Review Paper

Science and technology in special education

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Abstract

Innovative techniques and technological advancements has bestowed special need people with special abilities. The recent trends in Special education have enabled them to perform various tasks that were in limitations. The role of technology in early detection of the disability, early intervention, prevention and rehabilitation is incredible and there is no doubt that technology helps special people in gaining increased independence, flexibility and ambulation, access to employment, improves their quality of life completely. Therefore there is a great need for proramme to train special people in information and communication technology. However prior to such initiatives it is essential to equip knowledgeable and trainable special people. Providing them education and spreading awareness among them regarding various policies and programmes designed by the government would help them to improve their standard of living. The fulfillment of their basic need paves way for updating their knowledge in the field of science and technology, such that they become strong enough to confront various difficulties in life. The vast opportunities of science and technology aid these special people to exhibit their talents and potentials in them. Special educational institutions, whether governmental, non-governmental or government-aided opens up new vistas for the differently abled to render their service for the development of their well being and of the society at large.

Keywords: Education, Emancipation, Orientation, Special Education, Science and Technology.

Introduction

Education is the fundamental right for all human beings. It caters to one's basic need such as food, clothing and shelter. It inculcates in a person the essential qualities of life, good habits, attitude and moral thinking. It assures self confidence and builds an admirable personality. Education eradicates all types of discrimination. The discrimination between the rich and poor irrespective of caste, creed, gender, special or normal persons. It regards abled and disabled men on equal footing. Education during the medieval era did not reach the masses due to various conflicts, customs and traditions. Today, the adoption of compulsory education has made a landmark in the history of mankind. It has lead to modernization. Science and technology with its various aspects and advancements has reached the zenith. It has reached a place where education is impossible without technology. The advent of computer, smart phones, iPads, tablets and technology based initiatives like Digital India, E-learning, M-learning, and ICT, so on might be very much welcomed but when it comes to the perspective of special people, with regard to their needs, there lingers a question. It is at this juncture science and technology bridges the gap and paves a way for their identity. In spite of modernization and westernization, majority of special persons are in need of education, employment and empowerment. The hurdles faced by them are numerous because of their lack of awareness, education and training. This remains the major pull factor for them. According to Census report 2011 cited by Annu Singh

and Richa Verma[1], about 21 million people in India are affected with one or more disabilities at the turn of the new millennium. These included people with visual, hearing, speech, physical, emotional, learning and intellectual disabilities, who constituted about 2.21% of the total population of India. Out of the total population of special people in India about 75% belonged to rural areas and only 25% belonged to urban areas. In rural India, the prevalence of disability is much higher (2.21%) as compared to its urban counterpart (1.93%).Prevalence of disability is higher among males (2.37%) as compared to females (1.87%). States with higher prevalence of disability are Jammu and Kashmir (3%), Orissa (2.8%), Kerala (2.7%), TamilNadu and Himachal Pradesh (2.6% each) while states with least prevalence of disability are Maharashtra (1.6%), Jharkhand, Punjab and Delhi (1.7% each), Karnataka and Andhra Pradesh (1.8% each) etc. Majority of people with special needs in India are not literate; only 37% of females and 58% of males with special needs have access to education. Out of total literate disabled population only 3% reaches at graduate and above level, whereas only 10% reaches up to secondary or higher secondary level. Wide gap in literacy among special people existed in the states from 37% in Bihar to 67% in Kerala with almost half of the states having majority of their special peoples not literate. Special people, 58% of age 6-10 years and 63% of age 11-14 years of are attending schools, as against 69% and 75% respectively in the general population. More than a third (36%) of males with special needs and more than two-third (68%) of females with special needs of age 15 to 59 years are

non-workers in India. Majority of these are with speech or movement disability and almost three-fourth of them with mental deficiencies are non-workers.

The Challenges for People with Special Needs

The differently challenged face different difficulties in their day-to-day lives. They are sometimes stigmatized by the society and are subjugated by other people in their environs. They confront poor health condition, less educational provisions, less economic opportunity during their growth. This leads them to live in poverty and deal with greater inequalities than their peers without special needs[2]. Lack of awareness, difficulties of access, high cost of assistive technology, lack of funding, lack of extensive support and lack of training poses as the main difficulties of special needs people and as such they become a sort of stumbling stones in the process of their empowerment.

Lack of awareness

The process of socialization of children takes place at family setting.But this very process of socialization gets hindered when the family members deny to trust them and to take special care and concern. They fail to render utmost importance to education and training for special needs people. Many people with special needs and their families are unaware regarding the merits of science and technology. They are unaware of what assistive technologies are available or suitable and how they can be reached.

Difficulty to access

According to WHO[2] people with special needs have lower rates of primary school completion than those without special needs and in many cases their inability to have access to assistive technology is a major factor. Alquraini and Gut[3] believes that theinability to gain access over assistive technology due to its high cost remains a lacunae for a longer duration and sometimes it is left unsolved and therefore it becomes hard to receive the benefits of education, On the other hand, if measures are taken with due concern, their learning capacity would develop at a faster level[4].

High cost of Assistive Technology

One of the major hindrances is the high cost of technology. Assistive technology though very much effective with its additional features specially designed for the need, its high cost prevents them from participating in regular classroom settings. Purchase and maintenance of assistive devices and support services are often too expensive. Financing for devices and services related to mobility, communication and control of people's environment is an essential prerequisite for their use. In most cases, technology exists, but access to it is severely restricted due to the economic status of the people with special needs. However, limited funds for schools are not sufficient to purchase the latest computer technology, even if it is identified

as potentially beneficial. Majority of Indian population is still under BPL (Below Poverty Line), and as such they are denied certain important benefits.

Dearth of support and training

Special educational institutions with sophisticated Science and technological support and services are a blessing to special students. But when special education teachers lack necessary resources and personnel to guide these special need people through the assistive technology network, it becomes a blessing in disguise. The ongoing support ensures that they are gaining maximal benefit from appropriate technology resources in their learning environments. Due to scarcity of funds and trained teachers, their special needs remain unfulfilled. There exists a wide disparity between people with special needs and technology and insufficient training for special educators become another major reason for the abandonment of assistive technology. Proper training is the key factor to assistive technology and implementation[5]. It is essential not only for the people with special needs but also for every other teachers, friends and family members to know its working. There are many technologies for special people around the world but few special people in India are unaware as they lack knowledge, accessibility and training and hence they are unable to avail those benefits. They become unable to be a part in the growth of science and technology. Lack of adequate teacher training in particular leaves a strong impact on people with special needs. Technology serves the best component in planning and implementing an educational program for these people. According to Mack et al.[6] to meet the needs of people with special needs within regular classrooms, all teachers, both those in regular education and those in special education programs, need training such as pre-service and in-service training programs on how technology can be used, and the technical skills to carry out a plan of action.

Role of Science and Technology in the empowerment of special people

It is believed that in an information society, technology plays an important and significant role in many cases, in helping people with special needs, in overcoming academic difficulties and in helping them to develop their life skills and in enabling them to achieve these target through a series of easy steps. According to Wyer[7], a technology particularly for people with special needs is often viewed as "the great equalizer". It is perceived as a means of providing access and opportunity, promoting independence, and encouraging empowerment. Today's science and technology, which is adapted to everyone's abilities, means that disabled end users participate in all aspects of social life on more equal terms than ever before. "For most of us, technology makes things easier. For people with special needs, it makes things possible" [8]. The importance for special people is justified under following points:

Prevention and Early Detection: The latest advancement in medical science helps in the prevention of disability. Technological invention such as the preclinical marker of the early detection of disability test like amniocentesis identifies problems at prenatal period. Likewise various researches in medical science have made the process of screening of children on the basis of their age specific milestones much easier. The performance of the child as compared to the developmental milestones for their age helps in identifying the initial sign of disability. Parents must be vigilant to observe and consult medical specialists for early detection and intervention on the basis of these signs.

Early Intervention: Present day modern technology is introduced to reduce the limitations caused by disability and bring about necessary intervention at the early stage itself. This includes assessing the child's ability to understand the language, respond to prompts and trials, ability to make choices and the ability for social interaction. The child's response to stimuli and reinforcements, span of distraction and attention need to be considered.

Increased Mobility: Science and technology also offers new opportunities for special people to use the assistive technology for their daily activities at a larger level than normal people. In yesteryears special people had to depend on others even to move from place to another, to board a wagon and to cross the road. The present day technology has given them far greater an impetus to live a life on their own, to become the bread-winners and to socialize with other fellow being in the community. Their level of confidence and independent living and attitude is boosted up when they make use of these available technologies. In addition, it increases special peoples' capabilities and determination both in and out of learning environment. It assists students in the content areas, providing a means to engage in the domains of study which might not otherwise be possible. Technology offers the opportunity to focus on their innate abilities, rather than disabilities with functional limitations. Technology has contributed these individuals to have greater control over their lives. Automobiles are specially created for them with utmost care, for example, wheelchairs and cars are made specially for these people with physical disabilities to control their mobility[9]. With the various assistive technologies, the mobility of special people from one place to another has been made possible. According to Burgstahler[10] a student with mobility impairment uses a hands-free keyword and mouse, graphic calculator and Microsoft reader to operate a computer to take resources and complete paper rather than have an assistant write for his/her. Examples of assistive technology include scooters and wheelchairs, alternative automobile controls, environmental controls, prostheses, communication aids, hand splints, hearing aids, and alternative input and output devices for computers.

Education and Orientation: Education opens the avenue of success for people with special needs who want to learn, live

and work for their prosperity. It plays a major role in the process of rehabilitation, employment and ultimately in empowerment. Education and training in technology has brought a vast change in all spheres of life. It continues to change their very life style in a more practical manner. Thus, its spontaneous growth has influenced technology and education to go hand in hand particularly focussing on those with special needs. It is remarkable that computer technology envisages an indispensable part to combine various approaches and courses to meet individual needs. For instance, Touch-Sensitive Screens, a popular technology allows the user to simply touch the computer screen to perform a function. Many touch-sensitive screens with multiple screen overlays can be used to perform a variety of tasks. Similarly, many companies provide additional software that in which they can create their own overlays. Infrared Sensors with Pneumatic Switches is one of the latest technology introduced for the special people. Use of an infrared sensor worn on the head, along with use of a pneumatic switch, helps physically disabled students to interact with the computer. As the user looks at the computer screen, the cursor also follows the user's head movement. Head and the cursor move in the same direction on the screen. Thus, users can position the cursor anywhere on the screen by moving their head left, right, up, or down. The pneumatic switch, which is activated by respiration through a plastic tube, enables the user to use the mouse. The computer responds when he sips or puffs on the switch, and the mouse button gets clicked. In this manner, the user can move a cursor and click on items displayed on the computer screen. Special software is designed to help the user to type information on an exact copy of a keyboard that is displayed on the computer monitor.

In India, National Institute for Mentally Handicapped[11] developed Computer Assisted Instruction package for teaching arithmetic and reading skills for children with mental retardation. It is one of the latest techniques to develop software packages for making, reading, writing and understanding numeric concepts easy and stepwise process for people with intellectual disability. The impact of computers on vocabulary acquisition of young children with autism was examined by Moore and Calvert[12]. A behavioral program and an educational software program were made to assess and compare children's attention, motivation, and learning of words. Thus, with the combination of advanced teaching approaches like multi sensory approaches etc. and training them appropriately would make it an easy and interesting mode of learning for special people.

Employment Opportunity: As technology plays a pivotal part in all walks of life it is imperative to know that one's dire necessity is education and assuring them with jobs. Employment opportunity triggers off poverty and enables them to achieve social inclusion and participation in society. This applies equally to people with special needs. Special people who are educated and trained can also search for job opportunities in various firms. At this point, assistive technology helps people

with special needs to receive, retrieve, store and advance in employment and encompasses devices that increase function, independence, participation, and productivity for people with special needs.

Emancipatory Strategies to Special People through Science and Technology: Collins and Halverson's[13] in "Rethinking education in the age of technology", is of the view that education's massive transformation has given birth to digital revolution. Children of today are the first "digital age" generation. The new computer-based technologies has provided them more prevalent and faster worldwide links to commerce, communication, and culture as they witness the rapid changes brought about by science and technology. As per the observation of Reiser, in the past decade, use of technological innovations, along with the increased use of the internet and other digital technologies upsurged a sudden popularity among the puplis[14]. Children with special needs can be empowered by improving their educational skills and help in the mobilization of technology. Access to books as well as the directly transmitting lectures from classroom to their home makes the process of learning simple. Distance courses allow people with special needs to earn while they are studying, to share documents, lessons, exchange ideas and make presentations. People with different disabilities can have access to educational courses via digital and audio libraries; obtain material, content and resources via the internet. The international network system provides large source of information at all time; all the information becomes just one click away. It shrinks the huge universe in to a village. Thus, it is essential to be familiar with the use of technology for people with special needs. It lays in the hands of all individuals especially the policy makers, placement officers of special people, teacher trainers, and the subsidizers of educational technologies to help special people to live a life of success. By collaborating together, parents, teachers, administrators, and school board members, as well as both students with special needs and their non disabled peers, can help to create classroom environments friendly and accessible to all opportunities kept before them. There is a need to raise awareness about the barriers that people with special needs face and identify the potentials of technology to overcome these barriers. Although technology holds great promise, its potentials can only be achieved if it is used in a right way. It may be true that science and technology for people with special needs may not solve all their plights but improve their functional capabilities. Annu singh[1] is of the view that acquaintance with technology is not only necessary at school age but it is a lifelong tool for employment, accessibility, maintaining and improving performance in a particular time.

Conclusion

An immense up-to-date knowledge in technology is a friend in need and a friend in deed. Assistive technology, according to Emily[15], are tools that lend success at school by helping special students to access material, provide the best learning environment and promotes independence at home, work and the community. The specially challenged people though had to face many a difficulties can overcome them with the help of technology. It gives them the possibilities to challenge the impossibilities. "Science and technology should not only be viewed by within rehabilitative context, but as a tool for accessing curriculum and exploring out means to help students achieve positive outcomes"[16]. Beyond the clear potential socialization and communication benefits, the internet offers an enormous array of new ways to pursue education and employment. Netherton and Deal[17] remarks that educated people with special needs supported by assistive technology will have greater opportunities for employment.

The Future Prospects Education is made possible for people with special needs who want to learn, develop, live and finally work in the future. The use of information communication technology and other assistive technology in education for people with special needs are to be considered at great depth especially by policymakers, researchers, developers and information providers. Science and Technology of tomorrow can solve the problem of today. Few initiatives such as befriending children with technologies in the learning process; giving technology based Vocational Training and programs; increasing awareness of technological advancements with the help of proper channel among people with special needs and their families; appropriate training of professionals from various disciplines on the uses of technology and by providing access to adequate assessment, prescription and follow-up services for special need people would be the greatest achievement.

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