

CHAPTER SEVEN

CONTRIBUTIONS OF SCIENCE AND TECHNOLOGY TO SPECIAL NEEDS EDUCATION

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Introduction

Science deals with the study of nature and the natural environment is made up of the living and non-living components. Science, therefore, is the search for information about the natural environment (Adejoh and Okwara, 2017). Technology on the other hand is the practical application of science in the service of man. It can also be defined as the application of scientific knowledge and research with the aim of developing products or processes for the use of man.

Science and technology have become critical factors for sustainable development worldwide to the extent that nations all over the world today are striving hard to develop their science and technology. Science and technology contribute significantly to the quality of life in many areas such as health, nutrition, agriculture, communication, transportation, industrial development and indeed Special Needs Education. Science and technology have brought a lot of inventions /innovations in terms of machines, equipment and gadgets that have helped to make teaching and learning more interesting and easier especially for Special Needs Education

Special Education and Special Needs Education are used interchangeably. There are varieties of children with learning difficulties. For example there are individuals who can learn very fast, there are those who are slow learners and others who have difficulties in learning. There are other individuals who have difficulties in learning and others who have special learning needs that occur as a result of sensory, intellectual, psychological or social - cultural deficiency. Others are precocious and prodigious. All these individuals need Special Education to function maximally.

Special Needs Education therefore means specially designed instruction that meets the unusual needs of exceptional students. Special materials, teaching or equipment and or facilities may be required (Hallahan and Kauffman, 2003). Special Education deals with children with special learning problems, difficulties and needs (Obani, 2004). Special Education is therefore, designed to meet the needs

of persons with special needs. Special Needs Education according to Obani (2006) merely entails simple modifications, adaptations, adjustments, innovations and management of the curriculum, methods and materials in addition to the other resources and practices of regular schools to fit and meet the special learning needs of those who present different forms of disabilities and learning difficulties. Students with health impairment and mental health issues have increased by 50% over the past decade. This number includes students with attention deficit, hyperactivity disorder, epilepsy, mobility impairments or mental health issues such as bipolar disorder, among others.

Persons with special needs are found everywhere in the society. Within and outside our different institutions of learning there are learners with special needs that require unique responses to their educational needs. These categories of learners cannot benefit from the conventional classrooms because they require special education and other related services if they are to realize their potentials. These children need extra help in school due to medical, developmental needs, emotional or learning difficulties. They require special care or help because they have one disability or the other and require caregivers or special teachers to help them cope with the task of their existence.

Children that have special educational needs come to school with a wide range of different needs. They suffer from a wide range of physical disabilities , medical conditions, intellectual difficulties or emotional problems including deafness, blindness, dyslexia, learning difficulties and behavior problems. Lerner (2000) and Gragiulo (2004) have recognized the following characteristics of individuals with special needs: Attention Disorder, Reading Difficulties, Poor Motor Abilities, Written Language Difficulties, Oral Language Difficulties, Social Skills Difficulties, Psychological Process Deficits, Quantitative Disorders, Information Processing Problems, Dyslexia among others .

Special needs education therefore is the education that is specially designed to suit special needs children who may experience learning problems and learning difficulties as a result of disabilities or handicaps or other forms of special educational needs (Obani,2004). Special needs education is therefore designed to help the exceptional children (both the gifted and the disabled individuals) in making the maximum use of their capabilities in order to contribute their quota to the socio- economic development of their country. Special Needs Education is aimed at development of the residual abilities of the exceptional child as a whole person capable of achieving whatever goals in life as he desires (Ugbe,2015).

Children with special needs have the right to education, work and the right to normal life. It is therefore important that these categories of learners must be taken into consideration when planning the curriculum to ensure that relevant technologies are deployed to enable them benefit maximally from educational programs so as to attain their potentials.

The Education Standards according to Dikusar (2018) claim that students with disabilities should be provided with opportunity to realize their potentials.

They should participate in education and training on the same basis as students with disabilities and that they are not subject to discrimination

The contributions of Science and Technology to SNE no doubt are enormous. Science and Technology have made it possible for a number of technologies to come on board which has made teaching and learning easy for persons living with one form of disabilities or the other.

As a result of the progress in the Information Technology industry, digital technologies are easily accessible and widespread which allows using them for providing students with new opportunities.

The use of technologies in special needs education helps to break barriers for people with disabilities and help provide them with access to the most relevant educational programs.

Properly designed software and hardware also allows students with special needs to get modern education and achieve any required information on line. Technology also provides students with individual learning events and allows flexibility and differentiation in educational methodologies.

The thesis statement of this paper, therefore, discussed issues of Science and Technology, Special Needs Education as well as the contributions of Science and Technology to Special Needs Education. The challenges to the utilization of the contributions of Science and Technology to Special Needs Education and the implications of the paper to Special Needs Education and the learners were briefly discussed.

Contributions of Science and Technology to Special Needs Education

Science and Technology have made it very easy for teachers to deliver education that works with student's unique needs. Some of the technologies employed for teaching and learning in Special Needs Education are discussed as follows :

1. Virtual Learning

Virtual learning is one of the prominent modes of teaching and learning that became widely used during the school closures occasioned by the COVID-19 pandemic. A lot of institutions deployed online lectures, online notes for their students since the face-to-face contact was no longer possible. Students with disabilities that can cause them to be absent from school can meet up by using skype to call into their class or using dedicated software created for distance learning. Teachers organize their examinations and assessments on-line and these modes of teaching and learning have become prominent and have come to stay even in Special Needs Education. A lot of modern technologies are now deployed in the teaching and learning process. Today many teachers and their students use social media like WhatsApp, Facebook etc. to teach and give assessments to students and this has made classrooms to be anywhere there is internet and no longer restrained to schools.

2. Tex-To - Speech Programs

Many web browsers also have tex-to Speech capabilities which is helpful to those who are blind or those that have low vision as well as other varieties of learners. Some students who struggle with decoding will prefer to listen to audio or have learning disabilities like dyslexia benefit from lessons being read loud. Some non -verbal students also use the same program to communicate. (Teachthought, 2022).

3. Interactive Boards and Touchscreens

This technology involves adaptive apps paired with tablets that can help students communicate and learn. The tablets are like laptops but more portable and less expensive than laptops They help learners to create sentences which they have never done before. There a wide varieties of both Apple and Android tablets that can be used to deploy this technology in teaching special needs children.

4. Enhancing Individual Learning Events

This involves varieties of technologies used in providing educational programs for special needs learners. Techniques for differentiated learning which often allows for students with special needs to remain in a mainstream classroom can help reduce the costs associated with special education. The techniques for differentiated learning in the past according to Teachthoughts (2022) included specialized classrooms and extracurricular tutoring, however advancements in technology have made education for students with special needs more accessible and less expensive over time.

5. Adaptive Computing

This technology allows the use of digital devices to bypass challenging tasks. Screen reader applications such as JAWS along with specially designed Braille keyboards allow visually challenged students to use the computer.

6. Augmentative Communication Systems

These systems according to Dikursar(2018) help students with special problems to overcome the communication barriers .Such systems use picture charts, books and specialized computers providing functions of word - prediction for more effective communicate

7. Online - App for Assessing Individual Academic Performance

The technology gives teachers better insight into student's progress. It allows educators to manage these special needs students better through an individualized education plans for students to be able to reach higher results. The software helps to simplify work for children with learning issues caused by brain injuries, developmental delays or intellectual disabilities. The software helps to monitor the learning progress and visualize it as a set of charts and helps in simplifying the reporting .

8. Light Weight and Intuitive Video Chat for Online Learning

This technology entails creating online classes that help students with disabilities to communicate with each other and the teacher. This type of

virtual classrooms according to Dikursar (2018) allow both teachers and students from different parts of the world to participate in live classes. Here students do not have to worry about travel expenses. All that is required is a laptop or tablet with internet access.

9. Web - Based Service for Distance Learning

This technology allows providing educational services taking into account the interests of students and educational organizations. Web-based learning solutions according to Dikursar (2018) offer students an easy-to-use and intuitive tools for purchasing online courses, scheduling and tracking the academic progress. An example of such tool is Devengo, an integrated cloud-based service for online booking and payment. With the use of this software students can order one of the available educational courses online without leaving home. There is also the possibility of hiring a specialist who has the skills required for teaching students with a particular form of disability.

Challenges in Actualizing the Contributions of Science and Technology to Special Needs Education

Several challenges confront the effective utilization of the contributions of science and technology to Special Needs Education. Some of the challenges are discussed as follows:

1. Irregular Power Supply

One of the greatest challenges confronting Special Needs Education in the efforts in utilizing the technology driven innovative teaching and learning strategies is irregular power supply. A lot of these teaching and learning strategies require adequate supply of power which is inadequately available in our institutions of learning.

2. Network Problems

The problem of network is also one of the serious challenges confronting the effective utilization of these contributions of science and technology to Special Needs Education. Many of the Innovative teaching and learning strategies are on line and are dependent on the availability of network which is also not adequately available

3. Inadequate Funding

A lot of the innovative teaching and learning strategies are technology driven and are also heavily dependent on digital instruments, equipment and gadgets that are capital intensive. Most schools are inadequately funded and therefore find it difficult to procure these facilities for on line teaching and learning. This is a serious challenge confronting the smooth transition to on line teaching and learning in Special Needs Education in Nigeria.

4. Time Management

The innovative teaching and learning strategies presents some challenges that are not experienced in the face-to-face teaching and learning technique. The formal face-to-face technique prevents the facilitator wasting precious time in producing videos for holding on- line classroom sessions

5. Inadequate Skills to Manage On line Teaching and Learning

Many teachers and students find it difficult to manage both the on line teaching and learning. This is because both teachers and students are used to the conventional face to face teaching and learning. This to a large extent is hindering the adoption of these technologies in Special Needs Education in Nigeria. because many teachers and students lack the requisite skills.

Implications of Contributions of Science and Technology to Special Needs Education and Learners

Technology plays a significant role in improving teaching and learning for both teachers and students with special needs. The use of technology in Special Needs Education has brought a lot of breakthroughs for people with disabilities and has provided them with access to relevant educational programs. A lot of hardwares and softwares have been invented which have made teaching and learning easy and very interesting for these categories of students. The technologies provides individuals with varieties of learning events, its flexible and allows for differentiation in educational methodologies and are designed to meet the individual needs of learners.

Conclusion

Some of the innovative teaching and learning strategies and technologies have been highlighted in this paper and government is encourage to provide these technologies and other associated resources in our educational institutions so that students with special needs can benefit maximally from our educational programs so as to *enable them realize their potentials*.

Suggestions

The following suggestions are hereby put forward:

1. Educational institutions should put in place an effective Information and Communication Technology (ICT) to support online teaching and learning for teachers and students with special needs
2. Government should also ensure regular supply of power and also provide alternative sources in our educational institutions in order to enable the ICT equipment to function steadily.
3. Teachers should be made to undergo training programs focusing on using modern technologies efficiently in order to deliver instruction in a manner that meets the needs of students with special needs.

4. Periodic training sessions be organized for students with special needs to acquaint them with knowledge and skills on the utilization of ICT for optimum learning.

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