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LEVERAGING ON LEARNING MANAGEMENT SYSTEM RESOURCES FOR EFFECTIVE TEACHING AND LEARNING OF BIOLOGY IN DELTA STATE IN POST COVID-19 ERA.

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Abstract

Learning Management System (LMS) is a software application or web-based technology used to plan, implement, and assess a specific learning experience. The advancement in technology gave room for different LMS resources use by educators and students to facilitate teaching and learning. The study examined the use of LMS resources for effective teaching and learning of Biology in Delta state in post covid-19 era. The study employed descriptive survey design. Population of the study comprised all secondary school Biology teachers in Delta state from which a total of 317 participated. Four research questions guided the study. A structured online questionnaire design using Google Forms, titled LMS Awareness and Utilization Questionnaire (LMSAUQ) was used for data collection. The instrument was validated by three experts and a reliability coefficient of 0.85 was obtained using Cronbach's Alpha. The data collected were analysed using mean and standard deviation. The result showed that biology teachers are highly aware of the use of learning management system. The finding further revealed that although they are aware of LMS, however they rarely use it in classroom. The study found among other challenges mitigating the use of LMS to include; poor electricity supply to schools and high cost of data for internet connection. The found the following as strategies for effective use of LMS to include; regular supply of electricity, installation and subsidizing of Wi-Fi in schools, and employment of more ICT skilled teachers. Based on these findings it was recommended among others that school administrators should collaborate with government to organize training programme such as workshop and seminar

in schools to train teachers on how to effectively use LMS for teaching and learning in schools.

Keywords: Learning Management System, Resources, Effective Teaching and Learning, Biology, Covid-19

Introduction

The emergence of Corona Virus disease in late 2019 in Wuhan, China took the world by surprise and caught many nations of the world, institutions of learning and people unprepared. The severe acute respiratory syndrome Coronavirus 2 (SARS-CoV-2) and its associated disease, COVID-19, quickly spread to countries worldwide (Sahu, 2020). Among the notable symptoms of the disease was high temperature and difficulty in breathing especially among the vulnerable groups such as aged and people with underling health conditions. To curb the spread, nations of the world started initiating policies in collaboration with World Health Organization (WHO) such as: total lockdowns, the use hand sanitizers, adoption of social distancing practice and the compulsory use of face masks. These policies were to ensure that movement of people are restricted and there is reduction in number of persons that can gather at a particular place through social distancing (Donitsa-Schmidt & Ramot, 2020; Yang, 2020).

At the same time there was global closure of all face-to-face educational institutions (Agormedah *et al*., 2020; Al-Nuaimi *et al*., 2022; Bryson & Andres, 2020). Schools were closed without proper consultation of neither the instructors nor the students due to the rapid rate of spread of the disease. Universities and colleges transitioned to online learning using Learning Management Systems (LMSs) and video conference tools like Zoom at their faculties and departments (Bryson & Andres, 2020; Oyedotun, 2020; De los Santos & Rosser, 2021). However, the inadequate IT infrastructure, the absence of reliable high-speed internet access on various campuses at the time, and financial constraints of stakeholders made the transition burdensome, haphazard, and disruptive (Houlden *et al*., 2020).

This resulted in an uncoordinated information dissemination, duplication of duties, and an overall sense of drop in the academic quality of online lectures and student assessment (Hodges *et al*., 2020).Studies revealed that internet connection issues and students' lack of technology skills hampered technology use during the pandemic in both developed and developing countries (Adov & Mäeots, 2021; De los Santos & Rosser, 2021; Tadesse & Muluye, 2020;) while Van Nuland *et al*., (2020) found that the transition was less challenging for many universities already using LMSs to track documents, prepare reports, and deliver courses. According to Chigozie-Okwum *et al*., (2021) the pandemic came and exposed the gross negligence of nations in the integration of e-learning technologies in classroom learning especially learning management system (LMS).

Learning Management System (LMS) is a web-based application that integrates and organises all teaching and learning initiatives. It is a software application or web-based technology used to plan, implement, and assess a specific learning experience (Chigozie-Okwum, *et al*. 2021). LMSs are online learning technologies for the creation, assessment, management and delivery of course material (Sabharwal *et al*. 2018; Turnbull, *et al*. 2019). LMS is one of the e-learning technologies that facilitate effective teaching and learning (Ifi, 2021). It is considered the backbone of e-learning (Washington, 2019) and mandatory for educators and students at higher education institutions (Shine & Heath, 2020).

Effective use of the LMS makes teaching and learning process more interactive (Waheed *et al*., 2016; Alshammari, 2020; Alshammari *et al*., 2016), enhance the quality of teaching and learning (Yen *et al*., 2018) and provide training on technical skills to users and motivate them to be more interactive (Rhode *et al*., 2017). It allows instructors to share course materials, communicate with students and assess their performance. LMS offers learners a real-time remote learning capability to access online material at the comfort of their home irrespective of time, location or distance (Morrison *et al*., 2021; Namada, 2021).

Similarly, LMS enables the teachers communicate efficiently and meaningfully with the students, through announcements, notifications, discussions, emails, feedback as well as issuing reports, tracking data from student activity, assessing learners via tests and grading, (Kulshrestha & Kant, 2013).

Despite the importance of LMSs to both educators and learners to institutions of higher learning especially in time of global uncertainty, one cannot confidently say the state of its utilisation among secondary school teachers in Delta state. This is supported by limited literature on the availability and the use of LMS for teaching purposes in Nigerian schools (Sarasa-Cabezuelo, 2021). However, given the benefits accruing from the use of LMSs and the present level of technological advancement, confining teaching and learning to only the traditional classroom experiences should be a history. No doubt, the use of LMS in teaching and learning has become a new normal. Examples of LMS in use today include but not limited to Moodle, Seesaw, Schoology, Google classroom, Skooler, CenturyTech, ClassDojo, Canvas, Blackboard, Desire2learn, Microsoft team etc. These LMSs are being used in many parts of the world for instructional purposes, but it is not clear whether these tools are in use in Delta state among the teachers especially Biology teachers.

Biology is a science subject which explains the existence of life. It is a natural science which is concerned with the study of living organisms, their structures, forms and functions, heredity, etc. It is a fundamental science subject which serves as tile basis for understanding the complexities of how the body parts of organism's function. According to Taiwo and Emeke (2014), Biology exposes students to the world of knowledge of self, the immediate and distant environment. Therefore, in order to achieve the laudable objectives of teaching and learning of biology in Senior Secondary School, innovative strategies such as the use of LMS, CAI, inquiry-based learning etc must be adopted to bring about meaningful leaming and ultimately improve students' performance.

Since the current teaching methods commonly used for teaching science have failed to enhance problem-solving skills, curiosity and critical and logical thinking among the science students (Shan & Khan, 2015), there is a need to shift to technology integrated strategies as a new form of pedagogy. It is in this regard that the researchers wish to examine the level of leveraging on LMS for biology teaching and learning in secondary schools in Delta state in the post-COVID-19 era.

Purpose of the study

The general purpose of the study was to investigate the leveraging of LMS resources among teachers in Delta state for Biology teaching in the post-COVID-19 era. Specifically, this study determined:

1. teachers' awareness of the use of LMSs in Biology teaching and learning in Secondary Schools in Delta state in the post-COVID-19 Era
2. teachers' use of LMSs in Biology teaching and learning in Secondary Schools in Delta state in the post-COVID-19 Era
3. challenges militating against the use of LMS for Biology teaching and learning in Secondary Schools in Delta state in the post-COVID-19 Era
4. strategies for effective use of LMS for Biology teaching and learning in Secondary Schools in Delta state in the post-COVID-19 Era

Research questions

The following research questions guided the study.

1. What is the teacher's level of Awareness of the use of LMSs in Biology teaching and learning in Secondary Schools in Delta state in the post-COVID-19 Era?
2. What is the teacher's level of use of LMSs in Biology teaching and learning in Secondary Schools in Delta state in the post-COVID-19 Era?
3. What are the challenges militating against the use of LMS for Biology teaching and learning in Secondary Schools in Delta state in the post-COVID-19 Era?

4. What are the strategies for effective use of LMS for Biology teaching and learning in Secondary Schools in Delta state in the post-COVID-19 Era?

Methods

Descriptive survey research design was employed for this study. The study was carried out in Delta state, using only government owned secondary schools. The population for the study comprised four hundred and thirteen (413) Biology teachers in Delta state. All 413 Biology teachers were purposively sampled to participate in study as the population was quite small knowing it is online survey. However, at the end of the exercise, a total of 317 teachers participated in the study. LMS Awareness and Utilization Questionnaire (LMSAUQ) was the instrument for data collection. LMSAUQ is a 30- item questionnaire structured into four clusters A to D, all rated in four-point Likert Scale.

Cluster A consists of 10 items on level of awareness of the use of LMS in teaching, rated "Highly Aware (HA) = 4, Aware (A) = 3, Unaware (U) = 2 and Highly Unaware (HU) =1"; Cluster B consists of 10 items on level of use of LMS in teaching, rated "Frequently Used (FU) = 4, Used (U) = 3, Rarely Used (RU) =2, and Not Used (NU) = 1"; Cluster C and D consisted of 5 items each on the challenges militating against the use of LMS, and strategies for effective utilization of LMS in teaching respectively, rated on Strongly Agree (SA) = 4, Agree (A) = 3, Disagree (D) = 2 and Strongly Disagree (SD) = 1.

The instrument was validated by three lecturers from the Department of Science Education, University of Nigeria, Nsukka. Cronbach's Alpha was used to establish the reliability and yielded overall coefficient of 0.85. The instrument was administered online. First, the Google forms link was sent to the ministry of education, from where the link was shared with school principals through their WhatsApp/email platforms, with instruction requestion only biology teacher to respond to the survey. Research questions were answered using Mean and Standard Deviation.

The decision rule for research question one was grand mean score of 0.01-1.4, 1.5 -2.4, 2.5 - 3.0, and 3.1- 4.0 as HU, U, A and HA respectively. Similarly, the decision rule for research question two was grand mean score of 0.01-1.4, 1.5 -2.4, 2.5 - 3.0, and 3.1- 4.0 as NU, RU, U, and FU respectively. However, for research question three and four grand mean score of 2.5 and above were accepted as agreed while mean score below 2.5 were considered disagreed.

Result

This was presented in tables below based on research questions:

Research question 1: What is teachers' level of Awareness of the use of LMSs in Biology teaching and learning in Secondary Schools in Delta state in the post-COVID-19 era?

Table 1: Mean and Standard Deviations of Teacher's Level of Awareness of the use of LMS for Biology Teaching and Learning in Secondary Schools in Delta state in the post-COVID-19 Era

S/N	Items on level of awareness in the use of LMS	N	$\bar{x}$	SD	Remarks
1	Moodle	317	3.56	.61	Highly Aware
2	TutorNG	317	3.52	.74	Highly Aware
3	TalentLMS	317	2.84	.82	Aware
4	Schoology	317	2.82	1.01	Aware
5	Google Classroom	317	3.58	.74	Highly Aware
6	Educe	317	2.90	.81	Aware
7	Canvas	317	3.49	.83	Highly Aware
8	Blackboard	317	2.72	1.14	Aware
9	Gopius	317	3.30	.85	Highly Aware
10	TeachMe	317	3.46	.69	Highly Aware
	Grand mean	**317**	**3.22**		**Highly Aware**

Results in Table 1 showed that items 1, 2, 5, 7, 9, and 10 had their mean rating between 3.1- 4.0 which implies that Biology teachers are highly aware of these items while Items 3, 4, 6, and 8 had their mean ratings between 2.5- 3.0 which means that Biology teachers are aware of these items. The table further revealed a grand mean score of 3.22 showing that Biology teachers in Delta state are not highly aware of the use of LMS in the teaching and learning of Biology.

Research question 2: What is the teachers' level of use of LMSs in Biology teaching and learning in Secondary Schools in Delta state in the post-COVID-19 Era?

Table 2: Mean and Standard Deviations of teachers' Level of use of LMS for Biology Teaching and Learning in Secondary Schools in Delta state in the post-COVID-19 era

S/N	Items on the level of use of LMS	N	$\bar{x}$	SD	Remarks
1	Moodle	317	3.51	.70	Frequently Used
2	TutorNG	317	1.44	.68	Not Used
3	TalentLMS	317	1.47	.84	Not Used
4	Schoology	317	2.64	1.14	Used
5	Google Classroom	317	3.53	.64	Frequently Used
6	Educe	317	1.84	.90	Rarely Used
7	Canvas	317	1.96	.97	Rarely Used
8	Blackboard	317	3.23	.83	Frequently Used
9	Gopius	317	2.05	.93	Rarely Used
10	TeachMe	317	3.21	.85	Frequently Used
	Grand mean		**2.49**		**Rarely Used**

Results in Table 2 showed the level of use of the items. Items 1, 5, 8 and 10 had their mean rating between 3.1- 4.0 which implies that Biology teachers frequently use these items for teaching. Similarly, item 4 had a mean score of 2.64 showing that biology teacher does use it also while Items 6, 7 and 9 had their mean rating between 1.5 - 2.4, showing that Biology teachers rarely use these items for teaching. On the other hand, 2 and 3 had their mean rating between 0.1-1.4 which implies that Biology teachers do not use these items for teaching. The table further revealed a grand mean score of 2.49 meaning that Biology teachers in Delta state rarely use LMSs in the teaching and learning of Biology.

Research question 3: What are the challenges militating against the use of LMS for Biology teaching and learning in Secondary Schools in Delta state in the post-COVID-19 era?

Table 3: Mean and Standard Deviations of the challenges militating against the use of LMS for Biology teaching and learning in Secondary Schools in Delta state in the post-COVID-19 era

S/N	Items on the challenges militating against the use of LMS	N	$\bar{x}$	SD	Remarks
1	Poor electricity supply in schools	317	3.60	.57	Agree
2	Lack of skilled teachers on the use of LMS in for teaching purpose in schools	317	3.58	.66	Agree
3	Lack of training programme such as workshop and seminar in schools on use of LMS for learning purposes	317	3.40	.69	Agree
4	High cost of mobile data for internet connection	317	3.26	.82	Agree
5	Lack of support in form of funding from government	317	3.35	.80	Agree
	Grand mean	**317**	**3.44**		

Results in Table 3 showed that all the 5 items had their mean ratings between 3.1- 4.0 which implies that Biology teachers agreed that these items are among some of the challenges militating against the use of LMS for Biology teaching and learning in Secondary Schools in Delta state. The table further revealed a grand mean score of 3.44 meanings that Biology teachers in Delta state agreed that the above item are the challenges militating against the use of LMS for Biology teaching and learning in Secondary Schools in Delta state in the post-COVID-19 era.

Research question 4: What are the strategies for effective use of LMS for Biology teaching and learning in Secondary Schools in Delta state in the post-COVID-19 era?

Table 4: Mean and Standard Deviations of the Strategies for Effective use of LMS for Biology Teaching and Learning in Secondary Schools in Delta state in the post-COVID-19 era

S/N	Items on Strategies for Effective use of LMS	N	$\bar{x}$	SD	Remarks
1	There should be regular supply of electricity in schools to enable LMS usage	317	3.56	.65	Agree
2	Employment of more skilled teachers on the use of LMS for teaching purpose in schools	317	3.54	.69	Agree
3	training programme such as workshop and seminar in schools on use of LMS for learning purposes	317	3.36	.71	Agree
4	Installation of high-speed subsidized internet connections in schools	317	3.23	.84	Agree

5	Provision of more funds to support ICT initiatives in school by government	317	3.30	.82	Agree
	Grand mean		**3.39**		**Agree**

Results in Table 4 showed that all the 5 items had their mean ratings between 3.1- 4.0 which means that Biology teachers agreed that these items are among some of the strategies for effective use of LMS for Biology teaching and learning in Secondary Schools in Delta state. The table further revealed a grand mean score of 3.39 meanings that Biology teachers in Delta state agreed that the above item are the challenges militating against the use of LMS for Biology teaching and learning in Secondary Schools in Delta state in the post-COVID-19 era.

Discussion

The findings of this study were discussed in this section, and were presented based on the research questions. The result from research question one showed that Biology teachers in Delta state are highly aware of the use of LMS in the teaching and learning of Biology in secondary schools in post COVID-19 era. They have high awareness level in the use of Moodle, TutorNG, Google Classroom, Canvas, Gopius and TeachMe while TalentLMS, Schoology, Educe, and Blackboard reflect that they are just aware of their uses. This result is understandable due to the effort of Delta state government in championing e-learning during the pandemic. The findings are in agreement with the findings of Ifi (2021) and Obiakor *et al*. (2021) who stated that teachers are highly aware of the use of LMS in teaching. However, Morrison *et al*. (2021) and Sarasa-Cabezuelo, (2021) argued that teachers are not aware of the use and importance of LMS in the teaching of sciences.

Research question two revealed that teachers rarely use LMS in the teaching and learning of Biology in secondary schools in Delta state in post COVID-19 era. This result showed that although they are aware of the use of

LMS in teaching but they rarely use it. This finding is in line with the findings of Namada (2021) and Ukala (2018) who found that teachers rarely use innovative strategies in the teaching of Biology. In contrast, Shine & Heath (2020) and Ziraba *et al*. (2020) found that teacher exude to a high extent the use of innovative teaching strategies.

Research question three showed that all the listed items such as; Poor electricity supply in schools, Lack of support in form of funding from government, High cost of data for internet connection, Lack of skilled teachers on the use of LMS for teaching purposes in schools and, Lack of training programme such as workshop and seminar in schools on use of LMS for learning purposes are some of the challenges militating against the use of LMS in Biology teaching in Delta state in post COVID-19 era. This finding is in line with the findings of Ukala (2022), Oswal (2019) and Ukala and Ugwu (2019) who also found poor power supply and High cost of data for internet as the main challenge affecting the use of information technology in schools.

Lastly, the study identified strategies for effective use of LMS among teacher in secondary school to include; regular supply of electricity to schools to enable LMS usage, employment of more ICT skilled teachers, training of teacher on use of LMS for learning purposes, installation of Wifi in schools and provision of fund by government to buy computers and other gadgets. The findings agree with the findings of Ifi & Alonta (2021) training of teachers in the use of LMS for learning purposes; Washington (2019) regular supply of electricity to schools and Adov and Mäeots, (2021) installation of high-speed internet connections in schools. However, Namada (2021) and Shine and Heath (2020) found that government has provided enough ICT facilities in schools but blamed teachers for reluctant in using them.

Conclusion

Based on the findings of the study, the researchers therefore concluded that Biology teachers are aware of the use of LMS in teaching in learning purposes

however, they are rarely teaching with. The study also identified some of the challenges militating against the use of LMS in teaching in Delta state and also suggested possible strategies for effective use of LMS for teaching and learning in schools. The researchers are optimistic that if these strategies are carefully adopted, it will go a long way in encouraging teachers to teach biology using LMS.

Recommendation

Relying on the findings of this study, the researchers' recommended the following:

1. There should be regular supply of electricity to schools to enable the use of LMS enabled gadgets in schools.
2. Government should employment more skilled teachers on the use of LMS for teaching purpose in schools
3. School administrators should collaborate with government to organize training programme such as workshop and seminar in schools to train teachers on how to use LMS for teaching and learning purposes.

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