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E-LEARNING FOR BIOLOGY DELIVERY IN COLLEGES OF EDUCATION: CHALLENGES AND PROSPECTS.

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Abstract

The world has transformed into a global village. Globalization requires development of new generation that can manage environmental challenges and contribute actively to science and technology for economic growth. Biology is one of the science subjects that form the bases of many fields related to human life, food production, environmental management, industries and economic growth. For biology to play this role, effective methods of delivery need to be employed to produce future teachers in line with global transformation. E-learning is a modern pedagogy that uses ICT devices. This paper examined e-learning in biology delivery in colleges of education and challenges. Prospects of e-learning in biology delivery such as access to high quality/ up to date biology knowledge and modern equipment, enhancing competency of biology teachers and students, facilitating creativity /development of intellectuals collaboration and developing ICT skill were also discussed. It was concluded that e-learning is a viable strategy for effective biology delivery to produce future teachers that can facilitate biology-based man power in the 21st century.

Key words: E-learning, biology delivery, Colleges of Education, Challenges, Prospects.

Introduction

The world is dynamic with technology impacting on every aspect of human life for better livelihood and economic growth. Emergence of Information and Communication Technology (ICT) has transformed the education sector to cater for the changing global needs. In many parts of the world electronic learning (e-learning) is now employed at different levels across different subjects for effective delivery. E-learning is learning or knowledge derived from using computer aided gadgets (Noah, 2012). According to Cook et al (2006), e-learning encompasses learning that uses information network, internet, intranet, extranet, local area network (LAN), wide area network (WAN), e-mail, discussion forums, collaborative software, classroom management software, team learning systems, satellite delivered learning, interactive TV lectures and virtual education networks. E-learning offers a variety of strategies and devices that a teacher can select appropriately for any subject or concept. Salawudeen (2010) explained that e-learning uses network technologies to create deliver and facilitate learning anywhere at any time. It is particularly suitable for teaching and learning science by providing high quality content and equipments that may not be available in many schools of developing countries like Nigeria.

Biology is a branch of science that is central to human life and activities, it is a core subject of many fields of study including medicine, pharmacy, agriculture and environmental science. Global issues such as loss of biodiversity, deforestation, climate change, depletion of resources and their control strategies are closely associated with biology. In the recent time biology has assumed a new importance in the areas of bioinformatics, bioremediation and biotechnology. Biological resources and processes are used to produce goods and services in an environmentally friendly way (Vargas-Hernandez, Pallagst and Hammer, 2017). The teaching and learning of biology are therefore, crucial. It is essential to develop new generation of teachers with technological skills in biology using modern methods such as e-learning. Biology teacher is a vital foundation for any biology-based career or enterprise. E-learning has a global outreach, employing e-learning in biology education delivery affords the future teachers and their products at various levels align with knowledge and skills of facing the challenges of the 21st century. This paper discussed e-learning in biology delivery in colleges of education, its challenges and prospects.

E-learning in biology delivery in colleges of education

Biology is as a science is abstract. Students experience difficulties in many topics including endocrine system, nervous system, aerobic respiration, nutrients cycle, cell division and genetics (Atilla,2012). Ozcan (2003) found that difficulties students have with some topics in biology affect their motivation and achievement negatively. Effective biology delivery can however, be achieved in colleges of education with usage of one or combination of a number of e-learning resources.

National commission for Colleges of Education (NCCE,2012) recommended different teaching methods for biology NCE programme as follows:

- Lecture
- Practical
- Project
- Field trip and excursion
- Games and simulations
- Team teaching
- Demonstration
- Tutorials
- Concept mapping and computer assisted.

E-learning lends itself to all these teaching methods with aid of variety of resources. For any method, choice and usage of appropriate e-learning resources can make biology instruction interesting and student-centred. Clear well-prepared power point slides, videos, colorful simulations and software on different concepts in biology can be used in lecture, tutorial, team teaching or project by the teacher or for students' presentation. Malik and Agarwal (2012) posit that multimedia is an exciting combination of computer hardware and software that allows integration of text resources, audio, animation, graphics and video to develop effective presentation.Malik and Agarwal (2012) posit that multimedia is an exciting combination of computer hardware and software that allows integration of text

resources, audio, animation, graphics and video to develop effective presentation. Videos and colorful animations of plants, animals or biological processes can stimulate the students' interest, reduce distractions and make them to focus on their attention. According to Wammes (2016) students engage 33% of their time in mind wandering during lecture but engaging them is one of the ways to minimize it. Presentation facilitates students to process information. Preparation and presentation also contribute to acquisition of knowledge and skills development by increasing interaction with biology content. Prior to presentation students need to search for information on the net, collaborate and develop the materials for presentation. These processes enhanced acquisition of biology knowledge and development of scientific and ICT skills which are essential in building a teacher career or any biology enterprise. Field trip and excursion are exciting and part of biology programme in college of education (NCCE,2012). Plants and animals in their natural habitats, ecosystems, sceneries and animals' behaviors from field trips and excursion can be recorded in digital cameras iPad and smartphones for review at a convenient time or when the need arises.

The use of internet can equally be adopted in all methods of teaching biology to connect pre-service teachers in college of education to global knowledge pool. Websites and online biology learning packages in different aspects of biology are available. Biology teacher and students can obtain information or access activities from the net in the classroom using computers, tablets and their Smartphones. This can enhance participation, interaction and searching skills of the students. Offorma (2004) asserts that the use of internet changes the role of the teacher from a knowledge dispenser to a facilitator of learning. Biology teaching and learning can also be extended beyond the classroom with e-learning strategy. Teacher can send and receive assignments via e-mail and WhatsApp. Students can also consult and interreact freely at any time for project work, team work or tutorial preparation without meeting face-to-face.

Practical is an integral part of biology in college of education. Unfortunately, Chukunyerenmuwa (2013) observed that many practical classes are not carried out due to lack of certain equipment and reagents. Provision of different biology software can be used to offset some of these inadequacies. Virtual biology laboratory and virtual field trip though are expensive can be used in college of education to support practical biology in line with global standard. At certain times, conducting face-to-face practical could be challenging such as the period of coronavirus pandemic or insurgency, under such conditions virtual laboratory and field trip can be used conveniently for biology practical. Conducting biology practical with online resources should however be well planned to

ensure its student-centered and activity-based. Teaching and learning of biology in college of education can be made to be enthusiastic to the students by engaging them in biology discussion and presentation via video conferencing like zoom.

E-learning resources that can be used for teaching and learning biology in college of education are numerous. Exposing biology students in the college of education to variety of e- learning resources in the course of their programme will enhance their competency as future teachers in the global market. Utilization of e-learning in biology delivery in colleges of education is however limited due to a number of challenges.

Challenges of using e-learning in biology delivery

According to Nwabufo, Umoru and Olukotun (n.d.) e-learning in Nigerian tertiary institutions is still inadequate due to many challenges.

The challenges include:

- **Instability of electricity**: In many parts of the country there is epileptic electricity supply. Many of the e-learning devices require electricity which is not adequately supplied in college of education. The students and teachers face the same problem in their homes. Those in some rural areas are not even connected to the national grid. This limits access and usage of e-learning resources for biology students within the college and outside.

- **Inadequate funding**: Budgetary allocation to Nigeria education sector from 2015 to 2020 shows gradual reduction from 10.75% - 6.9% (Eduplana, 2020). This is far below the 15% - 20% recommend by UNESCO (Ameh and Aluko, 2019). Consequently, allocation to colleges of education is limited and money allotted to e-learning in biology is grossly in adequate. Computers for both staff and students are not sufficient, the infrastructure may not also be maintained. Adekunle (2015) lamented that internet facilities adopted in most Nigerian universities are not functioning very well.

- **High cost of biology software and bandwidth**: Many biology software is expensive. Colleges of education cannot afford to purchase them regularly; most biology packages also require much bandwidth which is equally expensive for college biology teachers and the students. This limit the choice of e– learning

services and accessibility of biology students and teachers to up – to – date biology knowledge.

- **Inequality of student access to e–learning devices**: There are students in college of education that cannot afford computer, tablet or smart phone. This creates dichotomy in access to e–learning biology materials. The affected students are hindered from enjoying personalized learning, they resolved to cyber café, their collaboration with biology teacher and fellow students is limited.

- **Insufficient ICT skills**: Some biology teachers and students in college of education do not have adequate ICT skills to effectively search, prepare and utilize e – learning technologies. Some biology software is also complicated and difficult to interpret.

- **Attitude of students**: E – learning requires commitment and some students are lazy, they rely on other students or teachers note. Many students have smartphones but some spend more time on social media at the expense of biology – learning activities.

Prospects of e – learning in biology delivery

The prospects of e–learning in biology delivery in colleges of education include:

- **Access to high quality biology content and equipment**: E-learning infrastructure and network provide for high quality information from famous professionals, promote sharing of information, discussion and analysis between teachers and students around the globe

(National Science Teachers Association (NSTA),2004; Leonard and Collin,2014). Internet therefore, extends biology knowledge and techniques with modern equipment from professionals, researchers and other stakeholders to people in different parts of the world. Via the internet teachers and students in college of education are connected to the world biology network and can access high quality and up – to – date information.

- **Development of competency**: According to Gulbahar and Kalelioglu (2015) competency entails possession of knowledge, skills and attitudes to effectively

perform and function to expected standard of a given profession. Individuals require sufficient experience to become competent teachers. Adopting e – learning strategy for biology in college of education exposes the students to rigorous training with variety of modern technologies. Undergoing biology education programme will therefore equip the students with biological and pedagogical knowledge and skills. The end products will be future biology teachers that can innovate, facilitate acquisition and application of biological knowledge in instruction and in solving practical life problems. NSTA (2020) also stressed that e-learning should be an important aspect of teacher preparation.

- **Collaboration**: Collaboration is a feature of biology enterprise. Major breakthroughs such as sequencing DNA for human genome was a combination of many scientists from different countries (Lee,2018). In e – learning biology students in college of education work as individual and mostly in groups. They generate knowledge, compare notes, discuss, modify and agree. This form the basis for team work that can enable them in the future to join the world of biologists to share ideas and address problems.

- **Creativity and development of intellectuals**: The process of e–learning in biology involves subjecting the students to different tasks and using different technologies which make biology interesting. It stimulates curiosity and drive them to explore, visualize, develop new ideas of approaching issues, discuss and test. These processes involve high order thinking skills which can lead to creativity and development of intellectuals. This is in line with conclusion of Golan and Dan (2010) that internet skills contributed to improvement in thinking and intellectual behavior of learners obtained in their study.

- **Development of ICT Skills**: Utilizing e-learning in biology enhances ICT skills of the students and teachers. Skills such as searching for desired information, selecting, organizing, processing and sharing that are constantly used in biology studies These skills are also required for day to day activities and in the workplace .Aduwa-_Ogiegbaen and Iyamu (2005) posit that ICT connects school around the world to improve education and develops skills required for securing jobs in 21st century. In many organizations ICT skills is already a pre-requisite for employment.

Conclusion

It was concluded that e-learning is a viable strategy for effective biology delivery to produce future teachers that can facilitate biology-based man power in the 21st century.

Recommendation

1. Teachers in college of education should as much as possible adopt e-learning strategy in teaching biology.
2. Government should ensure schools have steady electricity supply.
3. Government should invest more in education and ensure availability of functional internet service, e-library, biology software and virtual biology laboratory packages in colleges of education.
4. Biology students should be more committed and give enough time to learning biology instead of games and social media.
5. College management should lease with government/NGOs and provide each student in colleges of education with a tablet.

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