

EXPLORING THE EFFECTIVENESS OF TECHNOLOGICAL RESOURCES IN SCIENCE EDUCATION IN IMO STATE

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Abstract

Technology has become a vital part of our professional and personal lives. Today we cannot imagine living without many technological tools such as computers. For the last two decades technology has become inseparable from several areas, such as science. Hence, the paper explored the effectiveness of technological resources in science education in secondary schools in, Imo State. The survey method was adopted for the study. Targeted population were Science teachers from public secondary schools in Imo state. One hundred and eighty (180) Science teachers were randomly selected for the study which forms the sample size. Researcher self-designed questionnaire was used in the process of data collection. Data collected was analyzed using mean and standard deviation. The findings of the study shows that most teachers have not incorporated technological resources into teaching of science subjects for various reasons such as lack of knowledge of educational technology tools and having unfavorable beliefs about the effectiveness of technological resources on students learning of science education. Based on the findings, it was concluded that the use of technological resources in teaching of science education, promote teachers effectiveness during classroom instruction. It was recommended among others that Education technology should be made compulsory in all secondary schools in order to improve science teaching. The Teacher Registration Council of Nigeria should provide technological resources for teachers. Also, there should be opportunity for teachers' professional development through in-service education for science teachers

Keywords: Effectiveness, Technological Resources and Science Education

Introduction

Science and Technology play significant roles in the development of nations across the world. Hence, science and technology have been described as key drivers for positive nationhood because technological and scientific revolutions underpin economic advances, improvements in health systems, education and infrastructure among other benefits. Science education according to Al-rsa (2013) is an essential ingredient for the development of any nation and has a significant stake. It is a process of teaching or training especially, within the school system to improve one's knowledge about the environment and to develop one's literacy and skill of systematic enquiry as well as natural attitudinal characteristics (Al-rsa' 2013)

In the light of the above, Olatoye, (2011) is of the view that science education is the field concerned with sharing science content and process with individuals not traditionally considered part of the scientific community. The target individuals may be children, college students, or adults within the general public. The field of science education comprises science content and teaching pedagogy. The traditional subjects included in the standards in Nigeria are Biology Education, Chemistry Education, Physics Education, and Integrated Science Education. (Owoeye & Yara, 2011). In today's rapidly advancing digital era, technology has become an integral part of our lives, permeating various domains, including education.

Technological resources mean any and all technologies that produce, manipulate, store, communicate, or disseminate information. According to Murungi and Gitonga (2015) Technological resources is the collection of resources used for creating, storing, managing and communicating information. These technologies can be used to support teaching, learning,

research activities, collaboration learning and inquiry (Murungi & Gitonga 2015). These resources include, but are not limited to, wired and wireless data, video and voice networks, computers for processing information, and other devices for storing and archiving information. In the field of education, it connotes an electronic, digital, or physical resource that can support teachers in the delivery and testing of content (Ferk Savec, 2017). These resources include apps, platforms, and software, and can be used in virtual, hybrid, or traditional learning environments.

Costley (2014), observed that incorporating technological resources in the classroom can positively influence student learning in science. Using technology for teaching and learning is common nowadays (Price & Kirkwood, 2014). It has been proved that teaching with technological resources can expand and develop student's learning by supporting instructional goals. Moreover, using technology has a significant impact on education applications and changed the way educators teach, how students learn and the way teachers and students communicate (Storksdieck & Hunter, 2017). The implementation of technological resources in classrooms can greatly benefit teachers by enabling them to customize instructional materials and assessments according to their student's individual learning needs. Technology offers a wealth of authentic resources that can aid teachers in creating and delivering engaging lesson plans (Brunsell, 2014).

Integration of technological resources in science education improves the quality of teaching and learning, and helps to raise the standards of education (Sangrà & González-Sanmamed, 2010). , Abdullahi (2014) mentioned a number of advantages of utilizing technological resources in education. In science education, experiments play a key role. Usually it is taken for granted that all students actually observe the same facets that are so obviously to be seen from the point of view of the teacher. In the light of the above, Although the task of technological resources integration presents significant challenges to school districts, school administrators, and teachers alike, exciting new educational technologies are increasingly available that offer teachers novel ways of presenting material to students. Despite introducing the use of technological resources in our educational system , many schools are still struggling to find their feet's when it comes to technological resources implementation and integrations at their respective schools. Most of schools are faced with a number of challenges, which includes; limited facilities (like computer labs), lack of skills/experts (lack of trained teachers of ICT), geographical disadvantages, digital divide and financial constraints. (Carl, 2012.)

However, the effectiveness of technological resources in science education is faced with various constraints such as; shortage of time, equipment, teaching tools, pedagogical content knowledge, and pedagogical skills. (Guzey & Ro- ehrig, 2009). From the underscore view so far, poor utilization of technological resources in science education has remained a topical issue in our educational sectors, which has degenerated to all forms of academic laxity, poor self perception of concept, low retention capacity, and ineffectiveness in the teaching process pose an adverse implication on the learners academic outcome. During implementing educational technology resources such as computers, data collection, and analysis software, and interactive whiteboards can assist students to actively engage with the achievement of scientific knowledge and development of the nature of science

Objectives of the study

The main purpose of the study is to explore the effectiveness of technological resources in science education in, Imo state

Specifically, the study seeks

1. Find out the relevance of technological resources in effective teaching science education in Imo state

2. Find out the challenges encountered in effective usage of technological resources in teaching science education in Imo state

Research Questions

1. What are the relevance technological resources in effective teaching science education in Imo state
2. What are the challenges encountered in effective usage of technological resources in teaching science education in Imo state

Methodology

Research Design: This study adopted a descriptive survey design. The justification of this design was informed by the fact that the study's purpose was descriptive and allows collection of data without interference

Area of the Study: This study was carried out in Imo State, Nigeria with a land area of 5,530 sqkm. The State lies between latitudes 4045IN and 7015IN and Longitudes 6050IE and 7025IE. The State is located in the South-Eastern rainforest belt of Nigeria. The State shares boundaries with Abita in the East, Rivers State to the South and Anambra State to the North (ISSYB, 2004). The State has a total of twenty seven (27) Local Government Areas (LGAs) which is divided into 3 senatorial zones namely; Owerri, Orlu and Okigwe. Across these zones, agriculture is a major economic activities predominant amongst the people of the state

Population for the Study: The population consists of nearly 1800 science teachers selected from all the public secondary schools in Imo state **Source:** Secondary Education Management Board (SEMB2023)

Sample and Sampling Technique: The sample of the study was One hundred and eighty (180) science teachers were purposively selected. The purposive sampling techniques was use in the selection of the sample size.

Instrument for Data Collection: The instrument for data collection was a structured questionnaire which was based on the research questions guiding the study. The questionnaire was based on 4- point rating scale.

Validation and Reliability of the Instrument: Three experts two Education Foundation and one from Measurement and Evaluation all from AIFCE Owerri validated the instrument and their suggestions were effected and used to enhance the instrument.

Method of Data Collection: The questionnaire was administered on the respondents by direct contact method. .

Method of Data Analysis: Descriptive statistics (mean and standard deviation) were used for data analysis, for the research questions

RESULTS

Research Question 1: What are the relevance of technological resources in achieving effective teaching of science subjects in Imo State?

Table 1: Mean and standard deviation responses on the relevance technological resources in effective teaching science subjects in Imo state

S/N	The following are relevance technological resources in effective teaching science education in Imo State	X	SD	Decision
1.	Promotes easy understanding of scientific concepts during teaching process.	2.78	1.06	Agreed
2.	Makes learning visible and a tangible reality.	2.86	1.01	Agreed
3.	Encouraging teamwork and collaboration	2.84	1.07	Agreed
4.	Increased student engagement	3.14	1.13	Agreed
5.	Improved Teacher Productivity and Efficiency	2.97	1.10	Agreed
6.	Increased collaboration and communication	3.03	1.11	Agreed
7.	Supporting differentiated instruction	3.3	1.13	Agreed
8.	Improved teaching and learning outcomes	2.87	1.14	Agreed
	Grand Mean and Standard Deviation	7.93	0.955	

Source: Field survey, 2023

Table 1 above showed that all the items had mean scores above 2.5 cut off point indicating that all the items were accepted as relevance of technological resources in achieving effective teaching of science subjects in Imo State

Research Question 2: What are the challenges encountered in effective usage of technological resources in teaching science subjects in Imo state”

Table 2: Mean responses of respondents on the challenges encountered in effective usage of technological resources in teaching science subjects in Imo state

S/N	Challenges encountered in effective usage of technological resources in teaching science education in Imo state are as follows	X	SD	Decision
1	Poor Finance and Budget constraints.	2.97	1.04	Agreed
2	Inadequate teachers professional development on technological resources	2.67	0.97	
3	Lack of time for critical selection of learning resources related to curriculum topics;	2.7	0.99	„
4	Poor Internet or computer access	2.66	0.96	„
5	pedagogical factors	3.02	1.04	„
6	Poor power supply	3.02	1.07	„
7	Keeping up with changes	2.91	1.04	
8	Students misusing technology	2.78	1.01	„
9	Cost of new technology	2.82	1.00	„
10	Teacher knowledge of technological resources	2.96	1.02	„

Table 2 above showed that all the items had mean scores above 2.5 cut off point signifying that all the items were agreed as challenges encountered in effective usage of technological resources in teaching science education in Imo state”

Discussion of Findings

Findings in table one shows the relevance of technological resources in achieving effective teaching of science subjects Imo State. The findings of the study sustain the fact that effective use of technological resources poses a significant relevance in the following ways by promoting easy understanding of scientific concepts during teaching process. Improved teacher productivity and efficiency, making learning visible and a tangible reality and above all supporting differentiated instruction. The findings of the study is not surprising because the findings of the study lay credence to the findings of Murungi and Gitonga (2015) which stated that technological resources can be used to support teaching, learning, research activities, collaboration learning and inquiry. This is evidence to the findings of Costley (2014) who reported that incorporating technological resources in the classroom can positively influence student learning in science. The findings of the study also corroborated with the findings of Price& Kirkwood, (2014) who reported that using technology for teaching and learning is common nowadays.

Findings in table two show the challenges encountered in effective usage of technological resources in teaching science education in Imo state. The findings outline poor finance and budget constraints, inadequate teachers professional development on technological resources. Lack of time for critical selection of learning resources related to curriculum topics and cost of new technology as some of the challenges encountered in effective usage of technological resources in teaching science education in Imo state. The findings of the study aligned with the findings of Guzey and Ro- ehlig, (2009) who reported that the effectiveness of technological resources in science education is faced with various constraints such as; shortage of time, equipment, teaching tools, pedagogical content knowledge, and pedagogical skills. The findings also supported the findings of Carl, (2012) who reported that challenges, which includes; limited facilities (like computer labs), lack of skills/experts (lack of trained teachers of ICT), geographical disadvantages, digital divide and financial constraints affect the effectiveness of technological resources usage

Conclusion

Based on the findings, the study concludes that integrating and use of technological resources in science education plays as veritable roles in the development of science education in Imo state. Furthermore, the study concluded that technological resources in science education promotes easy understanding of scientific concepts during teaching process. Improved teacher productivity and efficiency, making learning visible and a tangible reality and above all supporting differentiated instruction. Hence, the study concluded that despite the significant impact attributed to technological resources in science education. There are still challenges facing the effectiveness of integration and use technological resources in science education

Recommendations

Based on the findings, the following recommendations were derived

1. Teachers’ Professional development should be effectively encouraged through seminars and conferences and emphasis should be made on innovative teaching through computer based instruction.
2. Government and other donor agencies should adequately fund education through consolidated budgetary especially in the provision of technological resources for schools

3. The Teacher Registration Council of Nigeria (TRCN) should provide technological resources for teachers.

References

- Abdullahi M. (2014) *Science Resources for Improving the Participation and Success of Female Student in Mathematics, Science and Technology*. Ottawa. Canadian Teacher Federation.
- Al-Rsa'. P. (2013). The relative Effectiveness of Programmed Instruction to the science teaching of Secondary School Mathematics. *Unpublished M.Ed. Project Thesis Teacher Education Department. University of Ibadan*.
- Brunsell, (2014). Problem-based Learning, Numerical Ability IN SCEINCES as Senior Secondary Physics in Ibadan. *Unpublished Ph.D Thesis.. University of Ibadan*
- Carl, (2012.) Adolescent and Computer: Real and Perceived Barriers. *Women and Education. A Canadian Perspective. Journal of science education* 2, 147 – 164.
- Costley. A. (2014) Problem-Solving, Video Based, Micro-wards Collective and Individual Outcomes of High Achieving 6th Grade Students. *Journal of Education Psychology* 92, 2: 391 – 398.
- Ferk Savec, , E. (2017). Teaching Effectiveness using digitalization process *Keynote Address Delivered at the Maiden National Conferences on Teaching Effectiveness*. Adeniran Ogunsanya College of Education, Lagos. 14 – 17.
- Guzey, P. & Ro- ehlig, R (2009). Learners and Learning science education of in the Twenty First Century: What do we Know About Students Attitudes Towards and Experiences of Information and Communication Technology. Taylor & Francis. *Studies in Higher Education*.
- Murungi, E. & Gitonga, P. (2015)). An Assessment of technological resources use in education : A Case Study of Computer Literacy in Plateaus State in Nigeria. *Nigeria Journal of Computer Literacy*. 3(#)*34-39*
- Olatoye, A. (2011). Effect of Concept Mapping on Students Performance in the Junior Secondary School Integrated Science in Uyo *seminar presented at. Department Science Education. University of Ujuo Nigeria*.
- Owoeye, P. & Yara, E. (2011).). Factors Affecting Students Choice of Science Subjects in Nigeria Secondary Schools. *Research in Science and Technological Education* 4, 1: 99 – 109.
- Owoeye, S. & Yara,. P. (2011). Learning Strategies inn sciences education on Senior Secondary Students Environment Knowledge and Attitudes in Kwara State Nigeria. *Unpublished Ph.D Thesis. . Teacher Education Department. University of Ibadan*.
- Storksdieck & Hunter, E. (2017)Effect of Concept Mapping on Students Achievement in 10th Grade Biology Students in Southern Lousina