

Innovations

Influence of E-Learning of Basic Science and Biology in Secondary Schools for Sustainable Development in Ekiti South Senatorial District, Ekiti State, Nigeria

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Abstract: *This study examined the influence of E-learning on learning basic science and biology in secondary schools for sustainable development in the Ekiti south senatorial Districts in Ekiti State. The study adopted descriptive research of the survey type. Participants were 120 (30 male and female) randomly selected from four secondary schools in two local Government areas of the selected senatorial District, Ekiti State. The instrument titled E-Learning for Sustainable Development and Learning of Basic Science and Biology (E-LFSDDBB) was used to collect data for this study. The reliability of (E-LFSDDBB) was determined through test-retest method, and this yielded a correlation coefficient of 0.75 at the 0.05 level of significance. Frequency count, simple percentage, and statistical means were used to analyze the data. The findings revealed that there is proper use of E-learning for learning Basic Science and Biology for sustainable development in Secondary Schools. The findings also revealed a relationship between E-learning and competence acquired by Basic Science and Biology students through effective use of E-Learning. The study revealed that E-learning has a significant influence on the learning of Basic Science and Biology in secondary schools for sustainable development. It was recommended that students should be encouraged to intensify their efforts in the use of E-learning to enhance their academic performance for sustainable development. The government and all educational stakeholders should collaborate together and introduce workable ICT materials to some schools without these gadgets to motivate students to use E-learning continuously through internet connectivity. It was also recommended that curriculum planners incorporate computer-mediated communication strategies in the relevant areas of study and expose teachers and students to these strategic areas for effective learning. Students should attend seminars and workshops to update them on the use of E-learning. Teachers should be encouraged to prepare lesson notes online for students to encourage their accuracy in the use of E-learning.*

Keywords: *E-Learning, Sustainable, Development, Learning, Basic Science, Biology*

Introduction

E-learning is a new phenomenon in promoting education globally, especially in some institutions, to promote distance education (DE) and lifelong learning. It also refers to the use of various types of electronic media and information and communication technologies (ICT) in education. It encompasses all forms of educational technology that electronically or technologically support teaching and learning. E-learning in education allows for interactive classes. Clifford and Freisen (2014) noted that e-learning is an innovative, well-designed approach to electronically mediated digital technology to deliver learning at the learner center in interactive learning environments. It provides help in providing training to learners. It enables students to receive the same type of syllabus and study materials. E-learning can be used by anyone anywhere, anytime, with instructional design principles. National Research Council(2000) added that E-learning comprises the use of electronic technology such as computers and the Internet to deliver in and out of the classroom. The researcher also noted that it can also be used to monitor and report learners' performance. This encourages learners to search for relevant topics on the Internet rather than searching through books. Teaching and learning of different topics or courses are delivered completely on the net (Haleem, Javaid, Qadri and Suman, 2022).

Basic science and Biology are science subjects taught at both the Junior and Senior Secondary Schools. These subjects appear to be the most popular science subjects at these levels. Basic Science teaching prepares students for basic knowledge of pure sciences, while biology teaching helps learners to understand Science concepts, principles, theories, and laws. The objectives of teaching Basic Science and Biology at the secondary school level as stated by National Policy on Education FME (2014) involve learners' ability to have meaningful and relevant knowledge in the subjects for sustainable development in a scientific and technological world. This also makes room for technological advancement.

“Teaching is an intimate contact between teachers and learners. The research of Edmund- Amidon in Rajagopalan (2019) showed the notion that teaching is an interactive process, which involves a definable activity between teachers and students. It is designed to further the education of learners for future use and sustainable development (Morrison-Love 2014). Teachers who are supportive and caring can have a significant impact on students' motivation and performance (Dekho 2023). Teaching is the arrangement and manipulation of a situation by instructors to bridge the gaps or remove obstructions during learning to overcome mediocrity. Ray, Gilbert, Magulod and Darin(2021) noted that teaching is influenced by various factors such as learners, the teacher's teaching style, and learning resources, with the aim of changing the behaviour or potential of learners, which could occur during certain definite activities. On the Contracts (Dekho, 2023) also

noted that poor methods of teaching can hamper students' future academic and career success. This researcher emphasized that inadequate training and insufficient resources contribute to poor teaching quality. This can also limit their potential and have long-term consequences for their personal and professional development.

The teaching strategy has a positive effect on students' learning if it is modified, improved, and developed. Teaching and learning activities and excellent performance could be established by the appropriate use of teaching processes or strategies. Davis and Glaser (2022) noted that the entire structure of teaching has four steps:

1. Organization of teaching contents and objectives for achieving the objectives.
2. Identification of suitable teaching-learning strategies for effective content communication.
3. Identification of suitable learning procedures for effective teaching and learning.
4. Managing teaching-learning, whereby the focus is on the assessment of the learning objectives in terms of student performance, and this forms the feedback to teacher and students.

Adegbola (2018) noted that the inability of teachers to possess the skills and knowledge necessary to help students understand complex concepts usually leads to poor performance. Furthermore, she stressed that teachers should be professionally competent in performing their jobs to improve teaching quality and student performance. Teachers tailor instruction to individual learners' needs for sustainable development (Calderhead, 2015). Hence, Ajay and Afolabi in Ogbonnaya (2020) noted that education that provides learning is an indispensable tool that contributes to the nation's social, political, moral, cultural, and economic aspirations. It also provides individuals with knowledge, skills, character, and desirable values that foster national development and self-actualization. Sustainable development is socio-economic development that helps meet the present and future needs of students (Gavin, 2019). Sustainable development seeks that the next generation will find a world and a society better than the current situation. Sustainable development connotes arrangements that future generations can meet. It also improves the quality of life, thereby resulting in economic growth, social interaction, and environmental protection.

Learning is a relatively permanent change, usually brought about because of developing a new skill, understanding scientific law, and changing attitudes. Change is not merely incidental or natural but usually occurs by acquiring new and modifying existing knowledge, behaviours, skills, values, or preferences (Clark and Richard, 2019). Leaders possess the ability to learn through much skills and knowledge they accumulate from repeated experiences (Karban in Agun,

Odewale and Famewo, 2023). These kinds of changes induced by learning often last a lifetime.

Human learning begins from birth and continues until death due to interactions between the person and the environment. Jegede (2007) noted that learning may occur consciously or without conscious awareness. For instance, learning usually occurs as a result of participating in more complex activities such as computer mediation in a relatively intelligent manner. Richard (2014) observed that change is usually acquired through the modification of existing knowledge, behaviours, skills, values, or preferences in learning. Active learning occurs when a person takes control of their learning experience. Since understanding information is the key aspect of learning, learners need to recognize what they understand and what they do not. E-learning is described as learning electronically (Abbad in Arkorful and Abaidoo, 2014). E-learning encourages learners to have an internal dialogue with their teachers, which gives them a good understanding. In line with this, Ezeahurukwe and Johnson (2011) noted that e-learning is generally used as part of teaching and learning to communicate and deliver lessons effectively. It is also used to collaborate research works among students to provide teachers and students with new teaching and learning tools. (Bransford, 2000) noted that Meta-cognitive strategies, which have proven the value of active learning, can be used to teach a child over time. On the contrary, Asogwa (2011) acknowledges that the lack of requisite skills by teachers, especially those who are not well skilled in the understanding of operation and applications of the packages, is facing a major challenge of optimizing e-learning in teaching of students. Learners have more incentive to learn when they have control over what they learn. The key characteristic of student-centered learning is active learning, which is usually acquired through E-learning. On the contrary, Ilechukwu (2011) pointed out that poor e-learning technology designed environment poses challenges to the implementation of e-learning technology and this in achieving the aims.

There are different ways through which students can learn, these include; associative learning, classical conditioning, operant conditioning, and observational learning. Associative learning is the process by which a learner learns the relationship between two stimuli while a previously unbiased stimulus is repeatedly paired with a reflex stimulating stimulus until eventually the neutral stimulus elicits a response in the classical stimulus. In addition, when a behavior is reinforced in the presence of a stimulus, changes occur in the behavior of the learner. Stimulus presents and controls behavior modification. Therefore, learning occurs by observing the behavior of others. It is a form of social learning that takes various forms, based on various processes.

Electronic learning is computer-enhanced learning that comes in a specific and is always more diffused in mobile learning. This is adapted to attend to the

individual learner's natural learning environment to improve learning performance permanently (Moore, 2009). E-learning complements the work of teachers and facilitates the provision of extra materials online (Matogo, 2019). Similarly, Neuhauser (2012) sees e-learning as a training delivered on a computer designed to support instructional delivery. To these researchers, e-learning helps in transferring the skills and knowledge needed to meet the expectations and demands of technological advancement of the country. Enugu (2017) reported that e-learning is designed, selected, and administered for the use of network technology to disseminate the learning content electronically with the help of internet technologies.

The internet provides an avenue for teachers to teach and for learners to sit at the computer exchanging information and ideas and interact with each other online. Rosemburg (2011) noted that the use of internet technologies delivers a broad array of solutions that enhance knowledge and performance. Furthermore, this researcher stressed that it also aids learning processes through interaction with digitally delivered content, network-based services, and tutoring support. Therefore, e-learning encourages users to peruse information using internet technology. It has the potential to facilitate teaching and learning in various ways. It is a learning electronic gadget that delivers learning, training and education programs electronically (Stockley, 2013).

Purpose of this study

The purpose of this study was to examine the effects of E-learning for sustainable development and learning of Biology in Secondary Schools in Ekiti South Senatorial District in Ekiti State, Nigeria. Specifically, this study sought to examine the effective use of e-learning for effective learning of Biology in Secondary Schools in Ekiti South Senatorial District, Ekiti State, Nigeria.

Research Questions

The following research questions are raised;

- i. To what extent do Basic Science and Biology students utilize e-learning (Computer and Web) for learning Basic Science and Biology for sustainable development?

Research Hypotheses

The following research Hypotheses are raised for this study:

- i. There is no significant effective use of computers and the Web (e-learning) for learning basic science and biology in secondary schools for sustainable development.

- ii. There is no significant influence of E-learning on the learning of basic science and biology in secondary schools.

Methodology

This study adopted descriptive research of the survey type to examine the effects of e-learning for sustainable development and learning of Basic science and Biology in Secondary Schools in Ekiti South Senatorial District, Ekiti State, Nigeria. The design is suitable because it enables the researcher to gather relevant information from teachers and students using qualitative survey measures.

Sample Sampling Procedure

The sample for this study comprises (120) Basic Science and Biology students who were randomly selected from four (4) secondary schools in two Local Government areas in the Southern part of Ekiti State through the multi-stage sampling procedure. The first stage was the purposive selection of one senatorial district in Ekiti State. The second stage involved the purposive selection of one local government area from the selected Senatorial District. The third stage involved the use of a simple random sampling technique to select four schools from the Local Government area selected for the study. Stage 4 involved the random selection of 30 (male and female) students from each school (which make up 120 students). In all, a total of 120 students were selected for the study.

Research Instrument

The effective use of E-learning for Sustainable Development and Learning of Biology in Secondary Questionnaire (EELSDLBBQ) instrument was used to collect data for the study. In addition, the results on previous performance of students were collected to elicit this performance in the classroom. The EELSDLBB contained 25 structured items that were used to collect information about the effect of E-learning for sustainable development and learning of biology in secondary schools in Ekiti South Senatorial District in Ekiti State. This item was given to three experienced Science teachers and three experts in the area of tests, measurement, and evaluation from Ekiti state university, Ado Ekiti, for face and content validity. Chronbach's alpha was used to determine the reliability of the instrument, which yielded a reliability coefficient of 0.85 for EELSDLBB.

Administration of the Instrument

The researcher visited the schools in the local government area selected for the study on the administration of the instrument (EELSDLBB). The instrument was administered by the researcher and research assistant to the students and teachers. The completed questionnaires were collected by the research assistant.

Data Analysis

Data collected were analyzed using frequency count, simple percentage, and statistical means to determine the degree of responses from respondents, while Pearson’s Product Moment Correlations was used to test research hypotheses.

Results

Question 1: To what extent do Basic Science and Biology students utilize e-learning (Computer and Web) for learning Basic Science and Biology for sustainable development?

Table 1: Analysis of the extent to which Basic Science and Biology students used e-learning for learning and sustainable development

S/N	ITEMS	SA(%)	A(%)	D(%)	SD(%)
1	I submit assignments online (Email, Learning Management System, or LMS)	88 (73.3%)	10 (8.0%)	12 (10.0%)	10 (8.0%)
2	E-learning enhances my ability to complete my assignments online.	60 (50.0%)	30 (25%)	10 (8.0%)	20 (16.0%)
3	I read the teacher/lecturer’s lesson notes online.	90 (75.0%)	25 (20.8%)	10 (8.0%)	5 (4.1%)
4	I have sufficient internet connectivity and a gadget to use in my online biology class	50 (41.6%)	20 (16.6%)	40 (33.3%)	10 (8.0%)
5	I encounter hitches on the Internet and in the gadgets used during an online class.	64 (53.3%)	21 (17.5%)	26 (21.6%)	10 (8.3%)

Table 1 revealed that 88 respondents representing 73.3% strongly agreed with the submission of assignments online (Email, Learning Management System, or LMS), 10 respondents representing 8.0% agreed, 12 respondents representing 10.0% strongly disagreed, and 10 respondents representing 8.0% also disagreed with the statement. Sixty respondents representing 50.0% strongly agreed that e-learning enhances their ability to do their assignments online, 30 respondents representing 25.0% agreed, 10 respondents representing 8.0% strongly disagreed with the statement, and 20 respondents representing 16.0% disagreed with the statement. Ninety respondents representing 75.0% strongly agreed that they read the teacher’s lesson notes online, 25 respondents representing 20.8% agreed with the statement, 10 respondents representing 8.0% strongly disagreed, and 5 respondents representing 4.1% disagreed with the statement.

The table further revealed that 50 respondents representing 41.6% strongly agreed that they have sufficient internet connectivity and a gadget to use online in class, 20 respondents representing 16.6% agreed, 40 respondents representing 33.3% strongly disagreed, and 10 respondents representing 8.0% disagreed with the statement. 64 respondents representing 53.3% strongly agreed that they encounter hitches on the Internet and in the gadget they use during an online class. 21 respondents representing 17.5% agreed, 26 respondents representing 21.6% disagreed, and 10 respondents representing 8.3% strongly disagreed with the statement. Therefore, with the result recorded from the table, there is proper use of Computer and Web (e-learning) for learning basic science and biology.

Hypothesis 1: There is no significant effective utilization of computer/web (e-learning) for learning basic science and biology in secondary schools for sustainable development.

Table 2: PPMC showing the effective use of computers and the Web (e-learning) for learning basic science and biology in secondary schools for sustainable development

Variable	N	Mean	SD	r-cal	r-tab	Result
Computer and Web skills and competence acquired by students in Basic Science and Biology	120	69.24	4.115	1.375	0.141	Significant
Effective utilization of e-learning devices	120	30.76	0.281			

$P > 0.05$

From the table above, it can be seen that Pearson's Coefficient of Correlation (r_{cal}) = 1.375, r_{cal} at 0.05 significance level (2 tailed) = 0.0.141. Since the r_{cal} value of (1.375) is greater than the r_{tab} value of 0.141 at the 0.05 level of significance, the null hypothesis stated that there is no significant effective utilization of E-learning (Computer and web) and competence acquired by students. This hypothesis is rejected. This implies that there is a significant relationship between e-learning (Computer and web) and the competence acquired by students through the effective use of e-learning devices.

Hypothesis 2: There is no significant influence of E-learning on Basic Science and Biology for sustainable development in secondary schools.

Table 3: PPMC showing the significant influence of E-learning on Basic Science and Biology for sustainable development in secondary schools

Variable	N	Mean	SD	r-cal	r-tab	Result
E-learning	120	85.75	6.397	1.534	0.641	Significant
Learning Basic Science and Biology	120	14.25	2.426			

P > 0.05

From Table 2 above, it can be deduced that Pearson's Coefficient of Correlation (r-cal) = 1.534, real at 0.05 significance level (2 tailed) = 0.641. Since the r-cal value of 1.534 is greater than the r-tab value of 0.641 at the 0.05 level of significance, the null hypothesis, which stated that there is no significant influence of E-learning on basic science and biology in secondary schools, is rejected. This means that e-learning has a significant influence on the learning of basic science and biology for sustainable development in secondary schools.

Discussion

Findings revealed that the majority of the respondents agreed that E-learning is used for learning. Therefore, there is effective utilization of computers and the Web (e-learning) for learning basic science and biology. This finding agreed with the opinion of Hedge and Hayward (2014) and Digital Class Educational Worldn.d) who noted that e-learning is an innovative, well-designed approach to electronically mediated digital technology to deliver learning. The findings also agreed with Ezeahurukwe and Johnson (2011), who noted that e-learning is used as part of teaching and learning to deliver lessons effectively. On the contrary, Asogwa (2011) noted that teachers' lack of requisite skills to understand the operation and applications of the packages constitutes a major challenge in optimizing e-learning for teaching students.

The study further revealed that e-learning has a significant influence on the learning of basic science and biology for sustainable development in secondary schools. The study of (Richard,2014 and Karban, 2015) supported that change could not be incidental or come naturally but usually by acquiring new and modifying existing knowledge, behaviours, and skills that learners possess to learn. In contrast, Ilechukwu (2011) posited that a poorly designed environment for e-learning technology imposes challenges to implementing e-learning technology and meeting specific needs.

Conclusion

It was concluded from the findings of this study that there is an effective use of E-Learning for learning basic science and biology in both junior and senior secondary school students in Ekiti South Senatorial District, Ekiti State.

Recommendations

Based on the findings, the following recommendations are made:

1. Students are encouraged to intensify their efforts in the use of e- learning To enhance their performance in academics.
2. The government and all educational stakeholders should collaborate and introduce workable ICT materials to some schools without these gadgets to encourage internet connectivity for students in the use of e-learning.
3. Curriculum planners should incorporate computer-mediated communication strategies in the relevant areas and expose all teachers and students to this strategic learning.
4. Students should attend seminars and workshops to update themselves on the use of e-learning.
5. Teachers should also be encouraged to prepare lesson notes online for students.

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