



E-LEARNING SYSTEM ADOPTION: A STUDY OF UNDERGRADUATE ASSESSMENT DURING COVID-19.

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Abstract

The undeniable significance of e-learning in education has led to a massive growth in e-learning most especially during covid-19 pandemic. Thus, evaluating the performance of e-learning-systems with the use of some performance metrics is vital to ensure successful delivery, effective use, efficiency and positive impacts on learners. This study was carried out in selected universities in South-West Nigeria having confirmed the kind of E-Learning system been adopted in all the universities partaking in this study, questionnaires was used to gather information from the respondents. The item in the questionnaire was adapted from various previous success measures and design of the questionnaire was guided by the literature review, previous survey questionnaires used in similar studies, and the research questions. Finally, R statistical tool was used for analysis of the data collected while python programming language was use to predict a model. Findings of the study reveal that students prefer the mix of online and classroom to studying online alone or studying in the classroom alone. In terms of usability, the most used LMS was Google classroom followed by Zoom. A larger percentage of the sample under study (77%) agrees that e-learning is effective in reaching learning goals.

However, analysis of data gathered has shown that there are still many issues that need to be closely considered before we can safely state that E-Learning and other related learning methods have contributed to the enhancement of student performance at higher levels of our education system in Nigeria.

Keywords: Internet technology, Survey, Analysis, Performance metrics

1. Introduction

The emergence of the Coronavirus launched significant concerns for the whole world (WHO 2020). As the COVID-19 virus continues to ravage all, the world is thrown into great dilemma. Institutions across the globe were closed down temporarily to protect students, teachers, and staff from possible infection (Vitric et al., 2021). Universities are gradually shifting their attention away from the physical form of classroom teaching and accepting the digital environment. Universally, eLearning is gradually substituting the physical teaching space, particularly during the emergence of the COVID -19 pandemic. One sure way to ensure that academic activities are not hampered is eLearning.



Electronic learning is a technology learning that plays a vital role in modern education and training (Guzman, et al 2021). E-learning refers to the use of computer network technology, primarily via the internet, to deliver information and instructions to individuals (Singh and Thurman, 2019). The adoption of the eLearning system has stimulated and resulted in rapid growth in the education sector which gives rise to the integration of technology and education to become a powerful tool (Al-Fraihat, Joy and Sinclair, 2017). The impulsive rise in eLearning adaptation is due to ease of access and positive outcomes for both students and teachers (Ali, 2019). Accordingly, Alam (2020) stated that the world has experienced a paradigm shift in education through prioritizing distance learning, primarily through online systems. This is considered a useful tool to overcome the current challenges posed by the emergence of the pandemic. However, as good as it looks, there have been arguments that the present crisis is not a normal situation in the provision of formal education, rather it could be described as an educational crisis as well. Thus, if tactically handled, this new normal can bring about several positive outcomes for both the students and lecturers. (Adnan, 2020)

Universities are under pressure to align their curriculums with the global initiatives that demand advanced incorporation of technological skills in education and this has become the new normal. Presently, all over the world, e-learning has been massively adopted as a means of distance learning, assessing school curriculum and delivering lectures due to the Coronavirus pandemic that hit the world. Most universities in Nigeria use Learning Management Systems (LMS) to deliver their course materials to the students. Regardless of the ever-increasing practice of using eLearning in the university, the performance of most of the applications does not motivate students to learn. Significant gaps exist between institutional interests and learner needs when it comes to eLearning, bearing in mind that an e-learning system is an information system that integrates human entities (i.e., learners and instructors) and non-human entities (e.g., learning management systems). It is crucial to investigate multiple dimensions of success to both entities.

On the other hand, there have been a series of complaints from students on the fact that most Learning Management System is not user friendly. In the light of the foregoing, the study seeks to assess student performance and acceptance of E-learning platforms regarding the eLearning system adopted during the Covid-19 pandemic in Nigeria. The findings of the study are expected to overcome the pertinent challenges in the adoption of e-learning and would recommend an alternative model for universities in southwest Nigeria. Due to the sudden emergence of the pandemic, most universities do not have sufficient time to design the course content and pedagogy to meet the academic requirements of the students, thus the result of the study would serve as a pivot on which the learning experience can be improved by making it more productive, user-friendly and accessible in the course of adoption of e-learning. In the same vein, it is anticipated that the e-learning process continues even after the surge of the pandemic given the uncertainties that prevail at the moment. Consequently, a novel learning

system emerges with the likelihood of the adoption of blended learning even after the pandemic is over. The findings would also help universities to update their e-learning system to facilitate the adoption of the digital learning platform effectively.

2. Related Works

The review of literature looks at previous scholarly research that reflects on the usage of E-Learning. E-learning is evolving as a way to train and enhance teaching and learning by combining different learning styles and varying delivery systems to create the best learning experience possible.

2.1. E-Learning System

The term eLearning has been in use since 1999 when the word was first utilized at a CBT systems seminar. New words also began to spring up in search of an accurate description such as "online learning" and "virtual learning". However, the principles behind E-Learning have been well documented throughout history, and there is even evidence that suggests that early forms of E-Learning existed as far back as the 19th century. Natarajan and Krishnan, (2015) did an analysis on the evaluation method for e-learning, where they proposed the concept of e-learning with the evaluation techniques available for it. The study stated that, due to the enormous growth of educational institutions, the advancement of information communication technology enhanced the way of learning and the resources available for learning and teaching are changing in a hybrid way. Therefore, e-learning has come in a big way from all types of organizations and higher educational institutions. Different methods of accessing the e-content are made available in a multimedia environment, as the technology helps to include the audio, video, animated files in the learning environment. His study gives an analytical study of some of the existing evaluation methods for e-learning, as it becomes necessary due to the growth of the e-learning environment. Valentina and Nelly (2014) work on the role alongside the advantage and disadvantages of the adoption of e-learning in tertiary education. This study gives a scholarly background to the study by reviewing some contributions made by various researcher sand institutions on the concept of e-learning, particularly its usage in teaching and learning in higher educational institutions.

In the same vein, Tagreed et al (2016) submitted that the success of an e-learning system depends on the understanding of certain antecedent factors that influence the student's acceptance and usage of such e-learning systems. The study provides a discussion of the current e-learning environments including their characteristics, limitations, advantages and the major factors that affect the acceptance of such technologies. It was concluded that a successful e-learning system should consider the personal, social, cultural, technological, organizational and environmental factors. Cidral, Oliveira, Di Felice, and Aparicio (2018) in their study, categorized e-learning from

2001 till 2016. The result revealed that studies from 2001 started with a focus on the intention to use, adoption, usability, course contents and customization and evolved later to include satisfaction. This study proposes a theoretical model integrating theories of information systems' satisfaction and success in the e-learning systems.

2.2. The Need to Evaluate E-Learning System

Evaluation is a way for determining the significance and effectiveness of a learning system with benefits such as error correction, establishing the users' point of view and reducing unsupportable design issues in a system. In the context of this study, the evaluation of the E-Learning system is to help enhance the design of the training and the design of the eLearning system. Some of the factors that determine the use and acceptance of the eLearning system are examined below.

Perceived Ease of Use: The perceived ease of use (PEOU) of a system refers to the degree to which an individual perceives that the use of a specific technology would not be complicated (Cheng, 2011). Previous researches have shown that the PEOU has a positive correlation with the Behavioral Intention to Use (BI), directly as well as indirectly (Cheng, 2012). In relation to e-learning, PEOU is referred to the extent to which a student is of the view that using an e-learning system will not require a lot of effort and will be easy to use. The interaction between students and e-learning is clear and comprehensible (Cheng, Wang, Moormann, Olaniran and Chen, 2012). Similarly, PEOU will influence the student's intention to directly or indirectly accept the e-learning system through the Perceived usefulness.

Self-Efficacy: The concept of general Self Efficacy was originally proposed by Bandura in his social cognitive theory. Self-efficacy is an individual's belief in her capability to perform certain behaviours or one's personal beliefs about her ability to perform certain tasks successfully (Bandura, 2012). Several studies have found that perceptions of self-efficacy influence decisions about what behaviours to undertake, persistence in attempting certain behaviors, and the actual performance attainments of the individual to those behaviours. In the E-Learning context, self-efficacy is interpreted as a student's self-confidence in his or her ability to perform certain learning tasks using an E-Learning system.

Attitude toward Using the System: Attitude toward using is the user's evaluation of the desirability of his or her using the system and it also refers to "the degree to which a person has a positive or negative feeling towards e-learning systems" (Escobar-Rodriguez and Monge-Lozano, 2012). It has been shown by various studies (Farahat, 2012) that attitude has a direct impact on behavioural intention. This study shows that users are likely to have a positive attitude if they believe that usage of technology will increase their performance and productivity.

Technical Support: The availability of technical support is one of the important factors in determining the acceptance of technology for teaching. A strong determinant of perceived ease of use is the technical support rendered as a facilitating condition and external control. Empirical evidence shows that E-Learning projects that were not successful in achieving their goals were those that do not enjoy the privilege of having access to technical advice and support.

Behavioural Intention to Use: Behavioral intention is a measure of the strength of one's intention to perform a specified behaviour. It's also a good predictor of actual usage of a technology that has received numerous empirical supports from prior studies. It was stated by (Fathema, Shannon and Ross, 2015) that Behavioral intention refers to the intent of the learners to employ e-learning systems, and involves persistent use from the present to the future. It has been shown by various studies (Ghosh, 2016) that behavioural intention to use directly and significantly influences the actual system use of e-learning.

Subjective Norm: Subjective Norm is measured as a portion of the social influence variables and denotes the perceived social pressure to carry out or avoid carrying out behavior (Al-Aulamie, 2013). The subjective norm refers to "the person's insight that most people who are important to him or her think he or she should or should not perform the behaviour in question" (Al-Busaidi, 2013). In certain situations, people may likely employ a system to conform to the requirements of other people, instead of focusing on their emotions and beliefs.

System Interactivity: The major elements of learning processes are the interactions among students themselves and the interactions between faculty and students. Major sources of developments in E-Learning have come via technologies that promote increased learner interaction. These interactions can be either synchronous or asynchronous. Thus, system interactivity is expected to be one of the factors that may be used to evaluate students' performance on E-Learning systems.

Perceived Usefulness: Perceived usefulness refers to the degree to which individuals expect the use of new technology can improve their job performance (Chinyamurindi and Shava, 2015). Various empirical studies have indicated that perceived usefulness is the primary determinant of the use of a specific technology (Chow, Herold, Choo, and Chan, 2012). The e-learning system can be considered as a tool of information technology, and the system will only be accepted by the students when they perceive that its use is going to improve their learning performance. Hence, to e-learning, perceived usefulness signifies the degree to which students are of the view that the use of the e-learning system is going to enhance their learning performance. Therefore, Perceived Usefulness is going to have an impact on their intention to directly or indirectly (through PEOU) accept and adopt the e-learning system.

3. Research Methodology

This study was carried out in selected universities in southwest Nigeria. Questionnaires were used to gather information from the respondents. The choice of a questionnaire for the collection of data was based on the fact that most studies on information system success have adopted use of questionnaire for the collection of data. The questionnaire items were adopted from studies of (Aydin & Tasci, 2005; Hussein, et al., 2007, Lašáková et al., 2017). The questionnaire was created with the use of Google form which was distributed online to the participants through their emails. R statistical tool was used for analysis of the data collected while python programming language was used to predict a model.

3.1. Study Population

In this study, the target population for this study comprises of the undergraduate students of the participating Universities that employed the eLearning platforms during the pandemic in South West region of Nigeria. Disproportionate stratified random sampling was used to select a total of thirty-five (35) students at undergraduate levels from each university. A total of Twenty Universities was studied, detailing: Five (5) Federal Universities, Six (6) State Universities and Nine (9) Private Universities. Thus, the overall sample size was 700 students' constituting 35 undergraduate students from each of the universities.

Population of Study

S/N	Name of University	Type of University
1	Adeleke University, Ede	Private
2	Joseph Ayo Babalola University.	Private
3	Ekiti State University	State
4	Obafemi Awolowo University	Federal
5	University of Lagos	Federal
6	Federal University of Technology, Akure	Federal
7	AdekunleAjasin University, Ondo	State
8	Fountain University, Osogbo	Private
9	University of Ibadan	Federal
10	Lead City University, Ibadan	Private
11	Osun State University, Osogbo	State
12	Covenant University, Ogun	Private
13	Redeemers' University, Ede	Private

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14	Babcock University	Private
15	Ladoke Akintola University of Technology	State
16	Lagos State University	State
17	Olabisi Onabanjo University	State
18	Federal University of Agriculture, Abeokuta	Federal
19	AfeBabalola University	Private
20	Oduduwa University	Private

4. Data Analysis and Interpretation

Respondents Age Distribution

Table: 1.0: Age distribution of the respondents

Age	Frequency	Percentage
20 or younger	124	17.714
21 – 25	420	60
26 – 30	141	20.143
31 and above	15	2.143
Total	700	100

Table 1.0. shows that about 18% of the respondents are 20 years of age or younger, 60% of the respondents are in the age range of 21-25 years of age, about 20% of the respondents are in the age range of 26-30 years of age and only 2% of the respondents are 31 or more years of age. This implies that the bulk of the respondents are youths.

Deformation status of the respondents

Table 1.2: Deformation Status of the respondents

Physical Deformation	Frequency	Percentage
No	646	92.29
Yes	54	7.71
Total	700	100

While accessing the effectiveness of e-learning, one of the variables that is worth exploring is the deformations status of the students because it tells a whole lot about the student's performance. It is

worth noting that deformation here refers to deformation that is difficult for the deformed to use the computer. For our sample, about 93% of the respondents do not have deformation that make computer usage difficult and about 7% of the respondents does have deformation that makes computer usage difficult.

Practice question adequacy

Table 1.3: Are the practice questions on LMS adequate as a learning tool?

Questions Adequacy	Frequency	Percentage
No	124	17.71
Yes	576	82.29
Total	700	100

From Table 1.3, it could be seen that about 83% of the respondents agree that the practice questions on the learning management system are adequate as a learning tool while about 17% of the respondents disagree.

Ease of understanding course content

Table 1.4: Ease of understanding course content

Simplicity	Frequency	Percentage
Agree	529	75.5714
Disagree	22	3.1429
Neither agree nor disagree	75	10.7143
Strongly agree	62	8.8571
Strongly disagree	12	1.7143
Total	700	100

Respondents were asked if the course content was simple and understandable and our result indicated that about 76% of the respondents agree, about 3% disagreed, about 11% were neutral, about 9%

strongly agree and about 2% strongly disagree. This implies that most of the respondents agree that e-learning courses are easy to understand.

Course well structured

Table 1.5: Course well structured

Structured	Frequency	Percentage
Agree	523	74.7143
Disagree	22	3.1429
Neither agree nor disagree	60	8.5714
Strongly agree	83	11.8571
Strongly disagree	12	1.7143
Total	700	100

Respondents were also asked if the course content was appropriate and was presented in a structured manner. The result indicated that about 75% of the respondents agree, about 3% disagreed, about 9% were neutral, about 12% strongly agree and about 2% strongly disagree. We notice that result in Table 1.5 is similar to the distribution of the responses in Table 1.4, this could explain the fact that most people found the course easy to understand because it was well presented and structured.

Effective in reaching learning goals

Table 1.6: Effective in reaching learning goals

Effectiveness	Frequency	Percentage
Agree	537	76.7143
Disagree	24	3.4286
Neither agree nor disagree	52	7.4286
Strongly agree	81	11.5714
Strongly disagree	6	0.8571

Table 1.6 depicts that about 77% of the respondents agree that e-learning is effective in reaching learning goals, about 3% of the respondents disagree, about 7% of the respondents were neutral, about 12% of the respondents strongly agree and about 8% of the respondents strongly disagree. Overall, a larger percentage of the sample under study agrees that e-learning is effective in reaching learning goals.

Effective for knowledge improvement

Table 1.7: Effective for knowledge improvement

Knowledge Improvement	Frequency	Percentage
Agree	487	69.57
Disagree	18	2.57
Neither agree nor disagree	47	6.71
Strongly agree	135	19.29
Strongly disagree	13	1.86
Total	700	100

Table 1.7 revealed that about 70% of the respondents agree that e-learning is effective for knowledge improvement, about 3% of the respondents disagree, about 7% of the respondents were neutral, about 19% of the respondents strongly agree and about 2% of the respondents strongly disagree. Overall, a larger percentage of the sample under study agrees that e-learning is effective for knowledge improvement.

Satisfactory online interaction with the instructor

Table 1.8: Satisfactory online interaction with the instructor

Online Interaction	Frequency	Percentage
Agree	468	66.86

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Disagree	50	7.14
Neither agree nor disagree	63	9
Strongly Agree	105	15
Strongly disagree	14	2
Total	700	100

Respondents were also asked if online interaction with the instructor is satisfactory and our result indicated that about 67% of the respondents agree, about 7% disagreed, 3% were neutral, 15% strongly agree and only 2% strongly disagree.

Difficulty using computer

Table 1.9: Difficulty using computer

Difficulty	Frequency	Percentage
A little	200	28.57
All the time	10	1.43
Never	338	48.29
Sometimes	152	21.71
Total	700	100

From Table 1.9, we notice that about 1% of the respondents have difficulty using the computer all the time, about 48% of the respondents never had difficulty using the computer, about 22% of the respondents sometimes have difficulty using the computer and about 28% of the respondents rarely have difficulty using the computer.

Tool preference

Table 2.1: Tool Preference

Tool	Frequency	Percentage
Online & physical Classroom	551	20.453

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Google Classroom	514	19.079
Zoom	393	14.588
Google Meet	322	11.952
Customized LMS	314	11.656
Blackboard	198	7.35
Classroom	117	4.343
Teachers Dashboard 365	117	4.343
ClassDojo	68	2.524
Courselle	68	2.524
Online	32	1.188
Total	2694	100

For comparison and evaluation, the selected e-learning platforms are evaluated based on their frequency of use. Specifically, our metric for selecting the most preferred management system is based on the frequency at which universities adopt them. Additionally, we have added the options of classroom and online for students who prefer classrooms and students who prefer online but with no particular preference. As outlined in Table 2.1, students prefer the mix of online and classroom to studying online alone or studying in the classroom alone. In terms of usability, the most used LMS was Google classroom followed by Zoom. The idea behind school preferring Google classroom over Zoom is intuitive because Google classroom is designed to completely replicate the real-world classroom digitally. According to (Bennett, 2020) “Zoom is a video-conferencing application with file sharing features while Google classroom is a class management application ideally suited for file sharing”. In essence, Google classroom is a class management application. Furthermore, ClassDojo turned out to be the least preferred, and the reason is not far-fetched. According to ClassDojo’s website (ClassDojo Inc., 2020), one of its missions is to give kids the learning experience they love. That is, ClassDojo is specifically designed for kids, as such; we expect it to have a low score in this case since we are dealing with tertiary institutions. Next in importance after Zoom is Goggle meet, this is because Zoom is generally preferred over Google meet when it comes to learning. According to (De-looper and Cohen,

2020), Zoom is generally preferable because of its features. Additionally, (Pathak, 2020), Google meet lacks most of the advanced features Zoom offers, and most importantly, it is ideal for large scale meetings. Since universities deal on large scales, we expect them to prefer Zoom to Google meet. Other platforms examined include customized LMS, Blackboard, Teachers Download 365, and Courselle but overall, Google classroom is the most preferred and ClassDojo is the least preferred.

5. Discussion

This study has revealed that e-learning is effective for university students in the south-western region of Nigeria without any regard to the student's course of study. The study has highlighted some e-learning variables that contribute to the success of students using e-learning. To put things into perspective, in comparing our results with the work of (Ali, Ahmed, and Hossain, 2018), our findings aligned with his findings in that, the content structure of e-learning is worthy to add value to the learning of the students and that e-learning is usable for active learning. This study found out that the respondents agree that e-learning is effective in reaching goals and effective for knowledge improvement. On the other hand, it is worth noting that our results are not directly comparable with his because we have used different proxies for content structure, but despite the fact of our inability of direct comparison, we could conclude that our results align with his.

Furthermore, Ali, Ahmed and Hossain, (2018) also found in their study that e-learning is applicable outside the classroom. In this study, respondents agree to knowledge confidence, that is, students are confident about their knowledge on the subject learnt via e-learning. Hence, our results align with their work. Additionally, Stack-Cutler, Parrilia and Torppa (2015) in their study about learning difficulties reported that there is a significant relationship between reading improvements and gains in academic achievements. In our study, we have also found that the average grade of students depends on their time spent studying and this relationship is statistically significant, as such, our results are consistent with the findings.

Penultimately, in comparing our findings with the work of (Panyajamorn, Suanmali, Kohda, Chongphaisal, and Supnithi, 2018), our results are consistent. They found students' satisfaction to be significantly influencing students' performance in both rural and metropolitan areas for different subjects. The result of this study revealed that respondents agreed that they were satisfied with their interaction with the online instructors, and we found satisfactory online interaction to significantly

influence students' performance, hence, we may conclude that our results are consistent. Panyajamorn, Suanmali, Kohda, Chongphaisal and Supnithi, (2018) also mentioned that, if students are highly satisfied, they tend to perform optimally. Surprisingly, even though we found a significant relationship between online interaction and students' performance in our study, the relationship turned out to be negative, and this necessitates further investigation. However, we suspected that the contradiction is a result of our difference in the definition of satisfaction.

Finally, Haverila, (2011) found a correlation between the prior experience of e-learning and learning outcomes, this is also consistent with our findings in this study. In our study, we could link this finding to the significant relationship that was observed between difficulties in using computers and students' performance. Here again, our results are not directly comparable because of the difference in proxies used, however, we could conclude that the findings are consistent, although our approach has a broader view in that, knowledge of computers is broader than just experience of e-learning.

6. CONCLUSION

These short studies evaluate the performance of E-Learning platforms used during the Covid-19 pandemic. Many students are not well prepared to take the challenge of studying through E-Learning, because of the unexpected complexities of the application of IT as a learning tool that requires commitment as there are no strict rules on the learning times. The perception is that the world has become smaller as a result of the immense progress made in the field of information and communication technologies. IT is accessible to all across the continents and the oceans through satellites, cables, and other such devices that have made man more independent and have increased his mobility by making distances shorter and communication faster. As the analysis of data gathered has shown that there are still many issues that need to be closely considered before we can safely state that E-Learning and other related learning methods have contributed to the enhancement of student performance at higher levels of our education system, irrespective of individual differences due to heredity and/or environment. It can be confidently said that there is still a long way to go before we can make the whole world harvest the benefits from the progress of science and technology.

This research elicited and examined several points of view in evaluating the performance of E-Learning platforms. The following are the recommendations of this study:

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- There is a need to carry out detailed research involving case studies based on survey questionnaires in various learning institutions which will ultimately give a better understanding of E-Learning performance aspects within the implementation process.
- There is a need for improvement in the quality of teaching and learning through E-Learning at each university and the content of the materials (course note, PPT, assignments, other activities) on E-Learning should be improved.
- There is a need for improved support service provided to E-Learning users at each university and ensure that E-Learning support staff should always consider making themselves available for assistance bearing in mind that the system is all about technology and it can develop technical faults at any time.
- There is a need to consider increasing the number of E-Learning support staff on campus so that ready-made assistance will always be available to users whenever they encounter problems in the process of using E-Learning at the universities.
- There is a need for regular upgrading of the system perhaps after 3-5 years to ensure that the system keeps pace with new developments and modifications. Part of the modification could include adding more activities to what is currently available on the system.

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