ROLE OF EDUCATIONAL TECHNOLOGY FOR THE CHILDREN WITH SPECIAL NEEDS

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ABSTRACT
In the present age, the technology has changed the whole world and education also included. The role technology made the education system or the teaching learning processes very effective. The present paper has focused how technology has played a great role to change the education for children with special needs. As lot of researches have been taken placed in the field of special education which resulted in various software and devices e.g. Program Instruction and Computer Assisted Instruction which have a great role in the education for these children.

Keywords: Technology, Education, Children, Special Needs

Educational technology is the development, application and evaluation of systems, techniques and to improve the process of human learning. According to G.O. Leith, “Educational technology is the systematic application of scientific knowledge about teaching learning and conditions of learning to improve the efficiency of teaching and training”.

EVOLUTION OF CONCEPT OF EDUCATIONAL TECHNOLOGY
1. Use of Audio visual aids
2. Use of sophisticated instruments and equipments for formal and informal education.
3. Programming of self instruction material.

SCOPE OF EDUCATIONAL TECHNOLOGY
1. Determination of Educational objectives
2. Framing of curriculum
3. Selection of teaching methods and strategies
4. Co-curricular activities
5. Analysis of teaching learning processes
6. Protection and development of teaching learning material.
7. School administration
8. Effective use of mass media
9. Programmed learning
10. Evaluation

EDUCATIONAL TECHNOLOGY IN THE FIELD OF SPECIAL EDUCATION
1. Administration (Admission, Withdrawal and plans etc)
2. Preparation of time table and teaching schedule
3. Preparation of teaching presentation (Lesson plans, power point presentation and news letters etc.)
4. Examination – preparation of question banks, question papers and exam schedule etc
5. Evaluation
7. Guidance and counseling – psychological testing etc – I.Q., Aptitude scale and personality test etc.
8. Educational and vocational guidance:-
   - Information related to various courses
   - Teaching learning – Computer Aided Instruction (CAI) and Computer Management Instruction (CMI)

**COMPUTER AIDED INSTRUCTION**

- Drill and Practice
- Self paced level
- Immediate Feedback
- Varied type of learning activities
- Software can be developed on various domains for children with intellectual disability like personal, social and academic.

The present century is rightly called the “Technological Century”. Technology of education and technology in education have gone through a number of phases. Started with methods and strategies uses in Gurukul system, Educational Technology has reached to virtual environment facilitated by information and communication technologies. The changes have occurred due to the necessity of educating large number of students, geographical distances between the learner and the education providers, technological advances at the workplace requiring constant upgradation of knowledge and skill. Today we have reached the fifth generation of technology where lessons of an expert teacher can accessed by any one situated at any place with a provision of interaction between the teacher and the learner. The five generations of educational technology are, The Gurukul system of educational technology, institution based class-room oriented educational technology, ET for distance learning or independent learning, use of media and computers in education and training, internet based learning. One of the purposes of educational technology is to promote the efficacy of education; Educational technology is used for learning,

- Effective instruction
- Facilitating individual differences
- Providing equal educational opportunities
- Preservation of knowledge
- Transmission of knowledge
- Imparting quality education
- Educational planning
- Pre-service and in-service teacher education and
- Finding solutions for problems in Indian educational systems

The educational programs for persons with intellectual impairment aim at preparing them for independent living in the community. Due to the intellectual impairment, persons with intellectual challenged have limitations in acquiring knowledge
and skills like non-disabled persons. Among them some may have multi disability having loss of vision or hearing or epilepsy along with intellectual impairment. These children will have much more limitations in learning skills than the other group of children with intellectual impairment. However, the advancements in technology have made it possible to innovate electronic devices that supplement or support persons with intellectual impairment in learning and leading their lives meaningfully and fruitfully. To name some, electronically operated wheel chairs, walking aids, hearing aids, adaptations in computer peripherals, educational software are found to be of immense help to the needy persons.

Apart from electronic technology, the information technology (IT) has brought a revolution in their life and life styles. The information, which was accessible to only a few people before, is accessible today to many people through Internet, web-based learning, web-assisted classroom instruction and online education. Professionals, family members and others working in the field of mental retardation are able to compile information on new developments, trends and innovations in teaching process of children with intellectual impairment through surfing relevant web sites. This helps them in updating the knowledge to keep pace with the changes and advancements taking place in the field of special education. Further, the inventions, both in electronic and information technology have paved way to distance mode of education. With this a large number of persons in remote and inaccessible areas can avail educational facilities.

TECHNOLOGY AND SPECIAL EDUCATION

Technology includes 1. hardware / device or media, 2. software or programmed instruction, 3. Planning, designing and analyzing programs. Education in its broader sense means providing environments and opportunities to students to acquire knowledge and skills and apply those skills to lead a productive independent life in the society. The same goals of education are applicable to both disabled and non-disabled persons. However specially trained personnel, special curriculum, methods and materials, instruction and educational settings are required for optimum learning among children with disabilities.

Due to the disabilities, they will have problems in mobility, communication, education, (learning academics) and employment. The innovations and advancements in technology made it possible to device aids and appliances, learning materials or assessment devices, to reduce the limitations and to prevent the disability. For example, computerized wheel chairs, walking aids, hearing aids, talking books, talking telephones, software instructional programs and adapted computer peripherals are developed and are used in education and training of persons with disabilities. However, a limited number of persons with disabilities have access and affordability to such devices.

There are three main types of technology strategies used with children with special needs. These include “low” technology, “mid” technology, and “high” technology.

“low” technology → Any strategies/interventions that are not battery powered or electronically operated. “low” technology strategies are usually low in cost and easy to use such as, Picture Exchange Communication Systems, Dry Erase Boards, Clip Boards, Laminated Photographs, Manipulative / Objects.
“Low” technology strategies can be used with children with special needs to enhance expressive and receptive communication skills. When a child wants to communicate something, which he or she cannot verbally communicate, he/she can simply point to the picture and be understood. Using representational picture cards reduces the amount of frustration for both the child and the teachers. This can be expanded by pairing pictures with words so that children can start to see the connection between the words and the pictures.

“Mid” technology strategies that require the use of batteries or basic electronic devices that are used primarily as a means to support expressive communication such as Voice Output Communication Aids – piece of equipment that records voice and can be activated by touch. The voice is often paired with a picture clue, Big Mac, Talk Pad, Voice in the Box, Language Master – cards with recordable strips are run through the machine to produce sounds. You have the option of adding pictures to the cards. Tape recorders, Mid technology strategies can be used to increase classroom participation, focus attention on various skill areas, and assist in the development of social skills.

“High” technology strategies those are usually the most expensive and complex to use. These strategies are highly motivating to children with special needs such as Video Taping, Receptive Language Skills, Expressive Language Skills, Emotions, Social Skills, Nonverbal Cues, Scripts, Self-help Skills, and Academics, Writing skills, creating written stories, Computers, Adaptive Hardware, Touch Window, Intellikeys, Big Keys, Trackballs, Software, Accessory Equipment, Digital Cameras, and Scanners.

Today efforts are being taken by Government and non-Governmental organizations to make these devices available to people with disabilities in rural areas. In addition, R&D activities have been taken up by Government organizations and NGOs in developing and devising materials using latest technology are being funded by S&T mission mode of Ministry of Social Justice and Empowerment, Government of India, the software packages developed include, a) Literacy, b) Numeracy, c) Number skills, d) My country, e) Living and non-living things, f) Health and safety and g) Community utilization and many other Software are:-

- Read-e PLUS
- Read Please
- Black Window
- Project: Possibility
- SENIT

These are developed exclusively for persons with intellectual challenged, Learning Disabled & Autism, keeping in mind their limited intellectual abilities. Software for Physically Disabled & Cerebral Palsy are: - Access DOS, Bobby, Camera mouse, Caring Keys and Multi - web etc. Software for Visual Impaired & Low Vision are:- Another Lens, BrailleSurf, eMacSpeek, iZoom, Linux Accessibility, Talking Keyboard. Software for Hearing Impaired& Speech Problems are:-APAR-C, IE Page Reader Bar, Narrator, Say IT, Type Sign Writer and Text-To-Speech Software . Stating that technology related products would enhance and strengthen the process of learning and that the entire education system use IT products and enhance them periodically and also the teachers should enhance their skills to use IT related products.
COMPUTER ASSISTED INSTRUCTION & PROGRAMMED INSTRUCTION

Technology can play a powerful role at every step in a person’s life, particularly in lives of those individuals who have special needs. Parents, teachers, and service providers for students at every level want to know what options could expand the potential for their child or student to interact, learn, and develop. Computer Assisted Instruction has several types of instructional programs namely, drill and practice, tutorial, educational games, demonstration, simulation, problem solving and discovery learning.

Drill and Practice – These software’s are developed to help the students practice the previously learnt materials on computer, thus, enhancing automatic level of responding. Though it provides over learning, repetition and immediate feedback it may end up to be monotonous and have limited cognitive demands.

Instructional game – They are highly motivating as learning occurs through games. It increases concentration, coordination and dexterity, but it has the threat of children wanting to play the games and no actually meeting the educational objectives.

Simulation – Experience provided in simulations are analogous to real life situations, demanding active involvement of the student in problem solving. However, it may be difficult to integrate this component in academic curriculum, which is structured and rigid.

Tutorial – This assists the child to work independently and provides for review of learnt materials. It has the facility to present instruction in sequential, step-by-step manner. Child’s own motivation is a prerequisite for use of this software.

Demonstration – This allows the students and teachers to manipulate relationships among variables by pressing the keys and has presentation with color, graphic and sounds that sustain interest.

Problem solving – Computer as a tool to solve problems is used in many areas, especially, in calculations, where the student analyses the problem and writes executable program to get desired results.

Discovery learning – This can be integrated in games and simulations and it allows a child to learn by exploration and experience.

ADVANTAGES

Computers have changed the entire lifestyle of people. Those with disabilities are no exception. In the area of mental retardation, where individualized instruction is essential, the computer is a boon. It provides the individual learning time to student. After training the teacher may allow the child to use the computer on his own, and she can attend to other children. The interactive programs play the role of the teacher too. Multimedia helps to understand difficult concepts through multi sensory approach.

The child’s self esteem is boosted when he proudly say he uses computers. Going with the principle of normalization it provides access to retarded children. The suitably selected softwares help as drill and practice for the content already taught by the teacher. The studies done at NIMH through multi- centered data collection on use of CAI revealed that even severely retarded children benefit from the program, the students attention span increases and distractibility reduces, the students do their routine duties well if promised of computer time thus serving as a good reinforcement.
DEFINITION OF PROGRAMED INSTRUCTION

Smith and Moore (1962) “programmed instruction is the process of arranging the material to be learned into a series of sequential steps, usually it moves the student from a familiar background into a complex and set of concept, principles and understanding.

Table I Basic Concept in Programming

<table>
<thead>
<tr>
<th>SL.N</th>
<th>CONCEPT</th>
<th>INTERPRETATION</th>
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<tbody>
<tr>
<td>1.</td>
<td>Frame</td>
<td>A single step of learning programmed learning requires response from the learner after receiving information (Stimuli) and finally provides a feedback.</td>
</tr>
<tr>
<td>2.</td>
<td>Stimuli</td>
<td>A small bit of information followed by question based on the information.</td>
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<tr>
<td>3.</td>
<td>Response</td>
<td>The answer given by the learner</td>
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<td>4.</td>
<td>Cue</td>
<td>A prompt or information contained in a frame to help the learner to respond correctly.</td>
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<td>5.</td>
<td>Fading</td>
<td>A method of vanishing the presence of cues during the sequence of frames until the learner has mastered it.</td>
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CHARACTERISTICS OF PROGRAMMED INSTRUCTION

I) **Small Steps:** The new knowledge or information is divided into small parts, or steps are arranged in a sequence in such a way that the student can give the correct responses to a step and go ahead in learning himself. In case he fails to make correct response, he can repeat the step and get correct response.

II) **Students’ responses:** The student is required to give his responses to each step. In the book from of PLM he is to write a word or a phrase or a sentence. In the machine, he indicates his response by pressing the correct button. If his response is wrong, he has to repeat the process and learn.

III) **Self-pacing:** The student can make progress in learning according to his own, based on his ability and interest. The teacher does not regulate the pace of learning, which is completely individualized.

IV) **Immediate feedback:** As soon as the student makes response to a step, he is able to know immediately whether his response is correct or not. This enables him to make progress in learning quickly.

V) **Reinforcement:** Thorndike’s law says that if a response to a stimulus is followed or accompanied with satisfying experience, the response is reinforced. If it is followed or accompanied with dissatisfying experience, the response is not strengthened. The former is called positive reinforcement and the latter is known as negative reinforcement. In PLM, positive responses are mostly forthcoming and accordingly learning is reinforced and promoted adequately.

VI) **Evaluation:** PLM provide for recording the student’s responses at every step. It is therefore possible to go through the record and ascertain his progress of learning. After successfully completing one-step, he can go further.
ADVANTAGES OF PROGRAMMED INSTRUCTION

I) Teacher can play the important role of a guide, counselor, motivator, and organizer.

II) Social and emotional problem can be eliminated. It is said the introduction at programmed Instruction in the west on a mass scale has brought a revolution in the social setting of the classroom. Many emotional and social problems have been eliminated and problems of discipline have been automatically solved by the use of self-instructional material.

III) A well-programmed self-instructional device is tailored to cater to the needs of individual students of the class.

IV) Programmed instruction makes learning interesting. The learning material is presented in such a way that learning becomes an interesting game in which the learner is challenged by his capabilities. The novelty of learning by a device provides extra motivation to the learner.

V) Every student can work at his own place. Intelligent students need no longer be bored or allowed to lose interest due to slow progress of other students of the class. They may progress as rapidly as they are able. The weak can work at their own pace.

VI) Programmed instruction is particularly useful in certain areas, such as memorization of facts, procedures and mastering of simple facts, concept formation and learning of principles.

VII) Programmed Instruction is helpful for teaching complex subject matter. The complexity of the material is simplified through the analysis of the subject matter into small and more easily assimilated segments of information. Well programmed materials give the teacher the method and the individual of sufficient time to comprehend more complex concepts.

VIII) Programmed Instruction as a teaching procedure is particularly useful for developing countries which are unable to educate millions of children and are short of good teachers. It is very useful in certain situations where human instructors are not easy to provide. For example, small isolated schools in the hilly areas.

IX) Programming Principles, if incorporated into text book writing, can improve the communication potential of conventional text books.

DEVELOPMENT OF PROGRAMMED LEARNING MATERIAL (CAI & PI)

There are different types of programs they follow a common method of developing the program, adding some special techniques required for their specific characteristics. Three basic questions are to be answered for the development of programs: for whom, in what and how? The development phases of preparation and validation of programmed material are:

1. Decision regarding the target group.
2. Decision regarding the subject, topic, unit on which the program is to develop.
3. Decision regarding the type of program.
4. Selection of content.
5. Preparation of pre-test and post test.
6. Writing out the frame.
7. Individual testing.
8. Small group testing.
9. Large group testing.
10. Finalization of programmed materials with the manual.
11. Marketing.

ACCESSIBILITY FOR PERSONS WITH DISABILITY

Accessibility as per its dictionary meaning means “approach –ableness”. In that sense it could refer to access to many aspects of life I.E education, Employment, information, technology etc. but broadly when we talk about accessibility issues for persons with disabilities, we refer to their access/ mobility within the built environment- both internal and external i.e. their movement within the building, in markets, parks, on footpaths and roads etc. An accessible environment is one, which has the following components namely:

Safety: - A place where people can move around safety

Independence: - where people are able to use the facilities independently.

Affordable: - where barrier free or environment does not come with premium.

Logical layout: - where people are able to navigate without too much physical exertion i.e. not having to move through the length and breadth of the building to access information or make use of the facilities.

Principles of Universal Design (Balaram, 2003)

Equitable use: Flexibility in use, simple and interactive use, perceptible information, tolerance for error, low physical effort, size and space for approach and use.

THRUSTR AREAS FOR IMPROVING ACCESSIBILITY

A barrier free environment is a welcome step for all including persons with disabilities. It is a statutory commitment to be fulfilled within the limits of economic capacity and development when it comes to persons with disabilities. Following are the major areas of attention for improving accessibility:

- The external environment, which includes footpaths, kerb ramp at walkway, pedestrian crossing, traffic signals, subway and overhead bridge, play ground, park etc
- The internal built environment, which includes homes, schools, factories, companies, hotels, movie houses, museums, tourist spots, sports complex, public building, etc.
- Public transport by road and rail. Also equal access to water and air transport.
- Products that affect daily living like safe non-slippery good grasp utensils, safe cooking gas, obstacle climbing wheel chairs etc.

Accessibility Environment

- Parking facilities earmarked for Persons with Disabilities at the entrance,
- Ramps at the entrance to enable the wheel chair users to get to any floor easily and independently.
- Signage in Braille: At the entrance, there should be a route map that has the guidelines to all the departments in the center and the entire plan of the building is in Braille for the benefits of the visually impaired people.
Flooring: the major pathways of the entire building should be fitted with tactile tiles of contrasting color too guide visually impaired people within the building.

Public dealing counter, switchboards and other essential amenities like public telephones, drinking water etc. placed at a lower level for easy access by wheelchair users.

Railings throughout the building at two levels as additional support for people using crutches, elderly etc to move freely.

Doorways and corridors. The width of all the doors in the building should be more than 900mm and corridors more than 1500mm for easy and independent maneuverability of wheel chairs. Door handles should be smooth, end carved.

The lift with auditory signals and embossed controls enables visually impaired people to alight or embark at the right floor. Hand rail support in the lift is also essential.

The washrooms / toilets need to be spacious enough for movement of wheel chair. The toilet seats should be placed at an appropriate height for easy transfer from a wheelchair. Special attachments need to be fixed to wash so that hands are free to hold the grab bar.

Washbasin: The taps should have a lever that is easy to operate for everybody especially for people without hands or fingers, to use independently.

Visual information systems for hearing impaired like ticker tape information system particularly in public building and blinking signals for room bell and intercom services in hotels etc.

Underground cabling, emergency evacuation and appropriate signees should be placed to facilitate movement of people. Maps and information panels should be placed between the heights of 0.9m to 1.8m to allow ease in reading by wheel chair users.

Kerb ramps to facilitate movement, subways for crossing roads should have ramps of at least 1:15 slopes and with landing for resting after every 10m, instead of stairs.

Auditory signals should be provided at busy cross sections.

Public transport system needs to be accessible with appropriate provisions of space and movement of wheelchairs.

CURRENT SCENARIO

In spite of existence of legislative provisions, building codes and byelaws, resource constraints really make accessible environment in cities and rural areas an uphill task. A beginning has been made in some places: All Airports, Delhi Metro, Barrier free buildings by law, DTC high capacity buses, UGC has allotted separate funds to ensure barrier free accessible universities and Research activities on accessibility.

CONCLUSION

Research, particularly development research and innovations in educational technology are encouraged and recognized. The policy is to accord educational technology a significant place in the educational sector for persons with disabilities. To restore its proper concept, educational technology is visualized as a tool system to tackle educational problems rather than mere application of new technology. For its expansion
and utilization, it is contemplated to create a network of hardware and infrastructure for producing appropriate quality software both for teacher and students with disabilities. Last but not the least there is a great need to create awareness among the policy makers, engineers, and architects local bodies and to make them understand the needs and analyze why we do not come across people with disabilities in our schools, college, and work environment or in social gatherings. Consultation to PWD and education and Training of professionals on this issue plays a significant role in promoting a barrier-free world.

REFERENCES