

Educational Technology

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The Trend Report of the Sixth Educational Survey being the first one of the millennium, includes, in its repertoire, on the growth and evolution of Educational Technology (E.T.), mapping out the landscape of research studies, extrapolation of trends and creation of future scenario with an objective to build a vision of E.T. for 2010. If one looks back critically, one would see that in India, before independence, the term E.T. did not exist. Terms closer to E.T. were teaching aids or audio-visuals aids. The first attempt in this direction was by the Ministry of Education, Government of India to set-up a Central Film Library in the year 1942 to support classroom teaching. At that time teacher education colleges in India also had Departments of Teaching Aids or Audio-Visual Departments. These departments provided charts, models, projectors and slides, and others to be used in the classroom for effective teaching. In 1947, the Ministry of Education further strengthened its Central Film Library by setting up a unit for production of Audio-Visual Aids.

GROWTH AND EVOLUTION

In 1961, when the NCERT was established, the Central Film Library and the Audio-Visual Aids unit were transferred to NCERT to constitute the Department of Audio-Visual Aids, which was later on renamed as Department of Teaching Aids. In the fourth five-year plan (1972-77), the Ministry of Education, Government of India launched, in the central sector, an ET programme to bring about qualitative improvement and quantitative expansion in education. Consequently four schemes were envisaged:

- To set up a Centre for Educational Technology in NCERT.
- To set up E.T. Cells in various states of the country in a phased manner.
- To set up 100 Continuing Education Centres for teachers and to equip them with E.T.
- To set up an E.T. Unit in the Ministry of Education, Government of India to coordinate E.T. activities and projects in the country.

In 1973 under tripartite agreement between the Government of India, UNDP and UNESCO (IND/71/612), a separate institution was established under NCERT known as Centre for Educational Technology (CET). Six E.T. cells were established under the Projects of CET in Rajasthan, Maharashtra, Gujarat, A.P., Orissa, and Karnataka. Under this E.T. Project, E.T. was to be used for twin objectives: (i) to extend and increase access to education, and (ii) to improve the quality of classroom instruction. The first phase of the E.T. project had its brightest period in 1975-76 during which the Satellite Instructional Television Experiment (SITE) project was conducted by the Indian Space Research Organisation (ISRO), and E.T. was used in adult education and for teaching of primary level students. In-service teacher education programme were also launched under the project.

The *INSAT FOR EDUCATION* was the next phase which began in 1983. Under this phase educational television (ETV) came in the vanguard. Although E.T. as a national project started in 1973, there had been many steps taken earlier which could be called as the precursors of the National E.T. Programme.

In India, before the sixties, terms like educational technology, instructional technology (as is in vogue in U.S.A.), programmed learning, auto-instruction were largely unknown to the educational literature. Educational Technology, as a science of teaching, gathered its meaning only in mid-sixties, and appeared on the Indian horizon in the form of programmed learning in 1965. NCERT subsequently undertook some exploratory studies in programmed material in Indian Schools to evaluate their effectiveness. Some of these studies have been reviewed in Kulkarni (1986), Shah and Dewal (1970), and Patel (1971). A course entitled "Orientation to Programmed Learning" was organised by the NCERT in New Delhi from the 5th to 16th October 1965. This was the first course on programmed learning to be held in India. From 1966 to 1973 various sequential courses were organised (in two phases) by the NCERT.

In 1966 the Indian Association of Programmed Learning (IAPL) was formed with headquarters in NCERT, New Delhi. The IAPL was a voluntary body devoted to the advancement of research, training and extension of programmed learning and educational technology. The objectives of the IAPL were:

- To create an awareness about educational technology.
- To prepare and publish auto-instructional material or supporting material for effective teaching and training.
- To encourage research work in the field of educational technology.

It is quite encouraging to note that within a few years of its existence, IAPL disseminated the idea of Educational Technology in different spheres of education and training in different parts of India. The movement of programmed learning touched other sectors like defence, industry, and banking. The Universities of Baroda and Meerut conducted doctoral research on different aspects of educational technology. The Regional College of Education, Ajmer, produced video programmes on mathematics. The State Institute of Education, Rajasthan, Udaipur developed a series of programmes on Hindi Grammar. The Vidya Bhawan Teacher College, Udaipur developed programmes in Sciences and English language.

The Universities of Baroda, Meerut, Himachal Pradesh offered specialisation in Programmed Learning at B.Ed. or M.Ed. levels. The National Institute of Bank Management, Mumbai developed a whole set of programmed materials on different banking operations. The National Academy of Public Administration, Mussorie prepared programmes in Hindi for non-Hindi speaking administrative officers. The Indian Navy started a cell at the Naval Headquarters.

The Centre for Educational Technology (CET) set up in 1973 at the national level developed films, video and audio programmes, and telecast them through terrestrial TV. It also provided support to state ET cells in programme production, and co-ordinated broadcast programmes from the All India Radio (AIR). The C.E.T. also organises short duration workshops for script writers.

By 1973 the influence of educational technology was being felt at four levels:

- Curriculum planning
- Adult and continuing education
- Correspondence courses, and
- Textbook writing

CONCEPTUAL OVERLAPS

For conceptual clarity, it would be appropriate to make a distinction between '*technology of education*', '*technology in education*', '*instructional technology*', '*informatics*', '*telematics*' and '*communication technology*'.

Technology in Education relates to the hardware aspect of ET where intermediate or modern communication technologies are used, and which refers to the use of slides, projectors, overheads projectors, audio video cassettes, CCTV. In this sense, it refers to applications of physical sciences, engineering.

Technology of Education refers to principles of learning, technology of material production, psychology of motivation, behaviour modification and group processes. To name only a few by way of illustration, Ausubel, Gagne, Bruner, Piaget at the international level and Mitra, Kulkarni, Shah, Patel, Buch, Mukhopadhyaya (1989, 1990, 1991) at the national level, have contributed massively to this concept. In this sense, Technology of

Education provides specific inputs to

- Precise specification of objectives.
- Organising, structuring and sequencing of subject matter.
- Nature of learner activities.
- Facilitative mechanism relating to monitoring and feedback to the learner.

Instructional Technology (Tickton, 1970) has a narrower meaning and it relates to a technology of instruction per se. It basically means technology relating to class organisation, content organisation, stimulus variation, response elicitation, monitoring and feedback. It also includes learning to learn (Novak and Gowin, 1984) and concept mapping Novak (1990). **Informatics** relates to sciences of information, its organisation, access and retrieval. **Telematics** refer to using telecommunication in information technology. **Communication technology** refers to organisation of message, noise, barriers, decoding of messages. Cybernetics forms an important part in all the above sciences (Pask, 1961).

In India, the word '*Education Technology*' is very common and was consciously used in place of Instructional Technology. This was because the meaning of education technology in India largely refers to problem solving device—the third meaning given by Romiszowski (1981). Thus, when the National E.T. Project was

envisaged in 1973 it had the major objectives to help extend educational access, and help in retaining students providing quality education. **The first phase** of E.T. from 1973 to 1983 with CET in NCERT and E.T. Cells in six states. **The second phase** of E.T. began from 1983 when the CIET, and the E.T. Cells of states were upgraded as SIET (State Institutes of Educational Technology) in AP, UP, Orissa, Maharashtra, Gujarat and Karnataka. Now, Kerala also has a SIET.

With promulgation of the National Policy on Education (1986) the E.T. net became much wider as NPE (1986) strongly recommended the use of E.T. for quality education. On the recommendation of NPE, District Institutes of Education and Training (DIETs) were set up in each district with E.T. units that provide E.T. inputs to teacher education.

The **third phase** of E.T. began from 1995 onwards when audio and video conferencing were utilised for educational purposes. With efforts of IGNOU, NCERT and NIOS, E.T. gradually embraced information communication technology (ICT). An exclusive educational channel '*GYAN DARSHAN*' was made available in 2000 and Gyan Vani Channel (i.e. FM Radio) was inaugurated in 2001. To put things in perspective, a bird's eye view of the historical antecedents and major milestones in E.T. will not be one of place as given in Table 1.

Table 1 : Major Milestones in the Growth of Educational Technology in India

1942	Central Film Library in the Ministry of Education, Government of India
1947	Ministry of Education set up a unit for production of audio-visual aids
1959	National Institute of Audio-Visual Education (NIAVE) was set up
1961	NCERT was set up and NIAVE got merged in NCERT
1962	NIAVE renamed as Department of Teaching Aids
1965	Programme Learning came to India
1966	Association of PL was formed with headquarter in NCERT
1966-72	Sequential courses were organised by NCERT
1973	Centre for Educational Technology was set up in NCERT
1973	Six State E.T. cells were set up in Rajasthan, Orissa, Maharashtra, Gujarat, Andhra Pradesh and Karnataka
1983	D.T.A. and CET got merged to constitute CIET
1984	Six State Institutes of E.T. were set up in Orissa, Maharashtra, Gujarat, Uttar Pradesh, Andhra Pradesh, and Karnataka
1985	Educational Media Production Centre was set up in IGNOU
1986	NPE strongly recommended use of ET for instructional design and delivery
1987	AVRC, EMRC and consortium for Education Communication were set up under UGC
1998	Gyan Darshan Channel got operationalised
2001	Gyan Vani (FM Radio) came into existence

LANDSCAPE OF RESEARCH STUDIES IN EDUCATIONAL TECHNOLOGY (1972-1993)

Studies in E.T. have been a part of all the previous five reports of survey of research.

Trend Report in Educational Technology of the first two surveys obviously related entirely to programmed learning (Kulkarni and Kapadia, 1974), (Shah, Mehta and Kulkarni 1978). The chapter in third survey was on 'Educational Technology' (Misra, 1984), in which studies were grouped under the following headings:

- Studies on mass media
- Studies on programme learning
- Studies on micro-teaching
- Studies on toys and models
- Studies on distance education

Whereas chapter in the fourth survey was also entitled 'Research in Education Technology' (Shukla, 1993) and the categories of research studies were similar to the third survey. Specific areas were:

- Mass media
- Audio-visual aids
- Multi-media packages
- Correspondence education
- Programmed learning
- Micro-teaching
- Mastery learning strategy
- Models of teaching

The fifth survey of educational research had the following categories of research under E.T. (Dewal, 1997):

- Video and ETV programmes
- Radio and audio programmes
- Micro-teaching and teaching strategies
- Computer assistant instruction and mastery learning
- Programme learning
- Teaching aids
- Educational news reporting

It may be noted that in the fifth survey, trend report research studies relating to correspondence education and distance education did not find a mention. This was because distance education was subsequently identified as a separate area, and has secured its own separate space now.

The previous five trend reports on E.T. had been quite exhaustive and analytical. Besides examining the total canvass of educational researchers in E.T., these trend reports also reflected on the strength and weaknesses of the studies also indicated major issues and perceptions about E.T. Looking to the paucity of space we will not dwell on these comments. However, we will identify from the previous trend reports, three major comments which have significance for the present trend report.

- A poor coordination was found in the overall venture of research studies in E.T. at institutional, individual and Ph.D. levels.
- Most of the research studies were on comparing one media with another.
- There were no large scale research that would go into the systemic aspects of E.T. and which would help formulate policy implications.

Having said that, we now turn to the research studies surveyed for this report.

LANDSCAPE OF RESEARCH STUDIES IN EDUCATIONAL TECHNOLOGY (1993-2000)

Research studies in this Trend Report may be grouped under the following areas:

- Mass Media, television and video programmes
- Instructional technology, audio-video and teaching aids
- Programmed instruction
- Computer, and computer assisted instruction
- Informational technology and library sciences

Mass Media, TV and Video Programmes

A majority of the research studies surveyed for this Trend Report are on mass media, TV and video interventions. Some studies are purely on comparison of methods, while others are on attitude and impact of TV viewing on students behaviour. Some are on TV and language learning.

Kaswakar, 1996 undertook for her Ph.D. work construction and effectiveness of multimedia package to develop population

awareness. She found that it was significantly effective in comparison to actual method, and developed awareness to a significant degree. Multi-media package was more effective in changing the attitude of teacher trainees.

Umed Singh (1995) developed study material relating to video instructional package for teaching environmental awareness. It was field tested and used in three schools in Gujarat, U.P. and Rajasthan, and was formed to be very effective and interesting. The study also reported that students enjoyed working through video package.

Kothari and Chowdhari (1995) studied the impact of television programmes on behaviour of students of different age levels, and they found that girls had more positive effect on their emotional and creative behaviour than boys. As regard the impact of television programmes on moral behaviour, negative effect was more than the positive one.

Enigo (1997) undertook Ph.D. work on a study relating to effectiveness of instructor controlled interactive video and conventional non-interactive video. He found that instructor controlled interactive video was more effective than lecture method as well as conventional non-interactive video. Irrespective of the difficulty level of the content area contained in ICIV, it was found to be more effective.

Singh and Kaur (1997) studied the impact of television programme on socio-psychological behaviour of urban primary school children. They found that the duration of television viewing did not influence viewers on quality like alertness, boldness, cheerfulness, braveness, tidiness, self-confidence, friendship and leadership.

Two studies were conducted on UGC TV programmes. Singh (1994) studied the effectiveness of UGC countrywide classroom programme on models of teaching with interactive mode and without talkback. He found that the group with interactive mode and one without talkback differed significantly. The achievement of the interactive group was significantly higher than the achievement of the group without talkback.

Parhar (1994) as Ph.D. work took up the study of effect of media on student learning. It was found that out of 20 schools surveyed only 4 were using school TV programmes fully. Video and audio cassettes players were not used. No

teacher was found to be trained in the use of school TV programmes.

Purushothaman and Stella (1994) studied the effectiveness of teacher control interactive video for group instruction, and found that it yielded better academic achievement as compared to the traditional method. The teachers present with video lessons made the most desired impact. The research study concluded that the teacher's component should not be eliminated.

Sahoo and Goel (1995) studied the countrywide classroom with and without talkback and the IGNOU programme, and found that in the programmes they used, there was significant gain on programmes which were in talkback format. The viewers had positive attitude towards UGC programmes.

Sharma (1995) studied children's reaction on mass media communication. She found that children had difficulty in understanding formal English and Hindi, but liked television as it kept them attentive. Language styles were beyond the linguistic competence of young children. The disclaimers used were in passive voice, elliptical and semantically complex.

Chandra and Pandya (1996) studied the effect of video films for imparting legal education and found that students of science stream achieved higher than students from the art stream. Similarly, those students who had studied in English medium schools did better than those who had studied in vernacular schools.

Agarwal (1998) did her Ph.D. work to study educational impact of TV programmes on social and moral development of women in Greater Guwahati region. She found that TV exposé helped in awareness building and made them conscious about their rights and status. The study also revealed that sex, violence and offensive language made a negative impact on the viewer. This work strengthens the point that E.T. should combat the negative impact of media. Thus **Gyan Darshan** has special role to play.

Ilangovan (1998) undertook Ph.D. work on effectiveness of audio-video intervention in developing listening comprehension in English. He compared effectiveness of conventional teaching method (CTM) with Media-based non-interactive group teaching (MNGT) and AV presentation as support system (AVPSS). It

was found that MNGT was more effective in comparison to CTM. AVPSS was more effective in enhancing retention of listening comprehension.

Kulkarni and Kamat (1997) took up a study on experimental use of suitable education technology in the teaching of Marathi as first language. They found that the ability to read with correct punctuation could develop to a small extent only. However, the ability to write legibly and correctly improved. There was no difference in achievement of bright students.

Surwase and Chincholkar (1997) studied the use of educational technology in teaching of Geography to Class V students. They found that generally audio-visual aids were not available in schools. They also found that Geography teachers were not trained in using audio-visual aids. During the study, researchers found that teachers agreed to the point that difficult concepts can be taught easily by using teaching aids.

Sahoo and Mallick (1995) in their study found out attitude of lower primary and upper primary school children's on ETV programmes. They found no difference, however acquisition with ETV made them favorably disposed towards ETV. Sex-wise students also differed.

Sahoo (1995) did his Ph. D. work on appraising impact of UGC TV programmes and found that programmes had positive effect on student learning. However, no gender difference was found in the learning of students.

Kapoor and Verma (1997) studied aggression among adolescents in relation to TV viewing. It was found that adolescents high on aggression scale viewed TV for more hours and with concentration. They also didn't like to be disturbed while watching TV. The study however did not reveal whether TV viewing increase aggressive tendencies.

Neera (1998) took a study to compare effectiveness of video teaching learning material (VTLM), video aided instruction (VAI) and conventional teaching. He found students most favorably disposed towards VTLM. Retention with VTLM and VAI was more effective than CT. Students retained more who were exposed to VTLM than students who were exposed to VAI. Students exposed to VTLM and VAI were significantly different in their achievements.

Instructional Technology, Audio-Video and Teaching Aids

Under this heading, three types of research studies are presented : one relates to instructional technology like use of advance organisers, the other relates to use of audio tapes, and the third type relates, use of teaching aids on students achievement and retention.

Marthanda (1998) in the Ph.D. study on effectiveness of instructional media in modifying cognitive and effective behaviour in prevention of AIDS found that the package was effective as compared with lecture method, although it didn't change attitude. Audio tapes in Tamil were found more effective in retention as well as in changing attitude as compared to audio tapes, slides and posters prepared in English. The study indirectly brought into focus the communicative power of mother tongue or regional language as compared to English which is the foreign language. The study has implications for language teaching.

Desai (1994) studied the effectiveness of graphics and projected aids in teaching food and nutrition. He found that both were effective, though graphic aids were more effective than projected aids. Students with higher IQ and socio-economic status secured more on achievement and retention than those with lesser IQ and SES. When opinion of the students was sought they observed that graphics and projected aids helped in learning.

Bhangoo and Sidhu (1997) studied the impact of selected audio-visual aids on food hygiene knowledge of secondary school students. They found that students taught with audio-visual materials performed better than the controlled group.

Datta's Ph.D. work (1998) was a study on instructional technology. He tried to modify teacher behaviour using verbal interaction analysis feedback. It was found that most of the teachers followed direct lecture method and only asked recall questions. They seldom asked students to do something. Some asked students to read from the text. After providing feedback on their behaviour the researcher found that their behaviour improved significantly. He also found improvement in student achievement after interaction analysis was discussed with teachers.

Patnayak and Monahan (1993) looked into the effectiveness of advance organisers in teaching history and found that students taught with advance organisers performed better than those taught through conventional approach.

Singh (1995) compared the effectiveness of discussion method and traditional method at the B.Ed. level. He reported that the group taught through discussion method performed better than the one taught through traditional method. The study touched the soft side of E.T. and was an attempt to probe deeper into technology of education. Active participation helped in both assimilation and retention aspects of learning.

Singh (1994) compared inductive thinking model (ITM) with traditional method (TM) of teaching economics to Class XI students, and found that ITM was more effective than TM. Achievement of the experimental group was significantly higher than the control group (i.e. traditional method).

Raina (1995) made an extensive survey of instructional methods used by history teachers. He found that out of the sample surveyed only 7% used archaeological findings, documents, and coins. Only 20% teachers occasionally used radio, and 23% used remedial and enrichment method.

Kumar (1998) took up a study to look into problems and prospects of educational media. He found that teachers, by and large, had professional orientation but lacked training in educational media. Most of the teachers had positive attitude towards educational media but a few felt that they had poor media operating capability. Media utilisation was found to be poor. 79% used chalk board, charts and posters. It was a meta analysis of an agriculture university. The study clearly shows that we must not relegate intermediate technologies.

Gaikwad, K. D. (1993) investigated the effect of mastery over theory and planning skills upon teachers performance of concept attainment model at his Ph.D. level. It was found that mastery over theory alone could not create considerable variation in positive or negative performance. The group that was initiated into planning skills performed better in terms of student achievement. Thus it should that mastery as well as planning skills both jointly

made the significant impact on teacher performance.

Malik (1993) undertook Ph.D. work on technology transfer model at Chaudhary Charan Singh Haryana Agricultural University. He found that a majority of heads of department (83.3%) did not had training in extension education. Field functionaries acknowledged inputs of technology transfer from Haryana Agricultural University. This study showed that educational technology had a great scope in extending technology transfer, which may link up with higher agricultural yield.

Panda (1994) studied the effect of advance organisers and found that the group in which advance organisers were introduced performed better than those taught through conventional method.

Studies of Hathi (1994) and Kannan (1998) were based on survey work relating to study of AV aids in the secondary schools of the Gujarat state and E.T. inputs to B.Ed programmes in Tamil Nadu respectively. Hathi (1994) observed that government schools used AV aid much less than non-government private schools. The spread of AV aids was found to be limited to models, charts, maps, posters, globe and microscope. Science teachers used AV aids much more than language teachers.

Kannan (1998) found that teacher educators used E.T. rarely in the classroom. Khemchandani (1998) undertook a study on the use of technological devices by academic counsellors of IGNOU study centres and found that 30% of the counsellors didn't use any of the devices (OHP or VCR or audio cassette). Nearly 90% of the counsellors never used videotext or CCTV. In general academic counsellors were not satisfied with E.T. because of the low turnout of students.

Agarwal and Mohanty (1998) undertook a meta study to see the effectiveness of multimedia (MM), programmed learning method (PLM) and traditional method (TM), and found that students performance taught by MM and PLM were significantly higher than those taught by TM. Further, it was found that PLM and MM were more effective for secondary level than primary level, and found that PLM and MM were better suited to teach science subjects than arts subjects.

Programmed Instruction

Research studies in programmed instruction have been diminishing over the year. Whereas the first two trend reports were usefully devoted to programmed instruction, the third, fourth and fifth trend reports had dwindling numbers of studies in this area. However, the variety in the design of PIM has been much satisfying. We have for this volume designs that include branching programmes, tape slide programmes and group programmes.

Sarma (1997) used programmed instruction to teach Sanskrit grammar (Karaks). He found that the programme learning group obtained a higher mean. Their performance was better than the group taught through conventional method. The study reaffirmed the findings of studies done in the 60s on use and effectiveness of PLM.

Sunder and Ekdote (1994) developed and validated tape slides programmes (PLM). They found that the programmed material had positive impact on student's performance. Students also expressed positive response to the programme.

Thaker (1994) undertook Ph.D. work to find out effectiveness of linear and branching programmes. He taught economics to Class XI students and found that linear programme was more effective than the branching one, but branching programme was more effective for textbook materials which found to be least effective.

Trehan (1994) studied for her Ph.D. work relative effectiveness of individualised and group instructional modules for teaching biosciences to Class XI students. GIM was of three types: one having visual media (GIM-1), another having audio commentary (GIM-2), and the third with printed component (GIM-3). It was found that GIM-1 was most effective, followed by GIM-3 and GIM-2.

Computer and CAI

Computer and informatics technology are developing with mind-boggling speed. None of the research studies has been on impact of WWW or INTERNET or Video conferencing or virtual teaching. Research has mainly focused on the traditional use of computers and on CAI.

Goel, Joseph and Shinde, L. (1994) Development of computer software for assessing research aptitude. *Psycho-Lingua*, Vol.24(2), 83-91 (I.E.A. Issue Jan 1997).

Joshi and Mahapatra (1995) undertook a study relating to effectiveness of computer software. They found that students taught through software package significantly did better than those taught through conventional method.

Mahajan (1994) studies the effectiveness of computer instruction for teaching singular and plural at grade 2, and found CAI to be more effective than the traditional method.

Shah and Agarwal (1994) conducted a research study to evaluate teachers, attitude towards computer education as well as Computer Assisted Instruction (CAI). They found attitude positive in all the groups, though female teachers showed more positive attitude towards CAI.

Biswal (1995) studied for his Ph.D. work the development of computer-based time-space-personnel management system (TSPMS). He found that the manual system was quite poor in comparison to computer generated TSPMS. It helped create different formats, and in generating co-curricular timetable. It helped in even distribution of working load on teachers.

Agarwal (1995) for his Ph.D. work undertook a comparative study of conceptual understanding by programmed learning and CAI and that both were very effective; however PI was found better than CAI for students with lesser IQ. CAI was found to be better than PI for students of higher IQ and for student's of higher socio-economic strata.

Rangaraj (1997) for Ph.D. studied the effectiveness of computer assisted instruction in teaching physics. He found that CAI as Support System (CAISS) was much better than CAI as individualised instruction. Retention also was higher when taught through CAISS.

Information Technology and Library Sciences

It is heartening to see a few research studies on information technology and library sciences. One of the meta studies had been on how far libraries had opened up to informational technology. The other study related to theory and practical aspects of courses for professional development of library staff. Use of E.T. in

libraries was undertaken by Kemparaju (1993) and Sen (1997). Kemparaju (1993) work related to development of professional skills for library and information service personnel. He found that the courses were more theoretical, and less emphasis was given to practical aspects in the field of information science and information technology. It was also found that major employees were public sector, R&D institutions and institutions of Engineering, Agriculture and Medicine. Government institutions were at the lowest ladder of employers.

Sen's study (1997) related to introduction of IT in libraries. It was found that institutions of Physical Sciences and Technology used IT in Libraries, Medical colleges and hospitals had used IT at a higher level. However, management tools such as guidelines or hardware software specification were found to be absent.

TREND, ISSUES AND FUTURE SCENARIO

Those who work in the field of E.T. are well familiar with two extreme positions on the usefulness of E.T. One extreme position is to see E.T. as a sure cure for all educational ills. They feel that E.T. can help in increasing access, promoting retention and ensuring high achievement. The other extreme position, in the words of Susan Markle, is that E.T. has been over emphasised, over priced and under productive. Moon (1997) also advises us of dangers of over reliance on technological media Bates (1995) advises us to be more balanced and pragmatic. He guards us to keep in view seven factors while using E.T. namely, accessibility, costs, teachability, interactivity, organisational compatibility, novelty, and speed (and coined an attractive acronym ACTIONS).

In the 21st century no one can exclude or ignore the importance of information and communication technology (ICT), instructional technology (IT), and educational technology (ET). However, it will be prudent on our part to keep in view important issues of which are briefly mentioned as follows.

- i) Neither ET nor ICT can, replace the human element in teaching. Only a live teacher can develop the critical side of learners personality like self-esteem, confidence, positive thinking, social cohesion and

concern for human values. E.T. programme producers should have to see that some of their programmes touch these aspects of education.

- ii) If unimaginatively used ET and ICT can create a digital divide, which may result into a social divide. Educational planners have to take note of this danger.
- iii) E.T. programmes should be so designed and developed that they balance the tensions between localisation and globalisation. ET and ICT can facilitate globalisation but cannot overlook localisation as it preserves cultural values, cultural heritage and tradition which are essential for building social roots of an individual.
- iv) Many times the enthusiasm of Internet and www relegates to the background lesser technologies of audio cassettes and video cassettes, which have their own values and needs to be used judiciously.

As time marches, new thinking emerges on the horizon of E.T. One cannot just rest with the age-old concept of E.T. of 60's or 70's. Informatics, telematics and telecommunication are knocking at the door. The concept of New Information and Communication Technology (NICT) has also emerged (Hawkridge, 1993). The day is not far when NCERT and the school education system will be called upon to look at the concept of E.T. in a broader way. E.T. should adequately equip itself to respond to these emerging trends, and prepare itself for new challenges, which may relate to:

- New goal/new curricular orientations, new thrust areas.
- New target group of learners (out of school children, urban socially disadvantaged children, students with specific learning difficulty).
- Meta objective of "learning to learn" (Novak and Gowin, 1984) and thinking skills, self-guidance/directing skill.
- Increasing student autonomy, that is helping students to set their instructional goals and providing resources to achieve them (meta cognitive objective).

E.T. which has been largely passive and one-way affair in India, as opposed to E.T. in other countries (Saettler, 1990), is gradually becoming

more and more interactive. Constructivists and those who advocate deep learning de-emphasise passive learning. They highlight the active role of the learner. They also point out that E.T. should be used to promote deep rather than surface learning. One has to see whether Indian E.T. programmes have that element of learning.

Hawkrige (1993) has observed that there is challenge to E.T. from cognitive science, informational technology, and critical theory. He advises us to upgrade the cognitive level of E.T. This advice holds good in the Indian context also.

Performance of E.T. in India has been poor, marginal and patchy. It may be due to the following factors:

- (i) Unimpressive (if not poor) programme quality.
- (ii) Poor utilisation of programmes in the class or by a individual.
- (iii) Uncoordinated or poor coordination of programmes.

Management of E.T. enterprise has to be faultless at four levels: programme design, production, utilisation and transmission. Further, the thrust of E.T. should promote self-directional, resource-based learning. It should provide cafeteria approach to curricular learning to students. This will provide freedom to learn what they want to learn and when. Emphasis has to be more on quality than on quantity of programmes. If we look at the facilities in E.T. we see them at three levels – national, state and district – with varying degree of satisfaction. Further, at all the levels, linkages – both vertical and horizontal are abysmially missing. Conscious attempts have to be made to network institutions and ensure sharing of information/experiences. Special steps will have to be taken up to build up for institutional capabilities and capacities building.

We would now revisit our attention to E.T. programmes. They should satisfy all or most of the following conditions:

- It should be interactive in nature.
- It should provide “constructivist” approach so that the learner draws his/ her own

meaning and constructs his/her reality.

- It should have minimal teaching (pedantic) and maximum dialogue – a strategy by which the learner in a spiral ways goes to the depth of the problem with all its ramifications.
- Each programme should be modular in nature – that is it should be detachable self-contained, self-instructional with inbuilt monitoring and feedback techniques.

CONCLUDING COMMENTS

Research studies in E.T. in this Trend Report show variety in design and thrust. The larger part of the cake has gone to Mass Media and ETV programmes. However, there has been studies on other areas like effectiveness of advance organisers, branching programmes, and use of information technology in library sciences. Most of the studies have been on comparison of methods: this was relevant 20 years ago but not now. What is needed as new thrust areas in research are : the effectiveness of Internet, virtual classroom, virtual teaching, video conferencing.

The other weaker side has been lack of dissemination, lack of sponsored research and lack of coordination. Gagne (1978) has observed that the functions of dissemination must be identified as a definite job function of R&D organisation. On coordination, the comment of Buch (1991) is still relevant that “research activities in education are going on without any coordination.” NCERT, UGC, SCERT will have to undertake the role of coordination.

To end, we would like to elaborate on the concept of coordination. It is not only coordination of funds and logistics, but it also involves a vision to ensure a balance between individual as well as sponsored researches, balance between discipline oriented and format oriented research, balance research on policy initiatives and research for policy initiatives.

To this rich pasture, the researchers should move into in the next decade.

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