

CONCERNS OF EDUCATIONAL TECHNOLOGY FOR TECHNICAL EDUCATION

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ABSTRACT

The concept of Educational Technology has undergone considerable change over the last three decades from the one largely concerned with transmission-reception problems to the one which is basically a problem solving approach.

This paper shows concerns of educational technology in the context of rapidly changing technological scenario, giving an account of present status of its use in the technical institutions and the future trends. The paper also makes suggestions towards enriching instructional processes for preparing students to face the challenges of the world of work through judicious use of educational technology.

1. INTRODUCTION :

Education relates to a number of processes in which a desirable state of mind develops. The effectiveness of any form of organised activity largely depends upon an organization's ability to achieve its goals, fulfil the needs of its members, maintain itself internally, and to adapt to its environment. If an organization can do so, it is 'healthy', able to learn through experience, and is free to change and free to respond to new circumstances.

Educational Technology is concerned with these problems in an educational context, and it is characterized by its systematic approach to a creative organization of "resources for learning". The three concepts of educational technology are briefly stated as follows.

The first concept is essentially a 'hardware' approach, stressing the importance of the physical sciences and engineering to the problems of education. Technology is seen as a means of mechanizing or automating the process of teaching with devices that transmit, amplify, distribute, record and reproduce stimuli materials, and thus increase the teacher's impact as well as widen the potential audience. In other words, teachers can use the teaching aids to deal more efficiently with larger and larger groups of students, increase the capacity of their teaching, and reach beyond the boundaries of the institute or classroom - all without necessarily increasing the cost of teaching.

The second concept is essentially a 'software' approach, stressing the importance of "aids to learning". Its

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origin lies in the application of behavioral sciences to the problems of education. Technology is seen as a means of providing the necessary know-how for designing worthwhile learning experiences. Machines and mechanization are viewed merely as instruments of presentation or transmission. The procedures of curriculum and course development as well as instructional development largely revolve around: identifying appropriate aims, goals and objectives; selecting relevant content and subject matter; choosing varied learning methodologies, activities and experiences so as to make for a worthwhile and rewarding course of study; and then evaluating not only the success of the resulting learning experiences but also the effectiveness of the techniques employed for their development.

The third concept combines the 'hardware' and 'software' approaches mentioned above. It favours a systematic set of procedures focusing more on the processes as well as on the products of teaching and learning rather than following a step-by-step, rigidly mechanical procedure. Its bias is somewhat less towards the individual per se, rather more towards the group or team within which an individual plays a role. The quality and relevance of the overall experience is one of the major concerns of the third approach, and accordingly it assumes that the environment within which teaching and learning take place is as important as the actual processes themselves.

Education in general, and Technical education in particular, can use the third approach as a means of enhancing its worthwhileness. Whilst the first

approach is largely concerned with transmission-reception problems, and the second with purposeful shaping of behaviour, the third is human in its holistic approach. Its emphasis is on a range of varied skills, from which selections can be made depending upon the nature of the problem posed. It is fundamentally a problem-solving approach.

2. DEFINITION OF EDUCATIONAL TECHNOLOGY :

From the foregoing, it is now possible to define Educational Technology, thus :

'Educational Technology is a systematic way of designing, implementing and evaluating the total process of learning and teaching in terms of specific objectives, based on research in human learning and communication and employing a combination of human and non-human resources to bring about more effective instruction'.

The above definition is given by the Commission on Instructional Technology, USA.

3. CONCERNS OF EDUCATIONAL TECHNOLOGY:

According to the definition just mentioned, educational technology is concerned with increasing the efficiency and effectiveness of the teaching-learning process. This is done by application of systems approach. The learning process is so designed as to cause effective interaction between the stu-

dent and the various resources leading to development of certain abilities. Development of such abilities enables the student to conform to the requirements laid down by the objectives set forth. Through a system of formative and summative evaluation and feedback the learning process is continuously refined to cause a match to occur between the performance of the students and the specifications of the jobs they are required to do in the world of work.

Knowledge and technology are expanding at a fast increasing rate. The sum total of human knowledge was doubling every 10 years by 1950 and every 5 years by 1970. By the year 2040 there will be 200 million different books. The formal technical education system cannot impart all the needed knowledge and skills. It is not possible to change structured instructional material at the same speed with which knowledge advances. Nor is it possible for the teacher to keep pace with this change through conventional means. Continuing education has, therefore, to become an integral part of our technical institutions.

Fast increase in knowledge and rapid changes in technology make it more necessary than ever before that students are trained not only to undertake jobs for which they have specifically been trained but that they should also be trained to develop the attitude to confidently face problem situations which they may not have come across during their education and training programme. Training at technical institutions should inculcate among students the attitudes and skills to acquire new knowledge and new skills during the course of their working life. This calls

for incorporating in the training programme considerable amount of independent study, project work, case studies, group discussions and seminars.

A most important aspect of training programmes is the development of proper attitudes and interpersonal skills. Training programmes should have in-built provision to promote these traits among students.

Design, development, implementation and evaluation of the interactive teaching learning system for preparing students to face the challenge of the fast changing world of work, therefore, are the concerns of present day educational technology.

4. STATUS OF USE OF EDUCATIONAL TECHNOLOGY :

In the context of the definition of educational technology given in section 2, the present status of designing, implementing and evaluating the total process of learning and teaching in most of the technical institutes in India is as follows:

Learning and teaching is designed on the basis of the course content rather than any specific objectives. Emphasis is on teaching a given course content through lectures, laboratory instructions, independent study and study at the resource centre. Lectures are mostly classroom interaction based on what the teacher tells. In the laboratories, the instructor is heavily engaged as he has to explain experiments or tasks as also supervise student's work. For independent study, not much variety of learning material are available to students. The resource centre mainly is a library

having print material. There is no organised effort of evaluating the total process of learning and teaching. Student evaluation is mainly focussed on assessing learning of specific subject matter.

5. FUTURE TRENDS :

Four important trends may be identified in current educational technology :

- (i) A gradual shift towards a more student-centred approach to learning, a trend which is manifested in the increasing emphasis on individualised learning.
- (ii) An ever widening realisation that there is more to education than teaching basic facts and principles, and that a serious attempt should also be made to cultivate the various non-cognitive skills and attitudes that are so important for success in later life. This is leading to an emphasis on group learning methods.
- (iii) A rapidly increasing use of new information technology.
- (iv) Emphasis on life long learning.

5.1 Shift towards more student-centred approach.

Our educational system is almost entirely based on the teacher-centred approach in which the individual student has little or no say regarding what he learns and how he learns it. However, it is perhaps fair to claim that there is a slow but steady increase in the use of student-centred learning within the traditional system. This trend is certain to receive a considerable boost by the current information technology

explosion which is making student-centred learning progressively more practicable by making available new and more effective methods and media. Technical institutions will certainly be much more student centred than they are today, with less formal face-to-face teaching and more emphasis on individualised and resource based learning. Students in 2000 will make extensive use of computer terminals, both to gain access to learning programmes and to carryout calculations, simulated laboratory work, exercise and creative work. Assignments will probably be carried out using word-processors, which teachers will also use to scrutinize, mark and annotate students' work.

As a result of the above, teachers will spend less time in contact with students and more time creating, modifying and updating teaching packages and resource materials. Much of their work will probably be done via computers, with each teacher having his own personal terminals.

5.2 Spread of Group Learning.

Group learning techniques like group discussions, seminars, interactive case studies, etc. are being increasingly used in progressive technical institutions. It is believed that this trend will continue because such techniques are ideally suited for use in teaching towards desirable attitudinal traits that are now being regarded as an important part of a properly rounded education.

5.3 Increasing Use of New Information Technology.

New Information Technology is the application of new electronic and

other technology (like computers, communication satellites, fibre optics, video recording etc.) to the creation, storage, retrieval and delivery of all kinds of information resources.

New Information Technology in all its various forms and manifestations will be making an increasing impact on education as the years go by. If micro computers continue to become progressively cheaper their use will indeed eventually become universal.

New Information Technology will have a significant impact on informal education. With the increasing availability in the homes of products of new information technology an increasingly large proportion of the education of the child of the future seems likely to take place outside the school, a development that is again likely to have far-reaching implications both for society and for our technical education system.

5.4 Emphasis on Continuing Education.

At present the role of training and technical institutions is to provide a single one time programme designed to equip students for a job for the rest of their lives. Whilst this will continue to be an important part of the work of the institutions, it is expected that they will become much more heavily involved in short updating courses and extension services. They will also offer courses for the unemployed, the retired, non-working individuals and so on through contact cum correspondence mode.

6. IMMEDIATE NEEDS :

Technical education in India is facing criticism because its design has

not changed over the years so as to respond to the needs of ever changing requirements of environment in which the student output is going to be absorbed. While, bringing a major change will require some bold initiatives to be taken by the educational planners, some steps can as well be taken by the technical institutes towards effecting qualitative improvements.

6.1 Enrichment of Instructional Process.

Mentioned below are some of the immediate steps that our technical institutes need to take for enrichment of instructional process.

6.1.1 Lectures.

Presentation of lectures can be enriched and the monotony broken by using as supplements, tape recordings, slides, OHP transparencies etc. Video and computer can be used to bring into the class room real-life events. Computer has made the use of animation and simulation techniques much easier and these can help the teacher in explaining complex concepts.

Since teacher is the costliest resource, it is necessary to ensure that the teacher is accessible to as many students as possible. The difficulty of student-teacher interaction due to large number may be overcome by electronically operated feedback system.

6.1.2 Laboratory Instruction.

It is now possible to prepare video-cassettes to explain the total sequence of laboratory experimentations. This would reduce the load on the teacher of giving routine explanation and he

can now use his time for more effective individual guidance to a larger number of students.

6.1.3 Independent Study.

By adding to print materials, which are the only source of self study today, additional experiences through non-print media, the students' motivation for independent study can be enhanced by access to a variety of experiences and information. He should be able to listen to lecture by an expert and retrieve textual and visual information from VCR, film projector, micro-computer etc.

6.1.4 Resource Centre.

Traditionally library is a place where only print materials are stored. There is a need to extend the scope of library to production, acquisition and storing non-print information also. A library which stores a variety of information resources is called a Resource Centre. A typical Resource Centre uses microfilm for storing large amounts of documented information thus reducing requirement of storage space. It provides space for projecting, retrieving and recording information. It stores, in addition to print material, audio and video cassettes, slides, transparencies, video films etc.

6.2 Increasing Interactivity in Teaching-Learning - A must for preparing students to face the unknown.

In a changing technological society, skills required should be flexible and transferable which would demand an education process having transfer of learning objectives. Society would need

people who can take skills from one job to another, or from one industry to another, and who can improve or change their skills in response to the demand. The system will need to produce people with such skills who will be capable of designing, using and adapting to physical systems of almost biological complexity. The curriculum for such an education must be flexible and adaptable menu of varied opportunities. The above considerations lead to the concept and design of an exploratory (as against explanatory or expository) teaching-learning system for training a learner entrepreneur (a learner entrepreneur is one who is desirous of learning to learn) which will answer the needs of future educational pedagogy, changing technology and society. This view of a learner entrepreneur, though gaining acceptance in educational research, much of the educational community engaged in day-to-day teaching-learning tasks is either unconcerned with this issue or even unconvinced, particularly because in many situations, educational planners and educationists both alike tend to take short-term view of education and thereby rely more on quick-fire passive learning mechanisms.

With the rapid advancement of technology and the increasing complexity of the industries, technical education cannot afford to take a short-term view on education and remain static. It should meet the challenge by adopting a new system, which would be flexible, interactive and meet the needs of society vis-a-vis the students. For bringing in interactivity, the teaching-learning system should be made exploratory rather than expository. This necessarily would mean introducing

project method of teaching, projects being of open-ended type. For creating relevance, the projects may be taken from the real life situation. Teaching-learning activity would involve students taking more initiative in learning in trying to find solutions to the problems facing them. Such a teaching-learning system would be best organised by establishing meaningful linkage with industry where both industry and institute would benefit from each other.

Interactive teaching-learning process places tremendous responsibility on its participants, namely the teacher and the learner, with an additional proviso that the responsibility changes in content and nature every instant, thereby requiring both the participants to be in constant act of adaptation - a continuous process of interacting with the environment.

7. CONCLUSION :

Educational technology should be concerned with increasing the efficiency and effectiveness of teaching and learning. The objective of technical education is to enable them to face the unknown in the world of work. The emphasis therefore should shift from our present stress on teaching machines

to a more interactive and exploratory teaching-learning system where students are trained to acquire knowledge while making efforts in solving open-ended problems which are relevant to the needs of the society. Educational technology therefore should show its concerns as to how students would learn and the learning be made meaningful, motivating and less time consuming.

8. REFERENCES :

(i) Fred Percival & Henryk Ellington : A handbook of Educational Technology, Kogan Page London, 1986.

(ii) Ashoka Chandra; Kulkarni, PD; Ray, AK: Electronic Media in Education, Technical Teachers' Training Institute, Chandigarh, 1986.

(iii) James Hartley & I.K. Davies: Contribution to an Educational Technology, Kogan Page, London, 1978.

(iv) Davies, Ivor K: The Management of Learning, McGraw Hill, London, 1976 .

(v) Richmond, W. Kenneth : The Concept of Educational Technology, Weidenfield and Nicolson, London.

(vi) Mager, Robert F : Preparing Instructional Objectives, Fearon, California, 1975.

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