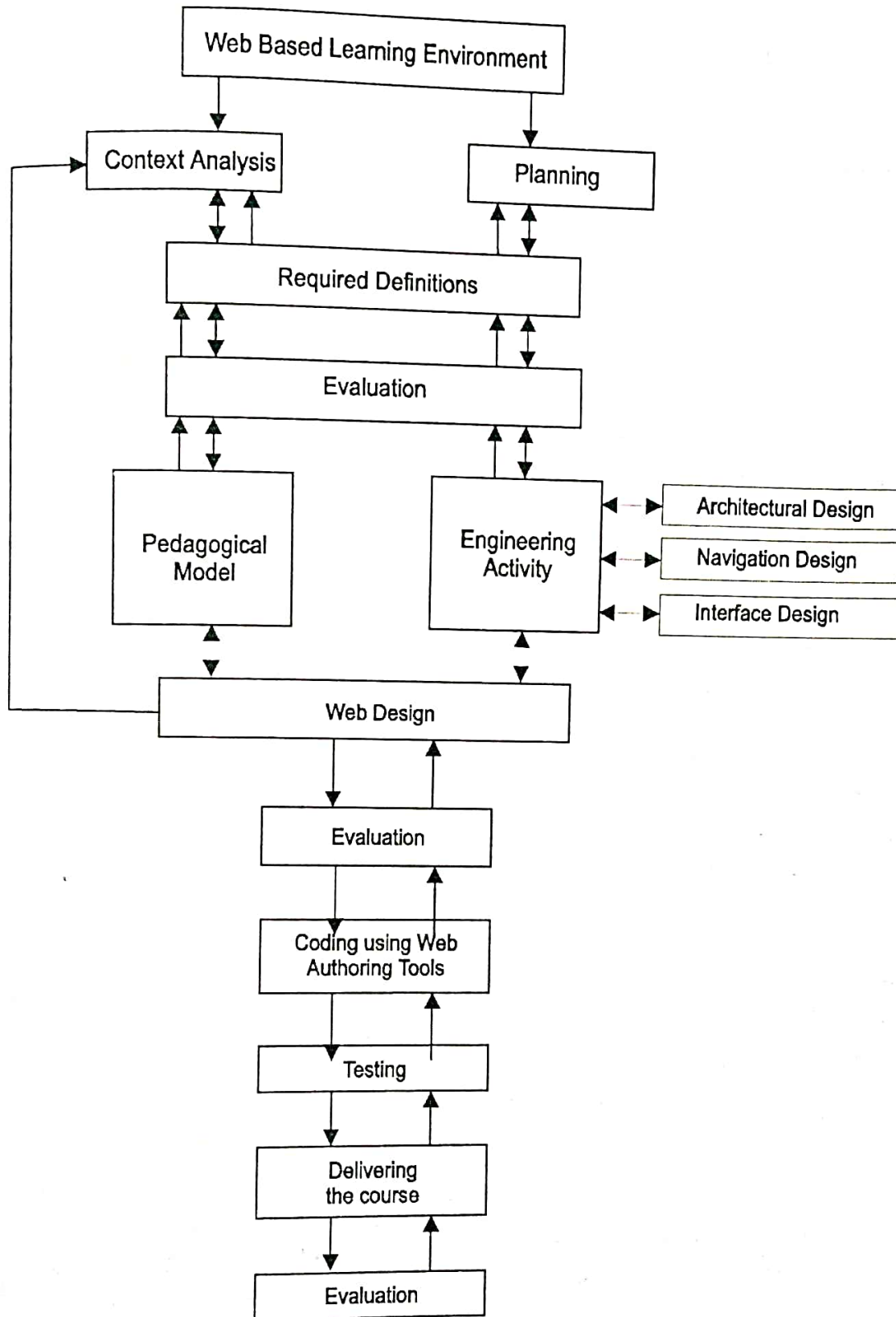


Fig 2. Web Engineering process model

The Web-based learning environment is identified and developed for the subjects in the MCA curriculum, which comes under Anna University, Coimbatore (India).

8.0 Implementation of the Proposed Model

When developing a large web site, there is a need to follow a process. A process will enable us to divide a complex development task into manageable coherent phases. To develop a process model, identify various activities to be carried out and organize these into some logical order.

Primarily understanding the overall environment within which the application will exist is very much essential. This is called the problem domain. For example, if it is an application to deliver education, the problem domain will include issues such as how the education is delivered at present, what new knowledge is available, what are the specific needs to develop a new Web-based application, who are the users and how will it be used, what are the information goal and application goals, technology available and bandwidth used. Thus, the process model should have appropriate activities to produce these components.

Planning is then to be taken up. The overall project costs are estimated and the risks associated with the

development effort are estimated. A detailed development schedule and different experts of stakeholders who may influence the construction of Web-based learning are to be identified.

Information, which is collected from Context and Planning Phases are defined as objectives and it involves gathering information from a range of learners through data collection methods. Technical, Non-technical aspects and system requirements are done using the UML diagrams (Hadjerrouit, 2006).

Formative evaluation has to be done which provides feedback about whether the course achieved its objective.

The learning content is then to be embedded into the on-line environment. Pedagogical model plays an important role for the foundation of learning theory. The suitable combination of behaviorist, cognitive and social constructivism produces a pedagogically strong Web-based learning.

The engineering activity involves both content design and production tasks, including acquiring all the content that is to be included into the Web-based system (e.g., text, graphics, audio, video). Architectural, navigation, and interface design tasks are performed in parallel. These tasks

involve the overall hypermedia structure of the Web-based system and the application of design patterns and templates to populate the structure.

The design phase consists of designing the web pages, architectural design (Linear, grid, Hierarchical, and Structured), learning theory, navigation, interface are considered based on the learner's requirement and formative evaluation is done which provides information on attainment of course objectives.

It consists of merging the content defined in the web design and produces executable web pages in HTML, XML, JAVA, J2EE, Authoring tools and other process-oriented languages. It involves revealing the potential errors caused by applets, scripts, forms or the use of various web browsers using alpha testing and beta testing.

The activity is the actual delivery, which involves not just the physical delivery of the course. The WBT, it means running it off a web server and summative evaluation is conducted at the end of the course to measure the degree to which the course objectives need to be attained.

9.0 Conclusion

This work provides a framework for understanding the challenges, potentialities, difficulties, and

complexity of Web-based learning. So far, the conclusions that can be drawn are as follows:

Developing Web-based learning is a complex matter. Web based learning has a number of components and subcomponents, which include both technical and non-technical aspects. There are methodologies, but few that provide an overarching framework for developing Web-based learning. The methodology presented in this paper aims to provide such a framework. It attempts to provide pedagogical and methodological foundation as prerequisite for effective implementation of Web-based learning.

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ABOUT OUR CONTRIBUTORS

1. Dr. Angeline Sheba Albert, Faculty in Commerce, Women's Christian College, Nagercoil - 629 001.
2. Ms. S. Anita, Sr. Lecturer, Department of Electrical and Electronics Engineering, R.M.K. Engineering College, Chennai 601 206.
3. Ms. Anjana Paira, Research Scholar, Faculty of Education, Visva-Bharati, Santiniketan, West Bengal - 731 235.
4. Shri T. Arun, Research Scholar, Department of Psychology, Chemnitz University of Technology, Germany
5. Dr. S. Dhanapal, Professor & Head, Curriculum Development Centre, National Institute of Technical Teachers Training and Research, Chennai - 600 113.
6. Dr. Geetha Sankar, Reader, Department of Commerce, Ethiraj College for Women, Chennai - 600 008.
7. Dr. B.L. Gupta, Professor, Department of Education Management, National Institute of Technical Teachers Training and Research, Bhopal - 462 002.
8. Dr. G. Kulanthaivel, Assistant Professor, Dept. of Electronics Engineering, National Institute of Technical Teachers Training and Research, Chennai - 600 113.
9. Ms. P. Malliga, Senior System Analyst, Computer Centre, National Institute of Technical Teachers Training and Research, Chennai - 600 113.
10. Dr. B. Mukhopadhyay, Professor & Head, Department of Educational Management and Applied Psychology, National Institute of Technical Teachers Training and Research, Chennai 600 113.
11. Shri N. Narayanasami, System Analyst, Dr. M.G.R. Medical University, Chennai - 600 032.
12. Dr. Panch. Ramalingam, Reader, Academic Staff College, Pondicherry University, Puducherry.
13. Dr. Panjabi Mala Devidas, Reader, Department of Commerce, Ethiraj College for Women, Chennai - 600 008.
14. Shri S. Pradeep Gnanam, Assistant Professor, MCA Department, Sengunthar Engineering College, Tiruchengode - 637 205.

15. Dr. Rajarshi Roy, Assistant Professor, Department of Education, National Institute of Technical Teachers Training and Research, Kolkata - 700 106.
16. Shri R. Rajkumar, Head of the Department, Mechanical Engineering, A.M.K. Technological Polytechnic College, Chennai - 600 107.
17. Dr. S. Renukadevi, Assistant Professor & Head i/c, Department of Education, National Institute of Technical Teachers Training and Research, Chennai 600 113.
18. Shri K.K. Sadasivan, Lecturer, Government Polytechnic, Meenangadi, Wayanad, Kerala 673 591.
19. Dr. T.G. Sambanthan, EDP Manager and Head, Computer Centre, National Institute of Technical Teachers Training and Research, Chennai - 600 113.
20. Dr. R. Santhakumar, Assistant Professor, Curriculum Development Centre, National Institute of Technical Teachers Training and Research, Chennai - 600 113.
21. Dr. P. Sivakumar, Professor and Head, Department of Educational Technology and Multimedia, National Institute of Technical Teachers Training and Research, Chennai - 600 113.
22. Dr. M.V. Srinath, Lead-Instructional Designer, M/s Hicommands Tech India Ltd., Vadapalani, Chennai - 600 026.
23. Dr. S. Sudarssanam, Additional Apprenticeship Advisor to GOI (Retd), 103, West Utra Street, Srirangam, Trichy - 620006
24. Ms. G.N. Sumathi, Research Scholar, Department of Management Studies, Indian Institute of Technology, Madras, Chennai - 600 036.
25. Dr. E.S.M. Suresh, Assistant Professor, Educational Media Centre, National Institute of Technical Teachers Training and Research, Chennai - 600 113.
26. Ms. M. Suryakala, Research Scholar, Computer Centre, National Institute of Technical Teachers Training and Research, Chennai - 600 113.
27. Shri P. Suryakumar, Educational Consultant, Chennai.
28. Dr. V. Thanikachalam, Professor & Head, Department of Correspondence Courses, National Institute of Technical Teachers Training and Research, Chennai - 600 113.

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