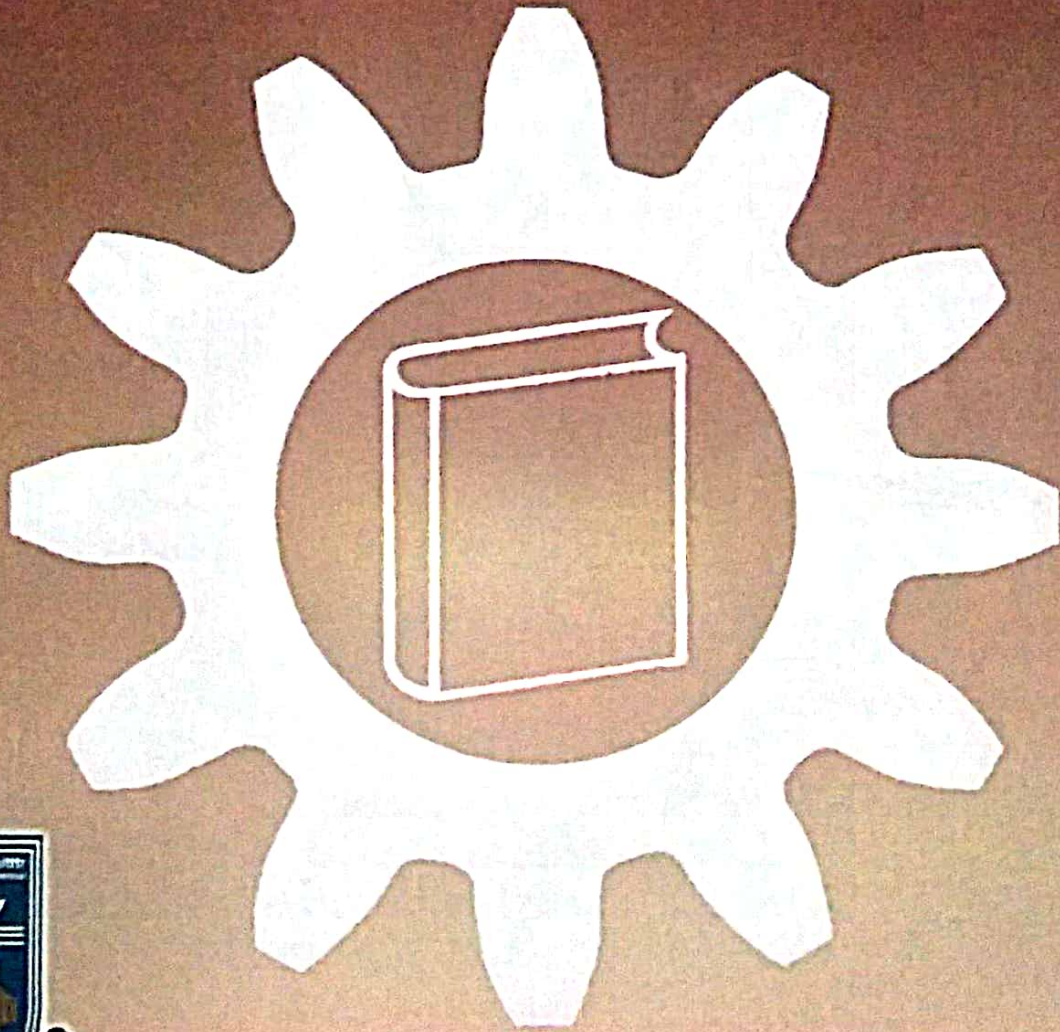


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EDITORIAL

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8/4/04

We are glad to bring out The Journal of Technical and Vocational Education Volume 20, Number 2 in time and we profusely thank the authors for their valuable contribution. All the articles and research papers were well thought out and well written which we firmly believe will be of great interest to our readers.

We have received a variety of articles and research papers for this volume in different areas of Technical and Vocational education. Among these papers, information technology and computer applications are more in numbers.

Prof. Gupta in his article on engineering curriculum has emphasised that curriculum changes are required specifically at polytechnic level so that the pass out technical work force are equipped with the knowledge of information technology and skills of computer applications. He has talked about integration of information technology in Engineering Curriculum, which is undoubtedly is the requirement of the present day.

Prof. Panch Ramalingam in his research paper on Teaching Effectiveness through Technological Advancement has attempted to examine the teaching effectiveness of the teacher in higher education through micro teaching approach. His experiment was conducted on teacher trainees of academic staff college of the Pondicherry University. He observed that teachers participating in the orientation courses derived benefit by immensely undergoing micro teaching session. The research output of this paper will be one of the motivating factors to teacher trainers.

Prof. Rajendran in his article has discussed how information technology is useful in management education. In his view capabilities of Information Technology revolution can be harnessed to transform management education.

Prof. Raju and Prof. Varma in their paper have discussed the details about the potential of proposed wide band CDMA architecture for application in future wide band mobile communication beyond 3G. Mr. Srinath has presented the article titled "The Promise of Computer Based Multimedia Learning" where he has discussed "how instructional messages are viewed", "the design approaches", and "learning outcomes".

In a different but related dimension, Dr. Madhavan came out with his observations on unique features of teaching. Interestingly he has mentioned about changed profile of students in the 21st century along with role of the teachers. The article "Teaching: Some Home Truths Revised" will be of interest to our readers.

The present volume is enriched with the contribution from Prof. Jaiprakash Narain who has presented his thoughts and ideas in his article "Challenges of Educating Persons with Disabilities". The article contains certain features like, characteristics and Interventions, and suggested measures which readers will find very useful.

Prof. Barki and Mr. Arasu in their paper have analyzed human errors which are expected to contribute in reducing accident rate in industries. This article again is another addition to the present volume from industrial field.

The demand and supply always remains a problem in manpower planning in technical and vocational education. Prof. Yadav came out with his valuable contribution with the article "Vocational Education at Graduate Level -An analysis of demand and supply". This article appears to be specially useful to the educational administrators and planners.

JTVE likes to include certain articles and papers which talked about "applications". Prof. Mandal and Prof. Srinivasan have presented an article titled "Acquisition of Skills in Laboratory and Workshop" where they have attempted to show how a skill can be imparted.

Last but not the least, Ms. Renukadevi and Prof. Mukhopadhyay have presented their analysis and ideas on reliability and validity of projective tests which always remains a controversy amongst psychologists and teacher counsellors.

We once again acknowledge the contributions of authors for this present volume. We welcome papers and research articles for future issues. We thank Mr. G. Kulanthaivel and Ms. S. Renukadevi for going through the proof and shouldering other responsibilities which made it possible to publish the journal.

-Editor

JOURNAL OF TECHNICAL AND VOCATIONAL EDUCATION

Vol. 20

December 2003

No.2

CONTENTS

Page No.

EDITORIAL

1. Integrating Information Technology in Engineering Curriculum
A.B. Gupta 1
2. Teaching Effectiveness Through Technological Advancements
Panch Ramalingam 6
3. CDMA Based Mobile Communications
B.L. Raju and Ravi Varma 16
4. Information Technology and Management Education
N. Rajendran 21
5. Teaching - Some Home Truths Revisited
B. Madhavan 25
6. Challenges of Educating Persons with Disabilities
G.B. Jaiprakash Narain 33
7. The Promise of Computer Based Multimedia Learning
M.V. Srinath 37
8. Analysis of Human Error Factor for Reducing Accident Rate in Industries
B.G. Barki and M. Arul Arasu 42
9. Vocational Education at Graduate Level - An Analysis of Demand and supply
Anil K Yadav 46
10. Acquisition of Skills in Laboratory and Workshop
N.K. Mandal and R. Srinivasan 56
11. Projective Tests: The Question of Reliability and Validity
S. Renukadevi and B. Mukhopadhyay 63

Integrating Information Technology in Engineering Curriculum

A.B. GUPTA

INTRODUCTION

In the emerging environment of globalization, the use of information technology in various work areas has increased. Besides providing employment opportunities to workforce, information technology is getting inter-wined in communication, control and various fields of technology to create an impact on the way, we work. To meet the challenges of quality and production efficiency, Indian companies will have to adopt information technology, at a rapid rate, to gain competitive edge, as information is the key input in strategic planning and resource development.

All these developments call for a need to bring changes in the curriculum, so as to have technical work force with knowledge of information technology tools and computer application. The curriculum changes are required specifically at polytechnic level as diploma holders are the backbone of the industry and are mainly responsible to executing and managing all types of activities in various functional areas in the world of work. They have, therefore, to be trained to make use of computers if they are to sustain in the industry.

ROLE OF IT IN MODERN DAY INDUSTRY

Information technology means use of computers, word processor, automated

equipment and telecommunication for exchange of any information amongst users. IT has entered every aspect of product life cycle in a big way, as shown in Fig.1. Computers and IT tools are being used in every aspect of product development. It is essential that students are trained in handling various software available for designing, drafting, testing, manufacturing/ processing and other applications. The following trends are being noted in the modern day industry :

Office Automation - To make the operations more efficient, the trend is towards an office where the entire business communication is carried out through network computers. This ensures faster and reliable movement of information.

Internet and E Commerce - Internet means network of networks. It provides information any time and anywhere. Commercial transactions over the internet is known as E commerce. This area is poised for huge growth.

Computerization in Production Planning, Inventory Control and Purchase. - As the manufacturing systems are becoming more and more complicated, these areas are increasingly making use of computers to make operations more efficient.

Enterprise resource planning (ERP)- Enterprise resource planning is the latest tool being used in industry. A software which is

loaded on network of computers, in which data from various functional areas is fed and the same information is used by all. Integration of various functions helps to take timely decisions.

Computer Aided Design (CAD) - Computer aided design is a very important tool for

designing complicated parts and systems with faster and more accurate results.

Computerization in manufacturing/ Processing - Manufacturing operations are getting automated due to use of computerized machines. CNC machines have not only led to increase in production but also improved flexibility.

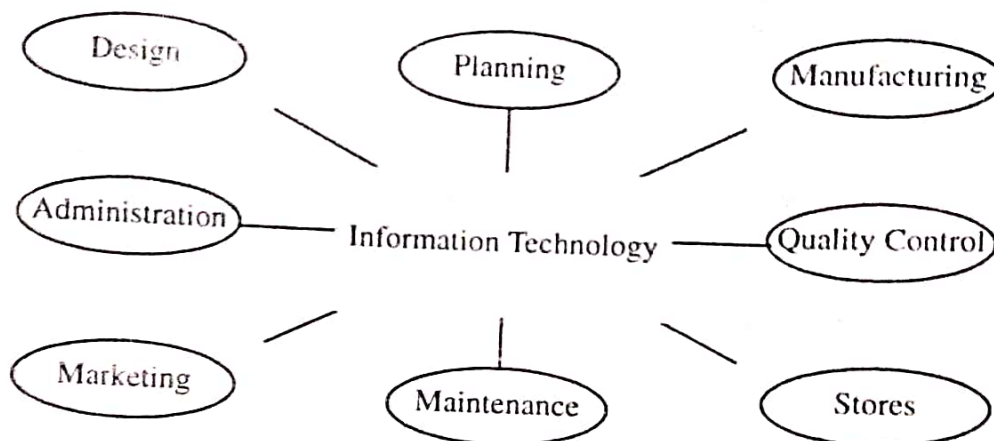


Fig.1 : Use Information Technology in Various Functional Areas

It is essential that the diploma holders should be acquainted with these developments and made proficient in using IT tools. Various strategies through which these objectives can be achieved are discussed as follows:

INTRODUCING INFORMATION TECHNOLOGY IN THE CURRICULUM

The information technology can be introduced to the diploma students in the form of two subjects namely, Information Technology-I and Information Technology-II. Information Technology-I will be common to all the branches, whereas Information Technology-II will be discipline specific.

Information Technology-I will mainly consist of concept, scope and uses of information technology, introduction to computers, windows, MS Office, use of internet, and setting up and maintaining a computer. Information Technology-I will be

helpful in developing competencies like understanding the concept of Information Technology and its scope, operating a computer, using various components of MS Office, navigating the internet, communicating by using an internet, and setting up and maintaining a computer. The diploma holders in various engineering disciplines should know about use of internet. The words like website, universal resource locator, e-mail, browsing, downloading etc. should be familiar to them. Besides that, skills should be developed in them for internet navigation. There should be thorough exposure for finding, accessing, processing, storing and retrieving and transmitting information by use of information technology tools.

The contents of Information technology-II will broadly consist of programming by using computer language, use of certain computer software, and exposure to

applications in specific engineering discipline. It will lead to developing competencies such as understanding about use of computer language for problem-solving and development of knowledge and skills in using various computer software. Information Technology-I, being general in nature can be taught by faculty of computer Engineering Department or a teacher having computer engineering background, whereas Information Technology-II should be dealt by faculty of respective engineering departments.

It also needs to be appreciated that only two subjects may not be sufficient to make the diploma holders proficient in handling IT tools. It is essential that curriculum contents are changed. As information technology has made its presence felt in every functional area such as design, manufacturing, planning, quality control, repair and maintenance, assembling, stores and administration, therefore it is necessary that use of computers in every curriculum area is incorporated in the curriculum contents. The diploma students should have awareness of various software being used in various areas and be provided skills in using various software. Learning experiences should be provided to the extent that students feel confident in working independently and using these software.

USE OF INFORMATION TECHNOLOGY TOOLS IN TEACHING-LEARNING PROCESS

Use of computers and IT tools in the class room not only makes the teaching learning process interesting but also leads to better to better assimilation by the students. It is essential that the teachers in the polytechnics use the IT tools to the extent possible. The IT tools can be taught through power point presentation, and asking the students to gather specific information related

to a subject area. All these learning experiences will develop sufficient skills amongst students in finding, accessing, storing, retrieving, processing and presenting information. The teachers should also promote use of computer language for problem solving. Use of computer aided learning packages and computer aided instructions and other multimedia lead to developing the desired ability to comprehend and conceptualize the various aspects of whatever is to be taught.

OFFERING PROJECT WORK SUPPORTING INFORMATION TECHNOLOGY TOOLS

In most of the curriculum for the polytechnics, students are required to take up a project work. The project work is an open ended assignment which does not have a specific solution at its inception and in fact the solution depends on the creativity, intellectual skills and innovative skills of the students. It is important that the students are offered such project work which require use of IT tools or use of computer language for finding the solution. Some live problems can be taken up from the industry and students should be encouraged to solve these problems using various software.

EXTENT OF FACILITIES AVAILABLE FOR EFFECTIVE CURRICULUM IMPLEMENTATION

For effective teaching of IT related subjects, every polytechnic needs to have appropriate infrastructure in terms of physical resources and well trained human resources so that students are trained in various aspects of computer applications. A study has been conducted to obtain information regarding existing computer facilities and associated requirements for effective implementation of

Information Technology subjects in the polytechnics.

PRESENT LEVEL OF COMPUTER FACILITIES

A structured questionnaire was designed to obtain information from the polytechnics to determine the extent of existing computer facilities. The questionnaire was validated by a group of four professionals and revised after obtaining their valuable suggestions. The questionnaire was mailed to all the polytechnics of Northern Region. 66 polytechnics of northern region responded to the questionnaire. The feedback received from each polytechnic was analyzed. The findings of the studies are as follows:

- i) All the polytechnics, under study, have got computer centers.
- ii) Around 85% polytechnics, from where information has been obtained, have 7-8 computers or a server system having 6-7 nodes.
- iii) Around 70% polytechnics have at least 3 dot matrix printers and one inkjet printer each. Around 40% of the polytechnics have got 2 or more laser printers.
- iv) 22% of the polytechnics have extended the facilities of computers to various departments in the institute.
- v) Only 50% of the polytechnics have got internet facilities. However, frequent power cut discourages use of internet in some institutes.
- vi) Around 30% of the faculty other than computer engineering department faculty was trained to use computer.
- vii) The level of computer training provided to students passing out from the polytechnic was not sufficient, as per

feedback and students were trained only up to awareness level.

- viii) 30% of the polytechnics have organized programmes related to computer for general public.
- ix) 35% of the polytechnics have indicated that repair and maintenance of computers and peripherals is carried out by them at their own level. Around 20% of the polytechnics take the help of local market / local vendors.

BROAD RECOMMENDATIONS

The following are broad recommendations for effective curriculum implementation of information technology subjects:

- i) Though the efforts are on to augment computer facilities in the polytechnics but we are still far behind. The number of computers and printers available in the polytechnics are insufficient. It is recommended that more computers and printers should be procured. For every six students, at least one computer should be available. The facility of computers and printers should be extended to individual departments. Every polytechnic teacher should be provided with a personal computer.
- ii) There is need to procure software packages related to specific disciplines of engineering offered by the polytechnics.
- iii) A time has now come that students should be given extensive training to make them computer friendly so that they are able to handle various software packages related to their discipline. It is essential that internet facilities should be made available in every polytechnic and student should be trained in making

- use of Internet. For better internet connectivity, provision should be made for leased lines on satellite reception for every institution.
- iv) The polytechnic faculty needs to be trained in making use of computers and its applications in the specific field. The training can be carried out in a phased manner. Every year, around 20 percent of the faculty in each polytechnic should be trained in the field of computers.
 - v) The Efforts should be made to provide better and extended facilities to polytechnic students in working on computers.
 - vi) Efforts should also be made by the polytechnics to conduct and organize computer related programmes for the benefit of public/industry.

CONCLUSIONS

The era of globalization has brought with it a lot technological advances. Industries

are going in for automation and computerization to remain competitive. This type of scenario requires that the workforce specially at the middle management level is trained and made proficient in using IT tools as per the requirements of various functional areas. The curriculum should have desired components of information technology tools and their applications. The teachers in the polytechnics should promote use of IT tools by using IT tools in the teaching learning process and offering work that requires use of computers for problems solving. The extent of use of IT tools be such that students are able to find, access, store, retrieve, process, transmit and present information confidently. For effective implementation of curriculum related to information technology subjects, polytechnics should have sufficient infrastructure in terms of physical resources that is computers and peripherals, sufficient human resources trained in making use of computers and its applications in the specified discipline.

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Teaching Effectiveness Through Technological Advancements

PANCH RAMALINGAM

This study examines the teaching effectiveness of the teachers in higher education through micro teaching approach and the educational technological advancement in the orientation programmes conducted by the UGC - Academic Staff College of the Pondicherry University. The assessment tool constructed by the researcher was utilized in this study to measure teaching effectiveness of the teachers through microteaching approach and educational technology. It was administered to the participant teachers ($N = 235$) drawn from various universities and colleges. Based on the formulated hypotheses, it is found that the hypotheses predicted on teaching effectiveness have significant positive relationship on the instruments used. This study also revealed that visual feedback has been found to be effective means of evaluating teaching strengths and weakness. Due to technological advancement, microteaching enables both intrinsic (self evaluation) and extrinsic (peer review) assessment of effective teaching behaviour. Several primary teaching skills have been identified in the development of effective teaching. These are incorporated into the microteaching session, so that the practice of any one or a combination of these skills could be identified and employed in a teaching situation. Some of the important teaching skills are set induction, explaining, questioning, illustrating with examples, stimulus variation, use of blackboard, reinforcement, closure, are some of the

important skills too often used in any teaching situation. It is also found that there is no significant difference between (i) male and female teachers, (ii) urban and rural college teachers, and (iii) teachers of arts and science disciplines with regard to teaching effectiveness. There is a significant difference among (i) different age groups and (ii) number of years in teaching experiences with regard to teaching effectiveness. Invariably all the teachers have shown a keen interest and involvement to make use of the recent educational technological advancements in the teaching and learning process.

Introduction

Teaching is a noble profession which attracts the brightest minds and best personalities with total sense of commitment. Teaching is both a science and an art in itself; it provides an opportunity for the study of human behaviour. A good teacher can disseminate innovative knowledge to his students and helps them to develop their inner potential. Thus, the qualities like intelligence, scholastic aptitude, emotional stability, good manners and pleasing attitude are pre requisites in teaching. The teacher has to be democratic, friendly and persuasive in and outside the class room. The periodical training to the teacher is absolutely necessary to develop required skills and competencies to induce desirable attitude and love for the

profession. Teaching must be considered in the context of social and national objectives.

The process of teaching and learning is a total quality of the acquisition of knowledge, skills, attitudes, values, personality, and self actualization. In the recent past, the teaching and learning has scientifically improved in various ways. Charles Silberman (1996) says "to be sure, teaching like the practice of medicine, is very much an art, which is to say, it calls for the exercise of talent and creativity. But like medicine, it is also or should be a science, for it involves a repertoire of techniques, procedures, and skills that can be systematically studied and described and therefore transmitted and improved. The great teacher, like the great doctor, is the one who adds creativity and inspiration to that basic repertoire... ". Likewise Elliot Eisnor (1983) describes that "willingness and ability to create new forms of teaching, new teaching moves that were not part of one's existing repertoire.

Teaching is not only passing information and facts but also inspiring and thought provoking. It needs involvement and commitment in the profession. A teacher is a all round master for desirable changes in the behaviour of students in terms of knowledge, attitudes, values, skills and personality. Today the classroom management requires maintenance of a healthy learning environment which is relatively free from behaviour problems. Interaction between students and teacher must be developed by means of personal rapport. Role of the teacher in the classroom includes supervising class activities, modifying the behaviour of the students, to create learning abilities and evaluating their learning abilities with parents and other teachers.

Teaching Skills

Teaching is combination of many complex skills which can be resolved into a number of simple components or a set of teaching skills. The modification or the refinement of teacher's behaviour to accomplish these skills is the basic requirement of teaching-learning situation. It helps to meet several challenging situation in the classroom environment. It also makes the teaching effective, permanent and interesting. Scientific studies and researches expect to understand that the characteristics of an effective teacher are self-knowledge, self-concept, intelligence, creativity, integrated personality, confidence, and competence. A teacher becomes a better teacher only when he is equipped with all sorts of teaching skills. This makes him an effective and challenging teacher. Hence, for the development of effective teaching skills a more scientific way or skills based training is needed to the young teachers. One of the important aspects of teacher preparation programme is to help him to become a effective teacher. Among the different techniques, micro-teaching is an important training technique. It is an innovative approach and was first tried out in Stanford University. It is now following in many countries with modified and improved techniques.

Micro teaching is a teacher training technique in which the complexities of normal classroom teaching are simplified. It is considered as a miniaturized classroom teaching (Passi, 1977). These definition of micro teaching explain small group of 5 to 10 pupils (micro unit), concentration on a single skill at a time, and preferably simulated teaching situation. Thus Micro teaching is the process of scaling down teaching process to miniature process, facilitating the trainee teacher to learn a particular skill and put

together all the skills learnt to make one's teaching into an effective teaching (Passi, 1977).

In India, educationists have conceptualised twenty one skills which are essential for general teaching competence. The major skills like Set induction, explaining, questioning, illustrating with examples, stimulus variation, use of blackboard, reinforcement and closure are some of the important skills too often used in any teaching situation.

The lecture method has been the earliest known method of teaching and still continues to dominate the higher education system. Lectures are mostly delivered for conveying information, generating knowledge, understanding and stimulating interest. An informal talk punctuated by suitable questions and made spicy by the use of visual aids and technological advancements of using computers provides a more vivid picture. This will be able to secure the attention of the students and will result in considerable amount of learning.

A good lecture involves two important aspects namely preparation and delivery. Selecting content, formulating the objectives, structuring the lecture, preparing teaching aids and preparing handouts would form part of preparation. Delivery aspect is concerned with effective communication and proper usage of technological advancements. This process involves the interplay of a cluster of the following skills: Skills of set induction, explaining, questioning, stimulus variation, use of audio-visual aids, using chalkboard and closure.

Set induction

This skill is required to be exhibited by a teacher during the first phase of the teaching

just to arouse the interest of students and create a sense of preparedness for the lesson. This can be done by checking the previous knowledge of the students through questions, narrating an experience of the teacher to arouse curiosity, performing a simple experiment relating the topic which has already been taught and so on.

Stimulus Variation

This skill is related to procedures by which the attention of the class can be secured. This involves deliberate changing of various attention-compelling behaviours of the teacher in order to gain student's attention. Some of the subskills are teacher movement, gesture and body language, change in speech pattern, focusing, change in interaction style, oral-visual switching and pause.

Explaining

Explanation is a set of interrelated statements made by the teacher related to a phenomenon in order to increase understanding in students. In order to explain the concept effectively the teacher has to develop certain desirable behaviours such as beginning statement, explaining cognitive links, fluency and concluding statement.

Using Chalkboard

Chalkboard is a versatile aid in teaching and one of the most widely used visuals in a classroom. The components of this skill are: writing legibly, neatness and appropriateness of written work in respect of meaning, brevity, simplicity, developing the necessary diagrams by using different colour chalks.

Achieving Closure

A smooth thought provoking ending of a lecture is as important as a good introduction. It is the skill of the teacher which makes him recapitulates the teaching points

covered in the class so that the students are reinforced and help them assimilate the parts into a meaningful whole. A review, a quick summary, an assignment and similar activities form part of this skill.

Micro teaching has a number of advantages over the traditional teaching methods. It is more effective in changing classroom behaviour of the teacher. Micro teaching performance and experience in teaching will increase the competence level of the teacher. It develops in the trainee teacher various skills needed for his effective teaching. It helps to have maturity, purity, and sensitivity for classroom teaching. It gives confidence and courage to face the class. It develops a new personality, styles in teaching, creativity in teaching; to gain confidence, to handle new situations and problems in the classroom environment. It helps to develop better communication and interaction. It paves the way for developing a positive attitude towards the student and the subject.

Technological advancements

The teaching effectiveness could be improved by using various kinds of teaching aids. This could be classified as projected and non projected aids. Due to the technological advancement in education we can list out many projected aids such as (i) Slides: diagrams illustrating the construction and working of technical objects can be projected. A number of slides can be used in a logical sequence to teach a particular topic. Teacher's explanation can accompany the visual request; (ii) Filmstrip-visuals supporting a topic can be developed in a pre-arranged sequential order, (iii) Overhead projector - A versatile aid which can be used as support system in teaching. (iv) Films/movies: are available on various topics, and have motion built into them. Usually, they combine audio and visual

effects. (v) Closed Circuit Television (CCTV) - This has the same advantage as film with sound. This is a live show of the laboratory or workshop activities. (vi) Computers in Multimedia - Multimedia is the latest computer aided instructional method. The components of multimedia are animation, sound, video, graphics, text, data and picture. They are created using the software in the computer and are integrated through suitable programming languages. The actual effectiveness of a teaching aid can be evaluated after it has been used in a classroom.

Computer Assisted Instruction (CAI)

CAI is an advanced technique of applying computer applications to teaching methods. These include drill, tutorial, demonstration, simulation and instructional games. In the processes of teaching and learning, computers may serve, as presenter of information, learners guide, in interaction with the learning materials, etc. Learning through multimedia is computer-assisted where powerful computers are used for showing text, diagrams (graphics), sound and motion. Multimedia is the new exciting development with personal computers. The technique enables a computer to do things like a television and video, and a stereo with compact disc. The multimedia instructional materials include encyclopedia, dictionaries and animated software. Encyclopedias are vast collection of hypertext, scanned photographs, animations, graphics, human voice, music, etc. They usually provide many menus and buttons to activate with various links in relation to the subject concerned.

Methodology

Objectives

In order to examine the teaching effectiveness of the teachers in higher

education through micro teaching approach and educational technological advancements in the orientation programmes conducted by the UGC - Academic Staff College of the Pondicherry University, the following objectives were framed in the present study.

- To explore the college/university teachers to understand the significance of micro teaching approaches in effective teaching.
- To enable the teachers to understand the linkages between effective teaching skills and use of educational technological advancements in higher education.
- To find out whether there is a significant difference between (i) male and female teachers, and (ii) teachers of arts and science.
- To find out whether there is a significant difference among (i) different age groups, (ii) different States and (iii) teaching experiences with regard to teaching effectiveness.

Sample

Subjects included in the study were 235 teachers who attended any one of the five orientation courses conducted at the UGC-Academic Staff College of the Pondicherry University during the year 2002 - 2003. There were 165 male, 70 female teachers with mean age = 36, teaching experience varies from one year to 14 years (less than five years = 187 and more than five years = 48). Subjects ranged in educational level from postgraduate ($n=97$), M.Phil ($n=98$) to doctorate degrees ($n=40$). The subjects involved with teaching arts ($n=119$), and science ($n=116$), subjects were from universities and colleges. Subjects were drawn from various States (Pondicherry = 31, Tamil

Nadu = 174, Karntaka = 19 and other States = 11). Participation in the study was voluntary. All subject showed keen interest to participate and considered to have a strong interest in effective teaching.

Instruments

A self administering teaching effectiveness instrument was constructed and used to examine the subjects. Self report assessment tool is usually considered to be a more accurate form of measurement for measuring teaching effectiveness and personality factors. Individuals were considered ones with greatest knowledge of self in most circumstances. The first part of the instrument consists of seven major skills and sub skills used for the purpose of micro teaching. Second part is having 20 items to test the teaching effectiveness of the teachers.

Procedure

The teachers were divided into three groups of about equal in numbers such as teacher group, student group and observer group. During the micro teaching session, members of teacher group take turns giving a five minute presentation to the other members of the micro teaching group, who acted as their students and observers. Teachers might use any teaching format they like, small group technique, demonstration, explanation or lecture, etc. Each micro teaching presentation was videotaped, presentations were reviewed in turn by the group. The group provided feedback to each presenter, helping one another to identify strength and weakness in their presentations and providing suggestions for areas in which they might improve. At the end of the session the expert would give his comments. The procedure consisted of four phases:

TEACHING EFFECTIVENESS THROUGH TECHNOLOGICAL ADVANCEMENTS

- Presentation - First, the teacher will present the new material assuming no prior knowledge on the part of the students and due care has been taken to formulate objective(s) before planning the micro teaching lesson.
- Practice - In this phase, teachers have a chance to work with the material they have prepared. A meaningful (or at least mechanical) drill activity is suggested here.
- Application - Students show themselves what they can do with what you have taught them. Communicative (or at least meaningful) activity is expected here.
- Evaluation - Evaluate whether the students learned what the teacher wanted them to learn. The teacher can do this in several ways such as an additional communicative activity, mini-quiz; etc.

This workshop was a valuable opportunity to learn from colleagues outside of one's discipline teaching/learning techniques that can be adapted to one's own teaching/learning strategies; and, through assuming the student role, to sharpen one's insight into students' teaching/learning needs and expectations.

A micro lesson is an opportunity to present a sample of what the teacher teaches and to get the feedback from colleagues about how it was received. It is a chance to try teaching strategies that they may not use regularly. This is a good, safe time to experiment with something new to be sure about its effectiveness. The purpose of the microteaching exercise is to allow the teacher to see what teaching skills he/she does well and what skills he/she can improve due to technological advancements. Micro teachers are provided with scenarios to prepare in advance. If not, think of a few minutes of material that you especially would like to

make sure your students understand by the end of your next class. As always, you should not only plan out how to treat the subject matter, but also give some thought to how you are going to present yourself, manage the class, and involve the students. There are, of course, many different ways of teaching a given lesson well. That is why participants find that, along with what they learn from their own experience of practice teaching, they can also pick up many helpful ideas from observing fellow micro teachers.

Result

- The teachers expressed their happiness for understanding the linkages between effective teaching skills and use of educational technological advancements (including overhead projector, video, films, electronic media and computer assisted instruction) in higher education through the micro teaching approach.
- The study revealed that there is no significant between (i) male and female teachers, (ii) urban and rural college teachers, and (iii) teachers of arts and science with regard to micro teaching approaches on effective teaching and use of technological advancements in higher education.
- There is no significant difference among the different age groups of the teachers with regard to micro teaching approaches on effective teaching and use of technological advancements in higher education.
- There is a significant difference among teaching experiences of the teachers with regard to teaching effectiveness. The teachers having more than five years of experience are teaching more effectively than the teachers who are having less than five years of teaching experience.

Discussion

One or two experienced instructors are usually invited to serve as facilitators. While one person takes his/her turn as teacher for micro teaching, everyone else plays the roles of students and observers. It is the job of these pretend pupils to ask and answer questions realistically. It is the job of the pretend teacher to involve his or her "class" actively in this way. Such a scenario typically runs for five minutes per micro teaching. When finished, the person conducting the class has a moment or two to react to his/her own teaching. Then everyone else joins in to discuss what they saw that they especially liked. Finally, the group may mention positive and negative points that the practice teacher might try doing differently in the future. Visual feedback has been found to be one of the most effective means of evaluating teaching strengths and weaknesses. Microteaching enables both intrinsic (self evaluation) and extrinsic (peer review) assessment of teaching behaviour. Several primary teaching skills have been identified in the development of effective teaching. These are incorporated into the microteaching session, so that the practice of any one or a combination of these skills can be identified and employed in a teaching situation.

Good teachers are not born but self made. The challenge of teaching is to retain the student's enthusiasm. In spite of their growing knowledge-a good teacher fosters creativity in the face of information. The following are some of the important aspects given to the participants before starting the micro teaching session: Choose a good text book, but do not follow it in lectures. The students expect the teacher to present and explain the subject matter in a form which is different from what is normally given in the prescribed text book. The explanation should

be more elegant and simple. The text book should never be taken to the classroom. Always re-experience your subject, this way it will forever remain fresh and lively. Organise your lecture, but do not be slave to kind of structuring. The prepared material should not be taken to the class. Hints such as statistics and numbers which one cannot remember could be noted on small pieces of paper and referred during lectures. However remember, a good actor needs no prompter. Let your lecture be spontaneous, never feel that attention to detail will compensate for lack of perspective. While presenting a problem, avoid example already worked out in the text books. You should formulate your own problem but can use the steps involved in the text book in solving it.

Invariably text book explain concept through definition which are abstract and difficult to understand. The student gets the feeling that the subject presented is full of mathematics and has no application whatsoever. The teacher should try to wipe out this impression by treating a practical system and quoting number of examples to illustrate the subject. The teacher must cite, whenever possible, similarity, of occurrences in day-today life with what is really happening. First of all your appearance must be impressive. This will give you a certain amount of confidence, Do not memorise your lecture, just understand your material. Always start on time and stop on time. The initial five minutes is a very important period, when students assess you. During this period, you should state the importance of the topic proposed, in a lucid manner. Never start fast and end slowly, this shows you have exhausted your material. Never start slowly and end fast. Do not end your lecture abruptly, but bring it to an end by summarising. Remember the audience. You should always

be aware of who your students are and why they are there? What is their background? What are their interest and aspirations? Establish a good rapport with students in the beginning. Sustain the interest of the students by changing pace or activity, if necessary, look at the students, not the ceiling, blackboard, floor, etc. Look into the eyes of the students, since eye contact keeps them engaged.

While lecturing, talk loudly, but slowly and clearly. Avoid monotonous delivery, the students interest should be directed to your subject, not your voice. Use discourse signals deliberately. Do not assume that a mere one time use of a word or idea exposes students. Repeat important aspects for better reinforcement. But never repeat every sentence, the result of verbatim repetition is simply half a lecture in a given time. Put down details systematically and legibly on the black board and allow time for students to interact with the teacher. Even if a little is taught, it should be taught profoundly with conviction, leave something in the syllabus for self study. Distribute hand-outs where feasible. Use visuals wherever possible. Let your visuals be seen clearly.

In the classroom, teacher and students should interact with each other. The lecture should not be a monologue. Permit students to ask questions and clarify their doubts. Answer all questions the best way possible because a question is not an interruption but a challenge to funnel the answer into the rest of the lecture. Ask questions to find out their depth of understanding. Never equate ignorance or lack of knowledge on the part of the students with stupidity. Deviate from the subject when you feel that the students are not with you, but never joke at this lecture. While lecturing, avoid having too many mannerisms. Students

generally tend to concentrate on the way you lecture rather than the lecture itself. As a good teacher, one should create a desired level of response in his students

Effective teaching is an art involving creativity, involvement, motivation, personality and many psychological factors. Teaching is also a science in so far as the identification of skills and practicing them are concerned. In micro-teaching sessions, the teacher is exposed to a wide range of skills and situations. Effectiveness of instructional media are derived mainly (i) through direct sensory contact which involves doing (ii) pictures and models which involve observing and (iii) oral and print media which involve symbolizing. The micro teaching technique is found to be highly economical in terms of time and efforts. It is also found to be more effective than the traditional approaches to practice teaching. Instructional materials to various teaching skill have already been developed and validated (Joshi, 1977; Lalitamma, 1977; Passi, 1977).

Conclusion

The present study shows that mostly all the teachers have shown a favourable attitude towards microteaching sessions. This is in conformity with the studies of George and Joseph, (1978), Bawa, (1984), and Dave, (1987). It also revealed that the college and university teachers participating in the orientation courses experienced themselves and derived benefit by micro teaching technique towards effective teaching, particularly for learning some new skills and proper use of teaching aids. The teaching and learning activities such as lecture, lecture cum discussion, role play, brainstorming, small group discussion, tutorial or demonstration involve a combined use of many skills. Invariably all the teachers have shown interest

to make use of models, overhead projector, slide projector, and other teaching aids developed with the help of technological advancements. The findings of the study will certainly prove the effectiveness of teaching skills by adopting microteaching as an essential supplement to the teacher training

programmes not only in the school education but also in the higher education. To conclude, micro teaching approach is the best way to teach the teaching methodology by using technological advancements in higher education.

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TEACHING EFFECTIVENESS THROUGH TECHNOLOGICAL ADVANCEMENTS

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CDMA Based Mobile Communications

B.L. RAJU and RAVI VARMA

Proposed Wide Band CDMA architecture has a great potential for applications in future Wide Band Mobile Communications beyond 3G, which is expected to offer a very high data rate in hostile mobile channels. Wide Band CDMA technology which can deliver various multimedia services on top of the voice oriented and slow-rate data services are available in the current systems.

CDMA architecture based on orthogonal complete complementary codes, is characterized by its innovative spreading modulation scheme, uplink and downlink signaling design, and digital receiver implementation for multi path signal detection. There exist several fundamental distinctions between traditional CDMA codes (Gold codes, m-sequences, Walsh-Hadamard codes etc) and CC codes concerned in our proposed CDMA system. There are several advantages of the proposed CDMA architecture compared to conventional CDMA systems pertinent to current 2G and 3G standards. It is expected that possible data rate for 4G systems should be roughly in the range of 10–100 Mbps. Bearing this objective in mind our question is how to guarantee such a high data rate in highly unpredictable and hostile mobile channels.

First advantage with this architecture is, it can achieve a spreading efficiency (SE) very close to one (the SE is defined as the amount

of information bits conveyed by each chip) where as a SEs of conventional CDMA systems equals $1/N$, where N denotes the length of spreading codes. Solution to improve the SE of a CDMA system with the help of a spreading technique based on complete complementary (CC) codes, taking into account various implementation constraints of a practical CDMA system.

Second, it offers Multiple Access Interference (MAI) free operation in both up and down link transmissions, which can significantly reduce the co-channel interference responsible for capacity decline of a CDMA system. New system should not introduce too much MAI to ensure higher capacity potential than that of conventional CDMA systems.

Third, the proposed CDMA is able to offer high band width efficiency due to the use of its unique spreading modulation scheme and orthogonal carries. It should preferably have an inherent ability to mitigate multipath problems in mobile channels. The multi carrier CDMA architecture based on orthogonal complete complementary codes is one such proposal that can satisfy all the requirements.

Lastly, the proposed CDMA architecture is particularly suited to multi rate signal transmission due to the use of an offset stacked spreading modulation scheme, which simplifies the rate-matching algorithm relevant

to multimedia services and facilitates asymmetric traffic in up and down link transmission for IP - based applications.

This paper will demonstrate its capability of high band width efficiency and low bit error rate due to its innovative signaling design in both down link and uplink channels. It also addresses technical limitations of the new CDMA architecture, such as a relatively small family of CC codes and the need for complex multi level digital modems. Nevertheless, the proposed CDMA architecture based on complete complementary codes a new option to implement future wide band mobile communications beyond 3G.

INTRODUCTION

In recent years the voice oriented services provided by the 2G mobile communications infrastructure in many countries have attracted increasing number of uses. The increasing trend in the penetration rate is expected to continue in many developing countries. Japan initiated the world's first testing commercial services for 3G mobile communications based on W-CDMA technology.

Considering the constraints on the available radio spectrum suitable for terrestrial mobile communications (100 MHz to 100 GHz), we would like to argue that probably the most relevant and feasible way to achieve goals promised by 4G systems is to workout some enabling technologies capable of improving as much as possible, the air link bandwidth efficiency of the system. In this article we tackle this issue comprehensively by proposing a new CDMA architecture. This article will demonstrate its capability to achieve high band width efficiency and low bit error rate due to its innovative signaling design in both downlink and uplink channels. Here we describe basic properties of CC codes and an

operational model of the new multicarrier CDMA system. We also glance at how the proposed system can achieve MAI-free operation in both up and downlink in a multipath-interference free channel. We discuss various aspect of the proposed system and possible future work.

COMPLETE COMPLEMENTARY CODES

There exist several fundamental distinctions between traditional CDMA codes (Gold Codes, M-sequences, Walsh Hadamard codes, etc) and the CC codes in our proposed CDMA system.

First, the orthogonality of CC codes is based on a flock of element codes jointly, instead of a single code as in traditional CDMA codes. In other words every user in the proposed new CDMA system will be assigned a flock of element codes as its signature code, which ought to be transmitted, possibly via different channels and arrive at a correlator receiver at the same time to produce an auto correlation peak. Take CC codes of element code length $L=4$ as an example by considering two families of CC code, one is for $L=4$ and the other for $L=16$. Hence both the flock size and family size are identical.

Second, the processing gain of CC codes is equal to the congregated length of a flock of element codes. For CC codes of lengths $L=4$ and $L=16$ their processing gains are equal to $4 \times 2 = 8$ and $16 \times 4 = 64$ respectively.

Third, Zero cross correlation and zero out of phase auto correlation are ensured for any relative shifts between two codes.

Fourth, since each user in the proposed system is assigned signature code comprising a flock of element codes, those element codes should be sent to a receiver using different

carriers. In other words, every signature code is split up in to several segments that are to be transmitted via different frequency channels.

PERFORMANCE UNDER MULTIPLE ACCESS INTERFERENCE

Compared to traditional spreading modulation used in conventional CDMA systems, the new system has the following salient features. The most obvious is that bit stream in the new system is no longer aliened in time one bit after another. Instead a new bit will start right after one chip delay relative to previous bit, which is spread by an element code of length 'L'. Another important characteristic attribute of the new CDMA system is that such an offset stacked spreading modulation method particularly beneficial for multi rate data transmission in multimedia services, whose algorithm is termed rate matching in the current 3G mobile communications standards. The unique offset stacked spreading method used by the proposed CDMA system can easily slowdown data transmission by simply shifting more than one chip (at most L chips) between two neighboring offset stacked bits. If L chips are shifted between two consecutive bits, the new system reduces to conventional CDMA system, yielding the lowest data rate. On the other hand the highest data rate is achieved if only one chip is shifted between two neighboring off set stacked bits. Doing so the highest spreading efficiency equal to one can be achieved, implying that every chip is capable of carrying one bit of information. Since the bandwidth of CDMA system is uniquely determined by the chip width of spreading codes used, higher SE simply means higher bandwidth efficiency. Thus the proposed new CDMA architecture is capable of delivering much higher bandwidth

efficiency than a conventional CDMA architecture under the same processing gain.

It should be stressed that the inherent ability of the new CDMA system to facilitate multirate transmissions is based on its innovative offset stacked spreading technique, which cannot be applied to traditional spreading codes. The current 3G W-CDMA architecture has to rely on a complex and some times difficult rate matching algorithm to adjust data transmission rate by selecting appropriate variable length orthogonal codes according to a specific spreading factor and data rate requirement on the services. On the contrary the proposed new CDMA system is able to change the data transmission rate on the fly, without the need to search for suitable codes with a particular spreading factor.

Another important feature of the rate change scheme adopted by the new CDMA architecture is that the same processing gain will apply to different data transmission rates. However the rate matching algorithm in the universal mobile telecommunications systems (UMTS) W-CDMA standard is processing gain dependent, the slower the transmission the higher the processing gain, if the transmission band width is kept constant.

The MAI independent of the proposed CDMA architecture is significant in terms of its potential to enhance its system capacity in a multipath channel. It is well known that a CDMA system is an interference limited system whose capacity is depended on the average co-channel interference contributed from all transmissions using different codes in the same band. The co-channel interference in conventional CDMA system is caused in principle by non ideal cross correlation and out of phase auto correlation functions of the codes concerned. In such a system it is impossible to eliminate the co-channel

interference especially in the uplink channel where bit streams from different mobiles are asynchronous such that orthogonality among the codes is virtually non-existent. On the contrary the new CDMA system based on CC codes is unique because excellent orthogonality among transmitted codes is preserved even in an synchronous uplink channel, making truly MAI independent operation possible for both up and downlink transmissions.

The Bit Error Rate (BER) of the proposed CDMA system under MAI and additive white Gaussian noise (AWGN) was evaluated using computer simulations. The obtained BER performance of the new CDMA system is compared to that of conventional CDMA systems using gold codes and M sequences under identical operation environments. For each of the systems concerned there, a matched filter is used at a receiver. Both down and uplink are simulated considering various numbers of users and processing gains.

SIGNAL RECEPTION IN MULTIPATH CHANNELS

Next, let us look at the performance of the proposed CDMA system under the multipath channels.

It is well known that a conventional CDMA receiver usually uses a RAKE to collect dispersible energy among different reflection paths to achieve multipath diversity at the receiver. Therefore, the RAKE receiver is a must for all conventional CDMA system, including currently operational 2G and 3G systems. However in the new CDMA architecture presented in this article the RAKE receiver becomes inappropriate due to the nature of the unique spreading modulation technique employed in the system. To

illustrate how the proposed CDMA system makes the RAKE receiver obsolete.

The use of a RAKE receiver in the proposed CDMA system still causes considerable BER which is obviously not acceptable. Therefore an adaptive recursive multipath signal reception filter is designed particularly for the CDMA system based on CC codes. The proposed recursive multipath signal reception filter possesses several advantages.

First, it has a very agile structure, the core of which is made up of two transversal filters, one for channel impulse response estimation and the other for data detection.

Second, working jointly with the pilot signaling it performs very well in terms of accuracy in channel impulse response estimation and the obtained BER results. The multipath channel equalization and signal coherent combining are actually implemented jointly in the proposed scheme under a relatively simple hardware structure. Third, it operates adaptively to the channel characteristic variation without needing prior knowledge of the channel, such as interpath delay and relative strength of different paths. Nevertheless, the CC code based CDMA system outperforms conventional CDMA systems using either gold code or M-sequence by comfortable margin that can be as large as 4-6 db, because of its superior MAI independent property.

CONCLUSIONS

In this article a new CDMA architecture based on CC codes is presented and its performance in both MAI - AWGN and multi path channels is evaluated. The proposed system possesses several advantages over conventional CDMA systems.

ADVANTAGES:

First, the system offers much higher bandwidth efficiency, the system under the processing gain can convey as much as one bit of information in each chip width, giving a spreading efficiency equal to one.

Second, it offers MAI free operation in both synchronous and asynchronous MAI-AWGN channels which attributes to co-channel interference reduction and capacity increase in a mobile cellular system.

Third, the proposed system is inherently capable of delivering multirate / multimedia transmissions due to the use of its offset stacked spreading modulation technique.

TECHNICAL LIMITATIONS:

Relatively small family of CC codes and the need for complex multilevel digital modems. Nevertheless the proposed CDMA architecture based on CC codes offers a new option to implement future wideband mobile communications beyond 3G.

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Information Technology and Management Education

N. RAJENDRAN

Management education today is at the centre stage, responsible for bringing about a transformation in the economy and society of a nation by producing change agents in the form of globally competent and competitive managers. Therefore, management education has to be in a symbiotic relationship with the IT and its applications to the teaching in the form of education technology.

A great deal of interest has been aroused in the country on the future potentials of Information Technology. The easy availability of modern computer devices combined with the proliferation of internet connectivity has generated an euphoria about the benefits of information technology. The revolution in information technology is influencing the concepts and practices of industry and education system worldwide. It opens up opportunities for the Management Institutes in India, to experiment with the newer methodologies of imparting management education so as to be linked to the advances taking place in educational technology attaining global excellence.

In India, we witness the Co-existence of multi-technologies. On the one hand, we have traditional revolution whereas on the other hand there are institutes with state of the art facilities of education technology. There is, thus, a need to develop an open attitude to using IT supported education technologies for better delivery of education, easier access to a number of knowledge sources, sharing

through networks and quality distance education in the field of management.

Information Technology in Education Delivery:

The technological tools for delivery of education have progressed from classroom aids like slide projector, overhead projector and LCD projector to distance education tools like TV broadcasts, cable TV, Tele education through satellite and video conferencing, floppy diskettes and CD-ROMS for large capacity data storage, networking via ERNET and INTERNET and a futuristic concept of bringing satellite channels directly to homes by DTH (Direct-to-Home) service. With internet, it is possible to have the facility of exploring world-wide pool of knowledge, through the Web TV, while sitting in the drawing rooms of homes. Out of these electronic tools, the broadcast TV is a very powerful medium, which offers an excellent opportunity in the education delivery as the best teachers, noted personalities and specialists can talk directly to a large number of students. CD-ROMS, which run on a multi-media PC, are an ideal option for taking education to the remote areas, where networking may not be cost effective. They store large amount of material in the form of documents, pictures, graphics, etc. with sound and video added. Internet communication is a very strong medium of education delivery which makes the concept of classroom at

home a reality by way of education through E-mail and web browsing on the world wide web, which is now going to be at the finger tips of millions through introduction of web TV.

By use of computer, instructional material can be prepared and stored in the machine. Advent of multi-media, which results from integration and synergy of several types of information such as graphics, animation, music, speech and video has a profound impact on education, computer based training relieves the teachers of certain repetitive tasks such as tasking drill, practice, information sharing and thus, provides them time for development work, paying attention to individual student and building of concepts and attitudes. The students also move from 'being taught' to 'learning', which brings about higher levels of motivation through frequent and unfailing feedback on achievements. This systems reduces the expensive infrastructure on elements of learning and reduces time wastage in classrooms. Extensive application of computer-based training will remarkably enhance the skills of students as well as teachers, e.g., management education is becoming dependent on various software design for business games and teaching (of finance, marketing, personnel, production, etc..) through specially developed software packages.

The expertise that has remained frozen at the institute level, so far, can be spread through the modern day communication channels. It is also possible to instantly share the course material, newly developed cases, access to the knowledge base and the library materials. In the new information technology era, not only the research, even the infrastructure facilities such as communication, video conferencing, interactive video classroom facilities can be shared for mutual benefit.

Avenues of Resource Sharing:

Some of the resources that can be shared by various management education institutions to bring about an overall improvement in the quality of management education are discussed in the following subsections:

Library resources, Facilities and Services:

Management institutes spend a significant proportion of their financial resources on acquiring and servicing these learning resources to their clientele. However, none of them can afford to acquire all the required knowledge sources.

1. Books / Journals:

Sources of information on functional management comprise books, memographs, periodicals, microforms, corporate report, dissertations / project reports, working papers, audio-visual materials etc., both in print and non-print media.

2. Research Papers, Technical reports and case materials:

The leading management education institutions are constantly producing new case studies, technical reports, management reviews and research papers. In the current context, most of this work is done on computers and the printed copies are then filed, published and / or distributed. The libraries can collect electronic version of this information and make it available to internal as well as external users. The libraries are also in stock of good material in the form of project reports of their faculty members, students and research scholars in electronic media that can be shared easily.

3. Subscription to Electronic Journals:

With improvement in the connectivity and bandwidth of the Internet, many publishers have moved to on-line publications of their journals. Online versions are

economically cheaper to create and distribute and are operationally far easier to manage. This avenue will provide all the management education institution libraries to share the cost and get a cheaper bulk subscription price as a block access to the networked management education institutions in India.

4. Databases in CD-ROMS:

Many of indexing and abstracting databases and other reference materials are available in CD-ROMS. Apart from the size and space saving, this mode of publication offers on-line access and retrieval facility to the user. These resources can be readily shared under certain specified and mutually agreed terms.

5. User Services:

The expenditure on servicing of documents to the target user groups is equally significant. It is more expensive when undertaken individually and normally less expensive when taken up jointly. The information services and products whose scope and utility could be enhanced through networking may include: (i) Content pages of periodicals; (ii) New additions; (iii) Indexing and abstracting products and services; (iv) Bibliographical Services; (iv) Literature searches etc..

6. Technical Processing:

Sharing of processing data (Classification number, catalogue data and the subject heading etc) will not only relieve the participating libraries of the unnecessary duplicate processing tasks but will also ensure uniformity and standardization in processing.

Course Material:

The course offered at many of the management education institutions are not in tune with current trends and tools. The access to expert faculty from various other institutions, their course material, course

syllabus and teaching plan will go a long way in eliminating some of the problems and improving the quality of 'products'. In the electronic era and with the inter-connectivity going up, sharing of such resources can be easily accomplished.

Conferencing:

Both from student and faculty perspective, using a networking mechanism that provide them an opportunity to carry out real-time discussions or live chat, conferencing and discussion forums, will go a long way in addressing many of the problems discussed in earlier sections. In the students' forums, they can discuss class assignment problems of other issues related to case studies. Thus, a cross sectional flow of knowledge and ideas can take place. Faculty members in various faculty forums can accomplish the same. These forums or discussion groups can be formed for general management related topics or for a very specialized sub-area within a particular field.

Management experts to multiple management institutes can also use the conference for transmitting live presentation or lectures. This will expose the students and faculty members of not-so-well-endowed management institutes. This will expose the students and faculty members of not-so-well-endowed management education institutions to the current state of art management practices in the field.

With further advances in network bandwidth (information carrying capacity), the interactive video conferencing forums can be organized. This can very effectively address the issue of lack of expert faculty at many places. Interactive video courses can be offered by leading management institutes with their expert faculty or, the mechanism can be used for training the management teachers of various institutes themselves.

Faculty Based Collaboration:

Most of the management education institutions work independent of each other in conducting research and consulting as well as developing the course content for their various academic programmes. These tasks can be done more effectively, if the faculty members of various management education institutions come forward to share the information, knowledge and problems through a common forum.

Student Placement Information:

Another area that will be tremendously helped by the networking is the students placement process itself. The placement schedules, past pattern database, profiles of prospective employers can be shared among the member institutions. The students themselves at various institutions can compile and facilitate the creation, building and maintenance of such a database. The student placement communities can come together to decide upon the mode and extent of sharing of the placement related information.

Computing Resources:

Finally, even the computing resources of various institutions can be tied up together. This will provide opportunity to smaller management institutes to make use of greater computing power available at larger institutes. The smaller management institutes may have adequate personal computing resources, but may lack ability to solve computationally intense optimization problems. Through, the network, they may access the computing facilities of other institutes to solve these problems.

Conclusion:

Globalisation has thrown many challenges and opportunities, which need to be managed and exploited to revamp the education systems for a better tomorrow. The

capabilities of IT revolution can be harnessed for transforming the management education during the process.

The foregoing discussion suggests that the IT revolution can influence management education in many fruitful ways by providing technological tools for education delivery, such as CD ROMS on multi-media PCs, distance education through automation of libraries and use of internet and networking of institutes sharing resources and information. Absorption of these technologies will improve skills of students and teachers and enhance the communication process to provide faster and easier access to the knowledge sources.

The advances in the information technology and communication technology have brought us to a stage where the ideas about resource sharing are not only feasible but are also the need of the hour. Apart from the classroom teaching, a lot of learning in any institute happens because of the environment. Today's management graduates, irrespective of the specialization, cannot escape the information technology revolution that is taking place in the corporate sector. The businesses themselves have to move on to the information age to stay competitive in the global economy. Thus, such an effort of networking among the management educational institutions will not only address the need of the hour, i.e., the improvement in the quality of management education through resource sharing but also directly expose the students to the state of the art environment. Last, but not the least, even after IT revolution in India for so many years, Indian Management Institutions seem to have utilized IT for a very minimal level.

“Miles to go before I sleep”

Teaching - Some Home Truths Revisited

B. MADHAVAN

It is true that excellence in Teaching is achieved by the juxtaposition of many varied factors-like the knowledge of the teacher, his personal qualities, qualities of the students, characteristics of the Institution, the standards of the university (like the syllabus, marks awarding pattern etc), the orientation of the society towards academics etc. Out of these, this article focuses on the role of Teacher only.

Unique Features Of Teaching In Contrast To Other Careers

1. It is the only job, which does not have a financial relationship with the beneficiary/ customers. In all other walks of life, say in any trade or business, such a relationship is present. A doctor or lawyer earns money from his clients. Even in the case of an agriculturist, he has a pecuniary relationship with the land. It is only in this profession that the giver of the service (Teacher) has no direct benefit - relationship with the receiver (Students). In simple words, he does not have scope to get **any direct benefit from the students** except

appreciation or may be gratitude. Therefore it is ideally suited only for people who have a high propensity for service.

2. A Teacher always orients himself to the position of the other party (student). Whenever a Teacher speaks, it is accompanied by a concern whether the students would understand it. The teacher's life goes on by realigning himself to the needs, moods and capabilities of the students. Even in a family gathering, one could find a marked difference between a Teacher and other relatives because the former keeps on asking during his conversation, questions like " Do you understand? Is it clear to you?" etc. Thus a Teacher will not be able to interact without bothering about the reception of the other party

This aspect of "**bothering for the other man**" is not there in many other professions - or if at all - it is present in a small degree. For example, a factory boss who gives orders to his subordinate does not think much of his convenience

Note:

1. In this article the word "Teacher" is liberally used to denote all levels of Teachers in different avocations and Institutions.
2. This article deals with conceptual and inspirational aspects of Teaching and not aspects like Institutional excellence, the nitty - gritty aspects of practical class room Teaching, the pedagogical aspects etc.

or other wise. His life is "I - centered". The same is the position of a businessman, a bureaucrat or trader etc. On the other hand, a very high degree of "you - centered" approach is the core Teacher's of life.

3. A Teacher is on **24 hours duty**. A factory boss does not have to behave like a boss after office hours. But a Teacher has to behave a Teacher whether on duty or off duty.

The same thing can be said about a few other professions also, like a doctor or a policeman, in varying degrees.

4. Anything in a Teacher's career is **qualitative**, abstract and has long-term implications. It is not comparable to the profile of say, a Marketing Executive who can relate his increased efforts immediately with proportional increase in his earnings. Even assessing the performance of a Teacher is quite complex. For Example, if the Institution wants to find out whether the Teacher is doing his job well, they have to wait for results of at least 2 or 3 batches of students trained by him.

Certain Advanced Interpretations Of The Teaching Career

1. Teaching is an intensely inter-personal activity. So all concepts of **Human Resources Management** - like motivation, leadership, communication - apply, with suitable modifications .
2. Referring to the Maslow's Need-Hierarchy theory of Motivation (brief description at Annexure-I), a Teacher has a very high degree of Esteem need and Self- Actualization need. He has very high degree of affiliation needs also, going by Mc clelland's theory.

Because of these, he is more motivated by the students' appreciation than by any other factor. - For example, he would feel very glad, if an old student who has studied 10 years ago, happens to meet him during a alumnus function and tells him that his classes were wonderful- rather than a news that his Institution is going to give the him 10 days extra holidays in this semester! He would be more glad to hear that his theory/thesis has been accepted (**Self-actualisation need**) than the intimation that he would be the leave sanctioning authority for one more Department (**Power motive**)

3. The Teacher must balance two considerations - **dignity for himself and importance for the subject**. If he displays overriding importance for himself, it will lead to a situation where obedience, compliance and discipline become more focused than transfer of knowledge;

On the other hand, if he lays an all-pervading emphasis on the subject, the students would feel dry and bored in a short while.

Of course, if he displays no importance of himself, the students will reckon the subject along with the Teacher as some thing being frivolous and trivial. But there is a strong correlation that if they like a Teacher, they are favorably disposed towards the subject too.

4. Whatever be the behavioural pattern of a Teacher in his other activities, he is quite wholesome during his interactions with students. In fact that is when the **best part of his personality comes out**.
5. A Teacher has the unique boon of seeing only the **good side of people**. A factory executive is placed in such a position

where he must squeeze work out of others; a business man has to deal with people who are constantly ready to out-wit him- whereas a Teacher sees only the good side of people whatever be their position otherwise. To cite an extreme example, a Teacher going for literacy training to prison inmates will still be seeing only their "good" side. They will also relate with him as "students" only.

Certain common innuendoes passed by the society on the Teaching profession

The Teaching profession, in principle, has been held in high esteem by the society, which is manifest in the following trends:

In the Indian tradition, the Teacher is placed in a very high pedestal in the order of evolutionary hierarchy i.e., **Mother, Father, Guru and then God**

Even today, in the rural heartland of India, a Teacher is held in such a high esteem that his signature as witness, is generally sought after and accepted, in all the written documents. In most villages the humble school Teacher is also a permanent member in the panchayat, to be seated with the other panchayat members who are high and mighty in the society. Even the village burglars exclude the temple priest and the school Teacher from their itinerary, by convention.

But, in the day-to-day world of stark realities, certain remarks made against the Teaching profession particularly from the affluent members of the society, have gained currency and have come to stick. Perhaps they have seeped into the Teacher's psyche also and might have impacted diffidence in their thinking. Some of the reproachful remarks we hear from career- Teachers are listed below.

The positive responses to them are also attached.

1. Remark: The Teacher spends his life in an imaginary and unreal world; those who can do-do, those who can't do – teach.

Response: A Teacher is in a **creative world** (not imaginary).

The question of competence (can and can't) is not the only dimension that determines success. The personality profile required for a Teacher is that he should be high on intellect but low on ambition. If he is low on intelligence, he won't be able to understand the subject, much less face a class of students. On the other hand, if he is high on ambition, he would not have continued in Teaching! He would have become a businessman! (also refer to response at para 2 below)

2. Remark: The Teacher is detached from the field – he is not a practitioner – he is a dummy manager, dummy engineer etc.

Response: Theory is nothing but practice crystallised over a period. All theory takes-off from where practice has concluded. If a person starts off practice without studying the concepts well, he would be spending lot of his life in re-inventing the wheel, the metal and so on. Therefore the Teacher contributes to the practical field in his own inimitable way. If he is good at his job, he would be creating excellent engineers and managers!

So, it is a matter of suitability to the profession. **Everyone can't be and need not be field executive.** When the person's profile matches the job-requirements, we get best performances indeed!

Incidentally most practitioners dread **Teaching**; they reckon it to be a very difficult task.

3. Remark: Many of the students might get into careers which will give them better resources and status than the Teacher ; but the Teacher will remain where he is.

Response: The students are not the standards for comparison (much less competition) against the Teacher.

The Teacher is comparable to a source of **Potential Energy** and the students, the Kinetic Energy. A Teacher is like a person who **knows the road but does not drive, himself**. The students are the drivers who don't know the road well enough. These two forces are the complementary parts of the same whole. The Teacher and the society should be willing to accept this dispensation and appreciate the fact that the Teacher is in a position to groom many, many students who would contribute to the society in various ways.

4. Remark: The Teaching job is a very routine and dreary one. Once he learns a Subject and prepares the notes, he can go on and on, merely repeating the same matter year after year. He has no scope or compulsion to up date himself. It is one long stretch of boring life lacking in excitement, glamour and dynamism.

Response: The lessons may not become different every year; but the batch of students is different – that's enough room for dynamism.

In any career, there are **not many extra-ordinary assignments**; but there are many **ordinary assignments to be done extra-ordinarily well**; and this certainly applies profusely to Teaching.

Again Teaching is the only position, which gives constant company of youngsters. That way the Teacher remains in contact with the world of youth, vitality and dynamism throughout.

It is true that a Teacher's day could begin and end as planned on most days. Without this kind of methodical and undisturbed schedule, it would be difficult to perform the job of Teaching. One cannot be a travelling salesman in the morning and do Teaching in the afternoon!

5. Remark: Some times, the Teacher is only five minutes ahead of the class. He is not necessarily a person of luminous brilliance.

Response: Of course good Teachers take great pains to relearn constantly and up date their inventory.

Even for a moment accepting the remark without contest, it still remains that putting ideas into other peoples' heads is still a very difficult job; and a Teacher does it all the same, notwithstanding his own repertory.

While a businessman can do "business-talk", the factory executive "shop-talk", only a Teacher can do Teaching.

And the Teacher is in an unique position **to groom people better than him self!**

Changed Profile of Students in the 21st Century

The following paradigm changes in current generation of students are generally observed over the previous generation. While many of them are a change in degree, in some aspects it could be a change in kind. Of course it must be borne in mind that we are talking about general trends here . There could very

well be exceptions to every single point listed below:

1. **The students have become more ambitious** – They are looking forward to quick riches and don't hesitate to negotiate very heavy salary packages. For the sake of a very simple argument, their general level of attire, appearance and eagerness to access comforts is visible in striking contrast to the apologetic ways of the previous generation. The improved economic scenario is also responsible for this.
2. **More talented** – In many cases they say, "Show us the Text Book, we will do the reading" The earlier-generation practice of methodically covering the subject in the classroom step by step, is losing relevance.
3. **Greater access to knowledge inputs:** Explosion in media– supplied inputs. The Net is a friend philosopher and guide and is an inseparable part of this generations' wherewithal.
Seeing this from another angle, we find that they are not un-comfortable with **impersonal learning**, too viz., learning through media (that's putting it mildly) in comparison to learning from other persons – the Teacher, friends or parents. This is also a marked departure from the previous generation.
4. **Education has become more costly** – With the advent of Self-Financing education and the gradual withdrawal of Government subsidies, education has become costly. Students and parents have also become conscious of cost-benefits involved in Education.
5. **More assertive-** Students think that they can exercise the correct choice on many matters including education- they think

they know better on every aspect of life – it is common to hear parents lamenting "My son/daughter wanted it this way – so I have no say in the matter". This was not the trend in the previous generation.

6. **Willingness to exert higher levels of effort** – They want to prove themselves instantly and are ready for many sacrifices en route. Of course they are also careful to project that the fact of their hard work.
7. **More motivated by on the job considerations** and less by affiliation needs - Less sensitive to criticism or even appreciation. They would respond better to job related threats or benefits- rather than bother about say, being appreciated by a colleague, much less being mistaken by him.
8. **General dilution of human considerations** – It is a matter for big debate whether the younger generation does care enough about others. For example, a very huge majority of youngsters are clear that they won't live with their parents in the joint family set up- so what to speak of relations with others? Their relationships are now need-driven and purpose- driven, it appears. The term of expression is likely to be "I need you" rather than "I like you."
9. **General erosion of interpersonal skills** – This is a by product of all previous items.

Changed Role of Teacher

1. The earlier role of equipping the student to gain mastery over the subject – cover the syllabus –is perhaps on the way out – **uncover** the syllabus little, enable them to study for themselves (by

- suggesting additional source material, case studies exercises etc. wherever possible,)- arouse their curiosity and let them **discover** the remaining.
2. The role as a tutor of dispensing of inputs (**trainer- centered**) is becoming thinner and thinner. The role as facilitator (**learner-centred**) is becoming more and more pronounced.
 3. Doing a bit of **marketing and public relations** on behalf of their Institutions- is another add-on assignment.
 4. Greater care to be exercised in **quasi-official activities**- like interacting with parents, advising students on their personal tangles etc., Such activities are being taken over by the Management progressively. Today's Teacher does not enjoy the unadulterated trust of the society as in yester-years.
 5. Periodical interactions with **Regulatory bodies**, Certifying agencies and Inspection agencies on behalf of the Institution.
 6. Assume responsibility for **personality development** of students. For example, students will always remember a Teacher who gave them a chance to do public speaking in the class or perform a number during College Day celebrations. Such is the importance of this aspect. The class room / campus is the safest place for such trials; outside, mistakes would be costly.
 7. Greater involvement in **administrative matters**. For example campus discipline.
 8. Teaching involves a few **allied skills** – The showman, the entertainer, the story teller and so on.. He has to have a smart turnout, a cheerful countenance and must be well groomed. It is the part of the showmanship. He must employ some

amount of humor, which brakes the monotony and rejuvenates the teaching sessions. Such allied skills was required earlier also, but more acutely so in the present scenario.

10. Today's Teacher deals with students who are exposed to very high degree of competition, uncertainty and the consequent stress. They have scope to get into despair and dis-orientation, often.. So the Teacher must be emotionally stable to refocus them on the objective and to reorient them properly. He can do this provided he has adequate **inventory of positive qualities**.

Certain Common Temptations And Infirmities In-Built In The Profession

Certain very subtle and refined aspects pertaining to the above are listed below:

1. **Becoming a non- Teacher:** Getting thoroughly absorbed in Project reports, Fund raising ventures, consultancies, arranging conferences etc., to the exclusion of student- centred activities. Perhaps, each Institution/Teacher must fix a quota or percentage of time for such activities out of their total time or provide such other suitable safe guards.
2. **Promoting himself at the cost of the Institution:** A Teacher grows, by acquiring experience and stature, with the support of the Institution- for example, publishing books or patenting a technology .The benefits of such development should flow back to the Institution and to the students. This is again connected to para 1 above
3. **Becoming esteem-centric:** As already stated, a Teacher has high dignity needs. This is certainly required for maintaining

his self-respect. But, it could become a subtle trap beyond a point- he may unconsciously get favourably inclined towards students/others who show high degree of obeisance to him – notwithstanding other factors.

4. **Castigating a student** who has learning difficulties: Some times Teacher might be tempted to call such a student as “idiot, stupid, dumb, dim-witted, clay-head, unfit for the class/education etc”. No doubt, a Teacher may pull-up, criticize or reprimand a slack student; he may even punish a troublesome student through the authorities. But a condemnation or a denouncement as stated above, in respect of a weak student does not behove of the sacred relationship between the Teacher and the Student. No doubt there are such students but a Teacher shall refrain from such intellectual excesses. He must build wherever possible, not demolish.
5. **Getting bogged down with administrative/office responsibilities:** There are two types of powers- the Formal (official) power and the Informal power (the power of knowledge, persuasion, advice etc.). A Teacher is well nigh with the earning and exercising of the latter. It would be quite befitting this profile, if the Institution does not overwhelm him with tasks involving the former. Again a balanced approach as in para 1 above seems called for.
6. **Lack of co-ordination :** The Teacher’s life could turn out to be highly individualistic and aloof. A Teacher can lead his daily activities without getting along with anyone – be it the colleague, the neighbor, the student or even the

management. In contrast, a business executive must actively interact, co-ordinate, co-operate and practice lots of give & take with his colleagues, superiors, subordinates, customers and suppliers – which in turn reflects in his transactions in his personal life also. But a Teacher need not practice this type of active co-operation. This aloofness is especially pronounced when it comes to peer – relationships (relationships with equals). No doubt, he is in the midst of other Teachers in the Department /Institution. – but each Teacher could afford to be on separate islands with the main stream flowing all around them.

7. **Intellectual domination:** A Teacher should enable students, not dominate them, except where deliberately necessary (that too as a temporary ploy). He should not try to have a final say in each and every transaction with students. In fact great Teachers play down their role strategically, to boost the confidence level of the student.
8. **Credit Robbing:** A Teacher should not simply “appropriate” the ideas / contributions of others. It is a professional temptation to be avoided at all costs. He should take proper permission and publicly acknowledge them with due credit. In the final reckoning, it would be ideal if the Teacher is **intrinsically a better person and a better human being**, enjoying good inner harmony and inner music, to shine through all the above profiles . To sum up, we may recall an old adage, **“An ordinary Teacher narrates, the good Teacher explains, the better Teacher demonstrates and the best Teacher inspires.”**

Maslow's Need Hierarchy Theory Of Motivation

Abraham Maslow, a great Psychologist and expert in Organisational Behaviour propounded the Need-Hierarchy theory of Motivation in the 1950s. He identified the needs that motivate people. They are listed below. The first two needs are categorised as lower order needs and the remaining three are classified as higher order needs.

- Physiological needs : The need for food, water, rest, sleep etc.
- Security needs : Protection of life, limbs and property. Also means and assured supply of Physiological needs – also called safety needs.
- Social Needs: : Man is a social animal – he needs to belong to his group –to affiliate with his members and to be affiliated. The need to be acknowledged, recognized and included in his group, to be identified as a member of a group.
- Esteem Needs (or Ego Needs) : The need to be distinct and unique in the group. The need to be recognized as the best (or at least different) in the group. (This is diametrically opposite to the earlier need)
- Self-actualization : The need to be what all a person can be, the need to reach the highest performance in his trade or line.(does not refer to the spiritual meaning)



McClelland's Three Factor Theory:

He identified 3 motives.

1. Power motive – the desire to exercise authority – to control people and resources – to sit over destiny of others.
2. Achievement Motive -- The motive to do well and better – to accomplish difficult tasks – to derive satisfaction that he can do .
3. Affiliation motive – the need for giving and receiving love and affection , the need to understand and be understood , to appreciate and beappreciated, the need to acknowledge and be acknowledged the need for praise, gratitude, to be recognised etc.,

Challenges of Educating Persons with Disabilities

G.B. JAIPRAKASH NARAIN

1 INTRODUCTION

The last decade, notably after 1995 has witnessed fundamental changes in policy and practices concerning the education, training and support of the persons with disabilities (PWDs) from childhood to adult life. Integration of the disabled into the mainstream of life has acquired a greater thrust following the Persons with Disabilities Act 1995, and the consequent scheme launched by MHRD, Govt. of India for upgrading polytechnics to integrate the physically disabled into the main stream of technical and vocational education.

The issue of PWD is no more to be considered a medical care issue. It is a social issue. Integration of PWDs into the main stream of social living can be achieved only through the medium of education and training. Education and training of high quality are major instruments to improve the overall socio economic conditions and to prevent and combat social exclusion and discrimination. Education is recognized as a process through which PWDs can reach their fullest potential. Education is critical for promoting sustainable development and improving the capacity of PWDs to live and lead a relatively hassle free independent life.

2 PERSONS WITH DISABILITIES AND THEIR LIFE

'Unseen, unheard, uncounted and unattended to' Persons with Disabilities constitute one of the most marginalized and for a long time an uncared group in our country. As per the last census it is estimated about 10% of our population are disabled making this population of about 90 million. Of these nearly 12 million are blind, 28.5 million are speech and hearing impaired, 6 million are orthopaedically handicapped, 24 million are mentally retarded, 7.5 million are mentally ill and the rest are leprosy cured. The 21st century is expected to witness higher prevalence of PWDs due to increasing accidents, acts of terrorism, persistence of poverty, mal and under nutrition, resurgence of diseases, increased prevalence of dreadful diseases like HIV/AIDS, greater levels of drug abuse. Mental disabilities such as depression, alcoholic dependence, and schizophrenia are becoming more prominent. The WHO report (1997) has cautioned that disabilities associated lung diseases are expected to increase alarmingly. Disability of a mental nature is not visible and would cause more tension and insecurity than any visible disability. Some years ago the reaction was

often to reject the PWD as a human being. Disabilities used to signal the end of active life. Today it has become a common characteristic of a normal life span. For generations society has viewed PWDs as people in need of charity. They have been sympathized. There is no more need for sympathy, for sympathy alone will not enable them to live the life of a normal and abled would live.

3 CHARACTERISTICS AND INTERVENTION

PWDs find themselves often discriminated because they are disabled and cannot live the same kind of life as the abled. They have to face all the prejudices, disadvantages and exclusions in a social, cultural, educational and economic context. In our country, an analysis of the PWDs brings out the following characteristics.

- They generally belong to the economically weaker sections of the society.
- Large numbers are illiterate and without vocational skill and hence unemployed.
- They are most likely to be non employable.
- Women with disabilities could also find difficulty in setting up own families.
- Women with disabilities may also find themselves physically and sexually abused.
- PWDs, generally suffer greater isolation due to stigma of disability and related myths and fears.

- PWDs get very little, family and community support.
- PWDs suffer from social isolation largely due to superstitions beliefs and prejudices .
- PWDs have a lower level of educational attainment than abled persons.

This calls for immediate steps to

- Sensitise the public to the educational, social and emotional needs of PWDs
- Increasing educational opportunities.
- Increasing the enrolment rate of PWDs in technical and vocational educational institutions
- Improving physical access and laboratory resources to suit the PWD requirements.
- Providing early intervention services and tailored curricula.
- Training teachers and other professionals for the specific needs of PWDs
- Taking education and training to the door steps of PWDs
- Promoting adult and non formal education in appropriate environments.
- Improving job placement opportunities
- Identifying and developing new job opportunities for PWDs which are geared towards the present and future demands of the labour market and provide them with training in those fields.

4 SUGGESTIVE MEASURES

The following suggestions are made for consideration for improved integration of PWDs into the main stream of technical and vocational education.

- Encouraging families to send PWDs to school. A closer and more proactive interaction with the family of the PWDs need be established to motivate them to admit their children to school.
- Arranging for participation of PWDs in skill training activities aimed at women, in particular, in the non traditional and income generating sectors. Programmes must be specifically designed to meet the demands and needs of Women PWDs. These programmes be such that the skills and competencies acquired would enable women to earn their living without being displaced from their place of living
- Wider information dissemination about the positive educational opportunities of PWDs is required. Besides attempts being made through the use of mass media including the TV and the local channels, efforts must be made to personally meet the PWDs and their family members to educate them about the facilities provided under the Scheme. Wide circulation of information about programmes is required. Visits to feeder schools to trace the PWDs who would become eligible for admission to the formal programmes is to be taken.
- Encouraging NGOs to include PWDs in activities to develop awareness and to

support and collaborate with other organizations.

- Organizing training seminars with a view to overcoming traditional beliefs and attitudes against PWDs
- Open house programmes may be organized by technical institutions with the active involvement of PWDs in the area, associations and organizations of PWDs.

The challenges facing technical institution in the 21st century and the need to be more proactive towards the education of PWDs, demand learner centered innovative and flexible approaches including reoriented curriculum to take account of the barriers for education of PWDs, needs background, ability and the suppression PWDs would have already suffered. The methods and materials used in technical and vocational education of PWDs should be carefully adapted to the needs of the different category of PWDs. In this respect the requirement are

- learning materials in special formats and types
- learning resources in the audio and video packages
- machines and equipment used in workshops be created to the needs of the PWDs so that they are capable of operating and maintaining them
- learning performance be evaluated assessed on overall basis that considers participation in class, interests and attitude for acquiring practical skills and competencies and relative progress, making allowance for the disability.

5. CONCLUSION

Given the necessity of integrating people who are disadvantaged into the society and its occupations, the same educational experiences and opportunities should be available to them as those without disabilities. Educational institutions must strive to immediately remove all types of barriers such as environmental, institutional and attitudinal in order to create

a healthy, friendly, caring and involving environment. Priority be given for training of staff to equip them with skills to educate, train and guide PWDs. Education and training are a right for all. Institutions must ensure that this right is accessible by all PWDs. The extent to which it succeeds depends upon the commitment, dedication and whole hearted involvement of institutions.

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The Promise of Computer Based Multimedia Learning

M.V. SRINATH

Abstract

In the present day there has been much emphasis on restructuring education using technology. Computer Based Learning (CBL) has developed tremendously with the addition of Multimedia capabilities. Multimedia capabilities have enabled CBL to become a more dynamic and powerful learning tool.

Instructional messages can be perceived using Delivery Media view, Presentation Mode view and Sensory Modalities view. Computer Based Multimedia Instructional messages can be designed using Technology Centered Approach and Learner Centered Approach. Computer Based Multimedia Learning is meaningful and it has good transfer performance and retention performance in learners.

1.0 Introduction

Computer based Multimedia instructional message refers to presentation of instructional messages through various media elements such as text, graphics, animation, video, sound etc., using computers. Learners understand in a better way when the messages are presented to them in an integrated way through Computer based Multimedia.

This paper discusses firstly, as to how instructional messages are viewed, secondly, about the design approaches and finally on the learning outcomes that takes place in

Computer Based Multimedia instructional messages.

2.0 What is Computer Based Multimedia Instructional message:

Computer based Multimedia instructional message refers to the presentation of instructional messages / information through various media elements using computers that is intended to foster learning.

For hundreds of years, the major format for presenting instructional messages has been text. In short, verbal modes of presentation have dominated the way we convey explanations to one another, and verbal learning has dominated education.

But the recent advancements of Information and communication technologies (ICT) has enabled an explosion in the availability of using various media elements together in presenting the instructional messages that fosters meaningful learning.

This is because various media elements complement one another which enable learners to mentally integrate the information using verbal and visual representations supported by cognitive theory of multimedia learning.

3.0 Views of Computer based multimedia instructional messages:

3.1 Delivery media view:

This view is based on the devices that are used to deliver the instructional message.

The main focus in this view is on the physical system such as computer screens, LCD projectors, video players etc., used to deliver the instructional messages.

For example in computer based multimedia, instructional messages are presented via the screen and the speakers. These devices can even be broken down further by defining each window or frame on a computer screen as a separate delivery device and each sound track coming from a speaker as a separate delivery device.

The main emphasis of this view is on the physical devices used to present information rather than on how people learn.

3.2 Presentation modes view:

This view is based on the representation formats used to present the instructional messages.

The main focus in this view is on the way the instructional message is represented such as through the use of text, visuals or using both.

For example in computer based multimedia, instructional message can be presented verbally as on-screen text or narration, and visually as static graphics,

dynamic graphics or animation. Presentation modes view is learner-centered as it allows learners to use various coding systems to represent knowledge, such as verbal and pictorial knowledge representations.

This view of multimedia instructional message is consistent with cognitive theory of learning, which assumes humans have separate information processing channels for verbal and pictorial knowledge.

3.3 Sensory modalities view:

This view is based on the sensory modalities the learner uses to receive the instructional message.

The main focus in this view is on the sensory systems such as eyes and the ears the learners use to perceive the instructional messages presented to them.

For example in a computer based environment, an animation can be perceived visually and a narration can be perceived auditorially. This view is learner-centered because it takes the learners information processing activity into account.

The main feature of the three views of computer based multimedia instructional messages are illustrated in Table 1.

Table 1 Main features of the three views of computer based multimedia instructional messages.

Sl.No	View	Definition	Example
1.	Delivery Media	Two or more delivery devices	Computer screen and amplified speakers
2.	Presentation Modes	Verbal and Pictorial representation	On-screen text and animation
3.	Sensory Modalities	Auditory and Visual senses	Narration and animation

4.0 Design approaches of computer based multimedia instructional messages:

Computer based multimedia instructional messages offer a potentially powerful learning

technology which acts as a systems for enhancing human learning.

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These learning systems can be designed using the two approaches.

4.1 Technology centered approach:

This approach focuses on using the cutting edge advancements of ICT such as virtual reality, WWW etc., into developing interactive computer based multimedia instructional messages.

4.2 Learner centered approaches:

This approach begin with an understanding of how the human mind works and ask, "How can we adopt multimedia to enhance human learning?". The focus is on use of multimedia technology as an aid to human cognition.

The differences between the two approaches of designing computer based multimedia instructional messages are summarized in Table 2.

Table 2 Differences between the two approaches of designing computer based multimedia instructional messages.

Design Approach	Starting Point	Goal	Issues
Technology-centered	Capabilities of Multimedia technology	Provide access to information	How can we use cutting-edge technology in designing multimedia presentations?
Learner – centered	How the human mind works	Aid human cognition	How can we adapt multimedia technology to aid human cognition?

5.0 Learning outcomes of computer based instructional messages:

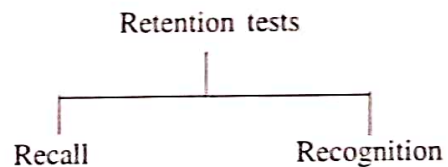
5.1 Major goals of learning:

There are two major kinds of goals of learning.

They are,

1. Remembering.
2. Understanding.

Remembering: It is the ability to reproduce or recognize the presented instructional message and is assessed by retention tests.



Understanding: It occurs when learners construct a coherent mental representation from the presented instructional message. It is reflected in the ability to use the presented material in novel situations and is assessed by the transfer tests.

Example: Essay questions

Table 3 The differences between the two types of goals of learning and the tests used for their evaluation.

Goal	Definition	Test	Example test item
Remebering	Ability reproducuer or recognize presented material.	Retention	Write down all you can remember fromthe passage you just read.
Understanding	Ability to use presented material in novel situations	Transefer	List some ways to improve the reliability of the device you just read about.

5.2. Learning outcome:

When instructional messages are presented using computer based Multimedia the outcome of learning is meaningful. This meaningful learning enables the learners to

have a good transfer performance as well as good retention performance.

Table 4 given below summarizes the main features related to the learning outcome of computer based multimedia instructional message.

Table 4 Main features related to learning outcome of computer based multimedia instructional message.

Learning outcome	Cognitive description	Test performance	
		Retention	Transfer
Meaningful learning	Integrated knowledge	Good	Good

The best way to promote the meaningful learning is through active learning.

Learners activity refers to both physical behaviour such as hands-on activity or cognitive activity such as what happens in his/her mind.

Researches on learning shows that the meaningful learning depends on the learner's

cognitive activity during learning rather than on the learners behavioural activity during learning.

Table 5 given below summarizes the two kinds of active learning that fosters meaningful learning outcome.

Table 5 Two kinds of active learning that fosters meaningful learning outcome.

		Cognitive Activity	
		Low	High
Behavioural Activity	Low	Does not foster meaningful learning outcome	Foster meaningful learning outcome
	High	Does not foster meaningful learning outcome	Fosters meaningful learning outcome

6.0 Conclusion:

Multimedia has become a powerful tool in the hands of teachers and trainers. The promise and goal of computer based multimedia instructional messages is to foster

meaningful learning outcomes making the learner cognitively active during learning and are designed to promote active cognitive learning.

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Analysis of Human Error Factor for Reducing Accident Rate in Industries

B.G. BARKI and M. ARUL ARASU

ABSTRACT

Analyses of industrial accidents have often concluded that 'human error' is a determining factor in 70-80% of the cases. Until the 1980's, human reliability focused upon individual erroneous action. Over the last five years, a number of researchers have become increasingly concerned to support technology transfer between human error modeling and constructive system development (Johnson and Leveson 1997). As a result workshops were conducted in Glasgaur (1997), Seattle (1998) and Liege (1999). Consequently, great effort has been spent to improve safety by better training schemes, by safety campaign motivating the work force to be safety conscious and by improved work system design to prevent human error. This paper stresses the importance of human error in reducing industrial accidents.

INTRODUCTION

The 1970s and 1980s focussed public attention upon human contribution to system failure. Flexiborough (1974), Sevesco (1976), Three Mile Island (1979), Bhopal (1984), Chernobyl (1986) increased awareness that human intervention could cause or exacerbate major accidents. Injuries, contamination of environment and loss of investment all depend on loss of control of physical process capable

of injuring people or damaging property. Human error models and error taxonomies were developed to categorize and explain operator failure during major accidents (Reason, 1990). Human behaviour in any work system is shaped by objectives and constraints, which must be respected by the actors for work behavior to be successful. Many degrees of freedom are, however, left open which will be closed by the individual actor in an adoptive search guided by local and subjective criteria such as workload, cost effectiveness, or risk in failure. This paper makes an attempt of detailed study of human error.

LITERATURE

Numerous studies and theoretical researchers have shown evidence of human error as major casual factor in industrial accidents. Researchers have found that 80-90% of accidents are due to human error (Heinrich *et.al.* 1980; Hole and Glendon, 1987). Feyer and Williamson (1990); Williamson And Feyer (1990) found that two out of these Australian accidents are caused by human error. A study by Solminen and Tallberg (1996) examined 178 fatalities and 99 serious accidents in Finland: they found that 84-95% were mainly due to human error. Evidence also supported that the high rate of human operator error was related to design error

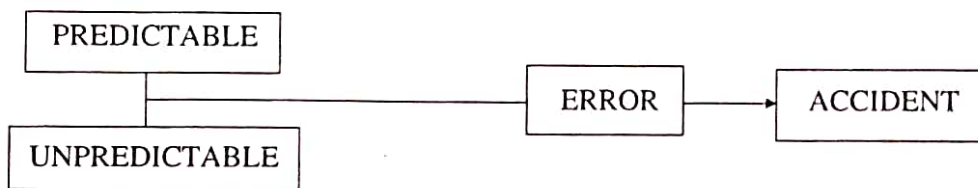
(Rasmusser and Pederson 1984; Reason 1990, philips 1996).

ERROR OCCURRENCE ANALYSIS

1. Failure to perform a required function (omission)

A step is left out of a prescribed procedure, intentionally or inadvertently or there may be a lack of completion of a sequence of operations. In some instances intentional omissions by workers may be due to procedures that are over lengthy, bad written, deviously expressed, in defiance of normal tendencies and actions or lead to a lack of understanding of directions.

2. Performing a function not required, including unnecessarily repeating or procedure of procedural step, adding uncalled for steps to a sequences or substituting an erroneous step (commission)
3. Failures to recognize an immediate hazardous situation requiring corrective action.
4. Inadequate response to a critical contingency.
5. Wrong decision as a solution to a problem that arises.
6. poor timing, resulting in a response that is too late or too soon for a specific situation.



BARRIER OF HUMAN ERROR ANALYSIS

1. Human error is inevitable

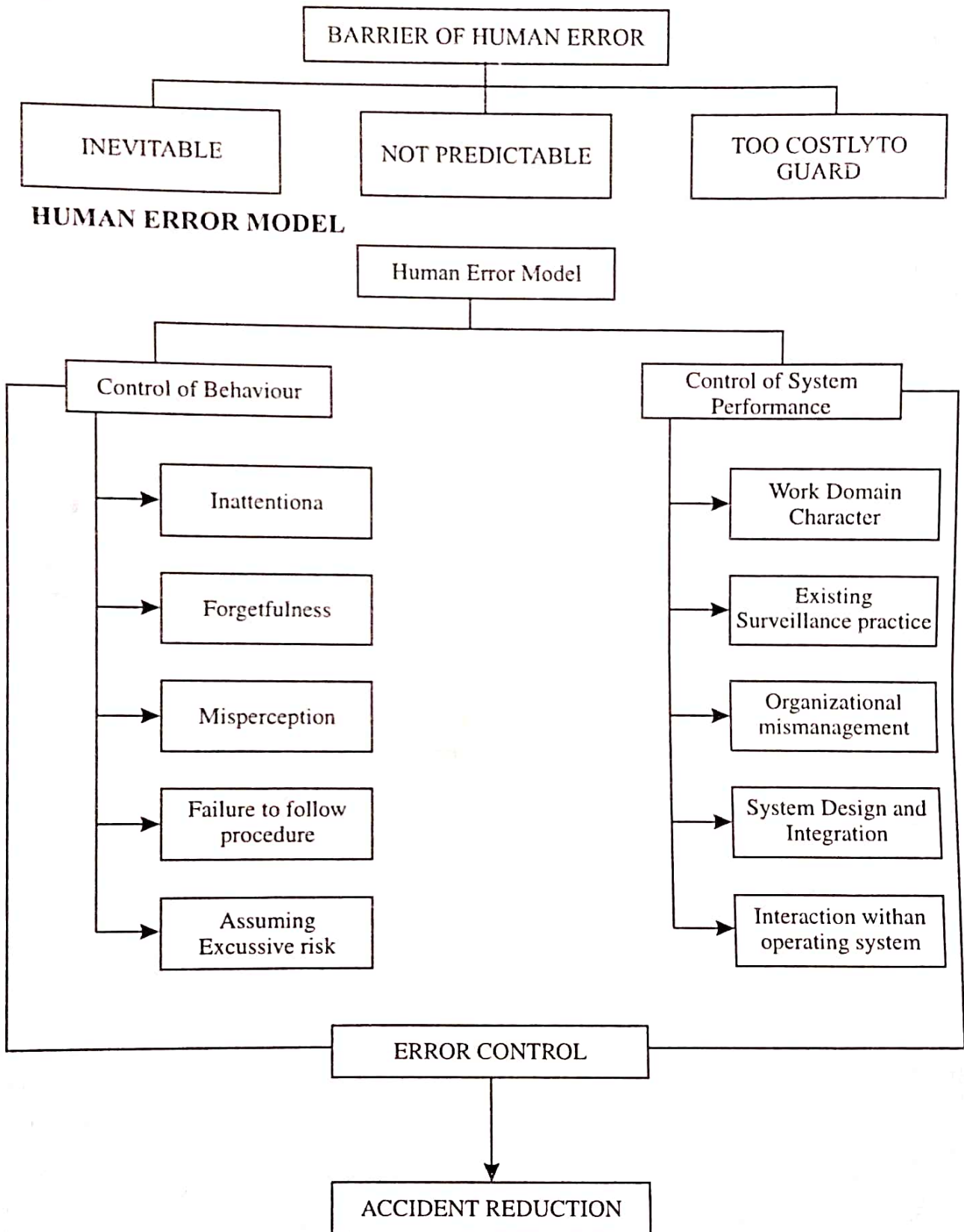
In this view, users will eventually defeat whatever safeguards and measures are put in place to protect them and this environment.

2. Human error cannot be predicted

In particular, it is difficult to anticipate the many ways in which inattention and fatigue jeopardize safety.

3. Human error is too costly to guard against

In this view, market forces prevent companies from employing the analysis and prevention techniques that reduce the human contribution to major accidents.



CONCLUSION

The root cause of the accident was a human error on part of a person involved directly in the dynamic flow of events, a pilot a process operator, train driver, crane operator etc. Accidents are more likely caused by a systematic migration towards accident by an organisation operating in an aggressive, competitive environment. Consideration of

human factors will reduce the likelihood of human error resulting in a safer, more efficient work environment, for all stake holder. Most human factors research is concerned with improving the understanding of human error. Human error model paves a way to improve the safe operation and control of work process so as to avoid accidental effect causing harm to people environment.

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Vocational Education at Graduate Level - An Analysis of Demand and supply

ANIL K YADAV

INTRODUCTION

In the aftermath of globalisation, liberalisation and increasing global competition vocational education is seen finding a place at the forefront of social policy issues internationally. It is probably because of the fact that vocational education is job oriented. In fact, the essential link between effective vocational education and socio-economic development has been recognised. However, it is believed that vocational education prepares efficient workers. It infact, prepares people for job in industry, business, agriculture and service sectors. Various organisations, like UNESCO and the World bank, have shown deep interest in vocational education. UNESCO considers, vocational education as an essential factor in the development process on two major aspects i.e., economic and social. According to UNESCO vocational education was required to prepare young people for employment in areas corresponding to talents and aspirations and to ensure that adults can adapt to changes in the employment structure and in their own ambitions to achieve career and personal satisfaction, and promoting development of a cohesive and democratic society.

Vocationalisation of education has been identified as a priority area in the Eighth Five-Year Plan. It happened probably because of the fact that the incidence of educated

unemployment and under-employment had been rising continuously. The Live Registrar of Employment Exchanges indicates that the increase in the number of persons seeking employment assistance had been higher in the case of educated than unskilled workers in general. Since employment is the main objective of vocationalisation, it is important that standards are clearly laid down for the competencies required. It is also required that there should be adequate opportunities of employment for the vocational graduates. These issues are of utmost importance in order to ensure the quality and employability in the area of vocational education. In this paper, we seek to highlight some of the features of Vocational Education Programme at graduate level. We also have made an effort to understand the demand and supply of the vocational courses to cater to the needs of the students.

Vocational Education Programme (VEP) in India

Since Independence, attempts have been made at a large scale to reform and reconstruct the education system to cater to the needs of the people. Surging ahead in this direction, it was felt to have separate stream of vocational education for providing a large variety of vocational courses to meet the existing demand of the economy and the varied needs,

aptitudes and capacities of youth (Kothari Commission, 1966).

In this direction, due to the strong recommendations of the Kothari Commission and strong feelings of the experts in the area, the Vocational Education Programme (VEP) was started in 1976 at 10+2 level in the schools. The objectives of this VEP were (i) to prevent youth power from unemployment (ii) To provide an alternative for aimless degree-based on higher education (ii) To prepare them for profitable employment and to develop middle level skilled manpower in the country for strengthening socio-economic development. Later, renewed emphasis was made through the new National Policy on Education (NPE) in 1986. Subsequently, a Centrally Sponsored Scheme was launched in the year 1988 to provide financial assistance to the States and Union Territories and to implement VEP in a planned manner.

The main focus of this type of education was to convert the senior secondary into the terminal stage of education. However, the objective of vocationalisation of secondary education could not be realised. Several factors contributed for the failure which includes the mismatch between training and knowledge imparted and skill required for the available jobs. Secondly, the supply of manpower was much in surplus than the possible demand. Under these circumstances the pass-outs of the secondary level education tended to flock to colleges and universities. This trend has infact been putting tremendous pressure on the universities, and colleges' material and manpower resources. But the fact remained that colleges and universities were unable to enroll these students appropriately.

This however, prompted the University Grants Commission to initiate a number of programmes related to career-oriented

knowledge and skills during Fifth Five-year Plan and in early eighties. The National Policy on Education (NPE), 1986 (revised in 1992) of Ministry of Human Resource Development, Government of India, and subsequent Programme of Action 1992 (drawn from NPE) also emphasised the need to exposing the university and college students to the application oriented courses. Later, to review the scenario at the first-degree level and to make suitable recommendations, the University Grants Commission constituted a Core Committee under the Chairmanship of Dr. T.N.Dhar. The responsibilities of the Committee were:

- An examination of the experience of vocationalisation of education at the higher secondary stage
- An examination of the restructuring courses at the first-degree level.
- An identification of first degree level subjects.
- The preparation of detailed outlines for vocational subjects.
- An indication of infrastructural needs for introduction of re-designed subjects.
- Specification of measures, needed to mobilize manpower for teaching these subjects.
- An indication of the strategies for implementation of the programme.

After careful examination of all the possible aspects of vocational education, the following recommendations were made by the committee:

- Deepening and diversifying the skill component of courses.
- Designing and developing the number of three-year vocational courses at the graduation level.

- Introduction of vocational subject on one hand and allowing optional subjects to students.

In a nutshell, the committee proposed that the basic structure of the present three years degree course remain the same and along with that a student should also select at least one vocational subject.

On the basis of the recommendations made by Dhar Committee, University Grants Commission (UGC) launched the scheme of vocational education in the academic session of 1994-95. The different aims of scheme pertained to preparation of graduates for employment were, filling up of intermediate job positions arising due to new economic policy, assurance of adequate supply of skilled persons for non-formal demands, development of capabilities of students with support from financial and other institutions to set up their own small enterprises, provision and assurance of vertical mobility in addition to the horizontal employability after graduation, provision for the rural and agro-based sectors to have the competent human resources, to have a check on the rural to migration, and finally, provisions of women's education compatibilities to the market needs.

The curriculum of vocational education was introduced as a part of under-graduate courses of Arts, Science, Commerce, Engineering and Technology. The curriculum of vocational education included the following disciplines at the first-degree level:

Arts, Humanities and social sciences

1. Functional Hindi
2. Functional Sanskrit
3. Communicative English
4. Archeology and Museology

Commerce and Economics

1. Principles and Practices of Insurance
2. Actuarial Science
3. Office Management and Secretarial Practice
4. Tax Procedures and Practices
5. Foreign Trade Practices and Procedures
6. Tourism and Travel Management
7. Advertising, Sales Promotion and Sales Management
8. Computer Applications

Sciences

1. Industrial Chemistry (Seven Streams)
2. Food Science and Quality Control
3. Clinical Nutrition Dietetics
4. Industrial Microbiology
5. Bio-technology
6. Biological Technique and specimen Preparation
7. Seed Technology
8. Sericulture
9. Industrial Fish and Fishery
10. Instrumentation
11. Optical Instrumentation
12. Geo-exploration and Drilling Technology
13. Mass Communication Video Production
14. Still Photography Audio Products

Engineering and Technology

1. Electronic Equipment Maintenance
2. Computer Maintenance
3. Electrical Equipment Maintenance
4. Environment and Water Management
5. Rural Technology
6. Automobiles Maintenance

VOCATIONAL EDUCATION AT GRADUATE LEVEL - AN ANALYSIS OF DEMAND AND SUPPLY

7. Refrigeration and AC Maintenance
8. Construction Tech. and Management
9. Manufacturing Process

It may be noted from the data presented in table 1 that this scheme has been implemented in 100 Universities covering 1317 colleges upto 1999-2000. The combination of subjects for the vocational courses as proposed by UGC is presented in the Annexure-I.

The vocational education programme at Graduate level as has been mentioned above is run in hundred universities and affiliated colleges to these universities. As per the table 1, the university-wise distribution of courses suggest that Uttar Pradesh has twelve (12) universities where vocational education is implemented. This is following by Bihar with ten (10) universities and Madhya Pradesh and Maharastra are placed on the third rank respectively with nine (9) universities in each state. But college-wise position differs. In the

Table 1: State-wise No. and Percentages of Universities and Colleges under Vocational Courses

SL. No.	State	No.of Univer- sities	No.of Colleges	%
1	Andhra Pradesh	7	113	8.58
2	Arunachal Pradesh	1	2	0.15
3	Assam	2	44	3.34
4	Bihar	10	62	4.71
5	Delhi	1	20	1.51
6	Goa	1	4	0.30
7	Gujarat	6	63	4.78
8	Haryana	2	42	3.19
9	Himachal Pradesh	1	17	1.29
10	Karnataka	6	119	9.04
11	Kerala	3	68	5.16
12	Madhya Pradesh	9	74	5.62
13	Maharashtra	9	187	14.20
14	Manipur	1	17	1.29
15	Mizoram	1	1	0.08
16	Nagaland	1	4	0.30
17	Orissa	3	49	3.72
18	Punjab	3	85	6.45
19	Rajasthan	4	35	2.66
20	Tamil Nadu	7	99	7.52
21	Tripura	1	3	0.23
22	Uttar Pradesh	12	101	7.67
23	West Bengal	5	80	6.07
24	Chandigarh	1	6	0.46
25	Pondicherry	1	4	0.30
	Total	100	1317	100.00

Source: Derived from the database of Monitoring and Evaluation Unit, UGC.

case of colleges, Maharashtra stands first with 187 (14.20 %) colleges out of 1317 colleges in India which have adopted vocational stream. Karnataka is at number two with 119 (9.04 %) colleges followed by Andhra Pradesh with 113 (8.58 %) colleges. Uttar Pradesh is placed at fourth rank with 101 (7.67 %) colleges. This means that although there are large number of universities which have adopted vocational education scheme in Uttar Pradesh and Bihar but college-wise acceptance of vocational education is higher in Maharashtra, Karnataka and Andhra Pradesh followed by Uttar Pradesh. This also suggests that college-wise Popularity of the courses is more in Maharashtra, Karnataka and Andhra Pradesh. One may also infer from the table that skill development is given lots of importance in these states as compared to the other states. Apart from this it is also true that Maharashtra is the most Industrially developed state. Similarly, the most sophisticated companies in the field of electronics and other are concentrated in and around Karnataka.

One may also note that in most of the Union Territories and small states such as Arunachal Pradesh, Himachal Pradesh, Manipur, Mizoram, Nagaland, Tripura have one university only which has implemented the scheme. However, the number of universities and colleges differ in different Union Territories and states except Mizoram. In Mizoram there is only one university and one college where vocational subjects are taught.

Table 2 below depicts clearly the subject-wise demand in different colleges all over the country. It is apparent from table that some subjects have very high demand as compared to other subjects. It may be seen from the table that subjects like Communicative English, Office Management

and Practices and Tax Procedures and Practices have very high demand. These subjects may be categorized in one group and renamed as group one for the present analysis. As against this in group three, there are subjects (Code no. 403-409) which have no demand or very low demand except environment and Water Management (404). This may have happened because these days there is lot of emphasis on environment and Water. Water because it has become a scarce commodity over a period of time. Apart from this the demand is also low for the subjects (code no.501-509) as has been shown in the table. These are the subjects related to agro-rural and electrical activities. This means that students are least interested in agro related activities, The students are however, interested in relatively more practical types of the courses which have industrial Orientation.

It may also be observed from the above table that the subjects like Functional Hindi (101), Tourism and Travel Management (206), Industrial Chemistry (301) Food Science and Quality Control (302), Industrial Microbiology (304), Bio-technology (305), Seed Technology (307), Sericulture (308), Industrial Fish and Fishery (309), Mass Communication and Video Production (313), Electronic Equipment (401), Computer Maintenance (402) and Biological Techniques and Specimen Preparation (306), Principles practices of Insurance (201) have a moderate demand. This may be considered as group two.

It emerges for the above analysis that the students are interested in relatively more practical types of the courses which have Industrial Orientation. Wherever the course content is based on the practical aspect the demand for that course seems to be higher and vice-versa, Apart from this the courses which

Table 2: Subject-wise\Year-wise Growth in the Number of Colleges (1994-95 to 1998-99)

Code	Subject	Year-wise number of colleges					Total
		1994	95	96	97	98	
101.	Functional Hindi	24	9	13	4	4	55
102.	Functional Sanskrit	0	3	2	1	3	9
103.	Communicative English	33	35	46	41	27	182
104.	Archaeology and Practices of Insurance	1	0	3	3	2	9
201.	Principles and Practices of Insurance	1	4	0	6	4	15
202.	Actuarial Science	1	0	2	10	0	4
203.	Office Management and Practices	19	17	30	46	34	146
204.	Tax Procedures and Practices	23	15	29	27	24	118
205.	Foreign Trade Practices and Procedure	7	3	6	6	6	28
206.	Tourism and Travel Management	13	3	15	20	16	67
207.	Advertising, Sales Promotional Sales Management	8	4	14	24	17	67
208.	Computer Applications	27	37	42	29	46	181
301.	Industrial Chemistry	7	14	24	22	32	99
302.	Food Science and Quality Control	1	6	7	4	5	23
303.	Clinical Nutrition and Dietetics	0	3	5	2	5	1
304.	Industrial Microbiology	3	1	4	5	13	26
305.	Bio-Technology	1	2	6	6	8	23
306.	Biological Techniques and specimen Preparation	2	1	7	1	3	14
307.	Seed Technology	2	3	6	6	6	23
308.	Sericulture	1	12	17	9	8	47
309.	Industrial Fish and Fishery	5	4	16	11	16	52
310.	Instrumentation	0	1	6	1	6	14
311.	Optical Instrumentation	0	1	0	0	1	2
312.	Geoexploration and Technology	1	2	3	1	3	10
313.	Mass Communication and Video Production	1	1	1	2	1	6
314.	Still Photography and Audio Products	1	1	2	2	2	8
401.	Electronic Equipment Maintenance	7	5	5	4	3	24
402.	Computer Maintenance	1	2	3	4	5	15
403.	Electrical Equipment Maintenance	0	0	0	0	1	1
404.	Environment and Water Management	0	2	7	1	1	12
405.	Rural Technology	0	0	1	0	0	1
406.	Automobiles Maintenance	0	0	2	1	0	3
407.	Refrigeration and Air Conditioning Maintenance	0	0	0	0	0	0

408.	Construction Technology	0	0	0	0	0	0
409.	Manufacturing Process	0	0	0	0	0	0
501.	Dry land Agriculture	0	0	0	0	3	3
502.	Non-conventional Energy Sources	0	0	0	0	1	1
503.	Agro Service	0	0	0	0	6	6
504.	Soil Conservation and Water Management	0	0	0	0	1	1
505.	Silvipasture	0	0	0	0	0	0
506.	Hill Agriculture	0	0	0	0	2	2
507.	Forestry and Wild-life Management	0	0	0	0	2	2
508.	Domestic Animal Farming	0	0	0	0	1	1
509.	Rural Handicrafts	0	0	0	0	1	1
	Grand Total	190	190 -	324	290	320	1317

Source: Monitoring and Evaluation Unit, UGC.

have higher possibility of the employment generally demanded more by the students.

Factor Affecting Vocational Education

It has widely been believed and observed (Yadav et.al, 2002) that vocational education programme in the Indian scenario at present has not been able to make much success. Firstly, at school level it failed to make secondary education as a terminal stage. Secondly, at graduate level also not much progress have been made although 1317 colleges have adopted these courses. The future of vocational education would be determined by the occupational structure which ultimately is influenced by social, economic and related environment. However, the following factors seems to have been affecting the vocational education programme.

1. Advances in Science and Technology
2. Duration of Courses and time spent for the subject
3. Infrastructure (Equipments and Reading Materials)
4. Selection of Trainees

Conclusions

It has been noted in this paper that the Vocational Education Scheme at graduate level was implemented in 1994-95. The main objective was to make the education, job oriented. Contrary to the expectations the students still find it difficult to find the suitable job in the market. It has also noticed that although supply of vocational education stream increased overtime for all subjects, while, the demand has gone up only for certain group of subjects. First group as classified by us for the analysis consists of the subjects such as Communicative English, Office Management & Practices, Tax Procedures and Practices, Computer applications and Industrial Chemistry have the highest demand. Whereas in the second group which consists of the subjects mainly from Engineering and Technology section have moderate demand. The subjects other than falling under these groups have low to very low demand. It appears from the whole analysis that the vocational education stream is slowly becoming popular. Nonetheless, it is certain that it would take some more time to achieve its main objective of becoming the

terminal stage of education and job generating scheme. However, in order to enhance the popularity of these courses the universities should make them more practical oriented.

Apart from this increase in time allotted for these subject is must as stressed by Yadav et. al.(2000).

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Proposed Combinations of Subjects

SI. No.	Vocational Subjects	Other Two Pre-requisites	Subjects Preferable	Subjects Studied at +2 level
1.	Industrial Chemistry (seven Steams)	Chemistry and	Mathematics	PCM/B
2.	Food Science and Quality Control	Chemistry	Any Science Subject	PCB
3.	Clinical Nutrition Dietetics	Chemistry	Any Science Subject	PCB
4.	Industrial Microbiology	Chemistry	Botany or Zoology	PCB
5.	Bio-technology	Chemistry	Botany or Zoology	PCB
6.	Biological Technique	Zoology and	Botany	PCB
7.	Seed Technology	Botany	Chemistry	PCB
8.	Sericulture	Botany	Zoology PCB	
9.	Industrial Fish and Fishery	Zoology	Chemistry	PCB
10.	Instrumentation	Physics and	Mathematics	PCM
11.	Optical Instrumentation	Physics and	Mathematics	PCM
12.	Geoexploration and Drilling and Technology	Physics	Mathematics	PCM
13.	Mass Communication Video Production	Any Science or Commerce Subject	Any Arts, Science or Commerce Subject	Any
14.	Still Photography Audio Products	Any Science or Commerce Subject	Any Arts, Science or Commerce Subject	Any
15.	Electronic Equipment Maintenance	Physics	Electronics	PCM
16.	Computer Maintenance	Physics	Computer	PCM
17.	Electrical Equipment Maintenance	Physics	Electronics	PCM
18.	Environment and Water Management	Chemistry	Science	PCM/B
19.	Rural Technology	Physics	Mathematics	PCM
20.	Automobiles Maintenance	Physics	Mathematics PCM	
21.	Air Conditioning	Physics	Mathematics	PCM
22.	Construction Technical Management	Physics	Mathematics	PCM

VOCATIONAL EDUCATION AT GRADUATE LEVEL - AN ANALYSIS OF DEMAND AND SUPPLY

23.	Computer Maintenance	Maths/Computer	Computer	PCM
24.	Archaeology and Museology	Geology	Geology/Anthropology	Science/ Sanskrit/ English/ History
25.	Functional Sanskrit	Sanskrit	Any*	Sanskrit
26.	Communicative English	English	Any*	English
27.	Functional Hindi	Hindi	Any*	Hindi
28.	Advertising, Sales Promotion and Sales Management	Any*	Any*	Any*
29.	Foreign Trade Practices and Procedures	Commerce/Economics	Any*	Economics and Commerce
30.	Principles and Practices of Insurance	Any*	Any*	Any*
31.	Actuarial Science	Any*	Any*	Any*
32.	Tax Procedures and Practices	Commerce	Any	Accountancy/B usiness Studies
33.	Office Management and Secretarial Practice	Any*	Any*	Any*
34.	Tourism and Travel Management	Any*	Any*	Any*
35.	Computer Applications	Any*	Any	Preferably Computer

P = Physics, C = Chemistry, M = Mathematics, B = Biology

* See the subject details for guidance.

* The views expressed in this paper are of the authors' and not of the institute in which he is employed

Acquisition of Skills in Laboratory and Workshop

N.K. MANDAL AND R. SRINIVASAN

1.0 Introduction:

The primary purpose of any training program is to establish the best relationship between the worker and his/her job i.e. the optimum person-task relationship. Such a relationship is at its best when the attitude to the job is right, when the knowledge of the job is adequate, and when he/she has developed the necessary skills. The development of the right attitude to the task and to learning it depends very much upon the instructor/trainer who trains the worker and upon the person who supervises his/her work. Hence both the instructor and the supervisor need to understand the training methods and their purpose and to appreciate the part each has to play in enabling the student to become fully proficient at, and 'at home' with his job

Following are the views of a teacher / instructor to start planning a new unit in a course or training program.

- College professor: My approach is to list the content that needs to be covered related to the selected topic. This would include the aspects, definition, concepts, and principles that I feel need to be communicated to my student.
- Industrial trainer/Instructor: It is important to start by listing the competencies I expect the trainees to have after receiving instruction on the topic.

In this paper different type of skill, how a skill can be imparted and duties and responsibilities of a good instructor are discussed.

2.0 Skill and their Methods of Learning and Teaching

Skills are classified as follows.

- Cognitive or intellectual skills - Thinking or reasoning. The skills of 'Using one's head.'
- Psychomotor or physical skills - Sports and practical tasks. The skills of 'using one's body.'
- Reactive or personal skill or personal behaviour. The Skills of 'Controlling oneself'
- Interactive or interpersonal skills - Interacting with others, leading, selling, persuading. The skills of 'controlling others'

Methodology of Learning a Skill and Teaching a Skill:

Learning Methodology:

- Reproductive skills are learned through practice
- Productive or creative skills cannot be learned by mere practice. Once 'threshold' of learning is reached through practice the perfection can be reached through practice in the

intellectual, planning, sub-skills which are used for creative decision.

Teaching Methodology:

For perfection of reproductive skills, practice should be provided.

- In productive skills, one must provide opportunities for self analysis, reflection

and exchange of ideas with other equally or more skilled practitioners.

- For productive skill development briefing and debriefing sessions should be included in instructional designs.

A task constitute of knowledge and skill. You need to have the instruction scheduled through which the skill can be imparted. Instructions schedules are obtained as follows.

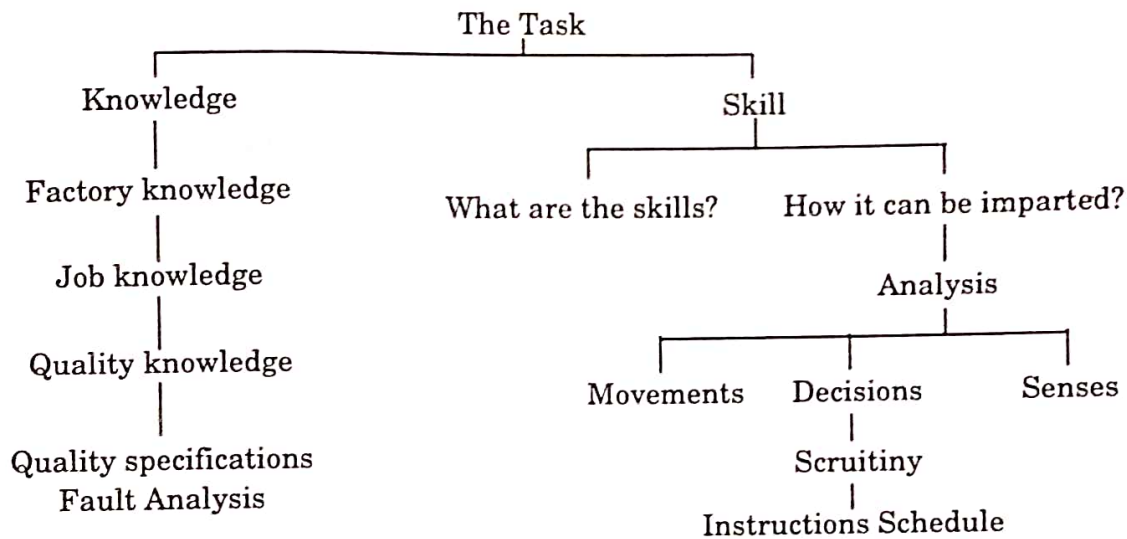


Fig 1

3.0. Imparting the Skill

Imparting skills is, in certain respects, more difficult than imparting knowledge. We are concerned here with teaching people to do things, not merely to remember. Normally, if we want people to be able to do things, we 'show them how to do it' i.e. we give a demonstration of the particular skillful activity which we wish to impart. Such demonstration is advantageous, if not indeed essential, in imparting all manual skill. But it will be appreciated that demonstration by itself is not enough to teach any simple activities which occur in industry. If we wish to enable people

to perform complex tasks, not only have to demonstrate them but also:

- To demonstrate them step by step in units which can be comprehended
- To communicate to the trainee for each step not only what the experienced worker does, but how the experienced worker achieves it.

Most of this communication will have to be done by means of words (spoken or written) or by charts, diagrams, etc. In other words, when we wish to communicate skill to people, we attempt to do so by means of symbols, which are representative of what we

wish to convey. But it is not these symbols which the trainee has to learn - even if he learned the instructions for doing a task until he was to learn - even if he learned the instructions for doing a task until he was perfect, he might still be totally unable to perform it adequately. In imparting skills, we are seeking a response which is not in the symbolic terms in which the explanation and instructions are given, but in an activity which depends upon the trainee's own muscles, senses and decision-making. Although we teach by means of symbols, it is not the symbols which we wish the trainee to learn, but rather a series of detailed muscular responses (and all that precedes them) which are only inadequately described by the symbols.

The various steps involved to acquire skills are,

- (i) Have everything ready: make sure that everything needed for exercise is ready and in working order.
- (ii) Established a contact: make sure that the trainees are 'with you' before beginning to instruct. A word or a smile is usually enough to get their attention.
- (iii) Introduce the section or exercise: this should be brief - just sufficient to name the exercise, but use the official name for the operation, and keep to this name throughout.
- (iv) Explain the job: tell the students the purpose of the exercise that is being taught.
- (v) Demonstrate silently: place the trainees in a position so that they can see, making sure that they face the same way as you. Do the job several times until the trainees seem to have understood. Do not say anything at this stage - this will

help the trainees to give their full attention to watching what is being done.

- (vi) Explain the hand movements: you should now explain in words what you have been demonstrating.
- (vii) Describe the senses employed: point out to the students what they should be attending to with their eye and other senses (Attention Points). In many jobs the sense of feel is very important.
- (viii) Ask the student to explain
- (ix) Ask a student to try
- (x) Let the student practice
- (xi) Demonstrate target time: when the trainees seem to have mastered the hand movements tell them the target time. Now demonstrate the exercise. Do not beat the target by too much, even if you can.
- (xii) Re-check: check the students frequently while they are practising. When they are trying to reach the target, they may alter their movements.

4.0. Duties of Workshop/Laboratory Instructor

- An instructor's first duty is to help the student to acquire the skills of a job in the shortest possible time.
- The duty of a workshop instructor is to prevent anything which hinders the students from learning.
- Instructors have a position of authority similar to that of a supervisor in the industry. You are unlikely to have difficulty with them over discipline if you always keep them busy and interested, and they will respect you -
 - (a) because you can do the job, and

(b) because you can, and do, help them and because you enable them to do things which otherwise they could not do.

- It is part of instructor's job to create and maintain the students interest in the job, and you can do this,

(a) By increasing your own knowledge of the job. There is always more in a job than you have yet realized.

(b) By increasing your knowledge of and interest in the students as persons.

(c) By acting as a 'go-between' between the job and the student - telling them what is happening inside them when they are doing the job, and helping them to appreciate what the job is telling them.

- One of the very important part of an instructor's job is to keep records of the students progress in detail.

The various divisions of skills and knowledges and the working steps involved in a welding process in a workshop are given below.

An Example

Straight Line Beading on M.S. Plate in a workshop
(Divisions of skills and instructions schedule)

Desired Skill:

- To prepare M.S. plate to size as per drawing
- To strike and maintain electric arc to start the weld without freezing the electrode with the job
- To deposit uniform straight bead in flat position
- To clean the slag and spatter from the weld bead using a chipping hammer and wire brush.

- To inspect deposited beads and ensure that they are,
 - ❖ free from weld defects.
 - ❖ of uniform width and height

Instructional Schedule:

- Cut the M.S. plate pieces to size (as per drawing) by power sawing.
- Fill the cut edges to square.
- Clean the plate surface (job) with a steel wire brush and file.
- Lay out parallel lines on the job surface as per drawing and mark with a centre punch.
- Set the plate on the welding table in a flat position.

Ensure the plate is well rounded with the welding table

- Wear protective clothing (safety apparels)

Ensure the filter glass or screen is in order.

- Fix a 4 mm diameter M.S. electrode in the holder.

Ensure the jaws of the electrode-holder are clean

- Set the welding current to 150 to 170 amps approximately and start the welding machine.
- Connect the electrode cable with the negative on the DC machine.
- Strike the arc on a scrap piece for trial and observe the current setting.
- Ensure the burning of the electrode is normal.
- Readjust the welding current if it is necessary.

- Deposit straight line beads on the workpiece along the punched line from one edge to the other.
- The run length per electrode (of 400 mm length may be 230 mm).
- Remove slag from weld bead using a chipping hammer and clean with a steel wire brush.
- Use a chipping screen while deslagging.
- Inspect deposited beads

Working Procedure Straight Line Beading on M.S. Plate In Flat Position

Preparation and setting of job piece (Fig 2)

- Prepare a M.S. plate piece $100 \times 10 \times 150$ by hand using a hacksaw and file.
- To get a straight line bead a punched line will be of much help. The distance between the lines can be 15 mm
- Set the job on the welding table in a flat position with the punched surface facing up

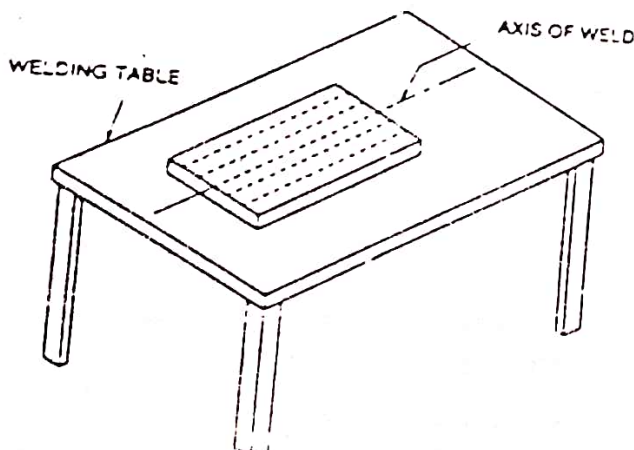


Fig 2

Deposition of straight line beads (Fig. 3,4,5)

- Select a 4.00 mm M.S. electrode and set 150-170 amps welding current in range.

- Connect the electrode to the negative on the DC welding machine.
- Always follow the current range according to the diameter of the electrode.
- Check for proper melting of the job and electrode on a scrap piece.
- Deposit straight line beads taking the punched lines as a guide maintaining:
 - ❖ The medium arc length (i.e. 3 mm length)
 - ❖ Correct travel speed (approximately 150 mm per minute)
 - ❖ Correct electrode position.

- The electrode should be moved towards the job to maintain a 3 mm gap between the tip of the electrode and the molten pool.
- Welding screen glasses should be clean enough to see the arc section on the molten pool and punched line mark.
- Listen to the arc's steady sharp crackling sound while welding. It indicates uniform burning of the electrode

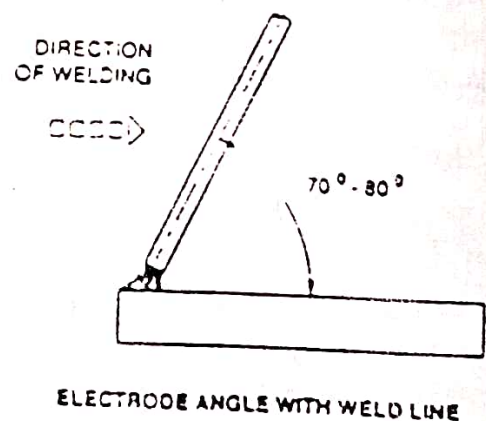


Fig 3

- Adjust the travel speed by watching the electrode melting rate and flowing through the molten pool to form the

deposited metal. The uniform travel speed along and towards the line of the weld gives a uniform bead.

- Use chipping goggles during slag removal

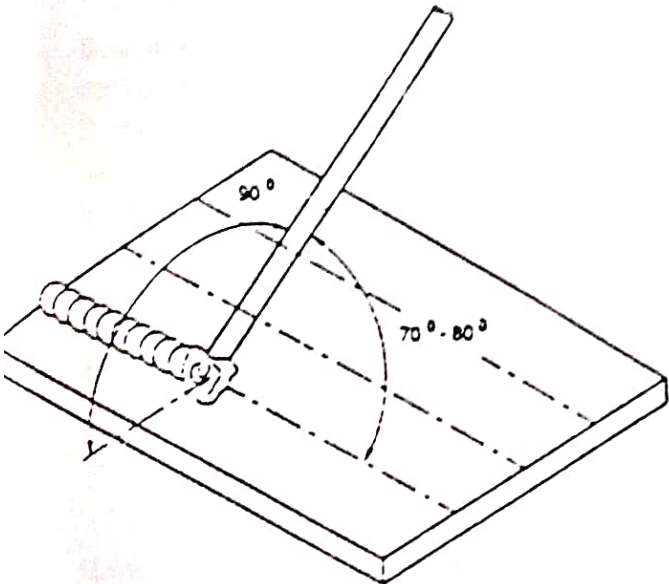


Fig 4

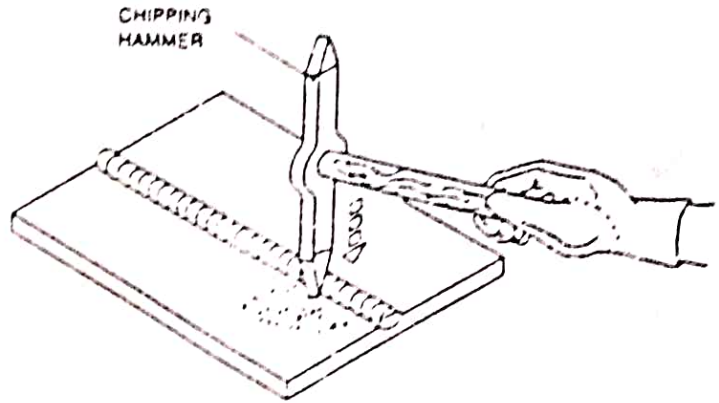


Fig 6

- Hold the hot job with a pair of tongs.
- Inspect the deposited beads and note any variation in the:
 - ❖ Width and height
 - ❖ depth of fusion
 - ❖ length of run or straightness
 - ❖ Surface defects such as slag inclusion, porosity etc.

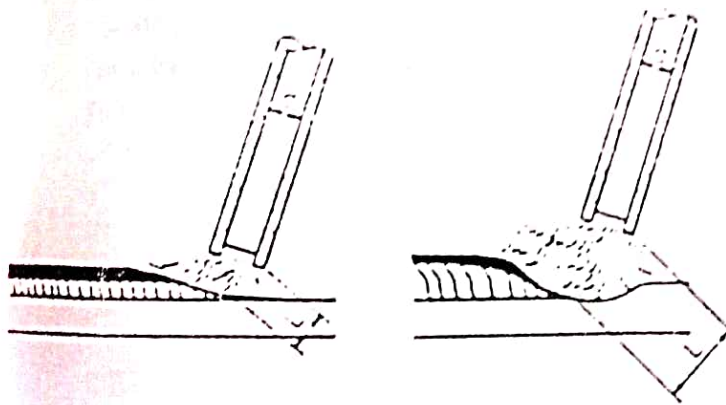
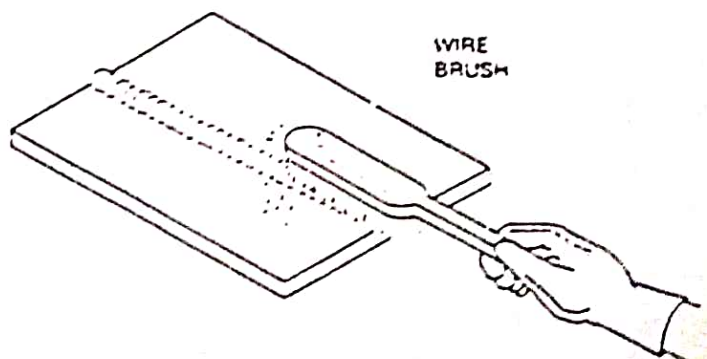


Fig 5

Cleaning and inspection of weld beads (Fig 6)

- Remove the slag and spatters from the weldment using a chipping hammer and wire brush, so that the metal surface of the bead is exposed for checking for any defects.



REMOVE ALL SLAG AND SPATTER.

Fig 7

5.0. Recent Studies on Acquisitions of Skills

Recent studies on the acquisition of skill have constantly emphasized the importance of the perceptual component in skills, i.e. the importance of the use of senses. It is clear that as the operator becomes more proficient, he organizes the information coming via his senses more effectively, and is thereby enabled to make decisions more effectively and more swiftly. The perceptual processes occur in five stages though these are not generally recognized.

- Planning the activity
- Initiating it

- Controlling the activity
- Terminating it
- Checking that it has been done correctly

One way in which the experienced worker is able to save time is by doing less checking, because he knows by the "feel" of doing the thing that it is being done correctly, and does not need to make a visual check at the end to ensure that it has in fact been correctly done. Thus, an experienced knitter will know by the feel of the work that it is done correctly, and will not need to look at it as a learner would to see that the pattern of stitches are correct.

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Projective Tests: The Question of Reliability and Validity

S. RENUKADEVI and B. MUKHOPADHYAY

Projective test in spite of their wider use by psychologists and clinicians have always been questioned on the ground of their reliability and validity. Projective personality tests such as the Rorschach and TAT are among the most controversial and misunderstood psychological tests (Aronow, Reznikoff, and Moreland, 1995; Blatt, 1990). Rorschach is used extensively by psychologists and clinicians and is given vigorous training in doctoral training programme for clinical psychologists in U.S.A. (Meloy and Singer, 1991). Barring the severe attacks from prominent researchers and psychologists the widespread acceptance of projective test is unquestionable. In the present paper an attempt has been made to examine certain aspects of reliability and validity of picture based projective tests.

RELIABILITY

Reliability and validity are essential characteristics for the effectiveness of any data gathering instrument. Reliability is the degree of consistency that the instrument or procedure demonstrate (Best and Kahn, 2002). The synonyms for reliability are dependability, stability, consistency, predictability or accuracy. Thus, reliability is the rating of the precision of the given instrument.

The major type of reliability which are of concern to the researchers are Test - Retest

Reliability, Alternate - Form Reliability, Split - Half Reliability, and Interscorer Reliability.

The most obvious type of reliability is the test - retest reliability which deals with the stability of the score over time. In this method, scores from an initial administration are correlated with scores on the same instrument after some interval.

The alternate form reliability has similarity with test - retest reliability except another form of the test is administered at the second session. The coefficient of correlation thus obtained represents both temporal stability as well as the degree of redundancy across forms.

In Split - Half Reliability a type of alternate form reliability is produced by dividing a single scale into two halves. This computational method estimates the degree of consistency across time.

In the method of interscorer reliability the reliability of the instrument is derived by the use of multiple examiners to score the same protocol of responses.

To establish the reliability of psychometric tools related to personality and careers including career inventories, one of the above methods or more than one method are generally in use. On the other hand, for projective techniques which are very specific in nature, certain other observational

techniques have been used in addition to some of the existing measures.

VALIDITY

The issue of validity answers the question - does the test measure what it intended to measure? And further, it answers does the test produce information that will be useful to the users? Validity is the quality of data-gathering procedure that enables it to measure what it is supposed to measure (Best and Kahn, 2002). The major types of validity of concern to the researcher are, Content Validity, Criterion - Related Validity and Construct Validity.

Content Validation starts at the initial stage of item selection for a test. It is easiest to demonstrate when the test has been built from a well - defined theoretical orientation and the researcher has started from a Table of Specifications.

Criterion Validity is extremely important and used widely throughout the construction of non projective psychological tests. This form of validity deals with the ability of test scores to predict behaviour, either through observable behaviour, as represented by the other test scores, or other accomplishment such as grade point averages.

Construct Validity involves studying test scores with respect to their relationship not only to variables that the test is intended to assess, but also to variables that should have no relationship to the domain underlying the instrument.

All these methods have been used extensively to validate psychometric tests and inventories. To validate projective tests, certain attempts have been made to establish content validity and criteria related validity.

PROJECTIVE HYPOTHESIS

Projective hypothesis is the proposal that when a person attempts to understand an ambiguous or vague stimulus, his or her interpretation reflects needs, feelings, experience, prior conditioning, thought processes and so forth (Kaplan and Saccuzzo, 2001). Projective tests are based on projective hypothesis.

Freud's discovery of Psychoanalytic theory became the basis of all projective methods. His realization of the importance of studying the relationship between the therapist and the subject led ultimately to the development of the projective Techniques which is a device for studying the inner life of an individual through their behaviour manifestation (Chowdhury, 1960). Jung's (1940), utilisation of free association method contributed to finalise the projective techniques and Rorschach (1942) developed the Projective technique into a highly scientific method. The Thematic Apperception Test appeared in 1935 as the outcomes of the clinical researches of Murrey and Morgan.

Though the term projection was used by Freud in 1894, the expression "Projective Techniques" first made its appearance in a paper by L.K. Frank in 1939. Here projection means the inclusion of a series of psychological mechanisms through which true response to, more or less, unstructured or semistructured stimuli are noted.

PROJECTIVE TESTS: RELIABILITY

In spite of widespread application, the reliability and validity of the projective tests like Rorschach and Thematic Apperception Test become difficult to establish. Psychometric properties of these tests such as standardization, norms, reliability and validity (Kaplan and Saccuzzo, 2001) are frequently

PROJECTIVE TESTS: THE QUESTION OF RELIABILITY AND VALIDITY

questioned. For instance, Exner (1995), Nezworski and Wood (1995) observed that there is little agreement regarding the scientific status of the Rorschach.

This is because due to the problem of lack of standardization and poorly controlled experiments. Similarly, many experts consider the TAT to be psychometrically unsound (Karp, 1999). Lack of standardization, poorly controlled experiments, or both has been reported for Rorschach (Wood, Nezworski and Stejskal, 1996).

Different techniques are in use to establish the reliability of projective test. For instance TAT reliability has been studied in three ways (Freeman, 1965). These are

- (i) Agreement among interpreters
- (ii) Test - retest method
- (iii) Split half method

When the method of agreement among interpreters used for TAT by clinicians, the percentage of agreement varied from 50 percent to about 75 percent of the stories. In addition, there were essential though not detailed, agreement among experts ranges from 10 to 25 percent (Sumerwell *et al.* 1958). Published research reports indicate that agreement is greater if experts have had similar training and if they use similar systems of analysis and scoring.

The reliability data obtained by the test - retest method are affected by the stability of the personalities being examined and by the personality changes as a function of time. In one study on TAT where four cards were used, the subjects were retested after two months. The range of reliability coefficients for fifteen variables were .54 to .91, while the average was .77 (Smith, 1958).

Using split - half method Sanford (1943) reported reliability coefficients of .48 and .46 for TAT. The responses were quantified by analyzing the stories for frequencies and rating intensities of "needs" and "press" elicited by the pictures. As reliability coefficients, these are generally found to be significant (Freeman, 1995). McClelland, on the other hand, reported a reliability correlation of .70 for the "achievement" need, derived from selected TAT pictures (McClelland, 1949). This correlation suggests that reliability is higher when pictures are selected to elicit a single major variable and stories are scored for the purpose.

While considering the reliability of the Holtzman inkblot Technique, many of the reliability coefficient using alternate forms found to be high to moderate and in certain cases low (Holtzman *et al.* 1961).

There are some similarities between the TAT and Rorschach. It was found that reliability coefficients for both tests vary widely and both are highly criticized. But at the same time both are used extensively and adopted enthusiastically by practitioners. Both provide a rich source of information about a single individual (Kaplan and Saccuzzo, 2001).

PROJECTIVE TESTS: VALIDITY

Various methods are used to establish the validity of the projective tests. Some of these methods are

- (i) Content Validity
- (ii) Criterion related Validity
- (iii) Comparison of projective test findings with other materials
- (iv) Comparison with results obtained through an intensive case study employing a variety of techniques

In case of TAT most of the experts agree that there is constant - validity evidence for using the TAT to evaluate human personality. At the same time experts feel that for the projective test like TAT criterion related validity is difficult to document (Kaplan and Saccuzzo, 2001). Spangler (1992) found that average correlations between the TAT and various criteria runs between .19 to .22, which is not at all impressive. With respect to validity of the Rorschach Inkblot test, Rorschach himself used 288 mental patients who presented clearly discriminable extremes of certain traits. In addition he tested more than one hundred artists, scholars, and persons of average abilities, and also some mental deficiencies. Among these groups Rorschach found what he regarded as significant differences in characteristics response patterns. Since the original work, many studies have been conducted on validity of Rorschach by using "Known Groups" techniques. The results of some of them are reasonably satisfactory and are in agreement with Rorschach; but many agreements are only in part (Freeman, 1965).

The Holtzman inkblot Technique is an interesting and probably promising variation on the original Rorschach Method. Holtzman *et al.* stated that their correlation data indicate quite conclusively with that of Rorschach (Holtzman *et al.* 1961).

Currently, one of the frequently used projective tests is the Draw - A - Person (DAP). Establishing the reliability and validity of projective drawings poses special challenges. This is because of the fact of fluctuating conditions, the underlying difficulties to prove assumptions behind the procedure and the frequent richness and complexity of the productions. Several rigorous analyses of the psychometric

properties of projective drawing have generally failed to demonstrate that the drawings are valid indicators of personality (Smith and Dumont, 1995).

Several TAT - type tests, have been designed to study specific problems areas. The Rosenzweig Picture Frustration Study was designed to fully understand how persons perceive and deal with frustration. According to Freeman (1965) this test is based upon two unsound and generally rejected assumptions. Freeman's conclusion is based on the opinion of several investigators on projective tests.

RELOOK AT RELIABILITY AND VALIDITY

Is it possible then to improve the measures of reliability and validity of projective test? A few authenticated suggestions are available in this regard.

Of the several methods used in studying reliability, interpreter agreement is the most significant (Freeman, 1965). In a projective test what we want to learn primarily is the content and organization of a personality and its related dimensions at the time of examination. Therefore the researcher while developing the instrument can make use of interpreter agreement.

Reviews of validity of some of the projective tests which uses "writing a story on each card" have shown wider disagreement. Proponents of the test described validity results "impressive", where as critics have said that validity is "almost" non existent. This disparity can be partially accounted for by differing interpretations of the data. Groth Marnat (1997) suggested that, use of criterion validity can balance between positive and negative findings.

In major projective instruments qualitative data are collected and they are transformed to quantitative data for interpretation.

The validity of qualitative research turns into the question of how far the researcher's constructions are grounded in the constructions of those whom he or she studied and how far this grounding is transparent for others (Schutz, 1962). Thus the production of the data becomes one starting point for judging their validity and the presentation of phenomena and of the inferences drawn from them becomes another one. All these aspects can be taken into consideration to derive the maximum benefit of validity of the instrument.

In applying projective test, the competency of the researcher is very important, specially his power of observation. For observations, the requirement to train the observers before they enter the field and to regularly evaluate their observing can be added. In the interpretation of data, training and reflexive exchange about the interpretive procedures and the method of coding can increase the reliability (Kirk and Miller, 1986).

Projective tests have also been shown to be quite sensitive to situational variables, such as mood, stress, sleep deprivation and differences of instruction (Lundy, 1984). These variables can significantly influence test performance, thus bringing down the reliability

coefficient and validity index. To derive the maximum benefit from these projective tests subject's present condition need to be overtly assessed along with the testing situation.

One of the difficulty of determining reliability of the projective tests like Senior Apperception Test or Thematic Apperception Test, lie in the wide variability among different stories. If test evaluators wish to find out the internal consistency, they are confronted with the fact that the various cards are not comparable. They were designed to measure separate areas of an individuals functioning. In contrast, Lundy (1985) found that when subjects were asked to tell a similar story between one administration and the next, a respectable test-retest reliability was achieved. This approach can be further tried out.

Use of intuitive judgement based of experience can be one of the useful tools to derive better results from projective tests. Smith and Dumont (1995) observed that within clinical settings quantitative scoring systems for cognitive development, emotional disturbance, impulsiveness, or cognitive impairment are rarely used despite their greater level of reliability and validity. Clinicians are expected to use intuitive judgement based on clinical experience and that can be proved to be of great advantage for projective tests.

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