Kogi Journal of Education and Pedagogy (KOJEP), Vol. 4, No. 1, JUNE, 2025

ISSN 2736-0091
E-ISSN 2737-0107

E- LEARNING FOR EDUCATIONAL DEVELOPMENT IN SCIENCE EDUCATION: PROSPECTS AND CHALLENGES

BY

Abdulwaheed Opeyemi Ibrahim, PhD: Department of Science Education, Faculty of Education, Prince Abubakar Audu University, Anyigba, Kogi State, Nigeria; E-mail: oabdulwaheed9@gmail.com

&

Prof. Gana, C. S.: Department of Science Education, School of Science and Technology Education, Federal University of Technology, Minna

Abstract

The integration of digital learning in science education become a critical component of modern pedagogical strategies, particularly in developing region such as North-central Nigeria. This study examines the prospects and challenges of E-learning for educational development in science education in Nigeria. The paper reviewed educational development in Nigeria, prospect of e-learning for educational development, e-learning present significant opportunities for enhancing science education, such as improved access to resources, interactive learning, and flexibility. Several challenges hinder its effective adoption. These challenges include inadequate infrastructure, poor internet connectivity, lack of digital literacy, and financial constraints. The suggestion were made to Government, policy makers, institutional support, and public-private partnership to enhance digital learning adoption in science education.

Keywords: E- Learning, Prospects, Educational Development, Science Education and Challenges

Introduction

Education is seen as one of the means or ways of transferring the beliefs and other ways of life of a people from one generation to another over the years. It is also a way through which a people can learn new ways of life, attitude, and tradition in a bid to further develop themselves and as well remain relevant in the present world. As one of the oldest industry and sector in the society, education is that tool which helps society to preserve, maintain and upgrade its social equilibrium (Ogbaji, 2018). This is as a result of its usefulness to man in general since the dark ages of the society. Orji and Job (2019) education is basically adopted to develop the cognitive, psychology and psycho productive domains of human beings. This means that it is an approach through which learning takes place. Education is therefore a process by which a person can develop new skills and qualities. It is therefore apt to note that learning process can take place in any environment whether formal or informal in as much as new ideas, feelings, activities will be learnt. The growth and development of any society reflects the level or quality of education which the people access and which to a large extent influence them.

A society that prioritizes education is bound to excel in all other sector of the society and this is based on the fact that education is the bed rock of any society. Every other unit of the society anchors on the educational sector to survive (Abdulwaheed & Fasanya, 2023). But, the Nigerian society has being struggling in one way or the other to develop and advance the educational sector at different point in time which has led to the establishment of different policies in other to advance education in Nigeria. However, in many coastal areas, students find it difficult to access education because of the poor infrastructural facilities available for learning to take place and this has brought about slow rate of educational development. In October 2018, Hamid Bobboyi, Executive Secretary of the Universal Basic Education Commission (UBEC), stated that the number of out-of-school children in Nigeria has climbed to 13.2 million from 10.5 million (Joseph, 2018). Additionally, UNESCO estimates that an estimated 1.725 billion learners have been impacted by school cancellations as a consequence of the new corona virus pandemic outbreak in December 2020, representing about 99.9 percent of the world's student population as of April 13th, 2020. (UNESCO, 2020). Arising from the above, it becomes apt that Nigeria fully adopts the different channels of electronics learning so as to help advance and develop the standard of education to the level experienced in other advanced societies of the world. With the growth in Information Communication Technology (ICT) there is need for us to advance our education through e-learning channels.

Adeyinka and Olusola (2019) added that the adoption of ICT enhances the learning processes, organizational structure, and administration of educational institutions. And that the internet is seen as a strong force that has contributed significantly to the advancement of development and new practices. Information Communication Technology avails Nigeria the opportunity to enhance their education by picking from different e-learning channels available to them. Zaitoun (2001), e- learning is the manipulation of the internet or any other technology to develop learning packages, transfer knowledge to learners and also monitor the activities of organizations. E- learning helps educationist and students alike to use information and communication technology to enhancing the exchange of knowledge between teachers and learners at all levels, and that constitutes a huge stride. Also, with the availability of e-learning platform, it will be possible to defeat the challenges of learning such as distance, huge cost of education and it will enrich academic content and learning materials will be easily accessible especially within this covid-19 era. In quest to achieve proper educational development and research advancement, it becomes imperative

ISSN 2736-0091
E-ISSN 2737-0107

for the Nigerian government to adopt e-learning mechanism and other technological platforms in a bid to enhance the learning process and standard of students in her academic institutions.

The rapid advancement of digital technologies has transformed educational delivery worldwide, offering new opportunities for teaching and learning. In Nigeria, E- learning is gradually gaining traction, particularly in science education, where interactive and practical learning is essential. However, the adoption of E- learning in North-central Nigeria faces several barriers, including infrastructural deficits, socioeconomic factors, and institutional limitations. This paper employs the prospects of E-learning for science education students in North-central Nigeria while identifying key challenges that impede its full integration. The study contributes to the discourse on educational technology adoption in developing regions and provides recommendation for policymakers and educators.

E- Learning in Science Education

Digital learning encompasses e-learning platforms, virtual laboratories, multimedia resources, and online collaboration tools. In science education, digital tools facilitate simulations, data analysis, and remote experiments, enhancing students understanding of complex concepts (Zeitoun, 2018). The growth in Internet activities and technology has brought about different channels to make available resources for research and learning for both instructors and learners at different levels so as to help in sharing of information (Richard & Haya, 2019). As the world advances in technology, there are innovations which help both learners and educators to interact and share knowledge at their convenience. The concept of e-learning according to Oblinger and Hawkins (2017) has no one globally or generally acceptable definition. But from whatever perspective you define e-learning, it connotes the activities or interactions that take place without necessarily bringing learners and instructors together physically. Holmes and Gardner (2020) also confirm that the concept of e-learning has being explained by different scholars with different academic explanations given to the concept. To Zeitoun (2018), e-learning is the manipulation of the internet or any other technology to develop learning packages, transfer knowledge to learners and also monitor the activities of organizations.

Rossi (2019) sees e-learning as that which covers wide range of applications, learning methods and processes that can be adopted for virtual learning to take place. Arising from the above definitions, we can say therefore, that e-learning is a computerized instructional medium which enables learning to take place at any given point in time in any selected location without out any hindrance. In today's digital age, learning mostly take place via the internet, unlike what happened in the early days of man where people must assemble together physically before exchange of ideas could take place. According to scholars like Oblinger and Hawkins (2017) e-learning has evolved from a fully-online learning to using technology in delivering courses in part or full not minding the time and place. Meaning, with the availability of technological devices and gadget, learning can take place at any point in time. Distance to learning is no longer a barer as scholars can now access learning aids prepared and uploaded online by their teachers. Abad et al., (2019) defined e-learning as any learning that is enabled electronically. E-learning activities usually take place via electronic channels such as radios, televisions, computers, ipad, podcast etc. For them, e-learning constitutes any learning that is empowered by the use of technology to promote leaning activities.

Also, Gotschall (2020) posits that e-learning came into existence because of distance learning activities. Therefore, it is the transfer of knowledge from one point to another distant or closed location by way of video or visual presentations. This paper therefore, aligns with the definition given by Wentling et al., (2020) which state that e-learning is that type of learning that is basically generated and distributed via any electronic means. To them, e-learning takes place via digital computers and other electronic connections; but it is likely it will evolve into different systems made up of different channels such as wireless and satellite, and technologies such as cellular phones. From the above, e-learning channels comprises but are not restricted to the use of radios, televisions, computers and other gadgets in the transmission of learning activities from one person to another at different locations. However, Liu and Wang (2019) assert that the advancement of communication technology, notably the internet, has resulted in the transformation of remote learning into e-learning. The model adopts different educational technologies that help in the improvement and development of education standard globally and therefore will help in the educational sector in Nigeria because it avails students and lecturers the opportunity of familiarizing with latest technologies.

Educational Development

Todaro and Smith (2021) argue that education is a component of development since it is critical for the development of human ability, research, and development, all of which contribute to social progress. Education is critical for the growth of every civilization since it enables individuals to acquire a variety of abilities. Therefore, there is need to develop the Nigerian education sector so as to compete with other advanced nations of the world. Educational development is the process of helping those who teach to get better understanding of what they do through workshops or other avenues. Educational development comprises the advancement of every aspect of the academic sector in any society. It covers the development of teachers, students and every actor in the educational sector. It also looks at the modus operandi of the different educational institutions;

ISSN 2736-0091
E-ISSN 2737-0107

their teachings contents, their research methodology, their mediums of teaching and how well the students are captured. Kremer (2023) posits that investment in education is a vital tool for development as a result of the different roles it plays in social cum economic development.

Educational development has positive effects on both the economy, human capital and other sectors of the society. Todaro and Smith (2021) think that education improves individual by allowing them to read, communicate, argue, and make better informed choices, as well as being taken more seriously by others. Education includes improved decision-making, increased involvement in the political process, and beneficial spillover effects on others who work with the educated individual. As a consequence of this rise in human potential, education is an important area to address due to the critical role it plays in society and its critical role at the core of development. Asiegbu et al., (2021) educational development is very important in every society, reasons being that when people are educated and aware society experience rapid development which opens doors and expands opportunities and freedom. Educational development also comprises of the drafting of good educational policies that will help in standardizing the sector for better performance. When government comes up with the right policies, it encourages the advancement of the educational sector. Educational development gives room for the purchase of the requisite tools for instructors and learners to meet with the introduction of technology and others like moral, cultural values in schools so as to help improve the standard of education.

Prospect of E-Learning for Educational Development in Science Education

The Nigerian education sector was designed to take care of the needs of every student. The Nigerian curriculum of education emphasized the use of both technology and other formal education learning process that is required to meet educational need of the students in the 21st century. The continuous growth of multimedia and other internet learning mediums for passing knowledge has brought about a paradigm shift in traditional ways of teaching (Wentling et al., 2020). With the wave of technological advancement spreading rounding the globe via technological advancement, educationist and others now has teaching and learning mediums. Almost every school and educational institution has realised the potential for e- learning to alter individuals, their knowledge, skills, and performance (Rossi, 2019). With the outbreak of the novel Corona virus in December 2020, many Nigerian institutions are gradually adopting different e-learning strategies in other to keep their students going. The Federal government through the Ministry of education instructed all schools to key into their e-learning platforms so as to continue with the academic calendar even as the pandemic continues to ravage the world and Nigeria (Adedigba, 2020).

The use of e-learning has become necessary in Nigerian so as to enable educationist and students advance our system of education from analog to digital mediums of learning. With e-learning comes the opportunity to switch from the analog system of teaching to a more digitalized pattern of teaching. This is because with e-learning, institutions will initiate several positive changes that will develop the system. The use of E-learning in education, especially for tertiary institutions has several benefits, and thus it is considered among the best mediums of education. Different scholars like Orji & Job (2019) states that any society that deploys the use of e- learning channels in their education sector will derive huge societal benefits. Society in general will grow fast and the people will be driven by technological changes advancement that comes with it. The flexible nature of e-learning gives everyone privilege of choosing the point where learning can take place. When students learn at their convenience, it gives them the chance of improving their learning speed thus, instructors and students need not meet physically before learning can take place. Mba (2019) asserts that a strong primary school education is critical for a country's economic success. However, due to a lack of technical infrastructures in Nigeria, the number of public elementary schools and instructors available for basic education are both grossly insufficient. This is aggravated further by the deplorable state of many higher and elementary schools' infrastructures. In 2018 World Bank assessment of 435 private and public postsecondary and elementary schools in Nigeria, which included 2,968 instructors, some teachers missed nearly 25% of planned teaching time. As a consequence of the inadequate learning environment, this reduced instruction time by an average of less than 33%. (Mba, 2019).

Most Nigerian academic institutions are crowded and over populated. This situation affects both the instructors and learners as learning might not be effective. There will be too many distractions affecting the learning process but e-learning is flexible enough to capture everyone from their different positions with all achieving the essence of learning. Education will become more flexible and accessible by all in Nigeria when e-learning is adopted. Another problem we face is that most times researchers and students find it difficult to access needed information or documents to enhance their study. When institutions adopt e-learning, it will enhance the standard of learning as people can now access different learning information from where ever they are. More so, students can carry out research and development studies which will in turn translate to national advancement and growth of both the economic and political sectors of the society. E-learning create avenue for discussion between learners and teachers. It therefore helps in eliminating different barriers in learning this is because it promotes academic engagement between student’s teachers.

ISSN 2736-0091
E-ISSN 2737-0107

With the use of e-learning research students exchange ideas and share their views on different phenomenon. The use of e-learning for teaching will help reduce the work load from our teachers. The system of learning in Nigeria is built in such a way that the teachers play about 80% roles in the learning process of the student. But with e-learning, the student is given the chance to build themselves better. It gives them the confidence that they can fit into the society. It prepares the learners for the journey of life. To Wagner et al. (2008), e-Learning provides additional opportunities for interaction between learners and instructors throughout material delivery. E-learning saves cost for students. It breaks the distance barriers for students who wish to travel long distance in other to access education. As students can have access to the internet at their convenience. A Report given by Al Jazeera in 2018 revealed that millions of Nigerian students had no access to their class rooms because of the ongoing Boko Haram attacks. This is because about 1,400 school buildings in Borno have been brought down by the insurgent's eight-year rebellion with more than 50 percent learning centers unable to open due to dance and the unsafe nature of the environment (UNICEF report, 2007). In situations as this, the government can use any of the e-learning mediums to teach the reach and teach school children so as to keep the school calendar running amidst the war Attacks. Therefore, students need not gather physically to learn but can do same virtually. Also, e-learning accommodates a higher number of students on course of the learning process. With the availability of internet services, computers can be inter-connected at different point for learners to learn from. E- learning also accommodates the learning pace of every student and this is because students have opportunity to be taught according to their understanding. With the availability of recorded voice lessons, PDF documents, video teaching aids, students can learn again and again unlike the conventional pattern where the teacher gives room for questions only after the topic or class is ended. It can also help the government in times of shortage of academic manpower.

Challenges of E-learning for Educational Development in Science Education

There are many key challenges that hamper the successful implementation of digital learning among science education students in North-central Nigeria, however, only a few will be mentioned:

- Poor technical infrastructure: The technical infrastructure in developing countries is not highly developed, which means that phone-lines and Internet connections are unreliable or slow due to narrow bandwidth. Most users access the Internet in cyber cafes, with shared bandwidth, thus slow Internet connections, as not everyone has a personal computer or laptop. In Nigeria our problem is further worsened by the lack of adequate power.
- Financial restrictions: In developing countries the cost of digital learning equipment can be a limiting factor with regards to reaching a broad target audience and making sure that everyone can afford this service. Also misappropriation of funds has added to the ongoing problem.
- Lack of computer literacy: It has been found that low computer literacy level is a critical factor that affects the acceptability of ICT/e-learning by students and teacher in educational institutes. Furthermore, the lack of ICT training for teachers and lecturers makes it hard for them to provide digital content, even when provided with all necessary infrastructures.
- Internet connectivity: the cost of accessing the internet in Nigeria is still on the high side. Hence, some students find it a challenge to afford. Aduke (2008) suggested that the government should make Internet connectivity a priority for higher education to be able to leverage on the promises and opportunities digital learning present.
- Energy related problems: irregular and frequent interrupted power supply in Nigeria is a perennial problem affecting almost every aspect of the economy, including education. Ajadi, Salawu, and Adeoye (2008) observed that it's been a major setback for technological advancement in the country. Most rural areas in Nigeria are not even connected to the national grid. The consequence of this is that students residing in such areas may find it difficult to use ICT gadgets effectively.

Suggestions

1. Government should increase funding for ICT infrastructure in universities, it will help in bridge the E- learning gap in Nigeria.
2. Public-private partnership (PPP) should collaboration with technology companies to provide affordable devices and internet access for science education students in Nigeria.
3. Educational policy maker should mandate digital literacy training for students and educators on e-learning tools.
4. Curriculum Developer should localize content creation of science education resources tailored to the Nigerian curriculum.

Conclusion

E- Learning holds immense potential for transforming science education in North-central Nigeria. However, infrastructural deficits, financial constraints, and skill gaps must be addressed to maximize its benefits. Strategic interventions from stakeholders can facilitate a smoother transition to digital education, ensuring equitable access and improved learning outcomes.

ISSN 2736-0091
E-ISSN 2737-0107

References

Abad, M. M., Morris, D., & de Nahlik, C. (2019). Looking under the Bonnet: Factors Affecting Student Adoption of E-Learning Systems in Jordan. *The International Review of Research in Open and Distance Learning*

Abdulwaheed O. I., & Fasanya A. G. (2023): Physics educators' perception on the use of internet in teaching secondary school students in Ilorin Metropolis of Kwara State. *Journal of Science, Technology and Mathematics Pedagogy* (JOSTMP) 1(1). 259- 268. Available online at https://jostmp-ksu.com.ng/index.php/jostmp

Adedigba, A. (2020). COVID-19: *FG launches free e-learning portals for students.* Premium Times Newspaper. Retrieved from: https://www.premiumtimesng.com/coronavirus/389775-covid-19-fg-launches-free-e- learning-portals-for-students.html

Adeyinka, T., & Olusola, A. (2019), Nigeria. ICT & Curriculum Development: the challenges for education for sustainable development. *Indian Journal of Science and Technology.* 2(3) 45

Al Jazeera. (2017). *More than half of Borno schools closed over Boko Haram* retrieved from: https://www.google.com/amp/s/www.aljazeera.com/amp/news/2017/09/borno schools-closed-boko-haram-170929045051929.html

Asiegbu, V. I., Nwankwo, S., Briggs, A. C., & Macs, O., (2021). An Empirical Analysis of Boko Haram Activities on Educational Development in Northeast, Nigeria. *International Journal of Trend in Scientific Research and Development*, 5(6), 1376-1379

Gotschall, M. (2020). E-learning strategies for executive education and corporate training. *Electronic Journal of Sciences*,141(10), 5–59.

Holmes, B., & Gardner, J. (2020). *E-Learning: Concepts and Practice.* SAGE Publications.

Joseph, E. (2018). *North constitutes 69% of children without access to education —UNICEF*. Vanguard.-Received-from https://www.google.com/amp/s/www.vanguardngr.com/2018/10/north-constitutes 69-of-children-without-access-to-education-unicef/amp/

Kremer, M. (2023). Randomized evaluations of educational Programs in Developing countries. *American Economic Review*, 93(2),102-106.

Liu, Y., & Wang, H. (2019). A comparative study on e-learning technologies and products:from the East to the West. *Systems Research & Behavioral Science Journal*, 26(2), 191–209.

Mba, D. (2019). Why Nigeria must get serious about primary school education Retrieved from https://www.google.com/amp/s/theconversation.com/amp/why-nigeria-must-get serious-about-primary-school-education-119326

Oblinger, D. G., & Hawkins, B. L. (2017). *The myth about E-learning*. Edu-cause review Publishers

Ogbaji, U. (2018). *Educational Development in Nigeria: A Comparative Analysis of the Military And Civilian Regimes* (1966-1983). Retrieved from:https://www.academia.edu/4239372/

Orji, K. E., & Job, M. (2019). The role of education in national development: Nigerian experience. *European Scientific Journal*,9(28), 34-53

Rossi, P.G. (2019). Learning environment with artificial intelligence elements. *Journal of e- learning and knowledge society*, 5(1), 67-75.

Todaro, M. & Smith, S., (Eds.). (2021). *Economic Development*. Addison Wesley Publishers.

UNESCO. (2022). *Covid-19 report* (April 202 Retrieved https://en.unesco.org/covid19/educationresponse UNICEF REPORT: Retrieved from: https://www.unicef.org/nigeria/education

UNICEF. (2017). Education under attack in Borno from: https://www.unicef.org/nigeria/stories/education-under-attack-borno

Wagner, N., Hassanein, K. & Head, M. (2008). Who is responsible for E-learning in Higher Education? A Stakeholders' Analysis. *Educational Technology & Society Journal*, 11 (3), 26-36.

Wentling, T. L., Waight, C., Gallagher, J., La Fleur, J., Wang, C., & Kanfer, A. (2020). E-learning - a review of literature. *Knowledge and Learning Systems Group NCSA* 9(1)65-73.

Zeitoun, H. (2018). *E-learning: Concept, Issues, Application, Evaluation*, Riyadh: Dar Alsolateah publication.