

IMPLEMENTING OPEN-SOURCE LEARNING MANAGEMENT SYSTEMS (LMS) FOR COST-EFFECTIVE ONLINE LEARNING IN FEDERAL COLLEGE EDUCATION (TECHNICAL) ASABA, DELTA STATE, NIGERIA.

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Abstract

This study investigated the feasibility and effectiveness of implementing open-source Learning Management Systems (LMS) in Federal College of Education (Technical) Asaba, as a cost-effective solution for online learning during these times of economic hardship. The study aimed to identify the potential benefits and challenges of adopting open-source LMS platforms, such as Moodle or Open edX in technical education programmes. A mixed-method approach was employed, combining both quantitative and qualitative data collection and analysis methods. The study's findings suggest that open-source LMS platforms can provide a cost-effective solution for online learning, reducing costs associated with proprietary LMS solutions. The study also identified potential benefits, including flexibility, customizability, and community support. However, challenges such as technical issues, training, and support are also highlighted. The study's results have implications for educators, policymakers, and administrators seeking to implement cost-effective online learning solutions in resource-constrained environments. Based on the study's results and findings that suggested that open-source LMS can be a viable option for institutions looking to enhance online learning while reducing cost, it was recommended that Federal College of Education (Technical) Asaba consider adopting open-source LMS platforms to enhance learning. Additionally, the college should provide technical support, training, and resources to ensure the successful implementation of open-source platforms.

Keywords: *Open-source; Implementation; Cost-effective; Online; Learning Management Systems (LMS).*

Introduction

The way People learn and school has changed drastically since the pandemic, and the need for effective online learning platforms has skyrocketed. Whether one is running corporate training, managing an online school, or simply looking to enhance educational experiences in a remote

area, Learning Management Systems (LMS) have become an essential part of the equation (Alalade, 2025). Also, the advent of technology has transformed the way People learn and teach. Learning Management Systems (LMS) have become an essential tool for online learning, enabling educators to deliver high-quality educational experiences to students (Kennedy-Ripon, 2025). Similarly, in today's fast-paced digital landscape, software training has become essential for businesses to remain competitive. As new tools and technologies rapidly emerge, ensuring that employees and users are up-to-date with the latest software skills is crucial for maintaining productivity and driving innovation. This is where Learning Management Systems (LMS) come into play, providing a structured platform to deliver, track, and assess software training (Dearmer, 2024). Learning management system (LMS) is a software application for the administration, documentation, tracking, reporting, automation, and delivery of educational courses, training programs, materials or learning and development programs (Ellis, 2024). They were designed to identify training and learning gaps, using analytical data and reporting and focused on online learning delivery but support a range of uses, acting as a platform for online content, including courses that are both asynchronous and synchronous based. In the higher education space, an LMS may offer classroom management for instructor-led training or a flipped classroom (Phillipo & Krongard, 2012). Modern LMSs include intelligent algorithms to make automated recommendations for courses based on a user's skill profile as well as extract metadata from learning materials to make such recommendations even more accurate (Aldahwan & Alsaeed, 2020). The learning management system concept emerged directly from e-Learning. They make up the largest segment of the learning system market. The first introduction of the LMS was in the late 1990s (Davis, Carmean & Wagner, 2009). LMSs have been adopted by almost all higher education institutions in the English-speaking world (Edutechnica, 2014). And have faced a massive growth in usage due to the emphasis on remote learning during the COVID-19 pandemic (Raza, Oazi, Khan, Salam, 2021).

A learning Management System (LMS) acts as a digital learning environment, bringing together all the materials, courses, assessments, and resources a learner might need in one place. Access to online course platforms is typically limited to registered users, with secure logins to ensure that only authorised learners and staff can participate. From the learner's perspective, an LMS provides a straightforward platform to access training content, complete assignments, join discussions, take tests, and monitor their progress. Everything is organised clearly, making it easy for learners to follow their path and stay engaged with the material. For educators and administrators, an LMS offers powerful tools for planning, managing, and improving educational delivery. They can build and update courses, enrol users, track engagement levels, measure completion rates, and spot areas where learners may be struggling. These insights help organisations fine-tune their training strategies and respond more effectively to user needs. Typically, LMS platforms support two main modes of learning: Online and Blended learning. Many classroom-based courses now include an LMS component for activities such as pre-reading, assessments, or ongoing discussions outside class time. Modern LMS solutions are also designed to work well on mobile devices. As more learners prefer studying on smartphones

or tablets rather than traditional computers, a mobile-friendly LMS ensures that learning remains accessible, whether at home, at work, or on the move. And not all Learning Management Systems (LMS) are created equal. They come in a variety of formats, each designed to meet different organisational needs, technical capabilities, and budgets. Broadly speaking, there are four main types: SaaS LMS (cloud-based); Installed LMS (on-premise); Custom built LMS; and Open-source LMS (Digital Samba, 2025).

Literature Review

Open-source LMS offer access to their underlying code, allowing organisations to customise the platform freely. While the initial download is often free, technical expertise is usually needed for installation, customisation, hosting, and long-term maintenance. Examples are: Moodle, Canvas (open-source editions). Key advantages include: high levels of flexibility and potential cost savings, provided one have the technical skills to manage it effectively (Digital Samba, 2025). The term 'open source' simply means that the software developers make the source code available to anyone who wants to view, copy, or modify that code (Kennedy-Ripon, 2025). "The open-source part means the code is freely accessible, which allows an individual to customize and modify the platform based on one's needs. They are popular with users who need a high degree of control over features and design, making them one of the best options for online learning software (Alalade, 2025). An open-source LMS is therefore a learning management system with freely available source code, allowing organizations to modify, customize and adapt or tailor the platform to their specific or unique needs without licensing fees. This flexibility makes open-source LMS an attractive option for schools, businesses, and nonprofit organizations looking for cost-effective and adaptable e-learning solutions. An open-source LMS's primary purpose is to provide a robust framework for creating and managing online courses, training programs, or collaborative learning environments. These platforms are designed to support a wide range of learning activities, from video lessons and quizzes to forums and progress tracking. They enable educators and administrators to maintain full control over their content, enhance the learning experience with custom features, and scale their systems to accommodate growth. However, managing an open-source LMS often requires significant technical expertise, self-hosting, and ongoing maintenance. Essentially, an open-source learning management system (LMS) is a software platform that facilitates the delivery, management, and tracking of educational or training content (Kolosky, 2024). Dutt (2024) also explained that an open source LMS is just like any regular learning management system. "The difference is that the source code is freely available for anyone to view & modify. Allowing users to customize the platform according to their specific needs. And the best part is all this comes without the constraints of licensing fees or proprietary restrictions. Open source learning management systems facilitate a wide range of learning activities. All while fostering a community-driven approach".

In comparison to Proprietary LMS, an open source LMS differ from proprietary LMS as the software is freely available for customization and use, Whereas proprietary software are owned by companies that charge for access and do not release the source code for public modification.

One can also secure an open source LMS because of their open nature that allows for continuous inspection and improvement by a global online community. However, a major part of handling security falls solely upon organizations. They must actively manage and update their installations to maintain security measures. While the software itself is free to use, there may be costs associated with hosting, customizing and maintaining the platform. And one can switch from a proprietary to an open source LMS but the process requires careful planning, data migration and potentially custom development. This is to ensure that all educational materials and user data are successfully transferred and supported (Dutt, 2024). The primary difference between an open-source LMS and a proprietary LMS lies in control and accessibility. Open-source LMS platforms allow organizations to freely access and modify the source code, offering complete customization to fit specific needs. In contrast, proprietary LMS platforms are owned and managed by vendors, offering limited flexibility in terms of customization and integrations. Proprietary platforms often require licensing fees, whereas open-source systems are typically free to use, although costs may arise for hosting, maintenance, and custom development (Dearmer, 2024).

Recent studies have highlighted the benefits of using open-source LMS platforms, including cost savings, flexibility, and customizability (Siemens, 2005; Downes, 2007). Open-source LMS platforms, such as Moodle and Open edX, provide a range of features and tools that support online learning, including course content delivery, assessment, and communication (Garrison & Anderson, 2003). "These platforms also offer a high degree of flexibility and customizability, allowing educators to tailor the learning environment to meet the needs of their students". Similarly, Dearmer (2024) opined that when it comes to delivering effective software training, organizations are increasingly turning to open-source Learning Management Systems (LMS). He then identified the top Five(5) advantages of using an open-source LMS for software training which covers: cost-effectiveness (no licensing fees and lower total cost of ownership); customization (Fully adaptable to specific training needs and workflows); scalability (Easily add users and features as the organization grows); security (Complete control over data privacy and security protocols); and community-driven support (Backed by a large, engaged community offering regular updates). He therefore added that whether it is building internal training programs or offering customer education, that understanding these benefits can help one make an informed decision. Dutt (2024) also outlined some benefits of Using an Open Source LMS and that includes; Flexibility & ease of customization; Zero costs associated with purchasing/renewing software licenses; Efficient allocation of resources; Rich community-driven support; Convenience of interoperability and integration; Complete environment ownership and independence. In the words of Kennedy-Ripon (2025), the benefits include: Harnessing the innovative power of community; infinitely adaptable to individual needs; completely transparent; better reliability; future proof for growth; unbeatably secure; cost effectiveness; long term on investment; customization and flexibility; building tailored learning experiences; scalability and control; multi-tenant capability; security and data privacy; self-hosting for enhanced control; active community and support; peer collaboration and open Innovation. In the same vein, Alalade (2025) noted that choosing an open-source Learning

Management System (LMS) can be a game-changer for an organization or individuals on a budget to deliver online courses or training programs. "Open-source solutions come with several benefits that can make them the right fit for many businesses, educational institutions, or even entrepreneurs. And these include: Cost-Effective; Full Customization; Ownership and Control of Data; Flexibility in Hosting Options; Community Support and Development; and Constant Innovation and Improvements".

Despite the benefits of open-source LMS platforms, studies have also highlighted several challenges associated with their use. Sakthi (2025) noted that like everything else, open-source LMS platforms come with their own challenges including the fact that they require technical expertise; have limited dedicated support; a longer implementation time; and there can be security risks if it's not managed properly. Similarly, Rovai (2002) and Moore & Kearsley (2011) asserted that these challenges include technical issues, training and support. Additionally, open-source LMS platforms often require significant technical expertise to install, configure, and maintain, which can be a barrier to adoption for some institutions (Garrison & Anderson, 2003). Dutt (2024) opined that while an open source learning management system offers a myriad of advantages, there also exist some crucial constraints. "Note that these are not deal-breakers but rather considerations that must be weighed. And these include: Certain levels of technical expertise; additional costs for assistance, support or troubleshooting; Lack of predictability and immediacy in the community; resource-intensive customisation and updation Integration with existing systems or third-party tools; lack of a user-friendly interface, posing a steep learning curve; Comparatively higher training and adaptation time; Inconsistent quality of plugins and add-ons; certain security challenges with the freely available source code; and Inconsistent updates and maintenance".

Recent studies have investigated the effectiveness of open-source LMS platforms in enhancing online learning. These studies have reported positive outcomes, including improved student engagement, motivation, and learning outcomes (Papaioannou, Volakaki, Kokolakis & Vouyioukas, 2023; Yun, 2014). Research.com (2025) then listed what it referred to as ten (10) best open source Learning Management System (LMS) and their Performance capabilities. And these include: TalentLMS(4.5/5); Connecteam(4.55/5); IspringlearnLMS(5/5); AbsorbLMS(4.75/5); SkyPrep(4.45/5); 360Learning(4.5/5); eFront(4.5/5); WorkleapLMS(4.5/5); Ispring suite(4.5/5); Talentcards(4.4/5); Learnworlds(4.5/5); Goskills LMS(4.7/5); LearnDash(4.1/5); BrainCert(4.35/5); Gurucan(4.4/5); Chamilo(4.45/5); Groundwork1(4.45/5); Amploo(4.8/5); Blackboard(3.75/5); Domestika(4.35/5); NEO LMS(4.5/5). It also noted that 10% of teachers felt unprepared to use LMS platforms due to a lack of ICT literacy. Kolosky (2024) however introduced a no-code alternative called "Knack" which stand out as a compelling no-code option. "It Provides extensive customization through an intuitive no-code interface, enabling users to tailor their LMS without technical expertise; Offers predictable pricing with built-in hosting, security, and support, eliminating hidden costs; Provides vendor-backed support, ensuring reliability and security without the need for dedicated IT staff; Scales effortlessly with cloud-based infrastructure, making it easy to deploy

and expand without technical roadblocks; Highly customizable, widely used in academia, large plugin ecosystem".

To choose the right open-source the first stage in the process is to: Identify the needs; Select the right open-source LMS; Choose Customization and Integration with other platforms; do a thorough test run before implementing it; and ensuring a seamless transition through Training and support/ongoing Assistance (Paradiso, 2025). Alalade (2025) then went further to outline and explain the basic Criteria for Selecting or choosing the Best Open-source LMS that one should consider to ensure the platform fit, suit or meet specific need of one's organization. These are: User-Friendliness (A good LMS should be easy to use for both instructors and learners, especially those new to online learning. And Platforms with intuitive interfaces and clear workflows should be prioritized); Customization & Flexibility (The ability to modify the platform to suit the organization's unique requirements is crucial. Go for open-source tools that allow extensive customization, from branding to functionality); Features & Functionality (Essential LMS features like course creation, assessments, collaboration tools, and reporting were key in choosing the best LMS for online training. Special attention should be given to tools with robust support for multimedia content and interactive learning); Scalability (Whether it is a small business or a large university, the LMS needs to grow with the organization. When selecting the best platforms, consider a platform that can handle a growing number of users, courses, and integrations); Cost (While all these tools are free LMS platforms, the hidden costs of hosting, maintaining, and scaling the platform must be considered too). However, Dutt (2024) bypassed the crucial and challenging part of choosing the right open source LMS by offering a step-by-step guide which includes: Assess the technical capabilities of the team. Some platforms may require more technical expertise for customization and maintenance; Consider the scalability of the system. Ensure it can grow with the organization while accommodating an increasing number of users and online training courses; Evaluate the features and functionalities crucial for the educational objectives; Customer support and service is another vital aspect; Additionally, review the LMS's security features and compliance with data protection regulations; and lastly, factor in the total cost of ownership. Including potential expenses for hosting and customization. "These factors depend mostly on the organization's specific needs and goals. And selecting the right open source LMS involves a balanced consideration of these. Ultimately getting a platform that aligns with the educational strategy and tech infrastructure".

The global economic landscape has been marked by unprecedented challenges, including recessions, pandemics, and conflicts, which have significantly impacted education systems worldwide. In Nigeria, the economic hardship has led to reduced funding for education, resulting in infrastructure decay, inadequate resources, and decreased access to quality education. Federal College of Education (Technical) Asaba, with a student population of about 1850 and 350 teaching staff and 400 non-teaching staff is facing significant challenges in providing quality technical education due to inadequate resources and infrastructure. The high cost of proprietary LMS solutions has limited the college's ability to adopt online learning, exacerbating the challenges faced by students and educators.

The purpose of this study is to investigate the feasibility and effectiveness of implementing open-source LMS platforms in Federal College of Education (Technical) Asaba as a cost-effective solution for online learning. The specific objectives are:

1. To investigate the feasibility of effective implementation of the open-source LMS platforms in Federal College of Education (Technical) Asaba.
2. To identify the potential benefits of adopting open-source LMS platforms in technical education programmes.
3. To Identify the potential challenges of adopting open-source LMS platforms in technical Education programmes.
4. To examine the impact of open-source LMS platforms on student learning outcomes and engagement.
5. To investigate the cost-effectiveness of open-source LMS compared to proprietary LMS platforms.
6. To Identify Strategies for successful implementation of open-source LMS platforms.

The following questions were formulated and answered in the course of the study. These included:

1. How feasible is the effective implementation of the open-source LMS platforms in Federal College of Education (Technical) Asaba?
2. What are the potential benefits of adopting open-source LMS platforms in technical education programmes?
3. What are the potential Challenges of adopting open-source LMS platforms in Technical education programmes.
4. Do open-source LMS platforms have an impact on student learning outcomes and engagement?
5. How cost effective is the open-source LMS compared to proprietary LMS platforms ?
6. What Strategies could be adopted for successful implementation of the open-source LMS platforms in the college?

Methodology

This study employed a mixed-methods approach, combining both quantitative and qualitative data collection and analysis methods. The study used a survey research design to collect data from a sample of 300 respondents, comprising teaching staff, non-teaching staff, and students of Federal College of Education (Technical) Asaba. The population of this study consists of 350 teaching staff, 400 non-teaching staff, and 1850 students of the College. A sample size of

300 respondents was selected using a stratified purposive sampling technique. This technique involved dividing the population into distinct subgroups (strata) and then purposively selecting samples from each stratum who were ICT literate and knowledgeable in the operations of online programs. The strata were teaching staff, non-teaching staff, and students. The sample comprised: 46 non-academic staff; 41 academic staff; 213 students. The study used the following data collection instruments: A self-administered questionnaire was designed to collect quantitative data on the benefits and challenges of implementing open-source LMS platforms. The questionnaire comprised closed-ended questions with Likert scale responses; Semi-structured interviews was conducted with a subset of respondents to gather qualitative data on their experiences and perceptions of open-source LMS platforms. The study employed descriptive statistics to analyze quantitative data. Descriptive statistics involving, mean, median and standard deviation were used to summarize and describe the characteristics of the sample. To ensure the reliability and validity of the data collection instruments, the questionnaires were pilot-tested with a small group of 21 respondents. The questionnaires were also reviewed by experts in the field to ensure content validity.

Results

Research Question-1: How feasible is the effective implementation of the open-source LMS in Federal College Of Education?

Table-1: Feasibility of the effective implementation of the open-source LMS.

Statements/Item,	SA	A	D	SD	RM
1. Highly Feasible to Implement	199(66.3%)	95(31.7%)	6(2%)	-(0%).	3.6

Finding-1: From table-1, the result outcome revealed a positive perception of teaching staff, non-teaching staff and students Population. 294 Respondents, which is 98% of the total 300 respondents agreed or Strongly agree that it is highly feasible to effectively implement the open-source LMS platforms in Federal College Of Education. The remaining Six (6) respondents who incidentally were all non-teaching members of staff, however disagreed and maintained that it is not feasible to effectively implement this LMS platform in the College.

Research Question-2: What are the potential Benefits of adopting open-source LMS for technical Education?

Table-2: Potential Benefits of Adopting Open-source LMS.

Statements/Items	SA	A	D	SD	RM
Benefits Exist in Use of Open-source	282(94%)	18(6%)	-(0)	-(0)	3.94
1. Cost Saving	279(93%)	21(9%)	-(0)	-(0)	3.93
2. Highly Flexible	270(90%)	30(10%)	-(0)	-(0)	3.90
3. Customization and Adaptability	268(89.3%)	32(10.7%)	-(0)	-(0)	3.89

4. Adding more Users and Features	264(88%)	36(12%)	-(0)	-(0)	3.88
5. Security & control in Data Privacy	261(87%)	39(13%)	-(0)	-(0)	3.87

Finding-2: From table-2, the total 300 respondents or 100% of the total respondents agree or Strongly agree that a lot of benefits accrue in the use of open-source LMS for online learning in Technical Education and listed the benefits in hierarchical order which included: Cost Saving; highly Flexible; adaptable to different needs(Customization); easily adds Users/Features with growth (Scalability); security and control over Data Privacy; community driven Support and regular updates; efficient allocation of Resources; compatible to other Technologies without Constraints; complete Ownership and Independence; high Innovations in development; high collaboration across industries; easy expansion of Learning Platforms; encourages personalized Learning; convenience of Interoperation and Integration; room for adjustment and re-distribution of software codes; complete transparency; multi-Tenant capabilities; highly reliable; long term returns on investment; and available tools and features to support online Learning, training, communications and Assessment. All these recorded responses means that range from 3.56 to 3.93, all greater than the average benchmark response mean of 2.50.

Research Question-3: what are the Potential Challenges in adopting the open-source LMS platforms for Technical Education?

Table-3: Potential Challenges in Adopting Open-source LMS

Statement/Items	SA	A	D	SD	RM
Challenges exist in Adopting open-source	99(33%)	201(67%)	-(0)	-(0)	3.33
1. Inadequate Technical Expertise	273(91%)	27(9%)	-(0)	-(0)	3.71
2. Additional Cost to assist/support	261(87%)	39(13%)	-(0)	-(0)	3.64
3. Unreliability of Network	258(86%)	42(14%)	-(0)	-(0)	3.59
4. Inconsistent Power Supply	255(85%)	45(15%)	-(0)	-(0)	3.57
5. High Cost of Local Data	252(84%)	48(18%)	-(0)	-(0)	3.54

Finding-3: From table-3, the total 300 respondents which is 100% of the total respondents also agree or Strongly agree that challenges existed in spite of so many listed benefits of open-source LMS use for online learning. The total number of Respondents that agree or Strongly agree on individual challenges range from 207 to 273 respondents which is 69% to 91% of the total 300 respondents. These also recorded response means that range from 3.36 to 3.71 which were all greater than the average benchmark response mean of 2.50. These in hierarchical order include: Inadequate Technical Expertise to install, configure and maintain, 273 (91%), 3.71; Additional cost to assist, support and troubleshoot, 261(87%), 3.64; Unreliability of Network, 258 (86%), 3.59; Inconsistent Power Supply, 255 (85%), 3.57; High cost of Data locally, 252 (84%), 3.54; Infrastructure limitations, 243 (81%), 3.48; Training needs, 237 (79%), 3.46;

Inconsistent updates and maintenance, 231(77%), 3.44; Its Resource intensive nature, 228 (76%), 3.43; Absence of immediate predictability, 225 (75%), 3.42; High Training and Adaptation Time, 222 (74%), 3.41; Certain Security challenges, 219 (73%), 3.40; Inconsistent quality of Plugins and add-ons, 210(70%), 3.37; Lack of User-friendly interface, 207(69%), 3.36; and limited support, 207, (3.36).

Research Question-4: Do open-source LMS have impact on Students learning outcomes and Engagement?

Table-4: Open-source' Impact on Students Learning Outcomes and Engagement.

Statement/Items	SA	A	D	SD
Significant impact on Students Learning.	197(65.7%)	89(29.7%)	14(4.7)	-(0)

Finding-4: From table-4, 197 respondents or 65.7% of the total 300 respondents strongly agree that the use of open-source LMS has a significant impact on student learning outcomes and engagement; 89 respondents or 29.7% of the total respondents, simply agreed. The remaining 14 respondents or 4.6% of the total respondents however disagreed. Ten (10) out of these 14 respondents were non-teaching staffs while the remaining four (4) were teaching staff. Most respondents adduced the reasons for such impacts as mainly due to the popular use of modern day ICT gadgets and Facilities including Smartphones, Palmtops, Tablets, Smartwatches, Laptops and Desktop Computers. This essentially leads to improved student engagement, motivation, and participation in online learning activities. Also its ability to provide a robust framework for creating and managing online courses, training programs, or collaborative learning environments. Another reason given was the fact that the platforms are designed to support a wide range of learning activities like video lessons and quizzes to forums and progress tracking. Another factor is the fact that it enables educators and administrators to maintain full control over their content, enhancing the learning experience of students with custom features, and scale their systems to accommodate growth.

Research Question-5: How cost effective is the open-source LMS compared to proprietary LMS platforms?

Table-5:Level of Cost Effectiveness of Open-source Compared to Proprietary LMS.

Statement/Items	SA	A	D	SD	RM
1. A cost effective Platform	216(72%)	84(28%)	-(0)	-(0)	3.72
2. Significantly more cost effective	209(67.7%)	91(30.3%)	-(0)	-(0)	3.70
3. Slightly more cost effective	-(0)	90(30%)	30(10%)	180(60%)	1.70
4. Not more cost effective	-(0)	-(0)	96(32%)	204(68%)	1.32

Finding-5: From table-5, the entire 300 respondents which is 100% of the total respondents agree or Strongly agree that the open-source LMS platform is a cost effective platform to use.

But compared to the proprietary LMS however, 209 out of the total 300 respondents which is 69.7% of the total, strongly agree that it is significantly more cost effective in comparison. The remaining 91 or 30.3% of the total respondents simply agreed. 90 (30%) respondents agreed to the remark that it was slightly more cost effective while the remaining 210 or 70% of the total respondents disagreed or strongly disagreed. 300 or 100% of the total respondent either disagreed or strongly disagreed that the open-source LMS is not more cost effective than Proprietary LMS. The reasons adduced for its cost effectiveness were the absence of licensing fees or payment of user subscriptions; more flexibility in hosting options so People can choose cost-efficient solutions; and that Customization and scalability can be done without further financial constraints.

Research Question-6: What Strategies could be adopted for successful implementation of the open-source LMS platforms at Federal college of Education (Technical) Asaba?

Table-6: Strategies For Successful Implementation of Open-source LMS.

Statements/Items	SA	A	D	SD	RM
1. Assessment of Organizational Needs	298(99.3%)	2(0.7%)	-(0)	-(0)	3.99
2. Comprehensive Planning	297(99%)	-(0)	3(1%)	-(0)	3.98
3. Selecting/Choosing a Suitable LMS	293(97.7%)	-(0)	7(2.3%)	-(0)	3.95
4. Training for Staff and Students	291(97%)	2(0.7%)	7(2.3%)	-(0)	3.95
5. Content Development/Management	285(95%)	3(1%)	12(4%)	-(0)	3.87

Finding-6: From table and using a mixed method approach, respondents provided suggestions, explanations or/and recorded agreement with some listed guidelines and Strategies for the successful implementation of open-source LMS platforms in the College. These in hierarchical order showed their levels of necessity and importance and include: Assessment of Needs: 300 respondents or 100% agree or Strongly agree that this is extremely necessary and important with response mean of 3.99; Comprehensive Planning: 297 respondents or 99% agree or Strongly agree while 3 respondents or 1%, disagreed with response mean of 3.98; Selecting a Suitable LMS: 293 respondents or 97.7% agreed or Strongly agree. 7 respondents or 2.3% disagreed with response mean of 3.95. The remaining Strategies including: Training for Staff and students; Offering Support; Content Development and Management; Regular Monitoring; Periodic Evaluation; Check Infrastructure capacity; Carry out Robust Security; Do update and maintenance; Develop a change management plan; Engage and Adopt some users to encourage others; Backup Infrastructure to handle increased Traffic; Establish content Standards; Provide Pedagogical Support for staff; Encourage use of Resources; Develop clear Policies for use; Implement LMS in Phases; Communicate to Stakeholders regularly; Be adaptable and Flexible; recorded 266 (88.7%,) to 291 (97%) respondents that agree or Strongly agree that they were extremely important and necessary. These also had response means that range from 3.24 to 3.76, all higher than the average benchmark mean of 2.50.

Discussion of Findings

The outcomes revealed a positive perception among teaching, non-teaching staff and students Population that agree or Strongly agree that it is highly feasible to effectively implement the open-source LMS platforms in Federal College Of Education. No wonder Edutechnica (2014) asserted that LMSes have been adopted by almost all higher education institutions in the English-speaking world. And Raza et al (2021) added that they have faced a massive growth in usage due to the emphasis on remote learning during the COVID-19 pandemic.

The result revealed that a lot of benefits are obtained in the use of open-source LMS for online learning in Technical Education. These benefits included: Cost Saving; Flexibility; adaptable to individual needs; easily adds Users/Features with growth; security and control over Data Privacy etc. This result is in agreement with recent studies which have highlighted the benefits of using open-source LMS platforms, including cost savings, flexibility, and customizability (Siemens, 2005; Downes, 2007). "Open-source LMS platforms, such as Moodle and Open edX, provide a range of features and tools that support online learning, including course content delivery, assessment, and communication" (Garrison & Anderson, 2003). They opined further that these platforms also offer a high degree of flexibility and customizability, allowing educators to tailor the learning environment to meet the needs of their students.

The result showed that challenges existed in spite of so many listed benefits of open-source LMS use for online learning. And these included: Inadequate Technical Expertise to install, configure and maintain; Additional cost to assist, support and troubleshoot; Unreliability of Network; Inconsistent Power Supply; High cost of Data locally; Infrastructure limitations; Training needs; Inconsistent updates and maintenance; Its Resource intensive nature etc. This is in agreement with the submissions of Sakthi (2025) that like everything else, open-source LMS platforms come with their own challenges including the fact that they require technical expertise; have limited dedicated support; a longer implementation time; and there can be security risks if it's not managed properly. Similarly, this finding finds relevance in the observations of Rovai (2002) and Moore & Kearsley (2011) that these challenges include technical issues, training and support. "Additionally, open-source LMS platforms often require significant technical expertise to install, configure, and maintain, which can be a barrier to adoption for some institutions" (Garrison & Anderson, 2003).

This finding revealed that the use of open-source LMS online platforms has significant impact on students learning outcomes and engagement. This majorly or mainly was due to the popular use of modern day ICT gadgets and Facilities including Smartphones, Palmtops, Tablets, Smartwatches, Laptops and Desktop Computers. This essentially leads to improved student engagement, motivation, and participation in online learning. This result is in line with findings of recent studies that investigated the effectiveness of open-source LMS platforms in enhancing online learning and reported positive outcomes including improved student engagement, motivation, and learning outcomes (Papaioannou et al., 2023; Yun, 2014).

This finding showed that the open-source LMS platform is not only a cost effective platform but is significantly more cost effective than Proprietary LMS platform in comparison. This result is in agreement with the assertions of Dearmer (2024) that the most significant cost advantage of an open-source LMS is the absence of licensing fees. "Organizations can use the software without paying for user subscriptions, which can significantly reduce long-term costs, especially for large-scale training programs. Additionally, open-source LMS platforms allow for more flexibility in hosting options, enabling companies to select cost-efficient solutions. Customization and scalability are possible without the financial constraints often imposed by proprietary systems, making open-source LMS solutions more budget-friendly, particularly for growing organizations".

Results showed that respondents provided suggestions, explanations or agreed with some listed guidelines and Strategies for the successful implementation of open-source LMS platforms in the College. These Strategies include: Need Assessment-a) identify the institution's specific needs, b) note the goals to achieve through the LMS, c) conduct a thorough needs assessment among teaching staff, non-teaching staff, and students; Planning- Develop a comprehensive implementation plan in timelines, budgets, and resource allocation; Choose or select a Right or Suitable LMS- a) Moodle:Highly customizable, widely used in academia, and large plugin ecosystem, b) Open edX:Ideal for massive open online courses (MOOCs) and strong analytics tools, c) Sakai:Flexible and feature-rich, widely used in higher education institutions, d) ILIAS:Flexible online working and learning environment with a sophisticated authoring tool; Training- Provide comprehensive training for teaching staff, non-teaching staff, and students on the use of the LMS; Support- a) Offer ongoing technical support and resources, including documentation, tutorials, and help desks. b) Encourage peer-to-peer support and collaboration among users; Content Development and Management- a) Develop high-quality digital content that aligns with the institution's curriculum and learning objective. b) Establish clear guidelines and standards for content creation, management, and sharing. c) Utilize the LMS's built-in features for content organization, tracking, and assessment; Monitoring- Regularly monitor the LMS's usage, effectiveness, and user feedback; Evaluation- a) Conduct evaluations to assess the impact of the LMS on teaching and learning outcomes. b) Use data and insights to inform future development and improvement of the LMS; Infrastructure- - Ensure the institution's infrastructure can support the LMS, including server capacity, network bandwidth, and security measures; Security- Implement robust security protocols to protect user data and prevent unauthorized access; Update and Maintenance- Regularly update and maintain the LMS to prevent technical issues and ensure compatibility with new features and plugins; Management Change- a) Develop a change management plan to facilitate a smooth transition to the new LMS. b) Communicate the benefits and expectations of the LMS to all stakeholders. c) Encourage a culture of innovation and experimentation among teaching staff and students; User Engagement and Adoption- a) Identify enthusiastic staff members to champion the LMS, providing support and encouragement to peers. b) Establish a feedback system to collect user input, suggestions, and concerns. c) Recognize and reward staff and students for innovative uses of the LMS; Technical Infrastructure- a) Ensure the LMS can handle increased traffic and

user growth (Scalability) b) Integrate the LMS with existing systems, such as student information systems and library resources. c) Regularly back up LMS data and have a disaster recovery plan in place; Content Standards- Establish standards for content creation, ensuring consistency and quality; Pedagogical Support- Provide support for staff to develop effective teaching strategies using the LMS; Open Educational Resources-Encourage the use of open educational resources (OERs) to reduce costs and increase accessibility; Institutional Policy and Governance- a) Develop clear policies and guidelines for LMS use, including intellectual property, accessibility, and data protection. b) Establish a governance structure to oversee LMS development, maintenance, and support. c) Continuous Evaluation- Regularly evaluate the LMS's effectiveness and make data-driven decisions for improvement; Phased Implementation- Implement the LMS in phases, starting with a small pilot group; Communication-Communicate clearly and regularly with stakeholders about LMS developments and updates; Flexibility-Be flexible and adaptable, responding to changing user needs and technological advancements. By adopting these strategies, Federal College of Education (Technical) Asaba can ensure a successful implementation of the open-source LMS, enhancing teaching, learning, and administrative processes.

Conclusion

This study aimed to investigate the feasibility and effectiveness of implementing open-source Learning Management Systems (LMS) platforms in Federal College of Education (Technical) Asaba, Nigeria. The study's findings suggest that open-source LMS platforms can provide a cost-effective solution for online learning, reducing costs associated with proprietary LMS solutions. The study also indicate that academic staff, non-academic staff, and students have a positive perception of open-source LMS platforms, citing benefits such as flexibility, customizability, community support and cost-effectiveness. The study also found that open-source LMS platforms can lead to improved student engagement, motivation, and participation in online learning activities. However, technical challenges associated with implementing open-source LMS platforms, such as infrastructure limitations, technical support, and training needs, were also identified. While these challenges have been reported, the benefits of open-source LMS platforms make them an attractive option for educational institutions looking to enhance online learning. And strategies for successful implementation were also identified.

Recommendations

The study's findings have implications for policymakers, educators, and administrators seeking to implement cost-effective online learning solutions in resource-constrained environments. Based on the study's results, it is recommended that Federal College of Education (Technical) Asaba consider adopting open-source LMS platforms to enhance online learning and reduce costs. Additionally, the college should provide technical support, training, and resources to ensure the successful implementation of open-source platforms.

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