

## **A** WAKENING FOR 21<sup>ST</sup> CENTURY CHALLENGES AND OPPORTUNITIES WITH THE USE OF ICT BASED VIRTUAL ASSISTIVE TECHNOLOGY TO TEACH EARLY CHILDHOOD EDUCATION OF CHILDREN WITH LEARNING CHALLENGES IN PANDEMIC CHALLENGED SOCIETY

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### **ABSTRACT**

**C**OVID 19 Corona virus pandemic disease has brought about the challenge of using Information and Communication Technology (ICT) based virtual Technology in teaching and learning systems. The use of ICT in education is nothing new, but the question is where the limit is when the use of ICT does not have the desired effect, classroom delivery with the use of modern technology is still very low in Nigeria. From the report of World Health Organization (WHO) and World Bank (2011), physically challenged persons carry a significant proportion of the world's population, about 15%, as a result of differences in educational standard to the normal individuals, they are rarely seen as contributor to productive human capital development of the Society. Most of the

### **Introduction:**

Learning Challenged persons find it difficult to learn and comprehend fast (Radka and Petr, 2016); as a result of this challenges, the need for assistive technology to enhance their learning ability is imperative. The use of ICT in education is nothing new, but the question is where the limit is when the use of ICT does not have the desired effect. Classroom delivery with the use of modern technology is still very low in Nigeria. This brought a draw back in quality

*Learning Challenged children access to education, this is as a result of several challenges they face in learning and comprehension. Most schools curricula were developed without considering the fact that, different categories of students including people living with learning challenges will also make use of them. This was never put into consideration during the requirement specification of those curriculum. This paper focuses on the use of ICT based virtual assistive Technology to teach early childhood education children with learning challenges most especially during this COVID 19 pandemic challenges. This will enhance the learning ability of this category of Students and also motivate their desire to learn. This research work was carried in one of the government school for handicap children in Nigeria. From the learning ability testing of the research, it was discovered that the students learn faster and easier with the use of ICT base assistive technology than normal classroom learning. As a result of this, this paper focus on comparing level of efficiency of the ICT base virtual reality assistive technology over normal classroom learning for these categories of Students.*

**Keywords:** *Early-Childhood, Education, Pandemic Disease, Intellectual Challenges, Virtual Reality, Assistive Technology, ICT, Teaching, Learning.*

Teaching and learning production. The use of ICT based Virtual Assistive Technology is a powerful technique for effective teaching of the Learning Challenged persons in different fields including Mathematics. In the paper we discuss the restoring quality teaching and learning in education with the use of ICT based Virtual Assistive Technology in delivering science and mathematics classroom teaching for the Learning challenged students. The learner to learner relationships in a classroom with the use of modern technology is an essential element of sustainable educational development. The success of ICT Based Virtual Assistive Technology use in science and Mathematics depends on how they incorporated into curriculum and how teacher use it. The most appropriate use of ICT Based Virtual Assistive Technology seems essential for those that use them for a supplementary tools for classroom and laboratory

instruction. Highly interactive, collaborative ICT Based Virtual Assistive Technology appealing growing interest because of their potentials to supplement constructivist learning. They offer inquiry environments and Learning tools to scaffold learning and apply problem-solving skills. ICT Based Assistive Technology are good tools to improve students' hypothesis construction, graphic interpretation and prediction skills. The literature review also implied that ICT Based Virtual Assistive Technology have potential for teaching science and mathematics for students with learning disability.

### **Clinical description of Learning Disability**

From the report of Intellectual Disability Rights Service Inc. (2009), Intellectual challenge is a disability which occurs in the developmental period of life that is before the age of 18, and is characterised by below average intellectual functioning. Most people with Learning Challenged are born with the disability. Significantly sub-average general intellectual functioning is defined as approximately 70 IQ or below as measured by a qualified psychological examiner on individually administered, nationally formed standardized measures of intelligence

Clinically, and for the purposes of proving that a person has a Learning Challenged, Learning Challenged is best assessed by a psychologist as:

- I. An IQ of 70 or under.
- II. deficits in at least 2 areas of adaptive behaviour, that is:
  - a. Communication
  - b. Self-care
  - c. Home living
  - d. Social skills
  - e. Self direction
  - f. Leisure and work
  - g. Learning.

In clinical terms, Learning Challenged is often defined in terms of the severity of the disability.

**Table 1 Clinical description of Learning Disability**

Level of disability	% of people with Learning Challenge	IQ
<b>BORDERLINE</b>		<b>70-75</b>
<b>MILD (Educable)</b>	75%	<b>55-70</b>
<b>MODERATE (Trainable)</b>	20%	<b>30-55</b>
<b>SEVERE (Totally dependent)</b>	5%	<b>under 30</b>

Source: (IDRS Inc. 2009)

People with learning affected Person have little or no access to education due to reasons as:

- a. poor societal perception of persons living with disability
- b. poor funding
- c. policy instability
- d. lack of commitment
- e. curriculum development and

## LITERATURE REVIEW

Catalina Devandas (2013), Worked on Supporting the Empowerment of Organizations of Persons with Disabilities: As a strategy to promote poverty eradication, using the Convention on the Rights of Persons with Disabilities (CRPD) The paper aims to give concrete suggestions on how to promote the empowerment of persons with disabilities and their representative communities to promote poverty reduction, using the Convention on the Rights of Persons with Disabilities (CRPD) as an instrument of sustainable development. The strategy addresses mainly organizations working at national and subnational levels, however mention to experiences at international level will also be made.

Daniel et al., (2001), Worked on enhancing independent access for individuals with mental retardation through use of a specialized web browser: A pilot study. In this pilot study a prototype web browser called web trek that utilizes multimedia to provide access for individuals with

Learning disabilities was developed and pilot-tested. Participations were recruited from an agency providing services to people with mental retardation in Colorado Springs school district. Twelve individuals with mental retardation participated in the study. Internet explorer and web Trek were the two browsers used. The three tasks performed with each browser involved searching for web sites, saving web sites to a favourites list and retrieving saved sites from the favourites list. All the participants formed one group and Test was carried out within one hour. A one-tailed student's t-test for identifying mean differences with paired examples was used. Analysis of the data showed statistically significant differences for all the three dependent measures when comparing means between the web Trek browser prototype and internet explorer. Overall results of this work provide preliminary evidence that the web Trek browser provided better access to the internet for individuals with mental retardation than did a widely available web browser (internet explorer).

Muktikanta and Angeline (2008), Worked on making web application operable by physically and mentally challenged users. The research work addresses some key recommendations of WCAG 2.0 and how to wricode which is compliant with the guidelines. For example, when a site is coded with semantically meaningful HTML, with textual equivalent, provided for images and with links named meaningfully. Many users who have disabilities need more time to complete tasks than the majority of users. These kind of users should be provided with enough time to read and use content. It was concluded that the basic concept behind web site operability is that everybody should be able to use the tools and mechanisms required to operate the web site.

Oksama (2013), Worked on the peculiar features of training program interface design developing for children with mental retardation. Recent changes in the system of preschool education affected the content of remedial developmental education of children with Learning Challenged. The ability of computer to produce the information simultaneously in the form of text, graphic images, sound, and voice, video to remember and to process data with great speed allows data to be processed with great

speed, which will allow the development of multimedia training programs for children with Learning Challenged.

Kunal et al. (2012), Worked on the critical analysis of the user interface for the disabled community. Much work has been done on this area for non-disable person which formulate the largest segment of the commercial population. A lot of effort is required to be made to make technology accessible to the disabled community. The work provides for the design of an abstract model which can be considered as the baseline foundation on which frameworks for developing adaptive intelligent user interfaces for disabled may be developed. Such interfaces will not only capture the interest of the disabled individuals but also provide a socio-economic reform, through which the participants of the disabled might be increased, and the use of their intellect may be given a positive direction for the betterment of the society.

### Research Gap

Several related articles were reviewed on this paper, and we discovered that:

- Most of them did not address the area of Learning Challenge in terms of the use of ICT base Assistive Technology.
- Most of the reviewed works did not solve the problem of Study inclusion of these people for economic growth and sustainable development.

### METHODOLOGY

This section analysed the difficulties faced by the Learning Affected persons in participate in class room learning most especially during this COVID 19 pandemic challenges. From the research carried out by the author of this paper in Home School for Handicapped Children, Ibadan, Oyo State 2018, four students of the school were tested with the use of ICT base Assistive Technology to teach Learning impaired students. It was discovered that the students performed better with the use of ICT than normal class room learning. From the interview conducted with the staff of



the school, it was discovered that, these people have little or no access to education due to poor curriculum development. The curriculum does not favour these category of students due to their level of IQ. Developing a curriculum that can promote their learning ability is highly imperative, this will enhance study inclusion of these people and further promote job creation. Learning Impaired is significantly sub-average general intellectual functioning which exists concurrently with deficits in adaptive behaviour that adversely affects educational performance and originates before age 18. Learning Challenged does not include conditions primarily due to a sensory or physical Challenged, Amyotrophic lateral Sclerosis (ALS), traumatic brain injury, autism spectrum disorders, severe multiple Challenged, cultural influences or a history of inconsistent and/or inadequate educational programming (Braithwaite and Mont 2008).

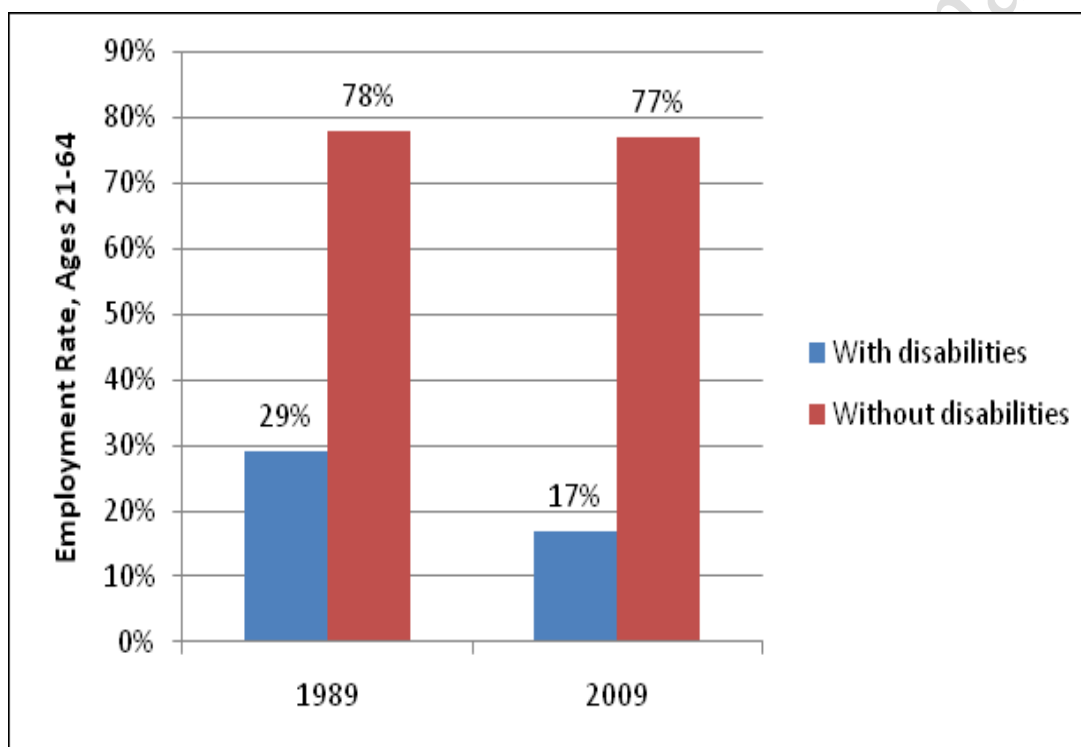
### **Economic and social impact of enhancing the Learning Ability of the Learning Challenged through ICT base Assistive Technology.**

Individuals living with Learning Challenges have little or no access to education resources that drives economy based on:

- f. poor societal perception of persons living with disability
- g. poor funding
- h. policy instability
- i. lack of commitment
- j. curriculum development and
- k. focusing on resources base economy rather than knowledge base economy.

National Council on Disability (NCD) (2011) submitted that the power of learning inclusion pave way for high job opportunities in the society and digital barrier has brought about low employment among people with disabilities. Manipulation of information has pave way for job creation for people with disability, it gives opportunity for these category of users to work alongside non-disabled people. Consequently, the job opportunity rate of persons with disability still remains extremely low (fig.1). Development and improvements in assistive technology can go a long way

to bridge this gap. Information society is being built on technology, knowledge and intelligence; appropriate use of the knowledge by people with Learning Challenged contributes to economic and social development. Information technology facilitates fast, cheap, equitable, and resource efficient; access to information, adequate research for learning opportunities become a support tools for job creation and sustainable development.



**Figure 1: Comparing Employment Rates, 1989 and 2009. Source NCD 2011**

### **The challenge of disabilities in the sustainable society**

The 2011 World Report on disability presents that approximately one in seven of the world's population, over one billion people are persons with disabilities which include Learning Challenged. Some estimates suggest that 80% of persons with disabilities live in developing countries; it also expressed the compelling evidence of the barriers that women, men, girls



and boys with disabilities face, such as inaccessible infrastructure, negative and discriminatory attitudes and out-dated laws and policies which infringe on their individual rights. These barriers result in persons with disabilities having poorer health, fewer educational achievements, less economic participation and higher rates of poverty and inequality than persons without disabilities. In 2015, a new set of Sustainable Development Goals (SDGs) is to be agreed by world leaders over the coming years as the new development framework begins to be implemented. Inclusive of every individual including people living with disabilities become imperative in achieving the sustainable development goals (Groce, et al. 2011).

### The challenge ICT in Restoring Quality Teaching and Learning in Education

According to the results of the findings, it is evident that almost all (92 %) of students were fairly positive or very positive (see Figure 2). Thus, it could be said that this students had a relatively positive attitude towards using ICT in their teaching.

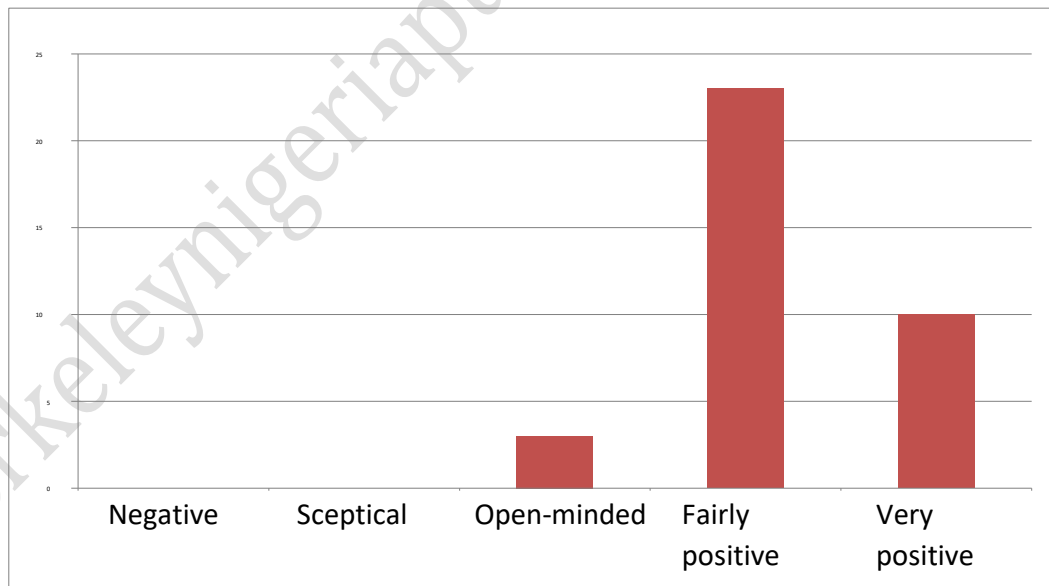


Figure 2 Attitudes to use of ICT in mathematics. Source: Bozkurt, G. (2016)

Of the 92% detailed above, five participants agreed to be interviewed. They all expressed efficiency in the usefulness of ICT in mathematics classrooms. Particular emphasis was made towards the dynamic use of visual elements of ICT. For example:

I think it has made a big difference because you can see how it gives kids more visual elements and it also increases the pace of their learning abilities and the fact they can see what is going on, and also interact with things as well.

The study suggests that the key factor encouraging student teachers' use of ICT in mathematics teaching was the fact that such use would change the way in which pupils learn (see Figure 3) and develop the pupils interest (see Figure 4). This also can be seen from the interview comments. That is:

*I think some students might not learn and comprehend or be interested in unless it delivered in a way which to them is not just book work. There are some students most especially the Learning impaired whom watching a graph being drawn or something that is moving, something that is more animated...*

Furthermore, majority (92%) of the student teachers expressed their belief in the value of ICT in helping pupils to learn. Also, 80% of the student teachers responded that ICT is a priority to them.

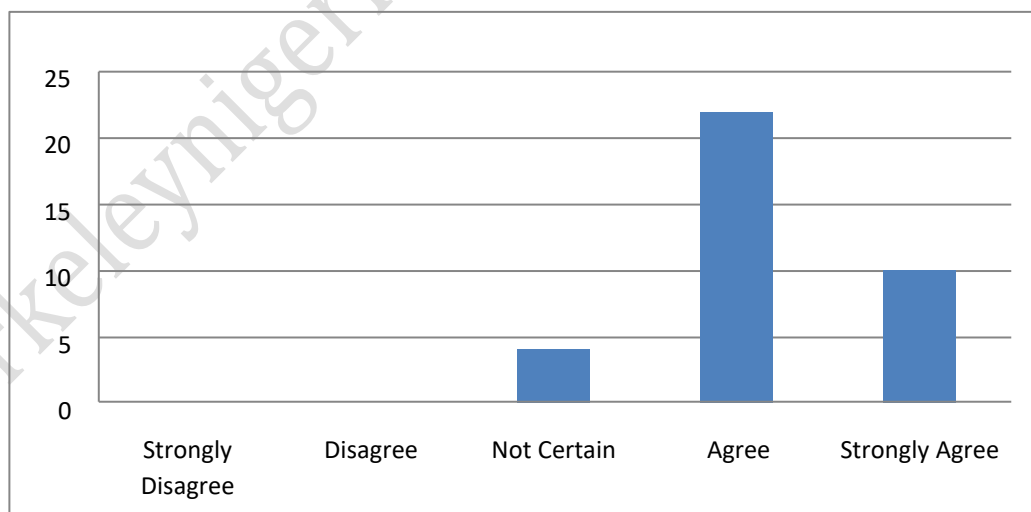


Figure 3 ICT changes the way pupils learn. Source: Bozkurt, G. (2016)

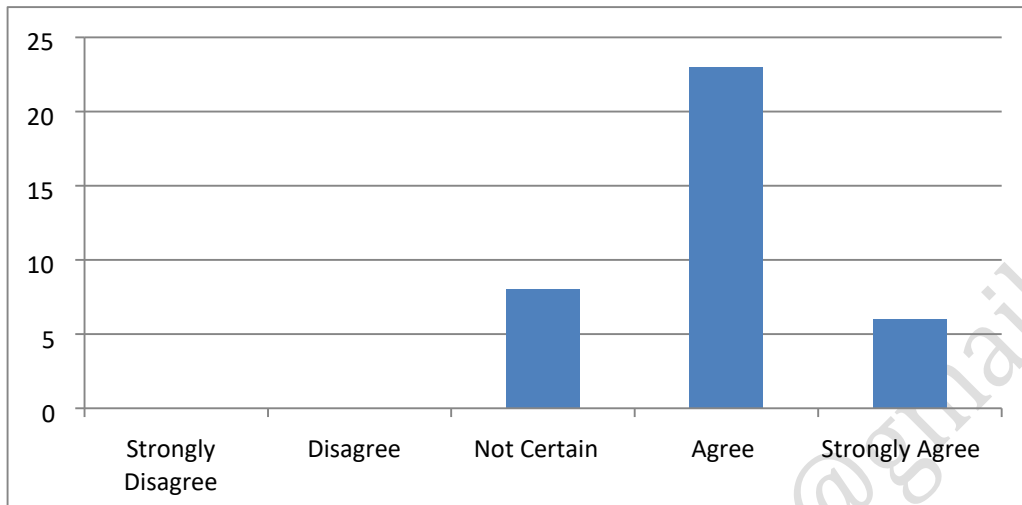


Figure 4 Pupils feel motivated when they use ICT. Source: Bozkurt, G. (2016)

In this study, the majority of the students (74%) reported that they were confident in using computers in teaching, and only 5% said they were not confident. As a result of this, it is important to note that student teachers interviewed expressed that they felt very confident in using technology in teaching and learning as well as in their personal use of ICT.

### Discussion of finding

The purpose of this research was to ascertain use of ICT based Assistive Technology in delivering mathematics classroom teaching for the Learning challenged students purposely to restore quality teaching and learning in education. From figure 2, It was found that pre-service mathematics teachers appeared to think that ICT was important for teaching and learning. It was clearly demonstrated that the student teachers were trying to use ICT where it improves their pupils' learning.

The student and teachers were also convinced of the value of ICT in helping pupils to learn, and they believed that ICT use changed the way pupils learn. From the research, it was concluded that teacher commitment to integrating technology was connected with appreciating the value of Education and have confidence in the transformative power of the technology.

## CONCLUSION

Achieving a sustainable educational development goals, prompt attention must be given to the empowering of persons with physical challenges. Multiple interventions should be put in place to support the structural lack of capacity and power of individuals with disabilities and their organizations. Much works need to be done to overcome capacity (information, relationship, skills, strategic) gaps. Disabled community have been denied education, participation in decision-making and access to quality information. The application of Information Technology should be vigorously harnessed to its fullest with its perceived vocational and wealth creation opportunities for the physically challenged individuals. The use of ICT based Assistive Technology to teach Science and Mathematics for this category of Students achieves more positive, and therefore we consider it appropriate to implement into education curriculum. However, it is a misapprehension that the use of ICT based Assistive Technology to deliver Science and Mathematics teaching for the Learning Challenged is the only way to bridge the gap between the normal students and students living with learning challenges. The results of the research have confirmed that it is very useful help for the rapid use of ICT base Assistive Technology to be incorporated into the learning environment.

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