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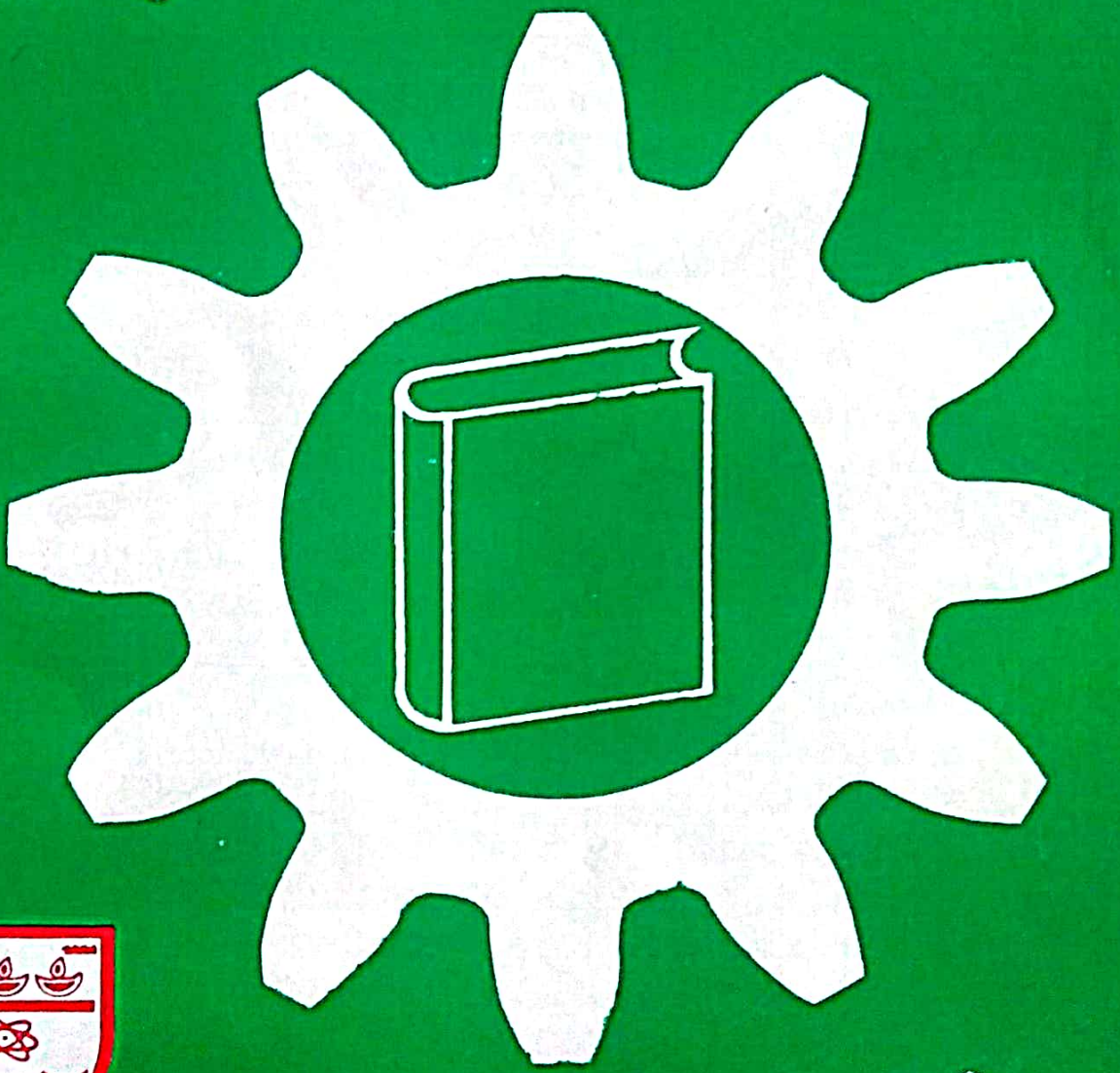

TECHNICAL TEACHERS' TRAINING INSTITUTE

CHENNAI 600113 INDIA

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EDITORIAL

We are glad to inform our readers that the number of issues of the Journal of Technical and Vocational Education increased from 1 to 2 this year and we will try our best to maintain this trend. It was a long cherished dream of our readers. The changing scenario of technical and vocational education in the country for the past few years with the enormous growth of engineering and technical eduction, encouraged us to increase the number of issues. Needles to say, we have been receiving good number of research papers, articles and reports from our esteemed contributors. Publishing two issues per year will enable us to disseminate the thoughts and the ideas of academics, administrators and policy makers in a larger way and to transfer them to all the stakeholders of the engineering-technician and vocational education system. The volume 20, Number 1, 2003, has come up with a variety of articles, research papers and reports which we feel be of great interest to our readers.

Industry Institute Partnership is an important strategy for improving the quality of Vocational and Technical Education. Dr. Khambayat has contributed the abstract of his research work on Enhancing Quality of Polytechnic Passouts in the form of a research paper. The findings of this research wok will be of great use to teachers and administrators working in the field of technical eduction.

Use of multimedia is becoming more and more popular by technical teachers in teaching-learning context due to its impact and effectiveness. Sri Srinath and Professor Brahadeeswaran have come up with "A Model for Development of Quality Multimedia Learning Packages for In-Service Training of Technical Teachers." Work of this kind will motivate trainers to develop training packages in various areas for the training of technical teachers.

Colleagues from overseas countries, especially from Nigeria have been contributing to the Journal of Technical and Vocational Eduction since long. Prof. Abazu in this present volume has contributed her ideas on "Home Economics as a Vocational Education". If this is included in vocational education, she feels, this will meet a felt need of the families and workers in Nigeria. We are glad to publish another article contributed by Dr. Offiong, from the University of Uyo, Nigeria titled "Nigerian Universities and Educating Future Mechanical Engineers" with the hope that this will be of interest to readers from Overseas countries and India.

Professor Ray in his paper on "Priorities in Technician Employability Attributes" has developed a list of attributes which appears to be important both to the technical teachers and to the personnel department of industrial organizations. Technical teachers can take apporiate initiatives in developing these attributes in their students to make them employable diploma engineers. In another attempt, Professor Kuruvilla and Professor Mukhopadhyay through their research work have tried to explore the possibility for the engineering colleges

to become centers for innovation. They felt that full potentialities of the engineering colleges have not yet been exploited by industries in India.

In this volume we are pleased to publish a few articles from the faculty of Polytechnic Colleges in India. Professor Choudhary has presented the article titled "Information Technology and Community Polytechnic Scheme in Arunachal Pradesh". He feels that Community Polytechnic Scheme is definitely going to help the state like Arunachal Pradesh in its development and Information Technology has its important role to play in this regard. From the islands of Andaman and Nicobar, Dr. Naidu and Professor Sundaram have presented their view on the role of World Bank aid in multidimensional development of the two polytechnics in the islands. The paper deals with the issues concerning quality of technical education, along with governance and management of polytechnics.

We have received a few articles and research papers form divergent areas and we are glad to publish four of them. Professor Jaiprakash Narain contributed his ideas on "Human Values in Higher Education". His rich experience in the field of engineering education got reflected in his writing. Professor Kumar and Professor Pal contributed a case study on QoL based on house conditions. Ms. Renukadevi contributed her ideas on "Career Exploration Devices in Information Technology". Sri Kulanthaivel has come up with his ideas on "Establishment of Campus Intranet with Internet connectivity for E-Learning". We feel, these aritcles will be of great interest to our readers.

We sincerely acknowledge the contribution of authors from India and aboard. We welcome research papers and articles for future issues also. The Editorial Board appeals to the academics and readers to come forward and contribute by way of publishing papers, articles and best practices in technical and vocational education to this journal. We welcome any suggestions for enrichment of the effectiveness of the journal.

We thank Mr. G. Kulanthaivel and Ms. S. Renukadevi for going through the proof and discharging other responsibilities which made it possible to publish the journal in time.

– Editor

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Evolving Industry Institute Interaction Strategies for Enhancing Quality of Polytechnic Passouts

RAJESH P. KHAMBAYAT

1.0 Introduction

The linkages between industries and polytechnics are of great importance for improving degree of relevance of contents and delivery of technician education. In the context of the changing global economic scenario and the economic changes that have taken place in our country, there is a greater need to have interaction that is more effective and fine-tuning between industry and institutes. The interaction and tuning between institute and industry is now widely recognized as an essential requirement to train and develop the right kind of technical manpower necessary for sustaining and promoting faster industrial and economic growth.

In this context, the researcher would like to explore the effect of industry institute interaction on the quality of passouts. Further, the study precisely aims at evolving industry institute interaction strategies for enhancing quality of polytechnic passouts.

2.0 Objectives of the Study

The study focused on the following objectives

(i) To study the present status of industry institute interaction in selected polytechnics

(ii) To identify factors significant for facilitating intensive interaction

(iii) To identify potential obstacles (hurdles) in intensifying industry institute interaction

(iv) To determine the influence of industry institute interaction on the overall performance of an institution

(v) To determine the contribution of industry institute interaction on enhancing the quality of polytechnic passouts

(vi) To evolve industry institute interaction strategies for enhancing quality of polytechnic passouts

3.0 Delimitation

(i) The study was limited to polytechnics situated in the state of Maharashtra, Madhya Pradesh and Gujarat of Western Region.

(ii) The research work was limited to Diploma in Mechanical Engineering discipline.

4.0 Population

Population comprises of autonomous and conventional polytechnics of Western Region

in particular and of India in general. The sample include urban and rural polytechnics where industry institute interaction activities to have started. Similarly, all those industries, which are interacting with polytechnics, are also considered.

5.0 Sampling

It is assumed that the intensity of industry institute interaction (I.I.I.) activities is influenced by the distance of the polytechnic from industrial area, whereas the intensity of interaction influences the quality of passouts. Purposive sampling was used to decide the sample. The criteria used for deciding the sample is as follows,

5.1 Polytechnics

(a) The location of polytechnic with respect to distance from industrial estate/area. It included polytechnics located within 10 km from industrial area and above 50 from industrial area.

(b) Conventional/Autonomous (Rural/Urban) polytechnics.

(c) Polytechnics offering Diploma Programme in Mechanical Engineering.

5.2 Industry

The sampling of industry was based on the following selection criteria,

(a) Industrial organizations from different sectors such as private/public/state are included in the study.

(b) Depending on their main products/services e.g. automobile, fabrication, steel, machine tools, energy etc.

(c) Geographical location

(d) Industries employing polytechnic passouts.

6.0 Research Instruments used.

The following instruments were used for collecting data:

(a) Questionnaire-1 (Respondent: Training and placement Officer)

(b) Questionnaire-2 (Respondent: Principal)

(c) Questionnaire-3 (Respondent: Head of Department (Mechanical))

(d) Questionnaire-4 (Respondent: Industry Personnel)

(e) Questionnaire-5 (Respondent: Polytechnic Students)

7.0 Details of Respondents

The data was collected from the following respondents:

STATE	PRINCIPAL'S	TPOs	HODs	INDUSTRY	STUDENTS	TOTAL
Maharashtra	08	08	08	15	80	119
Madhya Pradesh	08	08	08	13	80	117
Gujarat	08	08	08	17	80	121
Total	24	24	24	45	240	357

0.8 Findings and conclusions

OBJECTIVE:1 To study the present status of industry institute interaction in selected polytechnics.

(A) Present Status of I.I.I. in Western Region

- Increase in percentage of polytechnics organizing industrial visits.
- Increase in number of campus interviews held and number of students selected.
- Increase in number of students benefited through industrial training.
- Increase in percentage of polytechinics arranging expert lectures.
- Increase in percentage of polytechinics arranging industrial training of teachers and staff in western region.
- Increase in utilizing apprenticeship-training opportunity by polytechnic passouts.
- No. of EAP's and No. of students participated and No. of hours devoted is higher in polytechnics located with in 10 km (industry).
- Increase in the degree of involvement of industry personnel in students' evaluation.
- Forty two percent of polytechnics are assigning industry based project work to final year students.
- No. of continuing education programmes organized in polytechnics within 10 km is higher as compared to polytechnics located above 50 km from industry.
- Only 29% polytechnics are undertaking consultancy work for industries.
- Significant involvement of industry in curriculum development in polytechnics located within 10 km from industry .

(B) Status of I.I.I. Index

- Autonomous polytechnics have better I.I.I. Index as compared to conventional polytechnics.
- Polytechnics with large faculty strength, students's intake are having higher I.I.I. Index.
- Polytechnics with advisory committee to I.I.I. Cell have higher I.I.I. Index.
- MH-Highest I.I.I. Index, MP-lowest I.I.I. Index.
- Polytechnics with regular TOPs have higher I.I.I. Index.
- Polytechnics with large faculty having undergone industrial training have better I.I.I. Index.
- Polytechnics located within industrial area have higher I.I.I. Index.

OBJECTIVE:2 To identify factors significant for facilitating intensive interaction.

(A) Managerial Aspects

It is found that the rank order distribution (i.e most to least importance) is as follows.

(i) Leadership of the Principal

(ii) Initiative of Head and faculty

(iii) Good Team work

(iv) Industrial experience of faculty

(v) Participative decision making

(B) Resource Aspects

It is found that the rank order distribution (i.e. most to least importance) is as follows.

(i) Proximity to industrial estate

(ii) Adequate financial resources

(iii) Adequate faculty and supporting staff

(iv) Provision of separate vehicle

(v) Autonomy to the institute

(C) Process Aspects

The rank order (i.e. most to least importance) is as follows.

(i) Curriculum designed as per industry needs

(ii) Provision of industrial training to faculty and supporting staff

(iii) Sandwich pattern of the programme

(iv) Provision of industry based projects

(v) Consultancy work for industry.

It is concluded that the present status of facilitating factors in the polytechnic is as follows.

(a) The present status of managerial aspects i.e industrial experience and participative decision-making are below average.

(b) It is inferred that all the resource aspects are below average. The autonomy is given to selected polytechnics and it is limited to academic autonomy. No polytechnic is awarded complete autonomy.

(c) In Gujarat, all the facilitating factors are below average.

(d) In Maharashtra, all the process aspects are below average.

(e) In Madhya Pradesh, all the resource aspects and process aspects of facilitating factors are below average.

OBJECTIVE:3 To identify potential obstacles (hurdles) in intensifying industry institute interaction

(A) Managerial Aspects

The rank order (i.e. most to least importance) is as follows.

(i) Lack of planning for interaction

(ii) Lack of initiative by Head of department

(iii) Roles of Training and Placement Officer not clear.

(iv) Inadequate policy support

(v) Goal of interaction not explicit

(B) Resource Aspects

The rank order (i.e. most to least importance) is as follows.

(i) Shortage of faculty and staff

(ii) Communication facilities inadequate

(iii) Training to faculty improper (not result oriented)

(iv) Lack of financial resources

(v) Information about industries not available

(C) Process Aspect

The rank order (i.e. most to least importance)

(i) Adequate time not available for industry interaction.

(ii) Lack of industrial exposure to faculty

(iii) Poor support from industry personnel

(iv) Students not interested in industry related project

(v) Innovative ideas are not supported by institute

It is concluded that the present status of potential obstacles (hurdles) in the polytechnics is as follows.

(a) All the managerial aspects are found rated below average in polytechnics.

(b) Major obstacles (hurdles) in resource aspects in most of polytechnics are having shortage of faculty and staff and lack of adequate financial resources for organizing industry institute interaction activities.

(c) In Maharashtra, all the resource aspects of potential obstacles (hurdles) are below average. In addition, the average I.I.I. Index is higher as compared to Gujarat and Madhya Pradesh

(d) There is no provision of time for interaction with industry in academic planning by polytechnics.

OBJECTIVE: 4 To determine the influence of industry institute interaction on the overall performance of an institution.

- Autonomous polytechnics have higher Overall Performance Index (O.P.I) as compared to conventional polytechnics.
- Proximity to industrial area helps the polytechnics in improving their O.P.I.
- Gujarat-highest O.P.I Madhya Pradesh-lowest O.P.I.
- Polytechnics with large faculty strength have higher O.P.I
- Polytechnics with large faculty having industrial experience have higher O.P.I.
- Polytechnics having regular TPO have higher O.P.I

The correlation between I.I.I. index and Overall Performance Index (by using products moment correlation method):**There is a positive correlation between I.I.I index and Overall Performance Index.**

OBJECTIVE: 5 To determine the contribution of industry institute interaction on enhancing the quality of polytechnic passouts

- Quality index of conventional polytechnic has a slight edge over the autonomous polytechnics.
- State with higher I.I.I. Index too have higher Quality index.

Polytechnics located within 10 km from industrial area have higher Quality index.

- Polytechnics having regular TPOs have higher Quality index.
- Polytechnic with large faculty undergone industrial training have higher Quality index.
- Industrial experience of faculty helps improving interaction with industry, which in turn results in higher Quality index.

The correlation between I.I.I. index and Quality index (by using product moment correlation method): **There is a positive**

correlation between I.I.I. index and Quality index.

OBJECTIVE: 6 To evolve industry institute interaction strategies for enhancing quality of polytechnic passouts

The salients finding are summarized as follows.

1. Training in industry must be made compulsory before awarding diploma certification.
2. Active participation of industries in continuous renewal of the curricula and in its implementation.
3. Infrastructure facilities such as computer, telephone, duplicating equipments, vehicle should be made available to industry institute interaction cell and strengthened by adequate financial inputs.
4. Convert existing diploma programme into sandwich pattern.
5. Vocational training of 3 weeks should be introduced during last semester of diploma programmes.
6. Depute polytechnic teachers for industrial training frequently for industrial exposure.
7. Granting more autonomy to the polytechnics.
8. Exchange of faculty and industry personnel.
9. Training and placement officer should be appointed with sufficient supporting staff in the polytechnic.
10. Encourage industry to adopt polytechnics.
11. Need for State policy to support industry institute interaction.
12. Make provision of allocating fixed time for industry institute interaction in an academic timetable of institute.
13. Organise frequent industrial visits with specific objectives.
14. Arrange guest lectures of Experienced Professional from industries for sharing practical experiences with students.

9.0. Recommendations

Industry institute interaction is crucial for enhancing the quality of passouts and to bring more relevance to technical education. The recommendations are given below.

1. For establishing effective linkages with industry, a **Training and placement officer must be appointed in each polytechnic.**
2. It is observed that in spite of WBAP, in some of the polytechnic, I.I.I. Cell has not been established. Necessary steps should be taken to **establish I.I.I. Cell in all polytechnics.**
3. Till the time of data collection more than 50% polytechnics lacked in infrastructure facilities e.g. computer facility, telephone, vehicle, etc including appropriate place in some polytechnics. Based on this, it is recommended that suitable action should be taken to **ensure that industry institute interaction cell be provided with adequate facilities and becomes effective.**

4. The study has clearly revealed that wherever there is advisory committee the linkages are more effective and benefiting to students. Therefore it is recommended that **advisory committee to industry institute interaction cell be made compulsory** with representation from industry, commerce, professional bodies etc. It is expected that this committee meet bi-annually and advice I.I.I. cell on matters pertaining to education and training pertaining to student and faculty. Using their good offices cooperations/assistance from industry can be forthcoming.

5. The study revealed that wherever autonomy was given it has resulted in better linkages with industry. Therefore, **for enhancing industry institute interaction the polytechnics should be given more autonomy.** This will give flexibility to polytechnics in designing curriculum.

6. The finding of the vacancy position of faculty and staff has revealed that in most of the polytechnics the positions are lying vacant. For carrying out industry institute interaction activities, adequate faculty and staff are necessary. Therefore, **state directorate should take necessary step to fill up vacant positions of faculty and staff.**

7. It is observed that majority of TPOs have not undergone the basic training in training and placement skills. The directorate in consultation with TTTI's or similar training organisations should organise **relevant staff development programmes for TPOs.**

8. Findings indicate that complete data regrading the employment status of passouts is not available with most of the polytechnic. Therefore, **in each polytechnic a mechanisms using data base management should be developed to collect data and update records of passouts.**

9. Most of the respondents have suggested **converting diploma into sandwich pattern.** This comes under the state policy. The states may consider this.

10. It is recommended based on responses that the existing **curriculum should be periodically reviewed and modified to meet the changing requirements of industry in the region.**

11. Regular visits to industry and arranging expert lectures have been suggested, taking vacant position of faculty into consideration and the advancement of information technology. Therefore, it is recommended that **use information technology extensively as a potential tool for sharing of information, resources and expertise available with both industry and polytechnics.**

12. It was also observed that in most of the polytechnic information about industries is not available. **A database of industries needs to be developed at institute level. If this is developed state polytechnic as well as regional polytechnics can share and update their database of industries. It will further facilitate polytechnics in organizing various activities of I.I.I**

13. The state directorate should encourage **industrial houses to adopt polytechnics** located nearby. This will help in all round development of the polytechnic, with also benefits to industry.

14. At regional level, a **mechanism needs to be developed for exchange programmes** consisting of deployment of the service of personnel at various compatible levels between industry and institute to achieve closer linkages with industry.

15. Currently industrial training of students is not compulsory as part of curriculum. Considering its importance, it is recommended that such **training should be made as an integral and effective part of the curriculum with weightage in overall evaluation.**

16. A **state level policy support** needs to be developed for promoting industry institute interaction in polytechnics.

17. The HODs in consultation with TPO should make **provision for I.I.I. activities in the academic timetable** of **the polytechnic.**

18. The findings indicate consultancy is not taken for industrial problem solving. The reasons/causes may be looked into.

A Model for Development of Quality Multimedia Learning Packages for In-Service Training of Technical Teachers

M.V. SRINATH and D. BRAHADEESWARAN

For improving the quality of technical teacher training programmes it is necessary to use innovative models like Computer Based Multimedia Learning Package (CBMMLP). Based on their experience in developing CBMMLPs for in-service training of technical teachers the authors have developed a model for the development of CBMMLPs. This paper highlights the attributes of CBMMLP, characteristics of effective CBMMLP design and the various steps involved in development of CBMMLPs. It is expected that the paper will be highly useful for those interested in developing CBMMPs for the training of teachers.

1.0 Introduction

The widespread use of computers in all sectors and at all levels of education has carved a new path for learner centered and learner directed education. Morariu (1998) has rightly stated that the dream of creating information-rich and learner directed instructional environments is becoming a reality.

2.0 Need for In-Service Training of Technical Teachers

According to National Policy on Education (NPE, 1986), "The status of the teacher reflects the Socio-Cultural ethos of society and no people can raise above the level of its teacher." The effectiveness of the educational system largely depends upon the competence of its teachers.

The large-scale privatisation of higher education in general and technical education in particular has lead to the opening of a large number of Engineering Colleges. As on Year 2002, there are 1208 Engineering Colleges and 1224 Polytechnics in India. (http://www.aicte.ernet.in).

Due to the manifold expansion of Engineering Colleges, there is an acute shortage of trained technical teachers with pedagogical competencies. Technical teachers may have adequate knowledge in subject matter, but they lack exposure to knowledge and skills in pedagogical areas. The technical teachers of Polytechnics at Diploma level are given exposure and training in various pedagogical aspects through various in-service programmes by the 4 TTTI's. Recently TTTI's have started conducting short-term training programmes on pedagogy for Technical teachers from Engineering Colleges also.

In order to improve the quality of technical education it is necessary to train the technical teachers on pedagogical aspects at the time when they initially join the profession

as well as at periodical intervals during their service.

3.0. Computer Based Multimedia Learning Package (CBMMLP)- Advantages

Technical teachers have different working conditions, learning styles backgrounds. There are numerous limitations that prevail in the present context and methods of in-service training of technical teachers viz.

1. Over the years, it has been observed that large-scale vacancies exist in the faculty position of Engineering Colleges and Polytechnics. This limits the ability of the institutions to sponsor teachers for full-time in-service training programmes.

2. Teachers find it difficult to attend training programmes outside their place of work; further travel, boarding and lodging costs are to be incurred for such training.

3. Because of the above difficulties, the percentage of teachers trained in an institution is very low. As a result, the application of the training in the actual field situation of the teacher is very insignificant.

The reasons listed above, necessitate the use of CBMMLPs for increasing the reach of in service training programmes targeted on technical teachers.

As the teachers can learn at their own place and pace, CBMMLP gives flexibility to learners, which is a must for quality learning. Further, CBMMLP ensures consistent quality of training.

4.0 Attributes of CBMMLP

CBMMLP integrates all the media elements with the help of Multimedia hardware and software by applying the principles of instructional design to provide a learning system.

The CBMMLPs are being developed as an interactive multimedia CD-ROM which will act as a resource support for training of technical teachers.

5.0 Characteristics of an effective CBMMLP Design

The important characteristics that should be ensured while planning and developing a CBMMLP for effective utilization by the target population are listed below:

1. Media types chosen be based on the learning objectives.

2. A variety of media elements and technologies that speed up the learning and improve learner's performance have to be incorporated.

3. Ample opportunity should be given for the user to interact with the information.

4. Should respond to the users input appropriately and should also provide meaningful feedback to user input.

5. Linear thinking and design should be avoided. CBMMLP design should allow the user wherever s(he) chooses to begin and end.

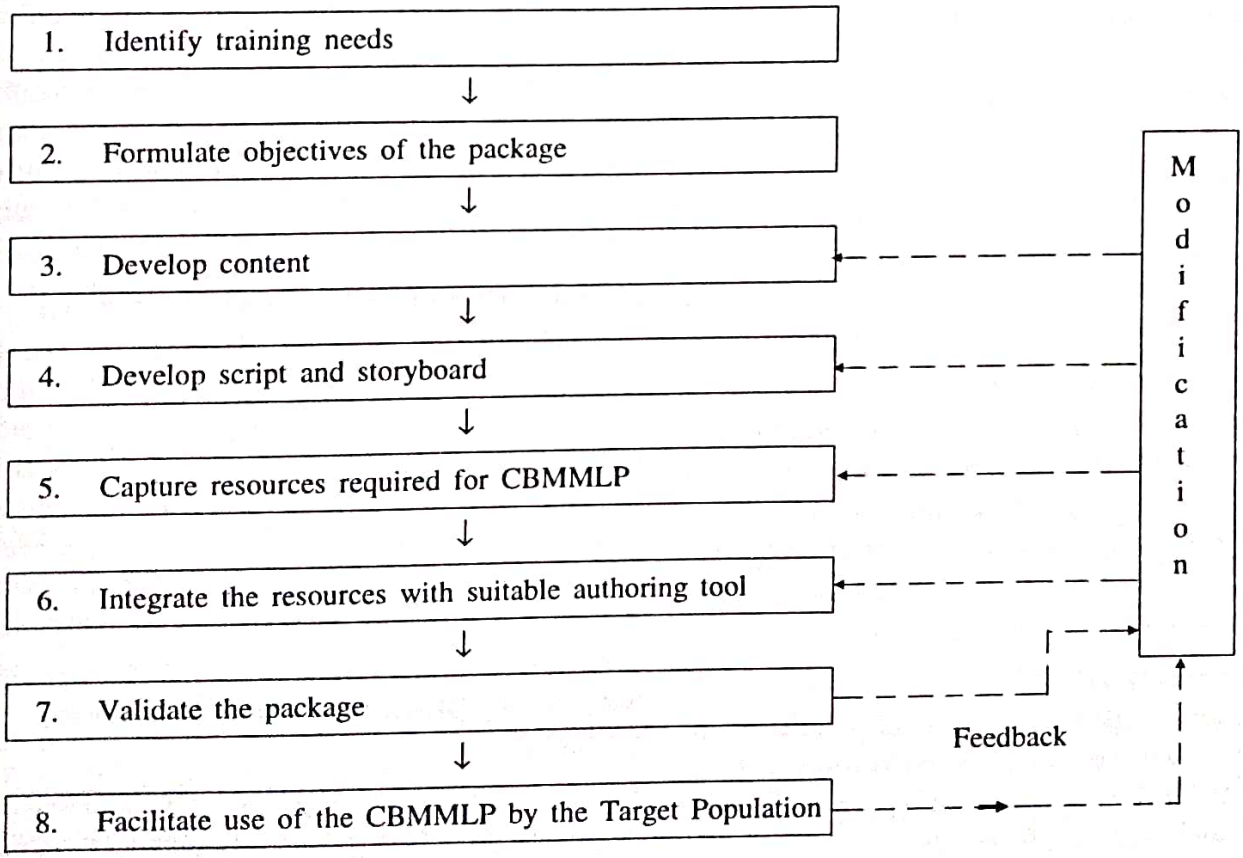
6. Instructionally insignificant, annoying or degrading content or feedback should be avoided.

7. Automatically timed screen changes must be avoided, unless those changes are timed to follow an audio script.
8. Easy access to a glossary throughout the learning event has to be provided.
9. The aesthetics of a screen design should not be allowed to compete with the message of the learning content.
10. Screen and text colours should be based on objective criteria and used consistently throughout the package.

6.0 A Model for Development of CBMMLP

To develop a quality CBMMLP, it is necessary to adopt a systematic approach. The Model suggested for the development of CBMMLP is shown in figure 1:

Fig 1 Model for the Development of CBMMLP



6.1 Steps involved in the development of CBMMLP.

Step 1: Identify Training Needs

The CBMMLP for in-service training of technical teachers should aim at improving the quality of teacher's performance and should be based on felt needs of technical teachers. Professional development needs may be categorized as follows:

1. Content knowledge related needs

Content knowledge related needs consists of an understanding of key facts and concepts, principles and explanatory framework in the discipline and rules of evidence and proof within the discipline. Content enrichment programmes through in-service training may equip the teachers to review gaps in their knowledge domain.

2. Pedagogy related needs

Pedagogical knowledge refers to knowledge about art and science of teaching. But a teacher's quest about resolving day-to-day teaching-learning problems is not being satisfied by his/her existing level of pedagogical knowledge. He/she has to cope with the fast changing trend from teacher centred to learner centered approaches.

3. Context related needs

Training in these areas correspond to the application of the acquired competency with regard to a specific instructional setting. Those contexts in which a acquired competency can be applied are hardly addressed in existing in-service training programmes.

4. Awareness related needs

These needs are generally related in creating awareness and to sensitise teachers at different levels of education on emerging pedagogies and policy issues.

Out of the four needs "Pedagogy related needs" is one of the most important component of in-service training of technical teachers and hence the pedagogical competencies required for technical teachers should be identified by doing a training need analysis and based on the training need analysis the content for the CBMMLP has to be finalised.

Step 2: Formulate objectives of the package

The specific instructional objectives of the package have to be formulated by taking into consideration the prioritised training needs of technical teachers

Step 3: Develop content

Appropriate content (Topics and teaching points) for achieving each of the specific instructional objectives have to be identified. Review of relevant books, reference manuals and discussion with content experts will help to identify the content, structure it and sequence it properly. In addition a rough visualisation of the content into a sequence of visuals, images and graphics may be made with the help of discussion with the content experts.

Step 4: Develop Script and Storyboard

During this step the developed content is converted into a script by splitting the content into suitable frames containing audio and visual components. Then a storyboard should be developed that has the following components such as audio, visual, picture, effects, time, sound, text on screen and browsing functions that are to be included in the package.

Step 5: Capture resources required for CBMMLP

The resources required for CBMMLP like digital photographs, scanned images, video clippings, animations, graphics images, audio and sound have to be captured with suitable equipments and tools like scanner,

digital camera, digital video camera, digital microphone and video grabber card based on the developed stroyboard.

Step 6: Integrate the resources with suitable authoring tool

In this step collected resources will be integrated with the help of suitable authoring software. Process of integrating the various multimedia elements with the help of software is called as authoring. There are many multimedia authoring software like Author ware, ToolBook, Director etc., Selection of a particular authoring tool to author a CBMMLP is based on ease of use by the multimedia programmer and the features provided by a particular software that suits the CBMMLP development.

Step 7: Validate the package

The developed package has to be tested for identification of problems in execution, presentation strategy, logical sequencing and synchronisation of visuals and sound and its interactivity. The extent of achievement of the objectives of the package by the learners can be taken as a measure of validity of the package.

Feedback collected based on validation should be incorporated by making necessary modifications at the appropriate steps of CBMMLP development as shown in Fig 1.

Step 8: Facilitate use of the package by target population

After making appropriate modifications the CBMMLP has to be burnt on a Compact Disk (CD) and has to be distributed to the target population along with a user manual in order to facilitate the utilisation of the package.

8.0 Conclusion

Computer based learning has brought about a convergence between learning, networks, new technology and the new economy. The model suggested in this paper for developing CBMMLP will be useful for developing training packages in various areas for the in-service training of technical teachers and thus contribute to the enrichment of the quality of technical education system.

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Home Economics as a Vocational Education (The Nigerian Experience)

HELEN U. ABAZU

Abstract

Home Economics in its most comprehensive sense is the study of the laws, conditions, principles and ideals which are concerned on the one hand with man's immediate physical environment and, on the other hand with his nature as a social being, and is the study especially of the relation between these two factors.

In its narrowest sense the term is the study of the practical application of empirical science as it concerns house work, cookery, sewing, laundry, house care and child care. Today, with high standard of education, advanced homes with highly sophiscated equipments, different kinds of foods and textiles thrown into them by modern technology and science, Home Economics has become very broad indeed. It utilises other disciplines in its scientific applications in solving the physical, social and economic problems of families the world over.

Introduction

In earlier times, the content of Home Economics Programmes was limited to the teaching of simple domestic skills - needlework and cookery. A much broader concept of Home Economics Education is now in vogue.

Newman (1976) stressed that a well planned Home Economics Programme is concerned with a wide range of activities of importance to the society, and includes the following:

- training and care of children
- producing and preserving and using food
- making and care of clothing and other household articles.
- health and sanitation
- improving the physical environment of the home
- home management and the wise use of all available resources.
- making a contribution to the financial or other resources of the family.

Presently, a much more professional cum vocational frame of reference for Home Economics is being stressed. The intention is to be able to fulfil present day requirements for the modern woman to function, both as a family person and as a wage earner servicing the various openings now technologically available. These make it possible for present Home Economics programmes to stress in-puts necessary for services in the health education sector; social and family welfare; in school education; agricultural extension; community development; medical services; and many

facets of industry. To provide for these numerous expectations, the programme should equip Home Economist with the training and information they need to function well.

What is Vocational Education?

Griffith (1977) says that Vocational Education is that part of education which makes an individual more employable in one group of occupation, than in another. It may be differentiated from general education, which is of almost equal value regardless of the occupation to be pursued. There are three basic objectives of any vocational education programme, namely; meeting society's needs for workers; increasing the options available to each student, and serving as a motivating force to enhance all types of learning.

The earliest and most widely accepted objective of vocational education was to provide a mechanism for meeting the needs of the local community for people with skills who can exist on their own.

Overview of Vocational Home Economics

Agwasin and Yaroson, (1986) stressed that today, the needs of the nation and society as a whole are as important, if not more important; society is gradually recognising that consumer education and home-making education of high quality are essential to the survival of the family. The need for adequate and properly articulated Home Economics education programme can be visualised when it is realised that in some countries, Home Economists are part of the world of commerce; they can be traders and so can handle cash; in some areas they are the producers of cash crops, and in others only of food for themselves and their children. In many others, they formulate and direct industrial and managerial policy and are an important link between industry and consumption.

Lee (1979): Home Economics education includes: Formal education in which Home Economics teachings are integrated into the curriculum of the schools at primary, intermediate and higher levels. The inclusion of Home Economics subject matter in primary schools is particularly important in that it then reaches many girls who will not receive further formal schooling and who will very soon become housewives and mothers in a position to contribute to the welfare of their own families.

Providing Skilled People

The oldest method of meeting for the skilled people was the father to pass on to his sons and for the mother to pass on to her daughters the occupational information they themselves had acquired from their parents with what they had learned by trial and error during a generation of productive work.

But when technological revolution, such as the substitution of agriculture for hunting occurred, the transmission of the family heritage was no longer a satisfactory method of creating educated workers in the newly generated occupations. People then needed on the job training, apprenticeships, schools which were the nearest method for the society to provide occupational skills. At present almost every skilled technical professional occupation induct a part of its workers through formal school programmes.

Haskew and Tumlin (1973) identified areas where a critical shortage of workers capable of performing well in semi skilled, clerical, sales, and technical occupations exist. There are the occupational fields with which vocational education is most concerned.

Recommendations

1. It is recommended that for Vocational Home Economics to serve the work

needs of the society effectively, a way must be found through which the acquisition of vocational skills could be made. Tumlin and Haskew (1973) held that workers learned the skills necessary for success in an occupation in various ways:

- Vocational education in secondary schools and post secondary schools.
- apprenticeships
- on-the-job training
- proprietary vocational schools
- military training
- correspondence schools
- trial and errors, observation and other methods.

2. Home Economics education should also be responsible for reaching families through informal methods of education such as is possible through adult education programmes, community development, extension services, social welfare, maternal and child health programmes. In this type of informal method, Home Economics education is grafted onto existing services; for example, health education with emphasis on personal and community health, nutrition and child care undertaken by the health service division instruction, food production given by the members of the agricultural and veterinary extension services.

The advantages of this system are immense for example:

(a) the potential clientele of this informal education programmes form a large portion of the work force in rural area.

(b) the subject matter of informal education emphasises the practical type of education relevant to daily living.

(c) the utilization of local volunteers in formal education programmes makes it very economical.

Conclusion

In the Nigerian situation, meeting the needs of the families and workers should be the objectives of Education.

This has arisen from the serious financial handicap of the country which makes white collar jobs no longer satisfactory. The talents of people are now viewed as instrument of corporative welfare, as tools for advancement of mankinds triumph over nature, as resources to be exploited fully least the economy collapse. Nigerian families will never deny themselves the importance of vocational education.

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An Industrial Survey on Priorities in Technician Employability Attributes

SIDDHARTHA RAY

Conflicting views have been expressed about the right mix of knowledge, skill and attitude in designing curriculum for Diploma Level Technician Education. However, there seems to be no disagreement on the view that the curriculum should be market driven *i.e.*, employment oriented.

Keeping above in view an exercise was taken up to find out what are the perceptions of actual employers about the desired qualities/attributes for employment of a fresh diploma engineer.

An opinionnaire consisting of a fairly long list of thirty-one (31) attributes/qualities required of a fresh diploma engineer by industries for employability was prepared. The attributes covered both technical knowledge and skill as well as other attitudinal and human relation components. List of these attributes, as sent, is shown in the first column of the table included as Annexure.

The opinionnaire was mailed to total 50 practicing managers (top and middle level), whose opinion matters in recruitment of technical personnel in their respective organisations, working in different large and middle scale industries in and around the city of Calcutta, with a request to prioritize the attributes on the basis of their importance as perceived by them. Totally 27 responses were received.

The responses were processed and the attributes/qualities were arranged rank wise, as prioritized by the respondents. Rank wise priorities are exhibited in column-2 in the same table (Annexure).

The first-six attributes of the prioritized list are:

1. Technical knowledge
2. Analytical approach
3. Technical aptitude
4. Logical Thinking
5. Self confidence
6. Communication skill

While the last six attributes, read from bottom of the list are:

1. Extra curricular activity
2. Measurement and calibration skill
3. Drafting through CAD
4. Maintenance skill
5. Machine operation skill
6. Ambition

Detailed analysis shows that 14 out of 27 respondents (>50%) have rated *Technical Knowledge* as priority number one while 4 respondents (~15%) have rated the same attribute as priority number two. Following table shows ratings of respondents on the first 6 ranked attributes.

Attributes	% of respondents and their priority rating		
	Priority 1	Priority 2	Priority 3
1. Technical knowledge	50	15	-
2. Analytical approach	11	11	15
3. Technical aptitude	7.5	22	15
4. Logical thinking	11	7.5	11
5. Self confidence	3.7	-	15
6. Communication skill	-	11	3.7

Measurement & Calibration Skill, Drafting through CAD and Maintenance skill occupying positions amongst the lowest priority block is quite surprising and in contrast to general belief that Diploma curriculum should be skill based. The possible explanation of this could be:

Large and middle scale Industries generally do not depend on practical training skill building at the institution level. They expect to train up the technically sound freshers in the desired skill(s).

As an extension of this survey work, a further survey is proposed among the small to small-medium sized industries, who do not have in-house training facilities, to ascertain their views on importance of possessing hard skills by the fresh diploma engineers.

ANNEXURE

As Sent List		Ranked List	
Sl.No.	Attributes	Rank	Attributes
1.	Communication Skill	1	Technical Knowledge
2.	Smartness/Presentability	2	Analytical approach
3.	Self Confidence	3	Technical Aptitude
4.	Analytical approach	4	Logical Thinking
5.	Technical Knowledge	5	Self Confidence
6.	Computer Literacy	6	Communication Skill
7.	Machine Operation Skill	7	Presence of Mind/Intelligence
8.	Maintenance Skill	8	Team Spirit
9.	Observation Skill	9	IQ
10.	Drafting through CAD	10	Flexibility (w.r.t. job profile, work place etc.)
11.	Management Capability	11	Learning-to-learn attitude
12.	Leadership Skill	12	Initiative
13.	Team Spirit	13	Reliability under Pressure
14.	Logical Thinking	14	Quality Consciousness
15.	Flexibility (w.r.t. job profile, work place etc.)	15	Creativity/Innovation
16.	Learning-to-learn attitude	16	Task Orientation
17.	Entrepreneurship	17	Human Relationship
18.	Ambition	18	Observation Skill
19.	Extra Curricular Activities	19	Smartness/Presentability
20.	Quality Consciousness	20	Computer Literacy
21.	Technical Aptitude	21	Comprehension Capability
22.	Measurement & Calibration Skill	22	Leadership Skill
23.	Presence of Mind/Intelligence	23	Management Capability
24.	Human Relationship	24	Entrepreneurship
25.	Task Orientation	25	Politeness
26.	Politeness	26	Ambition
27.	IQ	27	Machine Operation Skill
28.	Reliability under Pressure	28	Maintenance Skill
29.	Initiative	29	Drafting through CAD
30.	Comprehension Capability	30	Measurement & Calibration Skill
31.	Creativity/Innovation	31	Extra Curricular Activities

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Can our Engineering colleges become the cradle for innovation in industry?

V. JOB KURUVILLA and B. MUKHOPADHYAY

I. Introduction

Indian industry is in need of engineers who can think holistically, who can innovate, work in teams, who can integrate environmental and social values and ethics in to their work. Are we graduating students with thinking skills required by the Industry to succeed in the global environment of this century?

Despite having the largest pool of Technical manpower in the world, India's share in patents is negligible. Our share of patents filed in the US is 1/50th of those filed by South Korea, Taiwan, and Israel and 1/1000th of those filed by Germany. Over 70% of patent applications filed in India are by foreigner! Indian industry is heavily dependent on foreign technology. Ninety five percent of the country's industrial production is based on imported technology. With liberalization sweeping the country, many MNCs are setting up their manufacturing facility in the country, thus eliminating the need for technology transfer to Indian companies. The only way to face this challenge is to follow the Japanese example of 60s, Innovate, emulate and compete with the best in the world. It is for this purpose that we need a Paradigm shift in our Technical education.

II. R & D Activities in India

A brief review is given here to evaluate the contribution of Various Institutions in India in R &D activities. Universities and Institutes of Science & technology are engaged in discipline oriented academic research, mostly funded by Government. Barring a few centers of excellence (TIFR, IIT, IISc, and a couple of central Universities) the bulk of the research programmes in this class carry no direction or relevance and are done in poorly equipped laboratories. On the other hand, Industry rarely collaborates with these Institutions and if at all they do, it is for Reverse engineering, i.e., a product is there, and process innovation is carried out to meet the challenge of the existing project. The following data shows the expenditure incurred by Indian industry for R & D during year 2000-01

R & D Expenditure by Companies as percentage of Sales

Company	Sales%	Amount (Rs Crore)
Seven Tech.	91.7	11.5
Ramco	19.1	23.0
Glenmark	12.0	23.1

Company	Sales%	Amount (Rs Crore)
Hushes Soft	10.0	19.8
Cadila Health	7.9	40.4
Torrent Pharma	5.3	21.8
Shyam Tele	5.2	11.0
Bharat Elec.	5.2	89.3
Lupin	4.9	44.2
Unichem Labs	4.4	11.0
Telco	1.1	90.5
BHEL	1.3	86.3
ONGC	0.3	82.2
IOC	0.1	78.0
Bajaj Auto	1.7	61.0
SAIL	0.3	51.8
ITI	2.2	48.0
RPL	0.1	45.1

As per the data collected by CMIE, the expenditure incurred by the Indian Business is a minuscule 0.32% of sales. Among the largest spenders, public sector companies are on top. India's top most Private Company, Reliance, spent hardly 0.1% of their sales on R&D. No wonder that they have neither funds nor faith in Academic Institutions for carrying on the research work.

Role of National Laboratories

These laboratories are carrying out project oriented research programmes, and number of Industries associate with them for developing technologies or for solving their manufacturing problems. However, they have not made much of an impact, in the national Economy, mostly because they are focused on Import substitution, an area mostly irrelevant in the present liberalization. However great contributions are made by other Govt. controlled organizations like BARC, ISRO, C-DAC, DRDO etc, who were given time-bound, mission oriented projects to accomplish specific goals. Some of them tried to sell their spin off technologies to entrepreneurs, with limited success. May be this is an area, that engineering colleges can look forward, for entrepreneurial development, but a very wide gap exists between these giants and Academic institutions to have a beneficial interaction.

III. Role of Engineering colleges in Industrial Development

In the above scenario, what could be role of engineering colleges? Should they focus on research?

To answer the above question, we should have a clear understanding on R&D activities in industry. Research & development work, have two components: While the Research component generates new knowledge and discoveries, the Development component contributes to the application of that knowledge for the generation of new products. India has not made any significant mark in innovative R&D leading to patents. The Impending patent regime, and stiff competition from multinational companies should change this lethargy, and we may be forced to spend more on Research. To quote Sir James Black, the Nobel laureate scientist, "unfortunately, the industry sometimes points the finger in the wrong direction, when it talks about the high research costs. It should really be talking on high development costs. In the field of Pharmaceutical the research cost is less than 1/4th of the development cost. **R & D** are

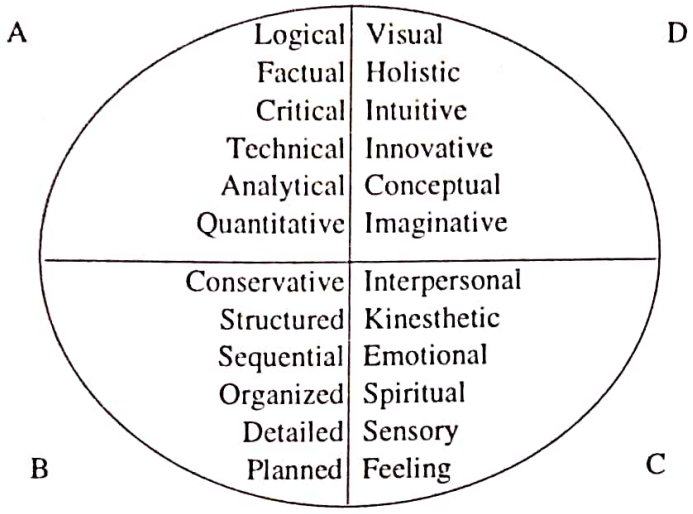
totally different, the development component is, knowing where you want to go and what you have to do to get there. But for the **R** bit, although you think you know where you would like to go you are not all sure how to get there. The Developmental process responds to hierarchical management, to whipping, kicking and pushing. But it is inconceivable that you can make the research to that way. Still you cannot just walk away and leave it, because it would wander like water all over the floor. Research has to be constrained and channeled. But the more you try to make it efficient, the more inefficient it will be. You will kill the goose."

Considering the above viewpoint, should the Engineering colleges focus on Research work - more popularly known as instruments of Invention, or should they pay more attention to Development work - more popularly understood as Innovation. To find an answer, let us see who an engineer is: There can be many definitions, but a very expensive study conducted by University of Toledo in 1994, using Herrmann Brain Dominance Instrument (HBDI), gave the following definitions in the Four Quadrant model:

Definition of Engineers in Four Quadrants

Quadrant A - Engineers Are not Train Drivers Is Creative Person in a Technical way? See and understand how things work, Use factual information into solving problems Make big bucks.	**Quadrant B** - Engineer is A whole brained thinker A communicator, A creative problem solver A designer Inventor of new innovative things A person who breaks the rules, A leader A correlator of abstract ideas.
Quadrant D - Engineer Define and solve, problems, generate ideas Find solution, implement solutions Work hard, make money, Creative.	**Quadrant C** - Engineer is Administrative hard worker Creative problem solver Overworked, underpaid Under appreciated synthesizer.

The above four views of an Engineer is brought out by those who belong to 4 different brain dominance profiles defined by Herrman as simplified in the following diagram: In this diagram brain is visualized as a circle divided into four quadrants. Each quadrant has very distinct clusters of thinking abilities or ways of learning and knowing.



Quadrant A thinking is factual, analytical, quantitative technical, logical, rational and critical. People with quadrant A thinking talk about the bottom line, getting the facts, or critical analysis.

They are talked about as number crunchers or human machines or egg heads.

CAREERS - Engineers, analysts, technicians, bankers, and physicians

Quadrant B thinking is organized, sequential, controlled, planned conservative, structured, detailed disciplined, and persistent

They talk about "we have always done it this way", or law and order, self discipline, play safe etc.,

CAREERS - Planners, bureaucrats, administrators, chartered accountants etc.

Quadrant C thinking is sensory, kinesthetic, emotional, inter personal (people oriented), and symbolic

They talk about the family, teamwork, personal growth, and values.

CAREERS – Teachers, nurses, social workers, and musicians.

Quadrant D thinking is visual, conceptual, holistic, innovative, metaphorical, creative, imaginative, special, flexible, and intuitive.

They talk about playing with an idea, or the big picture, or cutting edge, and innovation.

CAREERS – Entrepreneurs, explorers, artists, and playwrights.

The above discussion shows that, Engineers can be Researchers, Inventors, or Entrepreneurs, provided they fall into appropriate category in their thinking process. There could be a genetic advantage, for those who belong to Quadrant D thinking, but it is also equally important to remember, that a change in thinking process can be induced by appropriate training.

IV. Conclusion

The above discussion shows that in India, the full potential of engineers is not exploited in industry, because they feel no need for Innovation, in absence of competition. This past trend is likely to change in future, because of intense competition, due to globalization, and industries will be forced to spend more money on Development component of R & D activities. But even then our engineers may be found wanting in Quadrant D thinking, as our professional training does not make any differentiation among students who have different approach

and perception in their thinking. The Engineering Education has become mostly standardize as a result of which students are unable to make use of their talents for choosing an appropriate career.

V. Recommendations

1. Industry should be made aware of the need to Collaborate with well equipped Engineering Colleges in R & D to face competition in a Global Market. There should be a law by which Industries are forced to earmark 5% of their Sales for R & D activities.
2. Government funded research organizations like BARC, DRDO should be asked to offer their spin off technologies to identified potential Engineer Entrepreneurs to start their own Industry.
3. R & D itself should be split into two components. Engineering colleges should be entrusted with the task of contributing to the D part (Developmental Part) rather than R Part.
4. The accreditation process should clearly highlight the infrastructure required for Developmental work required to be carried out by Engineering Colleges with Industry. Such colleges should be given a special classification of its own.
5. Students, who join the Engineering colleges, should have their aptitude assessed in a scientific manner so that even in their branch of specialization, they could be groomed to choose a career of say, Entrepreneur, Teacher, Research, Designer, Software Developer, Technology Manager, Shop floor Engineer etc. He should have sufficient choice of optional subjects to pursue his field of rest.
6. Engineering colleges should have special labs called Innovation labs, where a selected few with D quadrant thinking must be allowed to develop their ideas.
7. Such Engineering colleges having developmental labs should be provided with Venture capital funds, 5% of which should be given as government Grant.

It is felt that the above approach will convert at least a few Engineering colleges into a cradle for Innovative engineers.

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Information Technology and Community Polytechnic Scheme in Arunachal Pradesh

ANIL CHOUDHARY

Community Polytechnic Scheme: An introduction

A working group on technical education of All India Council for Technical Education (AICTE) in February 1978 recommended that selected polytechnics should act as **"Focal Points"** to promote Community/Rural development on scientific lines through technology transfer. The scheme of community polytechnic was started under direct central assistance with a view to ensuring for rural society a fair share of benefits from the investments. The scheme envisaged the community polytechnics to act as focal points for science and technology applications in rural areas and generate self and wage employment opportunities through Non-Formal training towards competency and need based courses in various trades or multiple skills.

Community Polytechnic is not a separate polytechnic. It is a wing attached to the regular polytechnic under the direct central assistance scheme of Ministry of Human Resource Development (MHRD).

The rationale for choosing polytechnics for the implementation of the scheme of community polytechnic is based on the factor that approved polytechnics are equipped with educational infrastructure including qualified and trained faculty members, Technicians, Craftsman and skilled students who can scientifically formulate, implement and monitor rural oriented programs and projects.

Due to the impact on the community and society specifically amongst the weaker sections of the society in producing skilled manpower through its non formal short term training programs and training them into self/wage employable, this scheme has been expanded over the years.

The North-East & the Arunchal

The land of **seven sisters**, the seven states - Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura, is a land of perhaps the most colourful people on the earth.

These states with natural grandeur have immense agriculture and industrial potentials which are yet to be tapped. It is a most fascinating land of Brahmaputra with tropical forests, lush green landscape. The place of highest rainfall in the world. These states are also having a very rich variety of flora and fauna including the most famous one horned India rhino. Today all these states are fast catching up with modern education and industrial development. The Arunachal Pradesh is largest in area among seven sisters.

The Arunachal

Arunachal Pradesh situated in the North Eastern tip of India and part of the Eastern Himalayan range is nearly 84000 sq. Km. in area and has a long international border with Bhutan on the west (160 Km.), China on the North and North East (1080 Km.) and Myanmar on the East (440 Km.). It stretches from snow capped mountains in the North to the plains of Brahmaputra valley in the South. Arunachal is largest state area-wise in the North Eastern region.

It is a land of lush green forests, deep river valleys and beautiful plateaus. The land is mostly mountainous with Himalayan ranges along the northern borders criss-crossed with mountain ranges running North South. These divide the states into five river valleys: the Kameng, the Subansiri, the Siang, the lohit and the Tirap. All these rivers are fed by snows from the Himalayas and countless rivers and rivulets. The mightiest of these rivers is Siang, called Tsangpo in the Tibet, which becomes Brahmaputra after it is joined by the Dibang and the Lohit in the plains of Assam.

High mountains and dense forests have prevented intercommunication between tribes living in different river valleys. Isolation imposed by geography had led different tribes with several dialects to live and flourish with their distinct identities. Nature has endowed the people with a deep sense of beauty, which finds delightful expressions in their songs, dances and crafts. The climate varies from hot and humid in the shivalik range with heavy rainfall. It becomes progressively cold as one moves northwards to higher altitudes.

Trees of great size, plentiful climbers and abundance of cane and bamboo make Arunachal evergreen. Tropical rain forests are to be found in the foothills and hills in the East on the border with Myanmar. Northern most borders are covered with Alpine forests. Amidst the highly rugged terrain, there are green forests and plateaus.

Politically the state is divided in 15 districts. The total population of Arunachal Pradesh is 8,58,392 and the literacy rate is 41.22%(1991). Per capita in Rs. is 4176 and it is highest in the North-East. It has only 3,708 Km. roads and no railway network. Different tribes of Arunachal speaks different tribal languages. These tribal dialect have influence of languages spoken in neighboring states i.e. Assamese, Bengali and Hindi also has the greater impact. School education is provided by Govt. & Private Schools and all these schools are affiliated to CBSE. The medium of study in these schools is English only. Arunachal has only one state University and two Science & Commerce colleges, five Arts colleges, one Engineering college, one Polytechnic college, one Homeopathic medical college, and one college of Horticulture.

Important Features

- Covered with thick evergreen forest with streams, rivers and gorges and thousands of flora and fauna covering 60% of the area.
- The people of Arunachal have tradition of artistic craftsmanship, painting, weaving, pottery, basket making, wood carving etc.
- The major areas of focuses are: Tourism, local demand based industries and Minerals and Hydel-power resources.
- High rate of literacy.

- Wide variation in altitude and climatic conditions.
- The state is Home to many monuments and archaeological sites.
- Is worlds 8th mega biodiversity hotspot (As per Earth summit at Rio de Janeirio Brazil in 1992)
- the temperature is moderate throughout the year in the state.

Infrastructural Weakness

The Arunchal Pradesh is still lacking behind in terms of the growth and development. The state is undeveloped and lacks in most of the basic infrastructural facilities.

- The well transportation services network is not available in the state. Most of the places are not well connected even by roads and not easily reachable.
- People reach by walking to the most of the remote places. It takes 2-3 days to reach them.
- Railway network is not available at all in the state.
- Air service is available only with helicopter. State is not having the national airport.
- Still considered as remote place of the country.
- Electronic as well as mass communication infrastructure is not up to the mark.
- Internet access is not fast and not accessible to the remote areas.
- People are unable to get Newspapers and journals within time.
- Mobile phone services are not available.
- Advanced communication infrastructure is not available in the state.
- State has only two technical institutes (One Engineering college and one Polytechnic college).
- Only one State University, which is lacking in infrastructure and running only traditional courses.
- No medical college, only one homeopathy medical college, which also lacks in infrastructure and quality education.
- Eight colleges (Science, Commerce, Arts) of the state are not providing professional/latest education.
- Only two hospitals at state capital, which are unable to provide quality services.
- Hospitals do not have enough medical equipment and infrastructure in order to deal serious cases.
- Being a remote place private Hospitals/Dispensaries / Practitioners are not available in the state.
- Only one Cinema hall at Naharlagun in the state.
- Play grounds /gardens are very less and not maintained.
- Lacks in modern means of entertainment.
- State lacks in advanced and Internet banking facilities.
- Only State Bank of India has started recently the ATM services in its branch at Itanagar.
- Very limited number of branches of banks.
- Power plays the main role in growth and development and is indicator of

development. But unfortunately generation of power is just started and very less.

- Dependent on other states for electrical power.
- Power distribution is not smooth and continuous.

Threats

- Lack of work Culture.
- Absence of skilled manpower.
- Inadequate/stringent government policies in past.

Analysis

- Due to geographical isolation and lack of publicity, Arunachal Pradesh has not been adequately projected in the outside world. It needs intensive publicity to give exposure to its hidden treasure. If the attention would not be paid in this direction these aspects might prove as a major bottleneck in the prosperity of Arunachal Pradesh. Information Technology devices will play the main role in dissemination of information about Arunachal Pradesh.
- State could be the most favourite tourist destinations, if it gets good connectivity and publicity with the economically advanced states. Communication infrastructure and transportation infrastructure can play the main role for making this state tourist interest place.
- The state has got varied type of unique cultural practices, which can be of national and international interests. Communication media can bridge this gap of culture transformation.
- The communication bottlenecks and poor infrastructure in the state are the main causes for not getting growth and development. If experts in the different fields join hands to link remote regions of India with air, rail, roads and with hearts and mind then development of remote areas will be unimaginable.
- State has the enormous opportunities in the area of Art, hydel-power and tourism.
- The geography of the state requires the modern communication satellite and mobile communication infrastructure to connect the remote areas of the state.
- Modernization of banking, postal, reservation, hotel, tourist, and information services organizations using art of the computer, networking and Internet technologies is the need of the time.
- The education infrastructure is the backbone of any state/country. Therefore, **education on demand and education to home** using **multimedia education system,** Internet and satellite communication technologies is the requirement to provide technical/professional/school education to the people of Aruachal Pradesh in remote areas.
- Arunachal Pradesh is not marketed as a place of tourist interest at the national / international level due to the communication gap / absence on the national map. Television broadcasting and Internet Technologies can change the scenario of the state.

- Security is the main threat in this region. E-Security can play the major role in this regard.

- Tourists required inner line permit and the procedure to get it is lengthy due to lack of automation/modern IT technologies. Easy and quick movement of tourists is not possible due to this reason.

In view of the above mentioned features, isolation and tough constraints imposed by nature, the **Community Polytechnic Scheme** is very well suitable for the state of Arunachal Pradesh. Therefore, the Government of Arunachal Pradesh has participated in Technician Education III (Tech. Ed. III) project of Ministry of Human Resource Development (MHRD), Govt of India, which aims to develop technician education in remote areas (North-East). The Community Polytechnic Scheme is the part of Tech. Ed. III project polytechnics.

In order to develop Technician Education in Arunachal Pradesh The "Arunachal Pradesh Polytechnic", the first polytechnic of the state is formally inaugurated by Shri Mukut Mithi Hon'ble Chief Minister, Arunachal Pradesh on 15th July 2002.

Analysis of people opinion during visit to nearby village

1. Most of the school drop outs in the village of age 15-25 are unemployed.
2. Due to hilly area people have only 1-2 hectares of land for agriculture.
3. Average family income is very less(10,000-15,000 per annum)
4. The agriculture production is just enough to fulfill their requirement.
5. People do not have mechanized equipments like tractor, pump set, any other.
6. They own traditional Kachha House.
7. Electrical energy consumption (industrial) almost nil. Used only for domestic purpose.
8. Do not have facilities for hiring/repairing agriculture equipments or other mechanized equipments.
9. Most of the rural people use wood for cooking.
10. The schooling facilities in rural areas are not adequate.
11. People do not have recreation facilities in rural areas.
12. People have shown interest in learning some trades like Electrical, Computer/IT, Hotel Management, Automobile and Fashion designing.
13. Interested in setting up village / cottage / local demand based industries. But have no investment capacity.
14. People are not aware of different schemes run by govt.
15. People pass time just by doing nothing.

Suggestions

People are lacking in skills and their economical condition is not good. They are not getting any benefit from Government through schemes. In order to enhance the social and economical condition of people of Arunchal, they should be given proper skill

oriented training and financial help through some schemes like community polytechnic schemes. The community polytechnic scheme will help in this context up to some extent.

1. Arunachal Pradesh Polytechnic, through its community polytechnic wing should open nodal centers at district places to provide proper skill oriented training to the people at remote places.
2. Govt. should initiate some scheme to help the people in terms of Finance/Infrastructure.
3. Govt. departments like Industrial development/rural development/NGO's in collaboration with polytechnic should start some project to develop the social/economical status of rural people at remote places of Arunachal.

Role of Information Technology towards the implementation of community polytechnic scheme in Arunachal Pradesh.

Arunchal Pradesh Polytechnic is the first polytechnic of the state. Therefore, it will have a very big responsibility. But, it is still in its infancy with limited infrastructure and manpower. Very soon it will be having well equipped educational infrastructure.

In order to implement community polytechnic scheme, Information Technology can play the major role. Only by using IT devices, this task can be simplified and achieved up to greater extent.

The broad objectives and major operational activities of the scheme can be achieved effectively with the help of Information Technology and these major objectives are :

1. Socio Economic Survey
2. Manpower Development
3. Transfer of Technology
4. Technical Services
5. Support Services
6. Dissemination of Information.

Interactive Multimedia Information / Education System

This system can provide following services:

- Education on demand
- Education to home.
- Dissemination of information.
- Web browsing.

The applications related to Education on demand will support following services:

- Dissemination of multimedia lecture located at central Hub to remote classrooms.
- Creates a Virtual Class through multimedia presentation/ lecture from central education server to remote class room.

The applications related to web browsing through remote Proxy Server will support following services:

- Query will go through line modem and PSTN to the remote Proxy Server.
- Return information will be transmitted through high speed satellite synchronous channel having data rate 64Kpbs and higher.

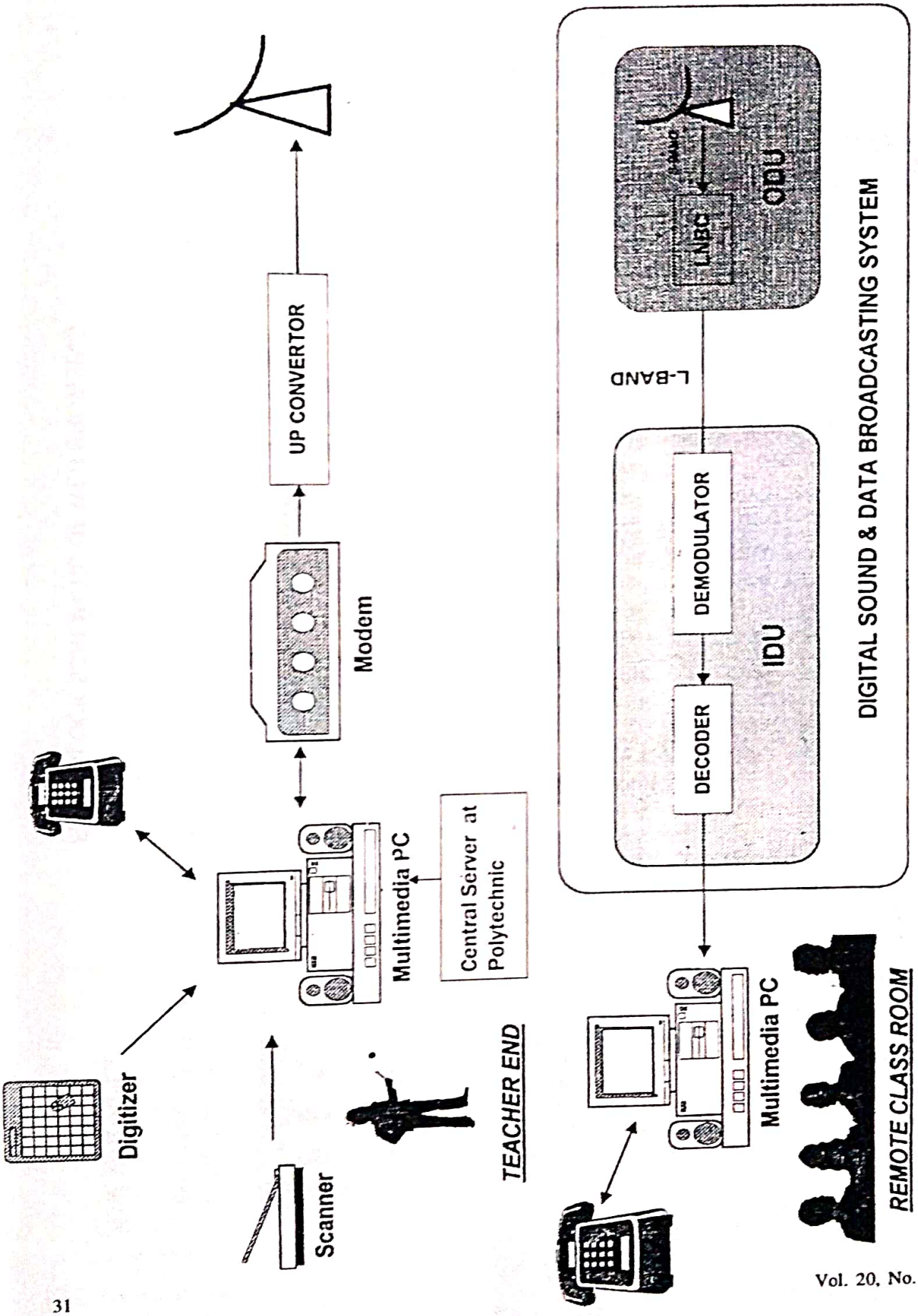

Fig.1 a BLOCK SCHEMATIC OF VIRTUAL CLASS ROOM FOR DISTANCE EDUCATION

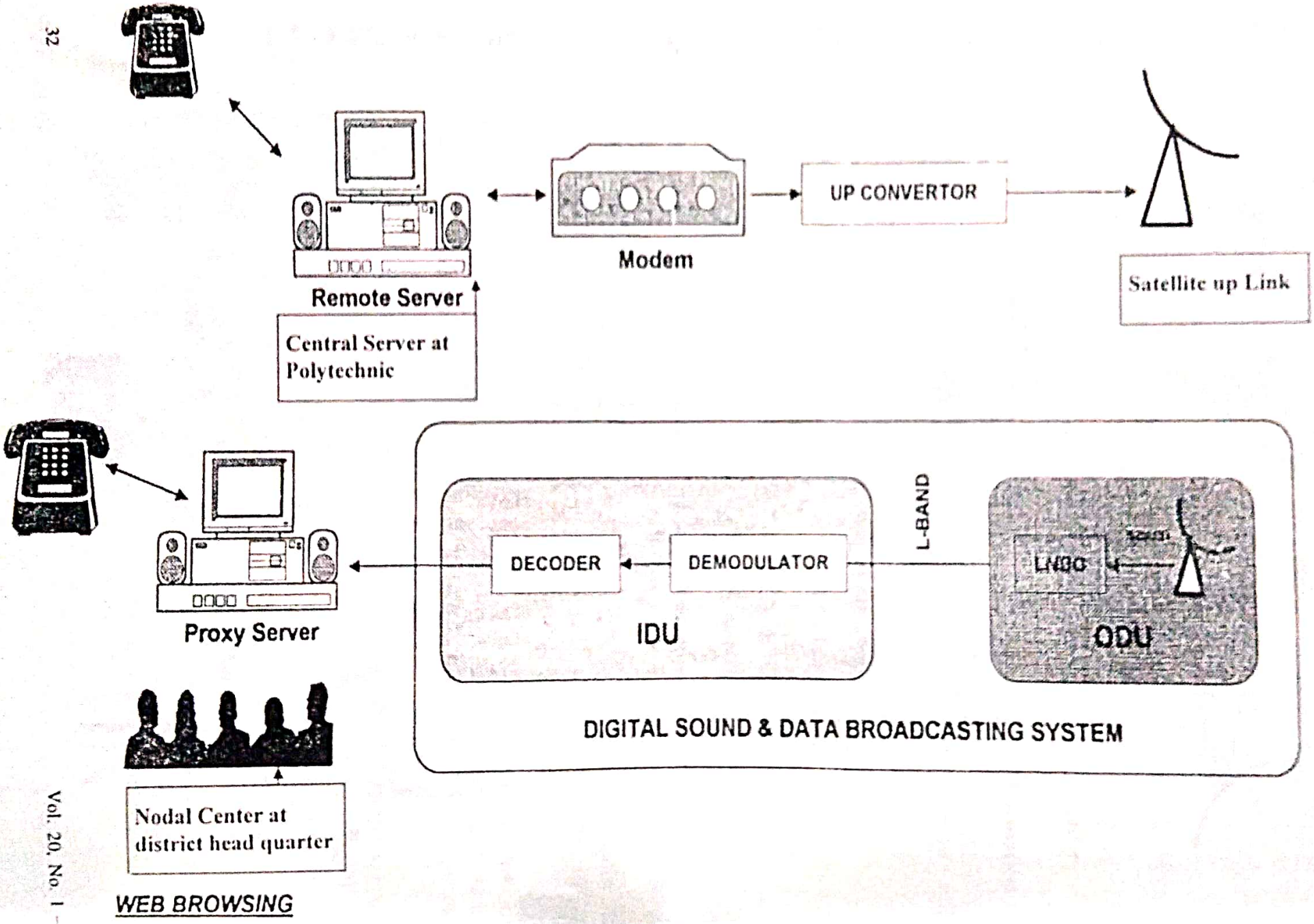

Fig.1b BLOCK SCHEMATIC OF WEB BROWSING

- Web pages/ Multimedia data will be received through in-house designed satellite receiver on a workstation.

- The information can be browsed through any web browser like Internet Explorer. These services can be provided efficiently using latest Digital video/audio broadcasting/Internet/VPN technologies. Today's explosion of new multimedia professional software requires large band width communication channels to the Internet backbone. This could be achieved by using satellite as transmission media. **Fig 1(a) & (b)** gives the block schematic of **Virtual class room for distance education** Web browsing through remote proxy server. This system consists of three main section i.e. Transmitting station (server), Communication media (Satellite / telephone network: PSTN / optical fiber) and receiving stations at users end. The user equipments consists of a small size dish (60 cm diameter) and PC with accessories for demodulation and processing of incoming signals. The server contains the original files requested by user. The base station performs basic server tasks and delivers IP datagrams. The gateway performs all necessary multiplexing coding and modulation tasks for transmission over direct broadcast. It broadcast the data either to one particular user (point to point data transfer transport control protocol: TCP/IP) or to a specific user group (point to multi point user datagram protocol : UDP). The end user can access the server through telephone and Modem connections.

Alternatively, to provide education on demand or to home a transportable Emergency Satellite communication van can be used. GNFCINSI communications has already designed such a van which is acting as a single platform for voice, data facsimile, video conferencing and Internet. This type of transportable setup can also be extremely useful in managing disaster situations like earthquake, heavy rain and special missions too (in our case Community Polytechnic Scheme).

The Qualis VAN has been divided into six compartments for housing the electronic and power system. The top and the bottom compartments are used to store antenna parts, SSPB cables and tools. The equipment are housed in rack, which is mounted on shock absorbers; the DG set is clamped down and positioned on rails. A ram is provided to wheel down the generator smoothly at the time of operation. A long cable is provided so that DG set can be kept away from van. An AVR is used to regulate the voltage and frequency of DG set output with low and high voltage cut-off protection for the electronics.

There is space to keep test equipment and video conferencing unit in the compartment. The DG set has 50% spare capacity to take up additional load. The system rack houses NSI's FlexiDAMA VSAT terminal with required accessories, and Ethernet interfaces to take care of immediate voice/data requirements. The SKY IP terminal is also installed in the Van for Internet application. The antenna is driven by a tracking controller, which is also housed in the system rack.

Features of transportable Emergency Satellite communication van:

- 1.8 meter Antenna mounted on aerodynamic frame carrier on top of vehicle.
- System can be installed in around an hour by two persons.
- Optional roof mounted antenna with auto deployment mechanism.
- Complete accessibility from front, middle and rear of the vehicle.
- Compartmentalized interior for storage of antenna parts and cables.
- Driver and two persons can comfortably sit.
- 5 KVA DG set.
- Automatic voltage regulator with high/low voltage cut-off protection.
- Equipments like video conferencing or test equipments can be accommodated.
- DG set has 50% Spare capacity to take 50% additional load.
- Configured for Ex. C Band.

In order to provide **Vocational and technician education** "Community Polytechnic Scheme" will definitely help the states like Arunchal Pradesh, having very tough life and geographic situations and where technical and vocational education infrastructure is very less. Arunachal Pradesh Polytechnic is the first polytechnic of the state and it will have to take the responsibility of developing and providing the vocational/technician education in the state through this scheme.

The success of the scheme depends on various factors but the main catalytic factor for smooth running and successful implementation of the scheme at grass root level is in the hands of administrators at various levels and also depends on the cooperation and support of the technicians, instructors and faculty members who are actual implementer.

Method/media, infrastructure and technology also plays the important role in implementation of such schemes. Keeping in the view the mentioned constraints imposed by nature and available infrastructure of the state of Arunachal Pradesh the satellite based communication media is suitable for effective implementation of the scheme.

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Norms & Guide Lines, Scheme of community polytechnics, Department of Secondary and Higher Education, MHRD, Govt of India.

Nigerian Universities and Educating Future Mechanical Engineers

ANIEKAN OFFIONG

Abstract

This paper reports the research undertaken by the author in developing and executing a Mechanical Engineering Program in a new Faculty of Engineering in contemporary Nigeria. The paper examines how potential Mechanical Engineers are educated in 23 Nigerian universities and the career opportunities awaiting them on graduation. The paper looks at the undergraduate and postgraduate programs in these institutions. Examination of the course content of this programs reveals that most of the undergraduate and postgraduate programs are similar in structure and content. The paper also surveys the problem associated with executing the programs and highlight the possible ways of solving them. Availability of Textbooks, Handbooks, Journals, Workshops, Laboratories and qualified Lecturers were identified as the major problems facing both under-graduate and postgraduate studies. It was established that level of industrial involvement was low, hence it is recommended that the industrial attachment program should be redesigned.

Keywords : Education, Mechanical Engineers, Universities, Nigeria

Introduction

The National policy of Nigeria aims at self-reliance and Industrialization. The policy encourages firms to develop new technologies, in particular automation, and to introduce new products. Some of our graduates in engineering are experiencing difficulties in supporting these developments. The western countries (Britain, USA, Germany etc.) remain ahead in terms of sophisticated products and technologies. The Eastern countries (Taiwan, Korea, India, Pakistan, etc) have become the base for low cost production and technologies. The Government of Nigeria as a leading African Nation is aware of this situation and is seeking ways of joining the economic train. One way of doing this is to encourage a sound education in Engineering. This requires high quality two - way linkages between academia and industries. Academics in Engineering must understand the need of the industry and be able to offer them practical solution (Smith, 1991). This is not a simple task when seen against the demand placed on contemporary Engineers by modern technology. Contemporary Engineers have to cope with more complex processes and manufacturing plants. Hence, in the near future Nigerian Engineers should be people who can exploit the potential of advanced expertise in terms of product and process technologies.

There are a number of works on how future Mechanical Engineers should be trained in Nigeria. These include the National Universities Commission's guidelines on minimum standard and also the Mechanical Engineering programs in the various universities. There are also theoretical works like woodcock and Chen (2000), Smith (1991) Nwachukwu (1994) and Adejuyibgbe (1994).

An earlier work by Fagbemi, (1988) leads to the view that since the introduction of Western Education in Nigeria around the year 1840, technological education has always been treated as a relatively insignificant aspect of the country's educational system. The Education Ordinances of 1882, 1887, 1903, and 1916 all relegated technical education to the background. Even though the first university college in Nigeria, the University College, Ibadan was established in July 1947 with affiliation to the University of London (it became autonomous only in 1962), no university in Nigeria offered Mechanical Engineering until the Ahmadu Bello University, Zaria (ABU) was established in 1962 with Nucleus from the Nigeria College of Art, Science and Technology earlier established in 1951 (Taiwo, 1980). The ABU thus became the first University to offer Mechanical Engineering infact Engineering. The University of Lagos established in April, 1962 urged strongly that opportunities should be provided for higher technological studies, hence in 1964 become the second university to offer the Mechanical Engineering discipline and infact Engineering. Surprisingly the University of Nigeria, Nsukka, which is the first autonomous university in Nigeria, having been established in 1960, did not offer courses in Engineering until 1965-66 sessions, thus becoming the third university to offer Mechanical Engineering. The University of Benin established in 1969 was the fourth University to offer Mechanical Engineering. The Obafemi Awolowo University Il-Ife established in 1962 did not offer course in Engineering until 1970 the second-generation university began to spring up and many of them offer courses in Mechanical Engineering and the number of universities in Nigeria now offering Mechanical Engineering is at least 23.

Methodology

The research examines the education and training provisions in 23 Nigerian Universities. The investigation was taken via an initial questionnaire to the Departments in the universities which was followed up by visits to some selected universities where the author met and interviewed senior academics by using face-to-face discussions based on their questionnaires' answers. Also, all the 23 universities were requested to submit their department brochures for the research, which 18 did. The questionnaires were composed of four parts: Background issues; Education of undergraduate students; Education of postgraduate student; Problems of Educating the students; and possible ways of solving the above problems.

The section on background issues sought information about date of commencement of the Department, availability of Lecturers, Laboratories and Workshops, Textbooks and Journals. In terms of educating undergraduates and postgraduate students, we sought information about course content, duration and mode of operations and admission requirements. Finally, in an attempt to identify the problem facing the universities in terms of training Mechanical Engineers, Senior academic in the various departments were

asked to state problems and highlight the possible solutions. Most of the face-to-face interviews were conducted during the First National Conference of the Department of Mechanical Engineering, University of Uyo, Nigeria 2 - 3 May, 2001.

Nigerian Universities Offering Mechanical Engineering

Mechanical Engineering includes the science and art of formulation, design, development, manufacturing and control of systems and components. These may include both power generating machines and machines that transform and consume this power. Power generating machines include nuclear and fossil power plants, propulsion devices, and engine turbines. Machines that transform and consume power include motors, control mechanisms, transportation systems (automobile, trans, space vehicle, marine vehicles, etc), refrigeration and air-conditioning system, cryogenic system, manufacturing machines and systems, materials handling and earth-moving devices. The field requires a basic knowledge of mechanics of solids, fluids, machines and materials; machine design; heart power; thermodynamic; heat transfer; manufacturing processes; industrial engineering; management science; optimization and system analysis.

There are 43 Universities in Nigeria with only 23 of these offering the Mechanical Engineering discipline. This include; University of Nigeria, Nsukka (UNN); Ahmadu Bello University, Zaria (ABU); Federal University of Agriculture, Markudi (FUAM); Bayero University, Kano (BUK); Federal University of Technology, Owerri (FUTO); University of Benin, City (UNIBEN); Federal University of Technology, Akure (FUTA); University of Ibadan, (UI); Edo State University, Ekpoma (EDSU); Obafeni (Awolowo); University Ile-Ife (OAU); Ondo State University, Ado-Ekiti (OSUA); University of Ilorin, Illorin (Unillorin); Federal University of Technology, Yola (FUTY); University of Lagos (UNILAG); Federal University of Technology, Minna (FUTM); University of Maiduguri, Maiduguri (UNIMAD), Lagos State University, Lagos (LASU); River State University of Science and Technology, Port Harcourt (RSUST); University of Port Harcourt; Port Harcourt (UNIPORT); Enugu State University of Science Technology, Enugu (ESUTECH), Nnamdi Azikiwe University, Awka (NAU); Abubakar Tafawa Balewa University, Bauchi (ATBA); Ladoke Akintola University of Technology Ogbomosho (LAUTECH), and the newly established Department of Mechanical Engineering University of Uyo, Uyo (UNIUYO) [JAMB, UME Brochure, 1999 - 2000].

Opportunities for Mechanical Engineering in Nigeria

The technological advancement of any country depends, to a large extent, on the ingenuity of its high caliber technical manpower. For the well-trained and conscientious Mechanical Engineer, interesting and challenging job opportunities abound in Nigeria. This rage from the design, development, production and maintenance of plant, machinery and equipment to the management of mechanical systems of men and machines. Mechanical Engineers are urgently needed in such industrial sectors as mechanical, petrochemical industries; food processing and beverages; paper pulp and wood processing textile industries; power generation; mining and metallurgy; public

utilities; construction industries; hospital and biomedical engineering; sanitary and sewage; defense and security, industrial standardization and factory inspection; manufacturing and material handling; agricultural mechanization and water resources; manufacturing and material handling; agricultural mechanization and water resources; manufacturing and metal processing; universities, polytechnics and research institutes.

Mechanical Engineering Programs in Nigeria Universities

Four programs have been identified in Mechanical Engineering in Nigeria-Bachelors, Post-graduate Diploma, Master, and Doctorate Programs.

Bachelor's Program

The Bachelor's Program usually consists of lectures supplemented by tutorials, laboratory and fieldwork, and project support and reinforced by practical training in industry. Coursers are designed to impart sound knowledge to students on the application of scientific principles to practical problems. In this regard a good background in mathematics, physics and chemistry is required. These subjects enable the student to develop the necessary technical skills, intellectual discipline and the power to analyse and solve complex system problems. The Bachelor's Program is for a duration of five years consisting of nine semesters of study in the university and one semester and three long vacation of compulsory practical training in industry. The first two years of study are devoted to the teaching of general engineering course to give a broad-based engineering education. From the third year onward, the emphasis is on the teaching of courses in the various areas of Mechanical Engineering. In the fifth and final year, an in-depth study of some aspects of Mechanical Engineering is undertaken by each student in the form of a project. A total of 12-month compulsory supervised industrial experience aimed at giving practical orientation and adaptability towards industrial life is also arranged by the Universities from the second to the fourth year of study. Admission into the Bachelor's Program is usually through the Joint Administration and Matriculation Board Examination (JAMB). In addition to passing this examination, candidates are required to have minimum of 5'O' level credit [including Physics, Chemistry, Mathematics, and English Language] obtained in not more than two sittings to be able to register for the Bachelors of Mechanical Engineering Program. Very limited candidates, about 5% of the total intake, may be admitted by some universities through Direct Entry with the relevant A level papers or diploma certificate.

Postgraduate Diploma Program

The Post-graduate Diploma Program consists, mainly of lectures and is usually organized for candidates who had read an engineering discipline other than Mechanical Engineering in their first degree and are working where the knowledge of Mechanical Engineering is required. In rare cases people with third class degrees in Mechanical Engineering are also be admitted into the postgraduate diploma program. The Postgraduate Diploma Program usually lasts for a minimum of 12 months at the end of which about 10 taught of postgraduate courses are examined. The candidate may also be required to audit some under graduating courses depending on his background.

Master's Program

The Master's program usually consists of lectures and research. The Masters program usually lasts for a minimum of 18 months at the end of which about 8 taught postgraduate courses are examined. The candidate is also required to submit his research findings in the form of a Masters Thesis at the end of the Masters Programme. Admission for the Masters programme is usually opened for candidate with a minimum of Second-Class Lower Division in the Bachelors program. Candidates with accumulative of above 3.5 points (in a 5 point grading system) in the Postgraduate Diploma Program may also be admitted for the Masters programme.

Doctorate of Philosophy Program

The Doctorate Program is mainly through research. In most departments, the program usually lasts for a minimum of three calendar year at the end of which the student is required to submit his doctoral thesis. However, prior to this, most Departments, will require the candidate to take qualifying examination in about four courses, related to his area of specialization. Admission is usually open for candidates with Cumulative Grade Point Average not below 3.5 point (in 5 point grading system) in the Masters Program. Candidate who made First Class Honours in the Bachelor Program may be admitted in rare cases to the Master/Doctorate Program which is usually for the duration of between 4 to 5 years.

Content of Undergraduate Mechanical Engineering Program

The content of undergraduate Program in Nigerian Universities, aimed at educating the next generation of Nigeria Mechanical Engineering is examined together with the National Universities Commission's Guidelines on minimum standard. Based on this, a program is proposed to the University of Uyo, Nigerian. The result is shown in table 1-5 which shows the courses offered and their credit hours in some selected universities. In the first and second year. General Studies courses usually include Use of English, Humanities, Social Sciences, Nigeria People and Culture, Introduction to Logic and Philosophy, Community Services, etc., while Introduction to Engineering may be Engineering Drawing, Engineer-in- Society, Workshop Practice, Applied Mechanics, Technology Policy and Development, etc., Elective courses in UNN include Fundamentals of Nuclear Engineering, Power Plant Engineering, Refrigeration and Air-Conditioning. Manufacturing and Tool Engineering, Systems Engineering and Advanced Theory of Elasticity. Elective courses in OAU included. Energy Technology, Material Handling, Industrial Engineering and power Generating Plants. Elective courses in Uniport include Building Services Engineering, Numerical Control, Machine Tools, Vehicular Dynamic, Quality and Reliable Assurance. In UNIUYO, Elective courses include Production Engineering, Principles of Industrial Engineering, Power Plant Engineering, Principles of Air Conditioning and Refrigeration, Internal Combustion Engine, Computer Aided Design and Manufacture, Operations Research Models in Industrial Engineering and Analysis of Capital Investment.

Table 1 : Courses and their credit hours in undergraduate programs for the first year in Mechanical Engineering

Courses	UNN	OAU	UNIPORT	UNIUYO
Mathematic	9	10	9	8
Physics	10	10	8	8
Chemistry	8	10	6	8
General Studies	4	6	9	6
Introduction to Engr.	5	4	7	2
Total	36	40	39	32

Table 2: Courses and their credit hours in undergraduate programs for the second year in Mechanical Engineering

Courses	UNN	OAU	UNIPORT	UNIUYO
Engineering Mathematics	6	8	8	6
Engineering Drawing	2	4	2	2
Workshop practice	2	2	2	2
Strength of Material	3	2	2	4
Engineering Materials	3	2	2	2
Electrical Engineering	4	6	3	4
Thermodynamics	2	2	3	3
Computer Programming	4	5	4	4
Fluid Mechanics	3	–	2	2
Engineering Mechanics	–	5	3	4
General Studies	8	6	1	–
Introduction to Engineering	–	1	4	3
Chemistry	–	–	3	2
Physics	–	–	3	–
Total	37	43	42	38

Table 3: Courses and their credit hours in undergraduate programs for the third year in Mechanical Engineering

COURSES	UNN	OAU	UNIPORT	UNIUYO
Engineering Mathematics	6	8	6	6
Engineering Drawing	2	2	2	2
Workshop practice	2	2	–	2
Control system	–	2	–	–
Mechanical Engineering Design	4	3	5	2
Mechanical Engineering Lab	3	2	–	2
Mechanics of Mechanics	2	4	5	2
Thermodynamics	2	2	3	2
Metallurgy	2	3	3	2
Heart and Mass Transfer	–	–	3	2
Electrical Engineering	4	3	–	6
Manufacturing Technology	2	–	2	2
Engineering Drawing	2	1	–	1
Civil Engr. Strength of Material	3	5	2	4
Measurement and Instrumentation	2	2	3	2
Research Method and Tech. Report Writing	–	–	2	1
Mechanics of Fluids	2	4	2	2
Industrial Training	Nil	Nil	Nil	Nil
Total	38	43	38	40

Table 4: Courses and their credit hours in undergraduate programs for the fourth year in Mechanical Engineering

COURSES	UNN	OAU	UNIPORT	UNIUYO
Numerical Analysis	3	–	3	3
Mechanical Analysis	3	3	2	2
Mechanics of Machines	2	–	–	2
Control system	3	–	–	3
Applied Thermodynamics	2	–	–	2
Applied fluid mechanics	2	2	2	2
Heart and Mass Transfer	3	2	–	–
Theory of Elasticity	3	–	–	–
Electrical Machines	–	–	3	–
Mechanical Engineering Laboratory	3	2	3	1
Technology Development Policy	2	–	–	–
Engineering Economics	–	2	3	2
Air–Conditioning and Refrigeration	–	2	3	–
Mechanical Vibration	–	2	–	–
Research Method and Technical Report Writing	–	2	–	–
Manufacturing Technology	–	2	–	–
Computer Aided Design and Manufacture	–	–	2	–
Principle of Automotive Engineering	–	–	2	–
Elective	–	2	–	–
Industrial Training	Nil	Nil	Nil	Nil
Total	26	21	23	17

Table 5: Courses and their credit hours in undergraduate for the fifth year in Mechanical Engineering

COURSES	UNN	OAU	UNIPORT	UNIUYO
B. Eng. Project	6	6	6	6
Engineering Management and Law	4	2	5	2
Advance Fluid mechanics	3	–	–	2
Advance Thermodynamics	3	–	–	2
Applied Design	4	3	2	4
Power Plant Engineering	–	–	3	–
Engr. Material Selection and Economics	3	–	–	2
Control Engineering	–	–	3	–
Mechanical Metallurgy	3	–	–	2
Mechanical Engineering Laboratory	–	6	3	2
Applied Thermo fluids	–	–	2	–
Principles of Industrial Engineering	–	–	2	–
Mechanical Vibration and Noise	–	–	2	–
Production Engineering	–	4	–	–
Internal Combustion Engine	–	2	–	–
Theories of Elasticity and Plasticity	–	–	3	–
Technology Development Policy	–	2	–	–
Fluid Machinery	–	3	–	–
Automobile Engineering	–	3	–	–
Mechanical Maintenance	–	2	–	–
Elective	9	6	9	12
Total	35	39	40	34

Content of Postgraduate Mechanical Engineering Program

The content of the Postgraduate Program in Nigeria Universities aimed at educating the next generation of Nigeria Mechanical Engineers is examined. The results are shown in table 6. It shows that 35 major courses re offered at postgraduate level in 23 Universities under five main area of specialization namely: Energy Engineering; Materials Engineering; Fluid Mechanics; Production Engineering; Industrial Engineering / Management. For the sake of simplicity, courses with mixed contents are shown by the content of the main subject. Post-graduate course were observed to be similar irrespective of whether they were meant for Post-graduate Diploma, Master or Doctorate student, However, the courses vary in dept and scope depending on the program they address. The courses usually carry about 4 credit hours. Table 6 shows major postgraduate courses identified in the various areas of specialization in Mechanical Engineering in Nigerian Universities. The following observations where made about Postgraduate Programs in Mechanical Engineering in Nigerian Universities.

1. For Post-Graduate Diploma Program, Candidates may be required in the first semester to do one compulsory course (Mathematical Methods in Engineering) plus one course for each area of specializations mentioned above. In the Second semester, candidate may be required to do one compulsory course (Research Methodology in Engineering)

plus 3 - 5 courses in their area of specialization. In the two Semesters, a candidate may be required to audit undergraduate courses depending on his background.

2. For the Master's program, candidates may be required, in the first Semester to do one compulsory course (Mathematical Methods in Engineering) plus one course in each of specialization mentioned above. In the second semester, candidate may be required to do one compulsory course (Research Methodology in Engineering) plus 3 - 5 courses in his area of specialization before proceeding to the Masters Thesis.
3. For the doctorate program, Candidate may be required to do between 4 and 6 courses in his area of specialization, before proceeding to do the Ph.D. Thesis. The courses are carefully selected by the dissertation committee such that they will provide a good background for the candidate's thesis.

Table 6: Major Postgraduate Courses identified in the various areas of specialization in Mechanical Engineering in Nigeria universities.

Compulsory courses

1. Mathematical Methods in Engineering
2. Research Methodology in Engineering

Energy Engineering

3. Advanced Thermodynamics
4. Air-Conditioning and Refrigeration.
5. Solar Energy Conversion
6. Energy Management
7. Advanced Heat and Mass Transfer
8. Reactor Design and Control
9. Propulsion
10. Conduction
11. Turbo machinery
12. Direct energy conversion

Materials Engineering

13. Advanced Mechanics of Materials
14. Technical Properties of Metals ad Alloys
15. Process and Extraction Metallurgy
16. Physical Metallurgy
17. Industrial metallurgy and Fabrication
18. General Dynamics
19. Advanced Vibrations

Fluid Mechanics

20. Advanced Fluid Mechanic
21. Turbo Machinery
22. Boundary Layer theory
23. Low Speed Flow
24. One Dimensional Gas Dynamics
25. Multi-Dimensional Gas Dynamics

Production Engineering

26. Production Technology
27. Machine Tool Engineering
28. Analysis of Manufacturing Process and Machines
29. Engineering Design and System
30. Design of Control System Component
31. Dynamic Problems in Design

Industrial Engineering/Management

32. Organization and Management of Human Resources
33. Operations Research Model in Industrial Engineering
34. Inspection, Quality Control

35. Analysis of Capital Investment
36. Engineering Organization

Results and Discussion

Problems of Educating Mechanical Engineering in Universities

The problems highlighted here were crystallized from the responses to the questionnaires

1. Lack of Books and Journals in the Market: There is a general lack of Mechanical Engineering Books in the Nigerian Market. The main text book in Mechanical Engineering in Applied Thermodynamics; Workshop Practice; Engineering Fluid Mechanics; Refrigerating Engineering Materials are sold in very few big cities in Nigeria namely Aba, Port Harcourt, Ibadan, Lagos, Onitisha and kaduna. There is also the problem of lack of Engineering Journals. Foreign journals are expensive hence most lecturers and student cannot subscribe to them. Also, until recently there was no Nigerian Journal catering for the discipline of Mechanical Engineering. However there are some Nigeria Journals which are of interest to Mechanical Engineers like the Journal of the Nigeria Institutions of Production Engineers, Nigerian Journal of Technology, Nigerian Journal of Engineering Management, and Global Journal of Mechanical Engineering.

2. Lack of Books and Journal in the University Libraries: There is an acute shortage of Mechanical Engineering books in the new generation universities. The old universities however have a large stock of out dated books. However around 1995 following a world bank loan the situation seems to change even in very new Departments like the one at UNIUYO. Very good Libraries in terms of Mechanical Engineering can be found at the UNN, UI, UNIBEN, UNILLORIN and OAU.

3. Lecturers: There is general lack of qualified Mechanical Engineering Lecturers in the country. The first generation universities are doing well but with an old work force which is likely to face mass retirement in the next five years. The situation in the third generation universities is worse as there are very few lecturers with Ph.D. The situation could have been easily handled but most lecturers are not willing to move other universities for various reasons including religious riots, ethnicity and immobility of family members due to schooling or employment.

4. Admission input: Sometimes the universities find it very difficult to get the right calibre of candidate for the Mechanical Engineering program because of pressure exerted by influential parents who insist that their wards mostly study Mechanical Engineering. Also because of the quota system, the University might be forced to admit students who do not possess the prerequisite science courses, hence the dropout rate in Mechanical Engineering is usually high.

5. Laboratories and Workshops: The Laboratories and Workshops in the first and second generation universities ar

well equipped, but the problem is that very few of them are well maintained. The third generation universities still have to put up more Laboratories and Workshops. The survey shows that the most important problem facing Mechanical Engineering Laboratories and Workshops is the aging of their well trained technical staff who are not being understudied by younger successors. In a typical workshop that was manned by 30 technical personnel in the mid - eighties, 22 of the staff are now either retired or dead without any plan for their replacement.

6. Industrial Training: Most students do not take the industrial training program serious as it is not always possible for lecturers to visit all of them at their locations.

7. Preliminary Program: The preliminary courses for engineering students usually handled by the Faculty of Science are usually organized in very large classes in most Universities. The result is that most students come into the main Mechanical Engineering Program without being properly grounded in the basic sciences.

8. Nigerian Society of Engineers [Mechanical Engineering Division]: This division of the Nigerian society of engineers which is supposed to promote the study of Mechanical Engineering has not been active enough in the universities. Their effort will have helped a lot in providing Continuing Education for the Lecturers in Mechanical Engineering.

Possible Ways of Solving some of the Identified Problems of Educating Mechanical Engineers in Nigeria Universities

1. Lack of Books and Journals in the Market: Nigerian lecturers have come a long way and they should be able to write books in this area and sell them in the Nigerian, African and International Markets. However, it must be mentioned that there is revolution going on now in Nigeria as most lecturers are now writing either individually or team upto write good books and Journals in their discipline. It is important to encourage these Books and Journals as they are addressing the problems of our immediate environment.

2. Lack of Books and Journals in the Libraries: University Libraries should be encouraged to subscribe to foreign and local Journals that are of interest to Mechanical Engineers. The Head of Department should send the list of Journals and books needed by the Department annually to the University Libraries. Sometimes these books and journals are not ordered for because there were no inputs from the Department. Also the most worrisome aspect of this is that some times the Librarian may order irrelevant books for Mechanical Engineering because there were no inputs from the Department. It is also important that the departmental Library be maintained as it is done in UNN, UNILAG, UI, UNIBEN and ABU.

3. Lectures: The problem with recruiting Lecturers in Mechanical Engineering is

centered on Remuneration for Engineers in the University System. Most Mechanical Engineers on graduation prefer to go into the lucrative oil sector, where they will earn four to five times more than their counter-parts in teaching profession. Special incentive should be use to retain graduate Engineers in the Departments. Also another problem is on the facilities available to train the few ones who, have stayed back to do graduate studies. University authorities should be made to see the need to upgrade the Postgraduate School Facilities in Engineering especially Mechanical Engineering.

4. Admission Policy: The only way to increase the quality of student admitted for the Study of Mechanical Engineering is to improve teaching facilities and staffing in our secondary schools. This will call for the training and retaining of science teachers and giving them good employment offers. Science laboratories and equipments should also be improved in our secondary schools.

5. Laboratories and Workshop: The Universities authorities should be made to understand the importance of keeping up-to-date Laboratories and Workshops by the Council for the Regulation of Engineering in Nigeria (COREN) and the National Society of Engineers (NSE). New and younger staff should the employed in the Laboratories and Workshop to take over from the older ones when they retire.

6. Industrial Training: Funds should be made available and on time by the Industrial Training Fund to lecturers in Engineering to enable them visit their students at their industrial training posting. Seminars should be organized for the student after their industrial training. For postgraduate students, it should be made compulsory for them to have industrial contacts. For those of them who have permanent jobs, where possible, their research should be centered on how to improve certain aspects of their organization' operations. The Industrial training program for Engineering students in Nigeria needs to be redesign to meet up with the contemporary circumstances. This certainly will require increase in funding by the National Universities Commission and the Industrial Training Fund.

7. Preliminary Program: As much as possible all Engineering course that can be taught in the Faculty should be taught in the Faculty to ensure that professional touch is added. For example in UNIUYO only first year courses are taught at the Faculty of Natural and Applied Sciences. There have been enough reasons to bring back to the Engineering Faculty Courses like Computer Programming and Engineering Mathematics.

8. Nigerian Society of Engineers (Mechanical Engineering Division) Lecturers in Mechanical Engineering should be encouraged by the Universities to join this division of the Nigerian Society of engineers. The Division on their part should hold conferences seminars and make visitations to the departments to ensure that quality is maintained. It is against this background that the First National Conference of

Mechanical Engineers was organized by the Department of Mechanical Engineering, University of Uyo, Nigeria between 2nd - 3rd May, 2001.

Conclusion

This paper has given an insight into how future Mechanical Engineers are to be educated in Nigerian Universities. It gives the list of Universities offering Mechanical Engineering and it discusses Career opportunities for Mechanical Engineering students on graduation. The program and the course content are examined. Generally, problems of the Universities in providing a sound education for future Mechanical Engineers are examined and possible ways of solving them highlighted.

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Governance and Management of Polytechnics in Andaman and Nicobar Islands

VASANT NAIDU and V. ALAGU SUNDARAM

To impart Technical Education in one of the remotest part of India, Polytechnics of these Islands are playing a dominant role. They are offering courses in various branches of Engineering. These Institutes have ISO Certification as well as accreditation from NBA. This paper deals with the issues concerning quality of technical education, the governance and management along with the SWOT analysis of the institute, continuing education, role of community polytechnics, Industrial Institute Interaction analysis and Revenue generation.

The paper reflects the role of world bank aid in the multi dimensional developments.

Introduction

This paper deals with the issues concerning the quality of technical education in the Andaman and Nicobar (A and N) Islands. Andaman and Nicobar is a group of Island, situated at the remotest part of our country. These Islands are only connected to the mainland through air or sea. Prior to 1984 there was no hope for the introduction of technical education in these islands, as there was no such institution.

In the year 1984 the first polytechnic came in to existence in these islands. The Engineering branches, such as Civil, Electrical and Mechanical were introduced. The total intake in 1984 was just 90 i.e. 30 in each branch. In year 1989, the Island development authority, introduced one more polytechnic in these Islands. The courses offered by this Polytechnic was in Electronics and Communication Engineering, Fisheries Engineering, Fishing and Boat Skipper and Hotel management certificate courses such as House keeping, Hotel reception, Book Keeping and Cookery. Later branches such as Computer Engineering, Post Diploma in Computer Application and Information Technology were introduced. The branches in Automobile Engineering and Refrigeration and Air-Conditioning and Post Diploma in Marine Engineering are on the way to be introduced.

The students are taught to equip themselves in terms of the skilled knowledge that he earns at the end. Along with this the student is taught to know all the requirement of a professional core technician.

The Grinter report of US, Finnston report of UK and Indian report has intensively dealt with the goals of Engineering. The curriculum of different countries were based upon either Basic Science and Engineering Science etc, or with the development of national economy and Industrial development

along with the electives, project, humanities social sciences and the appropriate technology.

Objective

The objective of the Polytechnics of these Islands has to groom an Engineer, to meet the international standard. Thus to attain this objective, the product of these institutions are capable in fulfilling the required professional demands such as.

- Problem solving abilities
- Analytical skills
- Communication skills
- Interpersonal skills
- Decision making skills
- Innovative concept

These abilities skills and concepts lead our students to acquire the status of an international engineer. On this line of action, the grooming of these students is such that they have the

- Concern for local values, sensitiveness and sensibilities.
- Concept of standard codes adopted in various countries.
- Proficiency in various International languages.
- Creativity and innovation.
- Integrative skills.
- Ability to fuse his concept with the national and international team.
- Wide exposure towards economy zone and various commercial disciplines.
- Commitment towards the sustainable development.

Staff

A quality staff of these polytechnics are capable of generating the

- Spirit hard work
- Inspiration
- Counseling to improve the moral values.
- Concept of globalization in Engineering and technology
- Leadership quality
- Self confidence
- Team spirit.

There are various activities for overall development and updating the knowledge of the staff and improving their levels to be at par with the international standard.

Staff are undergoing short-term courses of management in leading National Institutes of management. For updating the technical knowledge, they are looking into the various courses organized by various TTTI's, at Chennai, Bhopal, Kolkata and Chandigarh.

To meet the challenges of globalized market and to compete by enhancing the quality requirement of the international market, TQM principles are being evolved to

- Support the administrative function
- Get involved in curricula
- Get involved in primary universal functions.

This involvement of TQM in our institute is helping in monitoring and

improving the curricula, lifelong learning identification, description of products defining the excellence, improving the recruitment process, promotion policies and procedures along with the performance appraisal and identification of stake holders.

Activities

The activities of these institutions are time bound. To maintain this schedule an Academic calendar is chalked out long before the new session commences. This calendar is followed by each and every department of the institution.

ISO Certification

The flow of work is audited at regular intervals by the BVQI certified auditors as the institute is the first of its kind to obtain a complete 1SO9002 certification. The BVQI auditors twice or thrice a year further audits this audit. These serious sensoring of BVQI keeps the entire official on toes and the information on tips. These preliminaries helps in maintaining the perfection and consistency, along with the negative grey areas identified for rectification and enlistment of the subject of administration, management, academics and over all curricular activities. The subject requires, further improvement, for this BVQI has finalized for the ISO2000 certification. This will not only audit the quality, but the quanta of work, this will be reflected in-terms of various numerical data's. This data analysis will help in studying the various behaviours for obtaining the proper solution for improving the status.

Revenue Generation

With huge infrastructure and sophisticated laboratories, These polytechnics are running short term and long term technical courses for the rural and urban youths. These youths are either the dropped out from their academic sector or updating the knowledge as per local demands.

The various courses are offered to them are:

- Networking in computer
- Introduction to computer programming
- Welding
- Wireman
- Motor Mechanic
- Machinists and turner
- Fashion designing (for women)

These course are conducted under Community Polytechnic programme. In courses, such as Networking, Fashion designing, Introductory computer courses, fees are charged.

In the motor mechanic section departmental motor vehicles are maintained and their servicing is undertaken thus revenue is generated.

The Electrical wiring people undertake the various electrical wiring work inside the institute and outside. Similarly under the electronic/electrical gadget maintenance courses, the various gadgets such as fan mixie, grinder, -washing machine, amplifier TV, radio etc. are under taken for repairs and maintenance and charged accordingly.

Periodical Audit

Dr. B. R. Ambedkar Govt. Polytechnic is the first of its kind to get the ISO

certificates i.e. ISO9000 for the whole institute in the year 1999. According to ISO procedure periodical audits are conducted and after every six-month BVQI auditors conduct the detail audit. Along with this, the central audit is also conducted.

This periodical audit makes a detailed auditing of the activities as per the schedule mentioned, along with the compliance of work and maintenance of quality, the audit is in the microscopic level. If the performance report is not as per the schedule and quality, a non-compliance report is made. This report reflects the activities and keeps the objectives at proper pace and scope for further improvement.

National Board of Accreditation

Polytechnics of A and N Islands are first of its type to secure the accreditation from National Board of Accreditation. By acquiring the accreditation assures the quality technical education, which verifies, the programme of the Institution are in accordance with the norms and standards as prescribed by the council. It also assures the academic aims and the objective of these Institutions are known to be honestly pursued and effectively achieved by the available resources and demonstrates the capabilities for ensuring the continuous effectiveness of the educational programmes.

Continuing Education

Continuing Educations is the phenomenon of knowledge acquisition, resulting in rapid obsolescence of education acquired during the formal diploma/degree programmes. It imperatively makes the engineers to practice by continuous studies and learning.

The infrastructure of our polytechnic is used for conducting many oriented and refresher programmes in terms of time. Here the courses of long-term type as well as of short time type as per the need of the engineers and the technicians.

Continuous Improvement in Teaching

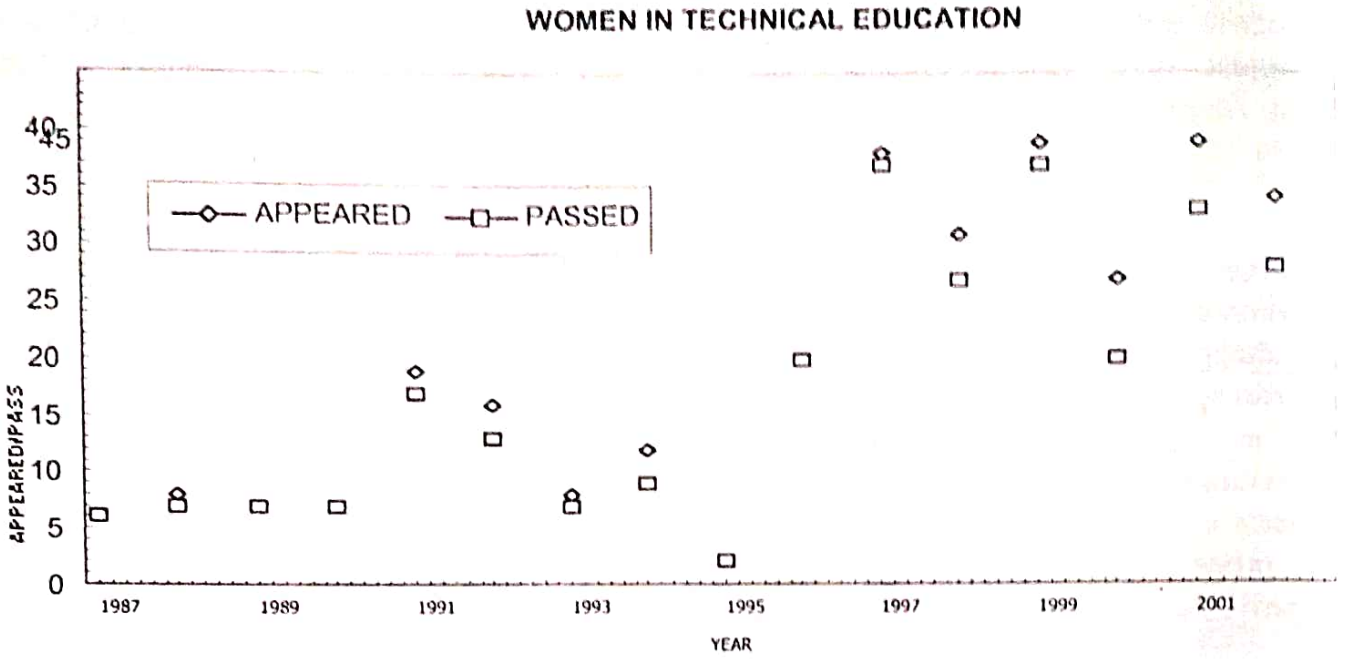
- Teachers give personal attention to each and every students and are familiar with the students.
- Regular seminars are held, dealing with the new development in the fields discussed in classes along with the extensive discussions.
- Teachers do not carry books and notes. The voice of teacher is audible to each and every student. There is an extensive use of black board, transparencies, slides.
- Teachers do not teach the same paper year after year, Rotation in topics are maintained
- Teachers attend the academic symposiums, workshops, conferences etc. to upkeep their knowledge.
- V-SAT helps the teachers to update their knowledge through the online services.

Grooming Women Engineers

To enhance the Parikh and Sukhtames (1992) studies special efforts has been taken to groom women engineers. The following graph shows the trend of women engineers.

Swot Analysis of Technical Education in these Islands:

SWOT stands for strength, weaknesses, opportunities and threats of these educational Institutions.



(A) Strengths

Aspirations of youth to pursue technical education by increasing interest of industry associations (Microsoft, Toyota) to collaborate with polytechnics of A and N Islands.

- Quality improvement in educational sector by accreditation initiatives of NBA.
- The upgradation and enhancement of technical education in A and N Islands by providing necessary resource by world bank project.
- AICTE and MHRD is promoting work on thrust areas of technical education.

(B) Weaknesses:

- There is an ample shortage of qualified and competent faculty.
- Lack of availability of Ph.D's in engineering for faculty positions.
- Lack of sufficient industry Institute interaction.
- Imbalance between education and training received by graduates.
- Inadequate manpower planning and manpower needs assessment
- The admission capacity at the under graduation level is very large, whereas the corresponding growth at the PG level has not taken place.

(C) Opportunities

- Setting up quality Indian Institutions sponsored off shore campuses.
- Easy availability of technological enhancement of learning, to widen the reach of technical education.
- Distance education possibilities for continuing education.
- Networking of technical Institutions with R and D labs and industry

- The substantial support offered by aluminum in their alma maters.
- Networking of technical institutions with R and D labs and industries.

(D) **Threats:**

- The non-uniformity in the distributions of technical institution in the country.
- Lack of popularity amongst technical institution based in rural and industrial backward areas.
- Student's inclination towards IT related courses and shunning other disciplines.
- The ratio of diploma programmes to degree programmes is on the decline.
- The downfall of science base in the country will cause adverse impact on capacity for technology development.
- With the emerging GATS Scenario, quality concern needs to be addressed urgently.

World Bank Assistance

- To develop the present technical man power and future demand in the Islands, World bank assistance has been adopted in the Tech Ed. III project which envisaged the following on the lines of Tech Ed. I and II.
- They are assisting Eighteen Polytechnics in the industrially and economically underdeveloped and geographically remote states of India. Andaman and Nicobar Islands is one of then.
- This assistance will increase access of some disadvantageous sections of society to technician education and will promote active interaction of Polytechnic with local Industries/services and the Community.
- Keeping in view, the future demands for technical manpower in these islands and mainland, following courses are proposed.
  - Diploma in Refrigeration and Air Conditioning.
  - Diploma in Information Technology.
  - Diploma In Hotel Management and Catering Technology.
  - Post Diploma In Marine Engineering
- Additional academic, administrative, and residential area 6215 Sq.m.
- Continuing education and Community Services
- Establishment of Six extension centres with V-SAT connectivity in six different Tehsils.
- To attract school dropouts and polytechnic pass-outs to increase their knowle dge and participate in the developmental programs.
- Additional qualified teaching faculty and staff as per AICTE normas.
- Industrial training of about 20 weeks duration in five years for all the faculty members.
- Introduction of Multi-point Entry and Credit System (MPECS).
- Modernization of labs and larger interaction with industries
- Computer education - a compulsory component of curriculum.

- Networking of the A and N polytechnics with some major Institutions/Industries in the country. Larger autonomy in academic, administrative and financial matters.

Conclusion

The creation of academic environment is a core problem. This environment cannot be created by bookish methodologies. To generate this environment, various solutions are summed up.

- Recruitment and proper Allocation of staff
- Adhoc-charges, shortage to staff, causes the downfall in efficiency.
- Due to the shifting of temporary staff permutation and combination are used in re-shuffling. This mismatch and time log for setting with the new allocation
- The development of the academic environment depends upon, classrooms, Laboratories and Library These components should be always kept upto data.
- Certain aspiration of the staff has to be carefully observed and maintained to standardize themself in the social as well as in the personal status.

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Human Values in Higher Education

G.B. JAIPRAKASH NARAIN

The goal of the Government is to "Usher in a Knowledge Society" by the year 2020. Professional colleges is "The main thrust of the Strategy in Higher Education". Higher Education should reinforce its role of service to society, especially assisting in the elimination of poverty, intolerance, violence, illiteracy, hunger, environmental degradation and disease. The objective of education is to train and condition the mind so that an individual can function effectively in a contemporary context.

In ancient years, when *gurukulas* existed, the *guru* was responsible for providing formal education as well as mould the character of the pupil. For the student, it was acquisition of knowledge along with the ethics of how to use it. Thus character building was an essential part of the educative process.

The core purpose of education has been to ensure that our citizens had the skills; they needed to actively participate in a democratic society. Human values among students in higher education can be fostered through personality development programmes. Behavioural skills can be imparted along with professional skills, thus linking value with knowledge.

Education is impersonalised and is acquiring the characteristics of a commercial commodity - the information technology revolution, distance education, programmed computer based learning and the Internet - their good effects not withstanding have shrunk the role and personalised influence of the teacher. There is abundant and easy availability of knowledge, but it is without the moral fibre that binds its use and the ethics that guide its application resulting in its dehumanisation.

Value education is not simply the heart of education, but also education of the heart. It is a necessary component of holistic citizenship education. Emphasis on value education is a product of many years of contemplation into the sad degeneration of society into hedonism, corruption and violence, even as poverty, inequity, injustice and the environment continue to send warning signals.

Values cannot be forced, even if conveyed with good intentions, no real integration or internalisation of values can be achieved unless the learner agrees with it. Communication is the key in this. This is one tradition we lack, it can be developed with the cooperation of all.

Value education teaches the youth that knowledge and skills are not the only requisite to succeed in life, but a positive attitude and

a human way of action. Values teach the youth to laugh at their miseries and be sympathetic towards others' miseries. Men with values and independent thinking do not succumb to pressures from time and their competitors. They take their competitors as a group of which they are good members or good leaders. [Men of values and independent thinking do not think they are above the competitors. They do not think themselves to be leaders with special gifts.] "According to the social psychologists, leadership is a special phenomenon arising from group action: it is not considered as a special property or gift of an individual. Although some people appear to possess more of the characteristics conductive to it than others, leadership occurs in group situation.

Gibbs lists the following three conditions as essential to leadership activities: (a) there is group (b) the group is unified around mutually agreed goals, and (c) certain tasks or roles have been assigned officially or unofficially to the various group members. This concept implies that leadership evolves from a dynamic and interacting group that is held together by loyalties to an individual, but concerns for the goals of the group".

Value education teaches harmony, independence and leadership. A person, who succeeds in the right way, is the one who inspires other to succeed. He appreciates other' problems too and tells them how to solve them. We should remember that our children, the future generation, start from only where we end.

Assessment of Quality of Life (QoL) Based on House Conditions - A Case Study

UDAY CHAND KUMAR and ASIM KUMAR PAL

House is very much essential for shelter for human being. Most of the human beings reside with family members in a house where they spend major part of their life span.

This paper mainly highlights an approach for evaluating the Quality of Life (QoL) of rural sector, based on house conditions.

On the basis of preliminary investigation of the rural community and their house conditions, 18 parameters were identified to evaluate their housing status and different scores [0 to 3] were assigned to each of these parameters as per the existing situation. Out of the total score of 44, the families acquiring a score 0-11 have been categorized as 'poor', those with score 12-19 as 'fair', 20-27 as 'moderate', 28-35 as 'good' and 36-44 as 'very good'. Similarly, the QoL grading of the village has been assigned as per the percentage of poor families [> 40% : Poor, 10-40% : fair and < 10 : good]

A systematic application of the above methodology in 10 villages of Joynagar Block-I in 24 Parganas (South), West Bengal led to the evaluation of QoL of the villages. Joynagar village, which is under municipal area, was qualified for "fair" gradation whereas the other nine villages registered "poor" QoL. It presents a very sad picture of the house condition of the rural community of West Bengal. As such, it is necessary to take appropriate steps to improve their house conditions where they have to spend a considerable part of their life.

Introduction

The linkage between housing and human well being has been outlined in 'modern' scientific and health literature for well over a century-and a half. The early articulation of causal relationships, exposure pathways, and risk factors' largely focussed on the linkage between physical attributes of housing (e.g., construction materials, crowding), environmental service provision (e.g., handpump water supply), and communicable diseases (e.g., tuberculosis, cholera).

Developments of 'modern' medicine and the initiation of a 'war' to eradicate specific communicable diseases, the articulation of housing health linkage in 'industrial' and subsequently in developing countries (DCs) changed slowly, but significantly. In this endeavor socio-economic, environmental, and psychosocial factors were acknowledged as intermediary factors that influenced the housing-health linkage.

Within the international policy domain, the Stockholm Environment Conference (1972) and Habitat I at Vancouver (1976) were turning points in the articulation of the relationship between the built environment, human health, and well being. A series of WHO surveys and expert reports in the early 1970s laid a solid foundation for enquiry into housing and health in developing countries (DCs). The Expert Committee on Public Health aspects of Housing (WHO 1961) outlined the key gaps in research including human physiological requirements, epidemiology of the impact of housing on disease incidence, the housing-induced family and social problems. The main recommendations included: provision of safe and potable water to each household in DCs; greater attention to accident prevention; and planning and preparation of Housing Codes in view of the relationship between housing and health.

The survey of Health Hazards of the Human Environment (WHO 1972) reviewed the home environment in DCs, and recommended improvements in housing for the poor, reducing overcrowding, increasing living space, and the provision of basic sanitation facilities.

Two years later, an Expert Committee on the use of epidemiology in Housing Programmes and Planning Human Settlements (WHO 1974 a) reviewed the state of the knowledge in this filed. Another Expert Committee Report on Disposal of Community Waste Water (WHO 1974 b) examined the effects of waste water on public health, and cultural and socio-economic conditions.

A monograph on Healthy Principals of Housing (WHO 1989) laid out 11 basic principles governing the relationship between housing, environment, and health of inhabitants. Suggested interventions included advocacy for cognizance of the health value of adequate housing, changes in economic and social policies, improved norms for house design and construction, and alliance- building between community organizations and external agencies to upgrade houses.

The Pressure-State-Impact-Response (PSIR) frame work has been picked up by recent health policy document (WHO 1997) attempting to cross-discipline barriers at some loss to the explicit cognizance of the complexity of the problem. Environmental threats have ben classified within this framework into 'traditional' hazards which are often associated with underdevelopment (developing countries) and 'modern' hazards associated with overdevelopment (developed countries). Traditional hazards, thus defined, are closely allied to poverty, inadequate working and living conditions, and are thereby closely linked to the domestic built environment. These hazards include: lack of access to safe drinking water, inadequate sanitation and solid waste disposal facilities, exposure to disease vector, indoor air pollution, contaminated food, and risk of injury.

The WHO has defined nine features of the housing environment that have direct or indirect health impact (WHO 1989). These include the physical structure of the built environment; provision of adequate water supply; disposal of faeces, liquid and solid waste; quality of the housing site; overcrowding; indoor air pollution; food, safety, and occupational health in the domestic work place; and disease vectors.

Poor quality housing and crowding are reported to increase the risk of household accidents which include falls, burns, cuts, and poisoning. The kitchen is a common place for these accidents to take place. Home accidents are reported to be a major cause to early childhood and elderly deaths in the developed world (Boucher 1995, Mood 1993), but no comparative study has been undertaken in the developing world.

A review of urban childhood mortality in Bangladesh found that residence of a single room dwelling or a structure of inferior construction were important environmental factors influencing child mortality (Stanton, Clemens 1988). Improvement in the housing and living environment of poorer households was found to be important factors in improving the health of children in Kampongs of Jakarta, Indonesia (Harpham et al. 1990). The quality of housing was found to have a marked influence on the prevalence of communicable diseases and on the standard of cleanliness of children in urban areas of Nigeria. It was found that a web of multi interacting factors within the environment and the socio-economic background of children had strong influence on the health of school age children (Oduntan 1973).

The household environment of the poor people, especially women, in developing countries carries the biggest risks to health. Domestic work is considered as one of the world's major occupations requiring a core of activities essential for our existence. Studies indicate that human beings in the Indian context spend major part of their life span in house.

Household work has its own worth and dignity as the means by which this setting is maintained and the family essentially needs for shelter. The job of the homemaking thus encompasses the core of activities essential for the very existence of the family.

As a house is essential for every family, it should have proper covered area, drainage facilities, well ventilated and it should be properly maintained, so that the house should be hygienically fit for staying with families.

But our rural areas give an altogether different picture. Due to poverty, most of the families suffer from having pucca house. Most of the families have mud house or some of the families have semi-pucca house. Besides, no drainage system exists in rural areas. This creates most unhygienic situations, causes dampness in their house and other inconveniences as well, particularly in rainy season.

It has been observed during the survey by authors that most of the families constitute nuclear system i.e., the individual families live in one room and verandah is treated as kitchen, irrespective of family size. For example, in a family having three sons and one daughter, the brother and the sister live in the same building with their parents, but after marriage of all, while the daughter goes to husband's house, other three sons with their wives live in the same buildings by taking one room or making provision for other room. This represents the basic status in most of the rural families.

Through this paper, an attempt has been made to evaluate Quality of Life (QoL) of rural community, based on house conditions.

Methodology

Based on preliminary investigations on rural community and their housing system, 18 parameters were identified and different scores (0-3) were assigned to those parameter as shown in Table 1. "0" (zero) indicates very poor whereas "3"(three) indicates very good. The maximum score, as can be seen from Table 1, is 44. In order to evaluate the Quality of life of individual family, following consideration was made.

Score	Quality of Life of family
36-44	Very Good
28-35	Good
20-27	Moderate
12-19	Fair
0-11	Poor

Similarly, following points were taken into consideration for assessing the QoL of concerned village.

QoL Rating of Villages	Gradation		
	Poor	Fair	Good
Percent of families having grade poor, i.e., score < 12	> 40	10 to 40	< 10

A systematic survey was conducted during 2001 - 2002 on the above mentioned house parameters in 10 villages of Joynagar Block - 1 in 24 Parganas (South), West Bengal. The findings of the survey are discussed hereunder.

Results and Discussion

Ten villages were considered for systematic survey in respect of house condition. Sample survey covering about 10 percent of the families was undertaken thorough well-designed questionnaire format. Number of families surveyed in each village, number of families having respective quality grade as well as the assigned quality of life for the villages with respect to house condition have been tabulated as shown in Table 2. As it is evident from Table 2, Pachchim Chak Panch Ghora was observed to be having maximum "poor grade" families (71%) whereas Joynagar having only 27% "poor grade" families. On the other hand, Jaynagar village was observed to be having 8% "very good grade" families. For other nine villages the percentage of "very good grade" families were restricted within 2 to 6. Similarly, the percentage of families having "fair grade" "moderate grade" and "good grade" for all the surveyed villages were observed to be within 11-35%, 7-19% and 4-11% respectively.

From the above, it is clear that the presence of "poor grade" families are dominating in most of the villages. As such, only one village viz. Joynagar, which is under municipality area, qualified, as 'fair' gradation, whereas the remaining nine villages registered 'poor gradation'.

Table 1: List of Important Parameters along with Assigned Scores

Sl. No.	Parameters		Score
1.	Type of house	Kuccha	0
		Semi-Pucca	1
		Pucca	2
2.	Having house	No	0
		Yes	2
3.	Area of the house (per six members family unit)	< 500 Sq.ft.	0
		500 to < 600 Sq.ft.	1
		600 to < 650 Sq.ft.	2
		> 650 Sq.ft.	3
4.	The roof of the house	Other	0
		Tali/Corrugated sheet	2
		RCC/Brick	3
5	The floor of the house	Other	0
		Plane cement	2
		Marble/Tail/ Mosaic	3
6.	The wall of the house	Other	0
		Mud	1
		Brick/RCC	3
7.	The wall is plastered with cement mortar (outside)	No	0
		Yes	2
8.	The wall is plastered with cement mortar (inside)	No	0
		Yes	2
9.	The painting of outside wall	No	0
		Colour/White wash	2
		Snowcem/Distemper	3
10.	The painting of inside wall	No	0
		Colour/White wash	2
		Plaster parries/ Distemper	3
11.	Having kitchen	No	0
		Separated from main building	1
		Integrated part of the main building	2
12.	If kitchen is separated from main building then whether it is	Kaccha	0
		Semi-Pucca	1
		Pucca	2
13.	Having latrine	No	0
		Separated from main building	2
		Integrated part of the main building	3

14.	If latrine is separated from main building then whether it is	Other	0
		Pit system	2
		Septic tank system	3
15.	Whether the building is maintained properly	No	0
		Yes	2
16	Cleaning of the floor	Not regularly	0
		Daily	1
17.	Whether the buildings gets properly Air/Sunlight	No	0
		Not adequate	1
		Sufficient	2
18.	Whether the building has properly drainage system	No	0
		Yes	2

Table 2 : Summarized Finding of the Questionnaire survey

Name of Village	No. of Surveyed families	Number of families having grade					QoL of the Village
		Poor	Fair	Mode rate	Good	Very good	
Khassara	326	199 61%	65 20%	39 12%	16 5%	7 2%	Poor
Ramkrishnapur	332	186 56%	73 22%	41 12%	20 6%	12 4%	Poor
Pachchim Gobberia	186	88 47%	48 26%	27 14%	18 10%	5 3%	Poor
Pachchim Chak Panch Chora	327	231 71%	36 11%	25 7%	19 6%	16 5%	Poor
Neutala	344	235 68%	45 13%	33 10%	17 5%	14 4%	Poor
Santipur	186	88 47%	42 23%	36 19%	12 7%	8 4%	Poor
Kismat Goolberia	209	154 74%	24 11%	18 9%	9 4%	4 2%	Poor
Purba Chak Panch Ghora	65	30 46%	14 22%	10 15%	7 11%	4 6%	Poor
Chandaneswar	447	295 66%	68 15%	47 11%	22 5%	15 3%	Poor
Joynagar	362	98 27%	129 35%	68 19%	39 11%	28 8%	Fair

Conclusions and Recommendations

The results and discussion led to the following conclusions:

- The house that serves the basis for providing shelter and security to the entire family is utterly neglected in rural sector.

- The poor community in rural sector is expected to expose to the severe environmental hazards and unhygienic condition.
- Due to low income, the poor families do not have any alternative arrangement for shelter.

Under these circumstances, it is extremely necessary to take appropriate decision and actions to improve the situations, which need to include the following:

- Provide the means and facilities to the rural poor so that they can build up their own house.
- Encouragement of the R and D activities for the low cost building design technology with locally available building material and other resources.
- Improvement of the awareness of the rural people through education and training for improved house facilities as part of primary health care package, child health package, etc.

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Career Exploration Devices in Information Technology

S. RENUKADEVI

Introduction

In the context of globalization, liberalization and privatization, the job market is becoming highly competitive day by day. India being one of the important players in the global market has developed a huge infrastructure in the engineering and technical education sector with about one thousand plus engineering colleges and institutes of higher technological learning all over the country and a similar number of polytechnic colleges.

Thousands of graduates are passing out from these colleges and placement of these graduates remains a constant problem. While there is shortage of placement for these graduates in the country, many are looking forward for jobs in other countries and in the age of globalization where the entire world is considered as a global village, the qualified engineering graduates and technicians need to look for jobs beyond the country boundary.

This process needs to be strengthened by producing qualified employable graduates, and continuous career guidance is one of the most important interventions of producing employable graduates. Thus, the aspiration of National Policy on Education 1986, which says "It should now be possible to intensify the nation wide effort in Human Resource Development like Education playing its multifaceted role"

Career Exploration

Career guidance as such has several components. One of this components is career exploration where students are provided with the opportunities to explore their career, mostly with the help of psychological tests and inventories. Once they are aware and convinced about their career they can develop their career according to their potentialities. This type of approach further gives them edge over others in placement according to aptitude and interest in the job market. Therefore, career exploration during the period of graduation is one of the prerequisites for producing employable graduate engineers.

Careers in IT

Information technology is an area where vast number of professions and jobs are available for almost all engineering graduates, whether it is Production, Material Science or Computer Engineering. Graduates have a variety of choice of profession in Information Technology (IT) irrespective of recession in IT industries. But most of the time our students are exposed only to application software development companies through campus interviews and newspaper advertisements instead of getting exposure to explore a variety of careers in IT. Once students are aware about a variety of careers in IT industries, by selecting and preparing for that career during

the period of graduation, the mismatch between the needs of the Indian and multinational IT companies and job placement is bound to reduce. Due to variety of careers offered by Indian and multinational IT companies there is a great need that career counseling programmes in engineering colleges take in to account the vital aspect of career exploration with respect to IT industries.

There are a variety of careers available in IT industries. The list of careers provided by NIIT (1999) are as follows:

IT Education and Training

Maintenance Programming

MIS Operations

Programming

Graphics and Multimedia

Sales and Marketing

System Implementation

System Administration

Technical Support

Technical Writing

Web Application Development

Network and Communication Support

Quality Assurance

Project Management

Tests and Inventories

Presently, a very limited number of interest inventories and aptitude tests are available to be used for career exploration in IT industries. Again these tests are mostly developed by respective IT industries for recruitment purpose, and may not be available to career counselors in the engineering colleges. On the other hand, a variety of personality tests are in existence and the personnel department of industrial organizations and career counselors of certain engineering colleges use some of these instrument to explore certain personality traits which they believe as basic attributes of an individual to become successful in a career. These tests and inventories can help to explore certain aspects of an individual's value, his emotional reaction and maturity, and his ability to adjust himself to the stress of everyday life and self-image. But these personality tests as such cannot help in exploring the interest, motive and deep aspiration of the individual with respect to a particular career. Though personality tests cannot help to explore a career but it can be used as support to career exploration. The traits like Individuality, Self confidence, Ambition, Emotional Stability, Obsessions, Perseverance, Cooperativeness, Impulsiveness, Thoughtfulness, Submissiveness, Extroversion, Introversion, Optimism, Initiative, Judgement, Dominance, and Personality Integrity can be measured through personality tests. These attributes are helpful in career selection.

Career Exploration Device

Thus, any test on career exploration will be of great use provided one of such kind is available in the career guidance scenario. It will be more useful if such career exploration inventory or test can take into account the individual's hidden aspirations and motives. This career exploration device can be either a protective type of test or a non-protective type. If it is protective type the Murray's (1971) type of approach or Atkinson's (1958) six picture techniques can be proved to be useful.

On the other hand to develop a non protective type test, the work of Crites(1973), Anne Roe (1969), and Holland (1985) could be useful.

There can be an intermediate approach. For instance, Chatterjee (1960) developed a Non-language Preference Record (Form 962) which helps to choose an educational or vocational field. Though this is not a projective test, but the pictures used in this test are cartoons like and thus give the scope of vagueness. This test, of course paves the way of developing projective technique for career identification. Further, the older modalities of using paper and pencil, cartoon or pictures can be replaced by a large number of multimedia graphics pertaining to various career fields in IT. A device of this kind might reveal individuals's choice of a career taking into consideration his interests, attitudes, feelings, needs and thought processes. It can be assumed that this technique will take into consideration to the extent possible the other factors and errors (Bowers, 1973) which are not considered much in the existing psychometric devices.

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Establishment of Campus Intranet with Internet Connectivity for e-learning

KULANTHAIVEL. G

Abstract:

For the last 500 years or so learning has largely consisted of physically bringing together students who are provided knowledge on a "just-incase" basis. However, the digital age is changing both how training is delivered, as well as how we view the roles of learners and teachers. Learning no longer has to be a scheduled, defined event. Video conferencing allows teachers to observe and interact with classrooms at a distance. This can provide needed access to diverse student populations. An open and flexible definition for e-learning is "the use of internet and digital technologies to create experiences that educate our fellow human beings." Learners can now obtain training and support on a just-in-time and just enough basis, which means learning becomes potentially a daily occurrence, tied tightly to on the job performance. This new model is gaining rapid acceptance. The paper gives an introduction to e-leraning, benefits of e-learning, the evolving role of network services in providing convenient, user-friendly access to electronic journals, e-learning resources and all other resources on the desks using the Institute campus network with Internet connectivity.

Introduction

As we closed the door on the 20th century and uncorked the millennium we have entered the e-decade. The worldwide Web has given us e-commerce – a new way to sell services, products. The Web and the Net have also increased opportunities to communicate with a large number of people, quickly and cheaply. There are plenty of e-opportunities—all using new technology to grab a larger market share. E-commerce, e-business, e-solutions and now e-learning, What's it all about? Are these just trendy words or do they point to new life styles and a new economy? Is e-learning just another new training technology that will be replaced by something 'better'?

In the first few months of the new millennium, e-learning loomed large. E-learning pops up in advertisements for training and education services, conference presentations, and it seems to be quite popular marketers of technology-assisted learning products. As a result of being new and intrinsically vague, e-learning has generated different definitions. Elliott Masie, one of the leaders in the e-learning field, tells us that the 'e' stands for experience. The resources section on the SmartForce Web site explains that e-learning is dynamic, happens in real

time, collaborative, individual, comprehensive, and it enables the enterprise. Cisco tells us that e-learning is Internet-enabled learning. Click2learn.com takes a wide view suggesting that e-learning refers to the creation, delivery, and management of training.

E-Learning

E-Learning basically refers to the delivery of courses and programs through the computer with internet linking the faculty and the students. There are supportive resources that are used here, like voice, video, data and print, with online programs being specifically designed to take advantage of these new technologies. Brooke Broadbent, the founder of e-learninghub tells e-learning represents convergence in the education, training and information fields. The term e-learning groups together education, training and structured information delivered by computers, through the Internet, or the Web, or from the hard drive of the computer—or an *organization's network*. This definition of e-learning includes Computer Based Training(CBT), Web based Training(WBT), electronic performance support systems, webcasts, listservs and other discussions on the Internet, threaded and unthreaded. Education, training and structured information overlap. The boundaries are not clear as the same materials are used for education, training and information dissemination. Convergence in the learning world, like mergers in the corporate world, is everywhere.

Educators and trainers are in similar waters as they wade into the e-learning sea. They face similar challenges and they have much to learn from each other. Doers and thinkers in both training and education—and we need both—can sink or swim depending on the quality of their decisions and their actions. Educators and trainers facing similar challenges—can help each other stay afloat. Swimming is safer when you use the buddy system.

Benefits of e-learning for Learners

From the point of view of learners, well-designed e-learning:

1. Creates interactions that stimulate understanding and the recall of information when learners exchange questions during online discussions.

2. Accommodates different types of learners and foster learning through a variety of activities that apply different learning styles.

3. Fosters self-paced learning so learners can learn at the rate they prefer.

4. Provides convenient access to learning any time, any place.

5. Reduces travel time and travel costs.

6. Encourages learners to browse for information through hyperlinks to sites on the World Wide Web.

7. Allows learners to select targeted and appropriate material on the Web.

8. Provides context-sensitive help through performance support tools.

9. Develops technical abilities required to use the Internet.

10. Encourages learners to take responsibility for their learning and build self-knowledge and self-confidence.

Benefits of e-learning for Instructors

Instructors value the following strengths of e-learning:

1. E-learning permits instructors to develop materials using the world-wide resources of the Web.

2. Allows instructors to communicate information in a more engaging fashion than in text-based distance education programs. E-learning offers a wide-range of text, diagrams and images with video and sound, including virtual reality technology that in the future will improve the effectiveness of the approach even further.

3. Convenient for instructors to access any time, any place.

4. Allows instructors to package essential information for all students to access. Instructors can then concentrate on high level activities.

5. Retains records of discussion and allows for later reference through the use of threaded discussion on bulletin boards.

6. Generates more personal gratification for instructors through quality student participation.

7. Reduces travel and accommodation costs associated with training programs.

Campus Network with Internet connectivity

Indian companies have realized the potential of the e-learning market. Many websites offer online programs and some of these are free. While corporate training faces no major hurdles in India, the training of individual does, as there are some implements to be overcome before e-learning becomes a phenomenon in every home. Limited bandwidth and inadequate telecom infrastructure are issues that are high on the list.

The attitude of professionals towards networking and network information resources plays an important role in exploiting their resources for providing information services. Various data networks presently available in the country have been established for specific purpose. The network will link libraries not only in cities but in remote and far off places too. Connectivity among the node will be provided through a mix of satellite and terrestrial systems. Local Area Network (LAN) interconnects the computers and other peripherals in libraries. Presently for Internet connection mostly we use PSTN lines. These telephone lines are basically meant for carrying voice signals. They put an upper limit on data speed for digital signals. Different networks provided for different services like voice, video, electronic funds transfer, email, teleconferencing, telegraphy etc., A user will have easy access to a multiplicity of services using Integrated Service Digital Network (ISDN) over a single connection to a network. Telephone network becoming digital has been the impetus to the ISDN. For digital data to be transmitted over normal telephone lines, it is modulated into analogue form and the possibility of interference with neighbouring channels puts a maximum limit on data speeds. But with the whole network or the whole transmission going digital, there will be no interference problem and high data rates are possible for ISDN. ISDN allows for the integration of voice and data services at the rates of upto and including 128 Kilo Bits Per Second(Kbps) utilising the existing cable networks. Optical fibres are being used increasingly as the transmission medium and

their costs too are falling down. This will open up the possibility of providing economically an integrated wide band access to the networks directly from the customers.

The most common way to access the Net today, is via a modem linked by the telephone line to an Integrated Service Provider (ISP). In turn, the ISP leases bandwidth from the government's external communications providers, Videsh Sanchar Nigam Limited (VSNL) who provides a gateway to the Internet. Nowadays, many private ISPs are also providing connectivity.

The conventional channel using the Plain Old Telephone System (POTS) can currently offer top modem speeds of 56 Kbps, Nowadays, besides PSTN and ISDN, emerging broadband technology options like Leased circuits, Very Small Aperture Terminal (VSAT) connectivity, DSL and Cable Modems are also available. Dishnet – a private firm – offer a new digital technology called Asymmetric Digital Subscriber Line (ADSL), which bumps up the speed of data transmission in one direction to 1.5 Mbps and in the reverse direction to 384 Kbps. This means that even in the slower mode(pushing data from PC to the Internet), ADSL is about 13 times faster than anything we have experienced till now. Of course, customers in India who can afford the exorbitant cost of a special leased line or an ISDN telephone connection have higher speeds than with the PSTN telephone connection. All broadband technology provide dramatically faster access to the internet, in some cases hundreds of times faster than regular modems.

Institute Campus Intranet with Internet Connectivity

An Intranet is a collection of networks, sharing information within an organisation. Information can be documents, files, memos, etc. These networks communicate with each other using the Internet's TCP/IP protocols. More powerful Intranet programs are those that allow people to communicate with, each other via e-mail or public messages.

In TITI, Chennai under the MHRD sponsored project, the main building and Management building which is 250 meters apart were connected using the fiber optic cable. The departments within these buildings were connected using UTP cable where the nodes are within 100 meters. The campus LAN was connected initially to Internet using the Integrated services Digital Network (ISDN) 64 Kbps/ 128Kbps dialup connection. The ISDN line was provided by the Department of Telecommunications - Bharat Samachar Nigam Limited (BSNL) which was terminated in the Electronics Department of the campus in a Network Termination. This was connected to the Local Area Network through an ISDN 128 Kbps router. The ISDN router and the switched HUB are kept in the Electronics Department which is situated at the center of the Institute. In the second phase of the project, the New Management building, Library, Hostel and Guest house were connected. All the departments in our Institute has been connected and Internet connectivity is provided. Internet Browsing Centre with 10 systems have been opened in the Main building. Recently Leased Line from BSNL and Leased Line 128Kbps Internet connectivity from Videsh Samachar Nigam Limited (VSNL) have been provided for the campus Network by which the speed of access is increased.

Benefits of Institute Campus Network

The available resources in the Intranet servers also can be shared in the network. The CD-ROMs available in different subject areas can be loaded in our Server and these can be

internally used by our students/trainee/staff members. Using this facility all the trainees and staff members can access the Internet in their departments. E-mail facility is made available to all the departments using this Internet/Intranet connectivity. Established campus network has given enhanced facilities for working in departments.

The Staff members can access the Internet for information as and when they want. Thereby, their knowledge levels are increased and hence our Institute performance also has increased.

Any student/trainee/staff member can access any search engine/on-line material available in Internet which enhances their learning.

The trainees are given free access to the Internet so that they are able to get recent information in their field of study. Able to access e-journals/e-books without delay. They also extensively use the Net for their thesis/project work.

E-mail facility enhanced the communication facility; thereby our staff members and trainees have wide contacts in National and International level.

The department offers courses on "Computer Networking and Internet Technologies" for the teachers/industry people/students. The provided infrastructure helps the trainees to understand the working of Network and installation of Network components. During these courses, the facilities are extensively utilized.

E-learning courses can be done in our Institute by the staff members/trainees using the high speed Internet access.

Conclusion

The network awareness and culture in India is growing with a fast speed. Internet services and access to it should be fully exploited to integrate the network-based resources and services by the Indian users community. Most of the valuable bibliographic databases are accessible through network only. Internet services can be used effectively for library applications by downloading from remote databases. The costs of access to networks also have come down before people are encouraged to undertake online training. Computer based Training (CBT) materials and Web based Training (WBT) materials can be loaded in the Intranet server / web server and trainees and clients can be permited to use these materials for enhanced e-learning. Through our project on Establishment of campus intranet with internet connectivity and with this learning environment, the students, trainees and staff members can use resources more, when and where they are needed.

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