Deployment of Learning Management System (LMS) for Sustainable Open and Distance Education in Nigeria

[1]Nwizu, Stella C., [2]Onyima, John, and [3]Olori, Christian N.
[1]Centre for Distance and e-Learning, University of Nigeria, Nsukka.
Email: *stella.nwizu@unn.edu.ng*
[2]Department of Computer Science, University of Nigeria, Nsukka.
[3]Department of Adult Education and Extra mural Studies, University of Nigeria, Nsukka.

Abstract

The evolution of technology has significantly impacted on the realm of education, especially in the promotion and sustainability of open and distance learning. While educational approaches are undergoing transformative and innovative shifts that are embracing and adaptative, Learning Management Systems (LMS) was seen as, a cutting-edge technology poised to meet diverse needs of educators, students, and educational institutions. The paper therefore provides a concise historical antecedent of LMS in distance education, stating some salient features on its relevance to effective deployment in open and distance education in Nigeria.

Keywords: learning management system (LMS), distance education and sustainable innovation

1.0 Introduction

The evolution of distance education in recent times has witnessed remarkable progress in technology utilisation. Tracing its roots, Chukwunonso, Ibrahim, Selamat, Idama and Gadzama (2013) observe that distance education started from the humble beginnings in 1728 with the introduction of new shorthand method by Caleb Philip through weekly mailed lessons. The action continued with the use of correspondence by Isaac Pitman to teach shorthand in Great Britain, thus, leading to the integration of technology and the introduction of online learning programs at the K-12 level in 2008. In line with meeting the objectives of the United Nations Educational, Scientific and Cultural Organisation (UNESCO, 1985), in prioritizing education for all and sustainable development, open and distance education emerges as the most effective strategy to ensure the achievement of the goals.

The prevalence of distance education systems today is so widespread that any discussion on the integration of technology in learning is incomplete without acknowledging its application in distance education. Chukwunonso et al, (2013), observe that the present era has witnessed a complete transformation in the way they learn, play, and work, which is facilitated by the adoption of the Internet and web-based technologies. For instance, the Open University United Kingdom (OUUK), which served as a model for numerous other nations formulated comprehensive strategies and action plans to promote ICT education (Anene et al, 2014). In Malaysia, the Open University Malaysia (OUM) stands out as a pioneering academic institution that harnessed e-learning to deliver its academic programs (Anene et al, 2014). Notably, these technologies have served as "lifesavers" during and after the outbreak of the COVID- 19 pandemic by facilitating the swift transition to online learning, and at the time preventing a collapse of the educational sector.

2.0 The Need for Innovation in Open and Distance Education

Innovation in open and distance education stems from the evolving response to changing needs and demands of the diverse learners. These emerging areas involve the periodic policy revisions for sustainable development, the establishment of a quality culture, enhanced student support services, course content design, the development of ICT-based modules, evaluation methodologies and practices, interactive delivery modes, and collaboration with various enterprises. Hence, the application of new technologies in open and distance education provides an appropriate starting point for delineating the knowledge required in today's global society.

The impact of ICT in education is evident in the use of devices and tools such as multiple media in the teaching-learning process. Although, the integration of ICT into education is multifaceted, Rahman (2014) stipulates that it involves not only technology, but also curriculum and pedagogy, institutional readiness and teachers' competencies among others. Hence, one of the benefits OF ICT is the use of various strategies by the facilitators to actively arouse learners' interest. Consequently, the presence of innovative practices such as ICT-enabled online student registration, program delivery, assignment and project report evaluation, online examinations, availability of results online, accessibility of self-learning materials in a digital repository, is capable of meeting diverse needs of learners in open and distance education.

Information and Communication Technologies (ICTs) encompass tools, equipment, machines, gadgets, and application support systems used for gathering, storing, retrieving, using, transmitting, manipulating, and distributing information with precision and efficiency. These technologies foster communication, enhance decision-making and problem-solving skills. In serving various functions in education, ICT is routinely incorporated into daily classroom teaching, open and distance learning, and online education, establishing virtual classrooms and proven to be an effective tool and medium for formal, non-formal, and informal education.

While advocating a paradigm shift in the learning environment, ICT has the potential of transforming the traditional views and methods of teaching and instruction from content-based testing to problem-solving and competency-based assessment, shorter duration examinations, flexibility of time limits, open-book examinations, self-assessment, peer assessment and feedback, maintaining a daily diary, and emphasis on continuous evaluation. The use of ICT tools for evaluating student progress serves as an innovative and user-friendly assessment and evaluation systems in ODL, providing an evidential base and establishing linkages between course structure, instructional delivery, and student expectations. Agreeably, management and evaluation are crucial components of managing the ODL system. Hence, scholars maintain that encouraging learners to maintain e-portfolios, utilizing them as assessment and evaluation tools, particularly in online academic programs have begun in some open and distance universities (Chaudhary & Dey, 2013).

3.0 Learning Management System (LMS)

The efficient delivery of educational contents requires the establishment of a distance education model. One of such models is learning management system (LMS). LMS serves as a virtual platform for e-learning, facilitating the management, monitoring of students, content delivery, learning tracking, testing, communication, registration processes, and scheduling. West, Waddoups, and Graham (2007) report that the system offers various time-saving features that are

beneficial to instructors. In serving as pivotal for a virtual learning environment, LMS exhibits several common features namely:

- guiding students in the educational direction
- delivering knowledge in diverse formats, such as text, presentations, flash, video, audio, etc.
- facilitating interactive applications for students
- assessing students through assignments and examinations
- delivering results to students
- enabling communication between students (discussion boards, chat, email, etc.) and between students and teachers
- facilitating interaction between students and lesson content
- managing the registration process
- handling scheduling and class management
- maintaining records for students, teachers, and the system (logs)
- recording examination entries and results
- collecting homework
- managing grades
- generating reports
- tracking student attendance records
- distributing e-learning content online and fostering knowledge and idea sharing.

These attributes of LMS suggest there are several systems that are employed in achieving these features. Some of which are free. For example, Moodle, Claroline, ATutor), while others require payment (e.g., Blackboard, WebCT, among others) (Cavus, 2010). Among the open-source free LMS systems, Moodle is distinguished as one of the most effectively and popularly acclaimed system use.

3.1 Moodle LMS

Moodle is an acronym for Modular Object-Oriented Dynamic Learning Environment. It is among the open-source LMS systems and rivals commercially available alternatives. According to a recent survey and investigation, moodle is recognised as the most effective and widely utilised open-source LMS system currently accessible.

3.2 Compelling Attributes of Moodle

The following compelling attributes are attributable to Moodle:

- it operates as an open-source learning management system.
- installation is straight forward, whether on a local machine or across a network.
- educators can effortlessly create online lessons using the platform.
- it has a broad user group, frequent announcements and regularly introduction of new versions.
- it supports 75 different languages as of today, allowing users to choose the language for a given LMS session.
- used in over 215 countries globally, Moodle boasts more than 1,176,162 registered members on its website (Moodle, 2012).

- required no licensing fees, as it is freely distributed as open source under the General Public License (GPL). Institutions using Moodle invest time and resources only in creating lessons.
- developed with a Social Constructionist Pedagogy approach, thus, distinguishing itself from other LMS systems.
- effortlessly upload lesson notes prepared by facilitators in various formats (e.g., SCORM, flash, MP3, RSS, PowerPoint, PDF, Word).
- competes with commercial packages such as Blackboard and WebCT, holding a significant share in the education sector.
- it is utilised by renowned establishments.
- it is easily operated with an account from a web service provider.
- no programming skills are obligatory in its use.
- constant additions of new features, such as blogs or modules, are distributed free of charge.
- being an open-source package, security issues are addressed promptly compared to commercial LMS packages.
- the large user base, drawn by its free-of-charge nature, aids in testing and enhancing the system.
- is user-centric, making it easily accessible for any educational institution engaged in distance education without incurring fees.

3.3 Properties of Moodle learning Management System and Educators

Some of the properties of Moodle that promote its use by educators are briefly highlighted

- Moodle is grounded in and aligns with the principles of social constructivist pedagogy.
- It accommodates both face-to-face (synchronous education) and fully online education formats.
- As an interface, it functions seamlessly with simple, efficient, compatible, and low-tech internet browsers (e.g., Internet Explorer, Firefox).
- Lesson lists are transmitted to the internet through the service provider, and courses can be indexed using search engines like Google for guest users. Moodle allows the categorisation of lessons, enabling easy and targeted searches, even with several thousand lessons loaded and controlled within the LMS.
- WYSIWYG HTML editor facilitates the editing of various items such as resources and forums.
- It supports the incorporation of multimedia products like video, Flash, PowerPoint, Excel, etc.

Given its open-source nature and support from universities and user groups, new modules are continuously developed, added, and distributed to users without cost. These modules can be accessed and shared freely on the Moodle website (http://www.moodle.org), allowing interested parties to download and use the required modules effortlessly on their server computers.

3.4 Learning Activities and Modules in Moodle

Lesson: lessons can be saved and reused in subsequent years. All activities related to lessons are presented in a weekly format, allowing students to easily view and follow all semester activities through the internet,

Examination: The striking feature about the system is the advanced examination module. This module simplifies the setup of multiple-choice examinations and facilitates swift assessment. Consequently, any deficiencies in subjects taught through theory can be promptly identified, enabling a focused review of challenging questions and a re-delivery of related content. The examination module supports various question types, including single-answer multiple choice, multiple-answer multiple choice, fill-in-the-gaps, pairing answers, true-false questions, and even mathematical questions with region-based acceptance criteria. Examinations can be conducted not only during regular lecture hours, but also outside normal hours. The system introduces randomisation of question-and-answer order to eliminate reliance on memorisation in repeated examination conditions. Hence, students receive immediate feedback on their scores, access correct answers, and learn from their mistakes instantly. This transforms examinations into learning activities, granting students the opportunity to revise and improve their answers. Additionally, a percentage factor can be configured, reducing a student's mark for each incorrect answer if desired.

Assignment: The assignment module prompts students with questions based on classroom theory. Upon completing the assignments, students can upload result files (.doc, .xls, .cpp, .java, etc.) to Moodle. The system can automatically mark assignments, or educators can manually assess them with feedback provided to students, while results are sent automatically via email. Assignment hand-in dates are also restricted based on various criteria. Detailed records of a student's semester activities, including completed assignments and grades, are easily accessed.

Survey: Utilising Moodle's survey module, educators are able to efficiently gather student opinions on various topics. Feedback on lecture delivery, assignment difficulty, quizzes, and emerging ideas can be converted into a survey format. The Moodle survey module enables all students to participate and share their opinions, providing valuable insights to educators about the overall class level and opinions.

3.5 Communication Modules found within Moodle

Forum Module: Through Moodle's forum module, students are able to post their questions on a pre-established forum. The flexibility of using these forums both within and outside regular lesson hours for asking and answering questions empowers students to extend their learning activities beyond traditional class times. Furthermore, the forum facilitates the grading of messages. If desired, these grades can be translated into student marks, fostering a more efficient and higher-quality teaching environment. Monitoring all messages sent by students throughout the semester is easily manageable. For students hesitant to ask questions in a classroom setting, forums provide a comfortable alternative. Questions and answers from these forums can be compiled into a frequently asked questions section, serving as a valuable knowledge resource.

Wiki Module: A wiki is a repository of knowledge pages accessible to everyone and open for modification. In preparing course notes by educator using the module, students have the opportunity to contribute to or modify the notes as desired. Hence, Wiki allows for quick, easy

preparation and review of lecture notes, and promptly rectifying any errors. In addition, student modifications are trackable, and if desired, these changes could be reverted. Pages dedicated to each topic are categorised under different keywords, establishing links to Wiki pages whenever the corresponding keyword appears on the course website. Moreso, students can be encouraged to form groups and collaborate on Wiki pages for specific topics, fostering teamwork. The pages created by student groups can be modified, if necessary, by other students, ensuring quick error correction and the development of a knowledge environment for future use.

3.6 Distribution of Authorities within the Moodle

Moodle encompasses distinct roles with varying authorities and responsibilities:

(a) **System Administrator**: This role involves server preparation, including the installation of PHP, Apache, and MySQL. The System Administrator downloads Moodle and installs it on the server. They add teacher(s), open lesson(s), assign teacher(s) to lesson(s), and add students to the system. Additionally, they can perform system backups, restore the system if necessary, and address issues related to system operation.

(b) **Teachers:** contribute lesson syllabuses to the system, load assignments, prepare examinations, add offline sources, and set up communication tools like chat, forums, and blogs. They also integrate dictionaries into the system, create backups of their own lessons, and monitor students' progress and activities through logs.

(c) **Students:** enter the system using their usernames and passwords. They have access to lesson contents, prepare assignments, upload them to the system, take examinations, check results, establish communication with friends or instructors, download documents offline to their computers, and print them. They can also view their own performance levels in the class.

(d) **Guests:** are limited to searching within the system in specified areas.

4.0 Deployment of LMS in Distance Education

In recent years, there has been a substantial surge in the acceptance and utilisation of Learning Management Systems (LMS) across tertiary institutions all over the world. Colleges and universities in developed nations have successfully implemented online education platforms, allowing students to attend lectures, collaborate, and access learning materials from any device, anywhere, and at any time through the internet (Bahari, 2020). These systems often integrate multimedia tools such as video, text, and audio, along with communication tools such as email, chat, discussion forums, and assessment tools (Skulmowski &Rey, 2020). Despite the advantages of LMS, a significant number of colleges and universities in many developing countries, particularly in Africa experienced disruption of academic activities owing to poor knowledge of the system and the outbreak of COVID-19 pandemic. Statistics show that as of May 25, 2020, 990,324,537 learners across 130 countries, constituting 56.6% of the world's total enrolled learners, were affected by school closures resulting from the pandemic (UNESCO as cited in Husky. et al., 2020).

In contrast to the figure, tertiary institutions in countries like the US, UK, Germany, France, Cyprus, and Malaysia successfully integrated all teaching and learning activities to an online environment using various LMS following the disruption of traditional face-to-face method by COVID-19.The disruption caused by the pandemic, particularly in terms of the suspension of conventional face-to-face teaching methods, has had a detrimental impact on the sustainable

development of the global educational sector, especially in developing countries. Consequently, adopting e-Learning technologies such as LMS becomes imperative for the continuity of educational activities especially during pandemics. However, the uptake of LMS in Nigeria has been slow, with only a few institutions incorporating it for academic purposes (Yakubu & Muhammadou, 2019). These challenges are said to have some negative impacts on the sustainability of educational activities in Nigeria.

5.0 Challenges in the use of Learning Management System in Nigeria

The application of Learning Management Systems (LMS) in open and distance education in Nigeria is faced with several challenges. These challenges are briefly discussed:

1. **Limited Infrastructure:** many open and distance education study centres in Nigeria are characterised by inadequate technological infrastructure, such as reliable internet connectivity and electricity. Thus, hampering the seamless use of LMS, as both students and educators may struggle with access to online resources.
2. **Financial Constraints:** Many educational institutions in Nigeria, especially those in rural areas are not adequately funded. Implementing and maintaining an LMS requires adequate financial resources for its smooth and seamless operation.
3. **Inadequate Training:** poor training of both educators and students on how to use LMS pose a great challenge in educational system, as such restrains the overall effectiveness of an online learning experience.
4. **Content Relevance and Localization:** Some LMS platforms may not adequately cater for the content needs of Nigerian educational institutions. Thus, adapting the content to align with local educational standards and requirements is crucial for the success of LMS in the country.
5. **Resistance to Change:** resistance to the adoption of new technologies and a preference for traditional teaching methods is still on the increase in the educational system of the country. A pragmatic shift to online learning is needed for the successful integration of LMS into the educational system.
6. **Inadequate Technical Support:** Limited technical support for users serves as a contributing factor to the use of LMS. Technical issues may arise, and without prompt and reliable support, users may face disruptions in their online learning activities.
7. **Security Concerns:** Concerns about data breaches, unauthorised access, and other security issues may deter educational institutions from fully embracing LMS. Ensuring the security and privacy of sensitive educational data is therefore paramount.
8. **Electricity Challenges:** Inconsistent power supply constitutes a barrier to the use of LMS in Nigeria. Without a reliable power source, students and educators are restricted from optimally accessing online learning materials consistently.
9. **High Cost of Purchasing Electronic Devices:** Many students may not have personal devices, such as laptops or tablets, for accessing online learning materials owing to the high cost of the devices. Hence, are retrained from benefiting from the enormous advantages of LMS.
10. **Cultural and Linguistic Diversity:** Nigeria is culturally and linguistically diverse. Adapting LMS content to cater to this diversity and ensuring that educational materials are presented in multiple languages can be a complex challenge.

6.0 Way forward

The following are suggested as way forward in the use of Learning Management Systems (LMS) in Nigeria

1. **Infrastructure Development**
    - **Investment in Technology:** The government and educational institutions should prioritise investment in technology infrastructure, including improving internet connectivity and ensuring reliable power supply.
    - **Public-Private Partnerships:** Collaboration between the public and private sectors can facilitate the development of technology infrastructure.
2. **Financial Support**
    - **Government Funding:** The government should allocate funds specifically for the implementation and maintenance of LMS in educational institutions, especially in economically disadvantaged areas.
    - **Grants and Sponsorships:** Explore opportunities for grants and sponsorships from private organisations to support the adoption of LMS.
3. **Training Programs**
    - **Comprehensive Training:** Develop and implement comprehensive training programs for both educators and students on the effective use of LMS. Part of the content in the training should cover navigation, content creation, and troubleshooting.
    - **Continuous Professional Development:** Establish ongoing professional development programs to keep educators abreast of new features and best practices in using LMS.
4. **Content Localisation**
    - **Curriculum Integration:** Collaborate with LMS providers to ensure that platforms align with the local curriculum and educational standards.
    - **Development of Local Content:** Encourage the creation of educational content that reflects the cultural diversity and linguistic variations within Nigeria.
5. **Change Management**
    - **Awareness Campaigns:** Conduct awareness campaigns to highlight the benefits of online learning and address misconceptions. Emphasise how LMS can enhance the quality of education.
    - **Stakeholder Involvement:** Involve educators, students, parents, and community leaders in decision-making processes related to the adoption of LMS.
6. **Technical Support**
    - **24/7 Helpdesk:** Establish a dedicated helpdesk or support system to address technical issues promptly and assist users.
    - **Training for Local Support Teams:** Train local support teams within educational institutions to handle common technical challenges independently.
7. **Security Measures**
    - **Data Protection Policies:** Implement and enforce robust data protection policies to ensure the security and privacy of educational data.
    - **Regular Audits:** Conduct regular security audits of LMS platforms to identify and address potential vulnerabilities.

8. **Device Accessibility**
    - **Government Initiatives:** Implement government initiatives to provide affordable devices to students or establish technology hubs where students can access devices.
    - **Collaboration with NGOs:** Collaborate with non-governmental organisations (NGOs) to facilitate the distribution of electronic devices to students in need.
9. **Cultural and Linguistic Considerations**
    - **Multilingual Platforms:** Develop LMS platforms that support multiple languages to accommodate Nigeria's cultural and linguistic diversity.
    - **Cultural Sensitivity Training:** Provide training to content creators and educators on cultural sensitivity to ensure inclusivity in online learning materials.
10. **Research and Development**
    - **Research Initiatives:** Encourage research initiatives focused on understanding the impact of LMS in the Nigerian context and identifying innovative solutions to address challenges.
    - **Pilot Programs:** Conduct pilot programs in collaboration with educational institutions to test and refine LMS implementations before full-scale adoption.

References

Anene, J.N., Imam, H., and Odumuh, T. (2014). Problems and Prospects E-learning in Nigerian Universities. *International Journal of Technology and Inclusive Education (IJTIE)*

Bahari, A. (2020). Computer-assisted language proficiency assessment tools and strategies. *Open Learn. J. Open Distance e-Learn, 36*, 1–27.

Cavus, N. (2010). The evaluation of Learning Management Systems using an artificial intelligence fuzzy logic algorithm. *Advances in Engineering Software, 41(2),* 248-254.

Cavus, N., & Momani, A. M. (2009). Computer aided evaluation of learning management systems. *Procedia-Social and Behavioural Sciences, 1(1),* 426-430.

Chaudhary, S. & Dey, Niradhar. (2013). Assessment in Open and Distance Learning System (ODL): A Challenge. Open Praxis. 5.10.59441 open praxis 5.3.65.

Chukwunonso, F., Ibrahim, R. B, Selamat, A. Idama and Gadzama W. A. (2013). The Impact of the Internet and the World WideWeb on Distance and Collaborative Learning. *Paper presented at The Eighth International Multi-Conference on Computing in the Global Information Technology* in 2013.

Husky, M.M.; Kovess-Masfety, V.; Swendsen, J.D. (2020). Stress and anxiety among university students in France during Covid-19 mandatory confinement. *Compr. Psychiatry*, *102*, 152191.

Moodle (2012). *Moodle Statistics.* Retrieved from http://moodle.org/stats

Rahman, H. (2014). The role of ICT in open and distance education. *Turkish Online Journal of Distance Education (TOJDE), 15(4),* 162-169.

West, R. E., Waddoups, G., & Graham, C. R. (2007). Understanding the experiences of instructors as they adopt a course management system. *Educational Technology Research and Development, 55(1),* 1-26.

Skulmowski, A. & Rey, G.D. (2020). COVID-19 as an accelerator for digitalization at a German university: Establishing hybrid campuses in times of crisis. *Hum. Behav. Emerg. Technol.2*, 212–216.

Yakubu, M.N. & Muhammadou, K. (2019). Nigerian Instructors' Acceptance of Learning Management Systems: A Structural Modeling Approach. In *Proceedings of the IST-Africa Conference (IST-Africa), Nairobi, Kenya,* 8–10 May 2019; pp. 1–10. Available online: https://ieeexplore.ieee.org/document/9144032/