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AFRICA 2025

CONFERENCE

Schedule of Presentations & Book of Abstracts

Theme
Leveraging the Power of Disruptive Technologies for Africa's Educational Transformation

Hosted by the
National Open University of Nigeria (NOUN)

Date: Wednesday 8th - Friday 10th October, 2025
Venue: Shehu Musa Yar'adua Centre, Abuja Nigeria

Host
PROF. OLUFEMI A. PETERS
Vice-Chancellor, NOUN

Chief Host
BARRISTER NYESOM E. WIKE
Honourable Minister, Federal Capital Territory, Nigeria

MOODLEMOOT ASSOCIATION MEMBERS

SPONSORS:

Conference Day 1 - Thursday, 9th October 2025
Time: 2.15 - 4.15pm
Parallel session 1

Track 1: Inclusive Access and Student Success with Moodle	Track 2: Empowering Skills Development and Innovative Pedagogies with Moodle	Track 3: Building Sustainable and Innovative Moodle Ecosystems
Chair: Professor Johnson Opateye **Rapporteur:** Esther Akiode **Venue:** Atiku Abubarkar Auditorium	**Chair:** Dr Bwambale R. Ramadhan **Rapporteur:** Kehinde Akintola **Venue:** Board Room	**Chair:** Dr Catherine Nkude **Rapporteur:** Joshua Oladapo **Venue:** Meeting Room
Abstract ID - [64] Transforming African Higher Education: AI and Xr Integration in Moodle-Based ODL **Joseph Oju, Gregory Onwodi and Olufunke Rebecca Vincent**	*Abstract ID [18]* Innovative Pedagogical Approaches to Skills Development Through Moodle Based Microlearning in African Higher Education **Sulaiman Zakariyya Yakub u**	*Abstract ID [7]* Adoption of the Electronic Program Delivery Mode: Experiences of Faculty Members in Private Universities of Uganda **Christopher Samuel Mayanja**
Abstract ID [40] Dynamic Machine Learning Model Selection Using Bayesian Optimization-Driven Controller for Assessment Selection Classification. **Godwin Otu, Oludele Awodele and Adenike Adeniji**	*Abstract ID [20]* Leveraging Moodle to Enhance Facilitation of Library Science Courses Among Librarians at National Open University of Nigeria (noun) in South-East, Nigeria **Lucy Okonkwo**	*Abstract ID [2]* Strengthening Cybersecurity in Digital Learning Environments: A Foundation for Sustainable Educational Transformation in Africa **Abubakar Bello**
Abstract ID [41] Federated Learning for Intrusion Detection in IoT-Based Smart Home Ecosystems **Ifeanyi Nwokoro, Edgar Osaghae, Saheed Kayode, Tombari Sibe, Augustina Nebechi Nwatu, Muhammad Qaim Aliyu Sambo and Ifeanyi Eze**	*Abstract ID [33]* Securing the Future Classroom: A Zero Trust Framework for Building Digital Trust in Africa's Transformed Educational Ecosystems **Ayobami Mesioye, Adebayo Rufai and Johnson Oluwagbemi**	*Abstract ID [8]* Ontology-Driven Privacy and Security Integration for Moodle: Advancing Trustworthy Digital Learning Ecosystems in African Universities **Rofiat Ajagbe, Hamzat Olanrewaju Aliyu and Kingsley Ukaoha**
Abstract ID [16] Bridging the Digital Divide in Low - Connectivity Regions of Nigeria: Challenges and Strategies for Inclusive Access to Moodle **Mayowa Ajiboye, Oladayo Tosin Akinwande and Christopher Atabo Haruna**	*Abstract ID [88]* Combining Moodle and WhatsApp to Teach and Learning Basic Generative AI Literacy and Fluency **Karen Ferreira-Meyers**	*Abstract ID [4]* Towards a Model to Integrate Metaverse into Moodle LMS for Better Students' Experiences and Preferences in a Resource Constrained Higher Education Situation in Uganda Stephen Kyakulumbye* Uganda Management Institute **Stephen Kyakulumbye**

Abstract ID [53] Revolutionizing Academic Assessment: A Generative AI - Powered Moodle Plugin for Automated Assignment Marking **Lebato Tswaledi**	*Abstract ID [37]* M-Res: An Inclusive Moodle Framework for Health and Agricultural Extension Services in Sub-Saharan Africa **Emmanuel Onwuka Ibam and Olabisi Josh-Falade**	*Abstract ID [96]* The Effectiveness of Two-Factor Authentication (2FA) in Preventing Online Banking Fraud in Nigeria **Grace Egenti**
Abstract ID [62] Advancing Moodle for Digital Transformation: The Role of E – Learning and Curriculum Design at Sol Plaatje University **Godfrey Rudolph**	*Abstract ID [44]* An Exploratory Study to Investigate Academic Integrity Challenges in AI-Driven Assessments **Riana Prins**	*Abstract ID [9]* Optimizing E – Learning in Resource-Constrained Environments: A Scalable High - Performance Computing and Cloud-Based Model for Moodle Deployment **Chinedu Otuya, Afolayan A. Obiniyi, Joseph Sunday Igwe, Esther Ladan and Danladi Moses Adayilo**
Abstract ID [63] An Evaluation of Moodle-Based Teaching and Learning Strategies in Science Education: Implications for Tertiary Institutions **Mutiat Olawale and Benneth Uzoechi**	*Abstract ID [39]* Using Moodle-Based Learning Analytics for Early Alerts, Student Tracking, and Targeted Interventions: A Comprehensive Review **Jacob Oluwafemi Orimaye**	*Abstract ID [38]* Upskilling for Industry-Ready Learners: a Practitioner's Window to the COLEAD State-of-the-Art E-Learning Platform Powered by Moodle **Adegboyega David Sodade**
Abstract ID [25] Improving Student Success in ODL Through Learning Analytics: A Case for a Moodle Plugin in Nigeria **Olawale Koledafe, Eseosa Iyare, Blessing Iyare and Ramnarain Umesh**	*Abstract ID [86]* From Access to Empowerment: Using Moodle to Transition Students from Information Consumers to Knowledge Producers **Adetola Akanbiemu**	*Abstract ID [104]* Decentralised E-Assessment at National Scale: How Noun Leveraged Moodle for Secure Offline Examinations Across More than 120 Study Centres **Buhari Alhassan, Olugbenga D Ojo and Adewale Adesina**
Abstract ID [15] Impact of User-Centric Design Approach and Adaptive Learning Tools on E - Learning Platform **Folasayo Obayemi and Naeem Balogun**	*Abstract ID [42]* Empowering Skills Development and Innovative Pedagogies with Moodle **Adewale Odukogbe**	*Abstract ID [36]* Moodle Meets AI: a Smarter Way to Support Students **Sean Marx**
Abstract ID [77] Institutional Strategies and Student Perceptions of Inclusive Access to Pedagogical Content Through Moodle: The Noun Experience **Adetola Akanbiemu and Felix Olakulehin**	*Abstract ID [35]* Harnessing AI-Enhanced Moodle to Advance Equitable Higher Education and Workforce Readiness in Sub-Saharan Africa: A Mixed - Methods Study **Johnson Oluwagbemi and Ayobami Mesioye**	*Abstract ID [31]* Secure Local Hosted Online Assessments in African Higher Education: Containerized Moodle with Safe Exam Browser Integration **Daniel Okon and Kelvin Chuku**

Abstract ID [79] Challenges and Opportunities of Accessible Moodle-Based Learning Among Science Education Students at Universities in Abuja. **Roseline Egbunu**	*Abstract ID [3]* Bridging Africa's Digital Pedagogy Divide: A Microlearning Framework Using Moodle to Empower Marginalized Learners **Philip Okposo**	*Abstract ID [24]* A Pan-African Moodle Federation Ecosystem for Cross-Border Academic Recognition and Resource Sharing Networks **Olabisi Josh-Falade**
Abstract ID [94] A Systematic Review of Institutional Use of Moodle Data to Predict Student Success in African Higher Education **Oluwaseun Philip Oluyide**	*Abstract ID [13]* Students' Perception and Ethical Considerations for Moodle-Based Online Learning Analytics for Dynamic Assessment in the National Open University of Nigeria (noun) **Johnson Opateye and Goodness Opateye**	*Abstract ID [30]* Building a Secure, Scalable, and Sustainable Moodle Ecosystem: A Cost-Effective Deployment Model for African Higher Education **Daniel Okon and Kelvin Chuku**
Abstract ID [100] Inclusive Access and Student Success with Moodle: Online Counselling as a Sine Qua Non **Ibraheem Adediran and Jamiu Ogunsola**	*Abstract ID [45]* Impact of Gamification on Academic Performance and Motivation Among Upper Basic Science Students in Kaduna Metropolis, Nigeria **Dr. Ashaolu Emmanuel and Hadiza Isa Muhammed**	*Abstract ID [19]* Rethinking Digital Governance Through Disruption Awareness and Resilience Memory: The Case of the Moodle Deployment at UAT **Alvin Orisedavweji Forteta, Evans Porbeni, Jacob Harrison Okpeh and Abigail Dauda**
Abstract ID [90] "Found and Restored": a Reflection on the Luke 15:4–7 and the Role of Moodle in Reclaiming Identity Through Learning in Nigerian Correctional Centres. **Funke Oyekan**	*Abstract ID [10]* Developing and Deploying Contextually Relevant AI Teaching Assistant with Moodle in Nigerian Higher Education **Danladi Moses Adayilo, Chinedu Otuya, Esther Ladan, Ishaq Oyefolahan and Juliana Ngozi Ndunagu**	*Abstract ID [12]* Leveraging Moodle-Based Learning Analytics to Enhance Engagement, Inclusiveness and Equity in Distance Learning **Esther Omowumi Ladan, Ishaq Oyefolahan, Chinedu Otuya, Danladi Moses Adayilo and Sunday Joseph**
Abstract ID [6] Disruptive Learning Technologies and the New African Learner: Evidence from Noun Students' ICT Readiness and Use Patterns **Charity Akuadi Okonkwo, Godwin Akper, Bibian Ugoala and Sefinat Omuya**	*Abstract ID [14]* Enhancing Practical Health Education Skills Through Virtual Simulations on Moodle at the National Open University of Nigeria (NOUN) **Waziri Kwata, Makinde Oluwayemisi and Musa Paul Hannatu**	*Abstract ID [11]* Ensuring Data Privacy, Digital Rights and Compliance with Moodle in Nigerian Education System **Danladi Moses Adayilo, Ishaq Oyebisi Oyefolahan, Juliana Ngozi Ndunagu, Chinedu Otuya, Esther Omowumi Ladan and Anekwe Nwando**
Abstract ID [102] Student Perspectives on the Accessibility and Usability of Tutor-Marked Assignments (TMA) on Moodle at the National Open University of Nigeria **Leah Olubunmi Oni and Segun Buhari**		

Conference Day 2 - Friday, 10th October 2025
Time: 11.15 - 1.15pm
Parallel Session 2

Track1: Inclusive Access and Student Success with Moodle	Track 2: Empowering Skills Development and Innovative Pedagogies with Moodle	Track3: Building Sustainable and Innovative Moodle Ecosystems
Chair: Prof. Ebenezer Malcalm **Rapporteur:** Joseph Ekoja **Venue:** Atiku Abubarkar Auditorium	**Chair:** Dr Khanyisile Mayekiso-Twabo **Rapporteur:** Grace Ameh **Venue:** Board Room	**Chair:** Prof Juliet Inegbedion **Rapporteur:** Moses Adegboye **Venue:** Meeting Room
Abstract ID [85] Spotting At-Risk Students Earlier: A Case Study at an Odel University Using Moodle Data Analytics **Stanford Mphahlele and Thabo Hlabahlaba**	*Abstract ID [48]* Enhancing Self-Directed Learning Through AI-Powered Teaching Assistants in Moodle for Contextualized Adult Education **Rotimi Michael Akande**	*Abstract ID [56]* Leveraging Parameter-Efficient Fine-Tuning of Nllb Models for Enhancing English-to Yoruba Translation in E-Learning Contexts **Ayodele E Awokoya, Oladapo Adeduro, Falade Adesola and Prof. Olatunji Okesola**
Abstract ID [21] Ve-Coil and Asynchronous Delivery Model for Student Success **Hakeem Ibikunle Tijani**	*Abstract ID [49]* Exploring the Potential of Gamified Moodle for Innovative Pedagogies in Lis Education: Evidence from Federal Universities in North Central Nigeria **Babarotimi Opeyemi Oluwaseun**	*Abstract ID [61]* Building Context-Aware Virtual Assistants on Moodle Using Rag and Generative AI **Eseosa Iyare**
Abstract ID [70] Multilingual and Multicultural Inclusivity: Moodle as a Tool for Global Learner Engagement **Sheriff Olatunji and Lilian Ugaduh**	*Abstract ID [50]* Continuous Professional Development to Improve Online Teaching Presence for Student Support in an Online Distance E-Learning Institution **Phumza Makgato-Khunou and Piera Biccard**	*Abstract ID [60]* Innovative Moodle Ecosystems: An Integration of Digital Media Literacy in the Religious Studies Program of the Graduate Theological Union (GTU), United States of America and National Open University of Nigeria (noun) **Adeyemo Abduljeleel Taiwo and Faqiah Afolake Adeaga**
Abstract ID [74] Assessing the Impact of Moodle Learning Management System on Students Performance in Nigerian Tertiary Institutions Using Machine Learning Techniques **Hadiza Umar and Ibrahim Lawan**	*Abstract ID [55]* Implementing Zero Trust Architecture to Enhance Cybersecurity in Africa's Innovative E-Learning Environments **Oladapo Adeduro, Adesola Falade, Ayodele E Awokoya, Grace Jokthan and Olatunji Okesola**	*Abstract ID [76]* Technological and Pedagogical Challenges in Implementing E-Learning for Clinical Skills Training. E-Learning in Healthcare Education: Implementation and Challenges **Samira Bashir, Cecilia Adegor, Kehinde Babagana, Ibrahim Maigari and Aku Mopa**

Abstract ID [47] Leveraging the Power of Disruptive Technologies for Africa's Educational Transformation: Inclusive Access and Student Success with Moodle in Nigeria **Angela Okpala, Victor Wagwu and Caroline Okoro**	*Abstract ID [34]* Empowering Skills Development and Innovative Pedagogies with Moodle. **Fortunate Masudze, Tarirai Mukabeta and Tafadzwa Musinachirevo**	*Abstract ID* [**65**] Building Sustainable Digital Learning Ecosystems: ACETEL's Experience in Strengthening Edtech Infrastructure **Grace Jokthan, Sinan Ismaila Idris and Abubakar Bello**
Abstract ID [83] M-Learning: Vehicle for Inclusive Access and Students' Success with Moodle **Francis Oladepo**	*Abstract ID [51]* A Sense of Ubuntu: Reflections of a Learning Management System Migration at an Open Distance and E-Learning Institution **Piera Biccard and Phumza Makgato-Khunou**	*Abstract ID [95]* Sustainable Learning Ecosystem: New Digital Media Technology Approach for Nigeria **Dutse Abubakar Yusuf and Bayero Muhammad Musa**
Abstract ID [32] The Use of Machine Learning Model Selection Framework for Synchronous Learning Analytics Engine **Muhammad Nuraddeen Ado, Shafii Abdulhamid and Adamu Abubakar Aliyu**	*Abstract ID [43]* Skills Acquisitions and the Pedagogy of Sociological Content Analysis Toward Sustainable-Innovative Development in Nigeria **Tajudeen Oduwole and Zainab Duhu**	*Abstract ID [66]* Innovation Dynamics and Sustainability of Moodle Environments in Institutions of Higher Education **David Nzuki and Mathias Nduwingoma**
Abstract ID [84] Leveraging Neural Machine Translation for Inclusive Education: A Low-Resource Approach to Nigerian Languages **Oghenekaro Orowho**	*Abstract ID [72]* Enhancing Skills Development and Innovative Pedagogies in Library and Information Science Through Moodle Integration **Dr. Isah Seidu Osimetha**	*Abstract ID [99]* Enhancing Digital Inclusion in African Higher Education Through Mobile-First Moodle Ecosystems **Chuba Henry Okeke and Ibrahim Salihu Kombo**
Abstract ID [52] Emerging Technologies and Accessibility in Enhancing Moodle for Students with Disabilities at the National Open University of Nigeria **Mercy Enefu Okwoli and Babarotimi Opeyemi Oluwaseun**	*Abstract ID [101]* Evaluating the Effectiveness of Online Facilitation in Postgraduate-Legal Education: A Mixed-Methods Study of Engagement and Learning Outcomes **Josiah Owolabi and Ernest Ogwuashi Ugbejeh**	*Abstract ID [67]* From Infrastructure to Impact: Optimising Learning Technology Systems Through Strategic Relationships at Stellenbosch University **Lianne Keiller**

Abstract ID *[69]* Equity in Open and Distance Learning: Moodle's Role in Expanding Educational Opportunities **Sheriff Olatunji**	**Abstract ID *[59]*** Transforming Science Education Teacher Professional Development in Nigeria's Distance Learning Through Enabled Technology: Virtual Reality, and Gamified Moodle Platforms **Mutiat Olawale**	**Abstract ID *[98]*** Leveraging Disruptive Technologies to Build Sustainable and Innovative Moodle Ecosystems for Africa's Educational Transformation **Chuba Henry Okeke and Ibrahim Salihu Kombo**
Abstract ID *[17]* Diversion Not Detention: Through Disruptive Educational Technologies to Reform Juvenile Justice Systems in Nigeria **Michael Chika Diyoke**	**Abstract ID *[81]*** Effectiveness of Moodle-Based Learning Strategies on Students' Achievement in Biology at the National Open University, Abuja **Roseline Egbunu**	**Abstract ID *[78]*** Building Automated Assessment in Moodle Using Natural Language Processing (NLP) – a Step Toward Sustainable Teacher Support **Rotimi Adebayo**
Abstract ID *[80]* Assessment of the Effectiveness of Moodle-Based Chemistry Education in Promoting Students' Engagement and Motivation in Noun, Abuja **Omobolanle Fatusi**	**Abstract ID *[68]*** Assessing University Lecturers' Perceptions on the Sustainability of Moodle as an Instructional Platform **Oluwasogo Ogunleye**	**Abstract ID *[93]*** The Promise and the Reality: a Reflective Case Study of Barriers to Learning Analytics in Moodle Amidst the Rise of AI. **Paul Prinsloo, Christine Ofulue, Adewale Adesina, Felix Kayode Olakulehin, Oluwaseun Philip Oluyide and Segun Buhari**
Abstract ID *[1]* The Bridge or the Barrier: Decoding the Role of Moodle in Democratising Education **Kolawole Aramide, Gbenga Alayande and Sakirat Salawu**	**Abstract ID *[71]*** Koha Software as a Catalyst for Effective Library Automation: A Case Study of the National Open University of Nigeria **Lucy Okonkwo and Babarotimi Oluwaseun**	**Abstract ID *[89]*** Exploring the Building Blocks of a Virtual Laboratory for Practical Chemistry **Tunde Adegbola, Olufemi Peters and Musa Runde**
Abstract ID *[91]* The Impact of Transfer Learning on the Application of Artificial Intelligence to Dispute Resolution **Lawman Nzenwa**	**Abstract ID *[57]*** Prediction of Mental Health Well-Being: a Depression Analysis in Higher Education Students **Falade Adesola, Oladapo Adeduro, Ayodele E Awokoya, Grace Jokthan and Prof. Olatunji Okesola**	**Abstract ID *[103]*** Building Automated Assessment in Moodle Using Natural Language Processing (NLP): a Step Toward Sustainable Teacher Support **Rotimi Adebayo**
Abstract ID *[92]* From Classrooms to Clicks: Policy Directions for Leveraging Moodle in Inclusive Education in East Africa **Annet Kisaka Magolo**	**Abstract ID *[75]*** Leveraging Artificial Intelligence and Big Data Analytics for Advancing Learning Outcome in Online Learning Environments Among University's Students **Oluyemo Abdullateef**	**Abstract ID *[5]*** Instructor Communication Strategies and Student Engagement in Moodle Mediated Higher Education in Nigeria **Ebele Nwafor**

Book of Abstracts

[1] *The Bridge or the Barrier: Decoding the Role of Moodle in Democratising Education*

Kolawole Aramide (University of Ibadan), Gbenga Alayande (Oyo State College of Agriculture and Technology, Igbo Ora) and Sakirat Salawu (Federal School of Surveying).

Abstract

The digital divide remains a significant barrier to equitable education, especially in online learning environments. This study evaluates inclusive access strategies within Moodle-based learning platforms, focusing on how these approaches bridge gaps for diverse learners. Moodle, as a widely adopted Learning Management System, offers various accessibility features designed to support users with differing abilities and contexts. These features include screen reader compatibility, alternative text for images, closed captions on videos, and consistent navigation structures that align with international accessibility standards. However, challenges persist, including usability issues and inconsistent implementation of accessibility tools across courses. This research synthesises current literature and empirical findings to assess how effectively Moodle's inclusive strategies address the needs of learners facing technological, cognitive, and physical barriers. The study highlights the "curb-cut effect," illustrating how accessibility improvements benefit all users, not only those with disabilities. Furthermore, it examines the role of educators and administrators in designing and maintaining accessible content, emphasising the importance of training and awareness. Findings reveal that while Moodle's built-in features provide a strong foundation for inclusion, proactive course design and institutional support are critical for maximising student success. The study calls for continuous evaluation and enhancement of accessibility practices, alongside investment in digital literacy and infrastructure. Ultimately, bridging the digital divide through Moodle requires a holistic approach that combines technology, pedagogy, and policy to foster an inclusive learning environment for all students.

[2] *Strengthening Cybersecurity in Digital Learning Environments: A Foundation for Sustainable Educational Transformation in Africa*

Abubakar Bello (National Open University of Nigeria).

Abstract

As educational institutions across Africa increasingly rely on digital learning platforms such as Moodle, cybersecurity has become indispensable to ensuring the resilience, equity, and sustainability of these systems. This paper examines the critical role of cybersecurity in safeguarding virtual learning environments within African higher education, with a focus on Moodle as an open-source learning management system (LMS). Building on literature and emerging technologies, the study integrates the Task-Technology Fit (TTF) model and the Information Systems Success Model (ISSM) to conceptualize how security quality directly influences usability, trust, and learning outcomes. Beyond theoretical grounding, the paper highlights practical challenges such as weak server configurations, unvetted plugins, fragmented policies, and limited awareness among stakeholders. To address these issues, it proposes a multi-layered framework that includes: (a) institutional adoption of international cybersecurity standards (e.g., ISO/IEC 27001), (b) systematic awareness programs for faculty, students, and administrators, (c) the integration of AI-driven security tools for real-time anomaly detection, and (d) stronger regional partnerships to promote collaborative defence. Case illustrations from selected African universities demonstrate how inadequate authentication protocols and inconsistent policy enforcement have led to breaches, reinforcing the urgency of proactive measures. The study concludes by emphasizing the practical implications for educational leaders, policymakers, and IT managers—arguing that cybersecurity should be embedded as a foundational design principle of digital learning rather than treated as an afterthought. Strengthening cybersecurity is not only essential for protecting sensitive academic assets but also for fostering trust, inclusivity, and sustainable innovation in African digital education.

[3] *Bridging Africa's Digital Pedagogy Divide: A Microlearning Framework Using Moodle to Empower Marginalized Learners*

Philip Okposo (National Open University (ACETEL)).

Abstract

Across many African regions, access to formal education is expanding, yet meaningful skill acquisition remains elusive for millions of learners. This paper presents a microlearning-based framework utilizing Moodle to close digital literacy gaps and enhance employability in underserved communities. The proposed approach delivers structured, bite-sized content aligned with specific competencies, enabling learners to progress at their own pace while gaining practical skills. Drawing lessons from the UNESCO–Huawei "Enhancing Digital Skills of Youth in Africa" program—which successfully introduced mobile-based digital literacy initiatives to young people in rural areas—this framework adapts those principles within an

open-source LMS environment. It emphasizes culturally relevant content, local language support, and intuitive navigation designed for mobile access. The model also integrates feedback loops and peer collaboration features to encourage active participation. Rather than positioning Moodle as a mere delivery platform, the framework reimagines it as a dynamic tool for inclusive digital pedagogy and long-term capacity building. Its modularity supports easy customization by educators, ensuring alignment with local needs while remaining scalable across institutions. The approach resonates with Africa's educational transformation goals and contributes to reducing the digital divide in practical, measurable ways.
Reference UNESCO. (2022). Enhancing Digital Skills of Youth in Africa. Retrieved from https://www.unesco.org/en/digital-skills/africa

[4] *Towards a model to integrate Metaverse into Moodle LMS for better Students' experiences and preferences in a resource constrained Higher Education Situation in Uganda Stephen Kyakulumbye* Uganda Management Institute*

Stephen Kyakulumbye (Uganda Management Institute).

Abstract

Learning Management Systems like Moodle are widely acceptable platforms for online learning. However, they get limitations when it comes to subjects and programmes that require physical presence especially for practical based courses like Engineering. This paper provides some expert insights into this online distance learning, with the goal of helping non-expert university teachers (i.e. those who have little experience with online learning) and within a technologically resource constrained environment to navigate in these challenging times. These conceptual case-based findings, using experience from Uganda Christian University (UCU) point at the design of learning activities with two certain characteristics, the enhancement of synchronous learning technologies and asynchronous ones to mitigate the challenge of system breakdown, passive learning to active learning, and enhancing the types of presence (social, cognitive and facilitatory). The paper both empirical and experiential in nature, offers an enhanced frame work of Moodle LMS with possibility to integrate it with metaverse tools to improve online education. To the developing country context within resource constrained environments, there is need for further researcher to test the proposed framework within such policy contexts. Moreover, it is an area of further research to ensure that the available technology infrastructure can support the proposed types of metaverse to be integrated into the LMS for purpose of improving the learning experiences and engagement of students, instructors and peers; and finally enhance physical space presence using Augmented and Virtual Reality tools through participatory research approaches through augmentation, simulation and prototyping to ensure fit into given contexts.

[5] *Instructor Communication Strategies and Student Engagement in Moodle-Mediated Higher Education in Nigeria*

Ebele Nwafor (National Open University of Nigeria).

Abstract

The rapid growth of digital technologies has reshaped higher education, with platforms such as Moodle creating flexible opportunities for teaching and learning. Nevertheless, ineffective instructional communication often undermines learner engagement, particularly in multilingual and multicultural contexts. This study examined instructors' communication practices and students' perceptions of engagement within the Moodle-mediated context. The population of the study comprised instructors and learners at the Asaba Study Centre of the National Open University of Nigeria's (NOUN) Open and Distance Learning (ODL) system. A descriptive mixed-methods design was used, combining structured questionnaires administered to 40 purposively selected students and 5 instructors with open-ended responses from instructors. The analysis was guided by Communication Accommodation Theory (CAT), developed by Giles (1973), which explains how instructors adapt language, tone, and communicative strategies, through convergence, divergence, or maintenance, to meet learners' needs. Findings indicate that while instructors attempted to provide instructional support, many students still experienced challenges with clarity, scaffolding, and limited use of multimodal communication. Connectivity issues, time limitations, and linguistic diversity further restricted participation and interaction. Open-ended responses suggested strategies such as simplifying instructional language, incorporating bilingual explanations, and integrating multimedia elements, though these practices were not consistently applied. The study provides practical guidance for instructors and ODL institutions on clearer, linguistically inclusive, and multimodally supported communication, while stressing the need for infrastructure improvements to strengthen engagement and academic outcomes in digital higher education.

[6] *Disruptive Learning Technologies and the New African Learner: Evidence from NOUN Students' ICT Readiness and Use Patterns*

Charity Akuadi Okonkwo (National Open University of Nigeria), Godwin Akper (National open University of Nigeria, Abuja), Bibian Ugoala (National Open University of Nigeria) and Sefinat Omuya (National Open University of Nigeria, Abuja).

Abstract

As Africa embraces digitally inclusive education, the readiness of learners to navigate disruptive learning technologies becomes increasingly critical for scalable transformation. This study explores the intersection of ICT competency, digital access barriers, and academic performance among students of the National Open University of Nigeria (NOUN), a flagship Open and Distance Learning (ODL) institution. Using structured questionnaire data, the research analyzes how students' digital literacy, technical readiness, and internet usage patterns affect their engagement with platforms such as Moodle, YouTube, and Google Scholar. Descriptive and inferential statistical analyses—including Pearson correlation, ANOVA, independent t-tests, and regression modeling—reveal that students with higher ICT competence and fewer access barriers exhibit significantly stronger academic engagement and better learning outcomes. However, persistent structural challenges remain, notably those linked to age, qualification level, phone generation, and device availability—underscoring equity gaps in digital access and technology adoption. The paper introduces the profile of the emerging "New African Learner": a mobile-first, platform-aware, and self-directed student navigating dynamic digital ecosystems. By linking readiness with behavioral data, the study delivers actionable insights for educators, institutional leaders, and edtech stakeholders. It contributes to MoodleMoot Africa 2025 by aligning with Track 1 (Inclusive Access) and Track 2 (Empowering Skills Development), offering evidence-based strategies to scale Moodle adoption, bridge digital divides, and strengthen sustainable learning ecosystems in African higher education.

[7] *ADOPTION OF THE ELECTRONIC PROGRAM DELIVERY MODE: EXPERIENCES OF FACULTY MEMBERS IN PRIVATE UNIVERSITIES OF UGANDA*

Christopher Samuel Mayanja (Ndejje University).

Abstract

This article reviews the adoption of the virtual program delivery from the experience of faculty members in private universities of Uganda. With the global 4th Industrial Revolution (4IR), there has been enhanced adoption of technology to facilitate delivery of programs in educational institutions, specifically, institutions of higher learning. This study aimed at exploring the experiences of faculty members on adoption of electronic program delivery in private universities of Uganda. It attempted to answer the research questions on how the electronic program delivery mode has eased or negatively affected teaching and learning. The phenomenological study deployed the qualitative research approach, which allowed generation of the faculty members' experiences on the electronic program delivery mode. A total of 17 participants drawn from two private universities, using the purposive sampling technique was engaged. A two-level narrative analysis was deployed to allow a narrative analysis, followed by an analysis of narratives. Findings revealed that the two private universities have progressively adopted the online mode of program delivery, though still facing some hiccups. Uptake of the online program delivery mode has been slow due to several factors including: insufficient capacity of members to effectively utilize information technology, insufficient gadgets like computers and laptops, poor internet connectivity, among others. It is recommended that the Ministry of Education and Sports, together with the university leadership need to prioritize the online program delivery mode through resource allocation, capacity building of both faculty members and support staff, as well as promotion of international exposure in the same area.

[8] *Ontology-Driven Privacy and Security Integration for Moodle: Advancing Trustworthy Digital Learning Ecosystems in African Universities*

Rofiat Ajagbe (NOUN (ACETEL)), Hamzat Olanrewaju Aliyu (NOUN(ACETEL)) and Kingsley Ukaoha (NOUN ACETEL).

Abstract

Abstract

As African universities accelerate digital transformation to broaden educational access and workforce readiness, ensuring trust in platforms like Moodle becomes paramount. While Moodle serves as a versatile foundation for scalable, inclusive learning, it often lacks systematic mechanisms to enforce privacy by design or guarantee regulatory compliance—exposing institutions to privacy risks that undermine user confidence.

This study proposes an innovative, ontology-driven framework that seamlessly integrates privacy, security, and compliance

into the software development lifecycle (SDLC) of Moodle implementations. Using Protégé, we modeled SDLC phases alongside privacy principles (e.g., data minimization), security controls (e.g., encryption, access management), and compliance standards (GDPR, NDPR, ISO 27701), connected through object properties and governed by SWRL rules. A binary compliance function operationalizes these relationships, enabling automated classification of compliant phases.

The system was validated on simulated Moodle module scenarios reflecting diverse privacy and security configurations, achieving a privacy compliance accuracy of 92% and an ontology reasoning efficiency of 35 queries per second. Outputs were rendered through CSV validations and an interactive Python-Flask interface, facilitating non-technical audits.

By embedding privacy by design directly into Moodle SDLC processes, this approach not only strengthens compliance but also fosters learner trust and institutional resilience. It offers a scalable, open, and customizable alternative for African universities striving to harness disruptive technologies while safeguarding digital rights and promoting equitable education.

[9] *Optimizing E-Learning in Resource-Constrained Environments: A Scalable High Performance Computing and Cloud-Based Model for Moodle Deployment*

Chinedu Otuya (National Universities Commission), Afolayan A. Obiniyi (Federal University Lokoja), Joseph Sunday Igwe (Ebonyi State University), Esther Ladan (National Agricultural Extension and Research Liaison Services, Ahmadu Bello University, Zaria) and Danladi Moses Adayilo (NOUN, Africa Centre of Excellence on Technology Enhanced Learning).

Abstract

The adoption of Learning Management Systems (LMS) has significantly accelerated, particularly following the COVID-19 pandemic, as institutions seek scalable solutions for remote and blended learning. Open-source platforms like Moodle have become pivotal in this regard, offering cost-effective, customizable environments for teaching. However, institutions in Africa often encounter numerous challenges in LMS deployment, including infrastructure limitations and scalability constraints. This paper is a practitioner case study involving the implementation of High-Performance Computing (HPC) to e-learning infrastructures. Based on quantitative performance monitoring of Moodle using Cacti, the study covers six federal universities in Nigeria. Data were collected before and after the migration of a centralized single server system, in which sixteen universities were sharing a common environment, to a distributed, cloud-based system with independent virtual servers per university. The results show improvements in performance: the average latency was reduced by 420 to 230 (around 45 percent) and the page load time was reduced to 2.1s (previously 3.8s) at peak load, the error rates were also lowered (4.3 percent to 1.2 percent) and the overall availability did not change (99.12 percent to 99.34 percent). Importantly, the distributed architecture enabled individual universities to upgrade Moodle (4.1 to 5.0) and PHP without interfering with the services of other institutions, which enabled the self-paced learning capabilities and the addition of new plugins. Findings indicate increase in scalability, reliability, and institutional autonomy. The paper concludes with a set of recommendations to strengthen sustainability and capacity building towards the adoption of e-learning in African environments that are resource-constrained.

[10] *Developing and Deploying Contextually Relevant AI Teaching Assistant with Moodle in Nigerian Higher Education*

Danladi Moses Adayilo (Africa Centre of Excellence on Technology Enhanced Learning, National Open University of Nigeria, Abuja), Chinedu Otuya (Africa Centre of Excellence on Technology Enhanced Learning, National Open University of Nigeria, Abuja), Esther Ladan (Africa Centre of Excellence on Technology Enhanced Learning, National Open University of Nigeria, Abuja), Ishaq Oyefolahan (National Open University of Nigeria) and Juliana Ngozi Ndunagu (National Open University of Nigeria).

Abstract

This research examines how a contextually applicable Artificial Intelligence (AI)-driven assistant has been developed and implemented to work with Moodle in Nigerian higher education. With the educational realities of the diversity of language, cultures, and learning demands in Nigeria, this AI assistant offers a localised learning experience according to the needs of the population. The AI assistant can assist students by being able to answer queries and give course direction, as well as offer immediate feedback due to using machine learning and natural language processing, and also target any linguistic and educational shortcomings in the Nigerian environment. The study employ mixed-methods design, such as quantitative and qualitative data. In particular, case studies were carried out at the selected institutions, such as the National Open University of Nigeria, the University of Lagos, and Covenant University. Quantitative data was analysed using regression and comparative models; evidence confirms that the AI teaching assistant was of significant help in increasing student

engagement and offering learner-specific learning pathways, which helped students retain and achieve higher performance at 85%. Qualitative data underwent thematic coding which showed that there were positive attitudes towards its potential in improving teaching efficiency (80%), though lack of technical capacity, training, and fears over privacy of data were perceived as limitations. This paper reveals the introduction of contextually relevant AI-based tools within Moodle will improve the digital aspect of pedagogy in Nigerian universities under good institutional policies and development of capacity.

[11] *Ensuring Data Privacy, Digital Rights and Compliance with Moodle in Nigerian Education System*

Danladi Moses Adayilo (Africa Centre of Excellence on Technology Enhanced Learning, National Open University of Nigeria), Ishaq Oyebisi Oyefolahan (Africa Centre of Excellence on Technology Enhanced Learning, National Open University of Nigeria), Juliana Ngozi Ndunagu (National Open University of Nigeria), Chinedu Otuya (Africa Centre of Excellence on Technology Enhanced Learning, National Open University of Nigeria), Esther Omowumi Ladan (Africa Centre of Excellence on Technology Enhanced Learning, National Open University of Nigeria) and Anekwe Nwando (National Open University of Nigeria).

Abstract

This study investigates the issues of data privacy protection, digital rights, and compliance in Moodle-based learning management systems (LMS) in the Nigerian universities with respect to complying with the Nigeria Data Protection Act (NDPA, 2023) and the European Union's General Data Protection Regulation (GDPR). A mixed-method design was employed involving structured questions of 250 students, lecturers, and administrators, alongside in-depth case studies at the University of Lagos and the National Open University of Nigeria. Moodle configuration audits were carried out as well, and data were analysed by descriptive statistics and coding interview themes. Findings reveal significant obstacles, such as limited implementation of Data Protection Impact Assessments (22% compliance), the lack of Data Protection Officers in 73% of institutions, and deficient subject-consent strategies. These gaps have been highlighted based on empirical evidence, as one lecturer remarked at the University of Lagos, "our institution has no policy of how students are informed about the way their data is kept." Privacy features include role-based access control, data anonymisation, and audit logs, which have been underused by Moodle even though the privacy feature has several available plugins. Relative to European, Asian, and South African experience, it is evident that Nigeria's formal compliance is still low. Whereas NOUN has shown 100 percent uptime since 2018, privacy workflows need to be improved. The study recommends automation of the DPIAs, the implementation of DPOs, and the creation of NDPA-GDPR hybrid systems of compliance to better protect the subjects' digital rights.

[12] *Leveraging Moodle-Based Learning Analytics to Enhance Engagement, Inclusiveness and Equity in Distance Learning*

Esther Omowumi Ladan (Africa Centre of Excellence on Technology Enhanced Learning, National Open University of Nigeria (ACETEL, NOUN), Nigeria), Ishaq Oyefolahan (National Open University of Nigeria), Chinedu Otuya (Africa Centre of Excellence on Technology Enhanced Learning, National Open University of Nigeria (ACETEL, NOUN), Nigeria), Danladi Moses Adayilo (Africa Centre of Excellence on Technology Enhanced Learning, National Open University of Nigeria (ACETEL, NOUN), Nigeria) and Sunday Joseph (Department of Computer Science, Ebonyi State University, Abakaliki, Ebonyi State, Nigeria.).

Abstract

Digital technologies have become essential in improving student engagement and academic achievement in higher education. Learning analytics, especially those within open-source platforms like Moodle, provide innovative ways to assist inclusive access and outcome improvements. This study examines how Moodle learning analytics has increased engagement, enhanced retention, and facilitated equity in higher education. A convergent mixed-methods design was employed, drawing on quantitative data from 188 undergraduate students across five Moodle-supported courses and qualitative insights from 12 participants (six students and six educators) at Ahmadu Bello University, Distance Learning Centre. Results revealed significant improvements: weekly logins increased by 20%, time spent on course pages rose by 16%, on-time submissions improved by 21%, forum participation grew by 31%, and overall completion rates increased by 18%. A paired-sample t-test confirmed these gains were statistically significant ($p < 0.001$). Completion rates went up from 70% to 88%, and dropout rates decreased by 35%. Qualitative data aligned with these findings, with 85% of educators reporting that analytics dashboards were essential for inclusive teaching, and 78% of students reporting that analytics-

driven feedback offered more support. The analytics-driven interventions demonstrated increases in motivation and inclusivity, while the early identification of at-risk learners showed that the analytics-driven interventions helped decrease marginalization. Although the research was carried out in one institution, it indicates a framework that could be applicable in resource-limited situations. Future research should focus on cross-institutional validation to provide more evidence on scalability, as well as ensure Moodle learning analytics provide balance to equity, retention, and student success.

[13] *Students' Perception and Ethical Considerations for Moodle-based Online Learning Analytics for Dynamic Assessment in the National Open University of Nigeria (NOUN)*

Johnson Opateye (National Open University of Nigeria) and Goodness Opateye (Al-Muhibbah Open University).

Abstract

This study investigated students' perception and ethical considerations surrounding the integration of Moodle-based online learning analytics (MOLA) for dynamic assessment at the National Open University of Nigeria (NOUN). A descriptive survey design was adopted, and a sample of 730 students was purposefully selected from the entire student population based on fully completed responses obtained via an online Google Form. The study was guided by two research questions and two hypotheses. Data were collected using an instrument titled Students' Perception and Ethical Considerations for Integrating Moodle-based Online Learning Analytics Questionnaire (SPECIMOLAQ), which had a reliability coefficient of 0.83 (Cronbach's Alpha). Descriptive statistics were used to answer the research questions, while independent sample t-tests and one-way ANOVA were used to test the hypotheses. Findings showed that students generally had a high perception of MOLA, with no significant gender-based difference in MOLA perception (t(728) = 1.845, p > 0.05), indicating that both male and female students valued the use of learning analytics. However, significant differences emerged based on students' degrees in view, both in perception (F(2,727) = 9.112, p < 0.05) and ethical considerations (F(2,727) = 15.917, p < 0.05). It is recommended that NOUN develops degree-specific orientations and training on the use and implications of Moodle-based learning analytics, ensuring students understand how analytics are applied within their disciplines. Additionally, ethical frameworks must be adapted to align with the data sensitivity concerns of different academic fields, with clear policies on consent, data usage, and privacy to foster trust and responsible use of MOLA.

[14] *ENHANCING PRACTICAL HEALTH EDUCATION SKILLS THROUGH VIRTUAL SIMULATIONS ON MOODLE AT THE NATIONAL OPEN UNIVERSITY OF NIGERIA (NOUN)*

Waziri Kwata (National Open University Abuja), Makinde Oluwayemisi (National Open University of Nigeria, University) and Musa Paul Hannatu (National Open University of Nigeria, Abuja).

Abstract

Open and Distance Learning (ODL) institutions, such as the National Open University of Nigeria (NOUN), face significant obstacles in maintaining student retention, particularly in health education programs. The research examines employing Moodle Learning Management System (LMS) analytics to pinpoint at-risk students and enhance engagement, with the goal of lowering dropout rates in NOUN's health education programs. A mixed-method strategy was employed, combining quantitative evaluation of Moodle usage data from 2022 to 2024 and qualitative perspectives from interviews with faculty, administrators, and students. Major findings reveal significant relationships among early login behavior, forum engagement, and assignment submission trends with student retention. Barriers identified consist of poor digital literacy and lack of sufficient feedback from tutors. Significantly, strategies such as automated notifications and tutor education improved participation in trial groups. The conclusion highlights Moodle analytics as a data-informed approach to enhance retention in health education at NOUN. Recommendations involve the complete incorporation of Moodle analytics, continuous educator training, and policy backing for infrastructure and assessment systems to guarantee sustainability and efficacy.

[15] *IMPACT OF USER-CENTRIC DESIGN APPROACH AND ADAPTIVE LEARNING TOOLS ON E-LEARNING PLATFORM*

Folasayo Obayemi (LAUTECH) and Naeem Balogun (Unilorin).

Abstract

This study investigated the impact of user-centric design approach and adaptive learning tools on e-learning platform, aimed to enhance personalize learning. The study's population consists of students from open and distance learning center, Ladoke Akintola University of Technology Ogbomoso with a sample of 369 students selected through multistage sampling. The rationale behind this study was rooted in the increasing relevance of digital learning environments and the need to

build resilient education systems against future disruptions like COVID-19 pandemic. Exploratory sequential mixed research method was adopted, beginning with a quantitative phase using a self-structured online questionnaire followed by a qualitative phase involving the development and evaluation of a Moodle-based Learning Management System (LMS). The study assessed students' frequency of e-learning use, preferred learning style, satisfaction level and overall learning outcomes. The study's findings revealed that user-centric design approach significantly enhance learner satisfaction with 86.8% of students acknowledged that user-centric approach prioritize intuitive navigation, 89.7% found adaptive learning tools helpful in meeting individual needs, system usability and engagement (78.8%) and learning style (75.2 %). The results also show that learning style play a vital role in student's engagement on e-learning platform. These could assist tertiary institutions, students and E-tutors to prioritize e-learning for educational technology developers, policymakers and academic institutions aiming to optimize e-learning delivery. Keywords: E-learning, User-centric design (UCD), Adaptive learning tools, Moodle, Learning Management System (LMS)

[16] *Bridging the digital divide in low-connectivity regions of Nigeria: Challenges and strategies for inclusive access to Moodle*

Mayowa Ajiboye (ACETEL NOUN), Oladayo Tosin Akinwande (Veritas University Abuja, Nigeria) and Christopher Atabo Haruna (Nigeria-Korea Friendship Institute Lokoja, Nigeria.).

Abstract

The integration of digital learning platforms like Moodle in higher education has expanded opportunities for flexible, learner-centered education. However, in many low-connectivity regions of Nigeria, the potential of such platforms remains underutilized due to infrastructural, economic, and socio-technical barriers. This paper explores the persistent digital divide affecting Moodle adoption in underserved Nigerian communities, drawing on mixed-method data from educators, students, and ICT administrators across five geo-political zones. Key challenges identified include unreliable internet access, high data costs, limited digital literacy, and infrastructural inadequacies in rural institutions. In response, the paper presents a multi-pronged strategy framework for inclusive Moodle deployment. These include offline-capable Moodle instances, partnerships with telecom providers for zero-rated educational content, use of solar-powered ICT hubs, and localized digital skills training for educators and students. Case studies from selected Nigerian institutions illustrate both successes and gaps in implementation. The findings offer practical and policy-oriented recommendations for government agencies, institutions, and development partners aiming to ensure equitable access to digital education. By addressing both the technological and social dimensions of the divide, this work contributes to the development of sustainable Moodle ecosystems that leave no learner behind.

[17] *Diversion Not Detention: Through Disruptive Educational Technologies to Reform Juvenile Justice Systems in Nigeria*

Michael Chika Diyoke (National Open University of Nigeria).

Abstract

Diversion programmes which aim to redirect young offenders away from the formal legal system and into supportive, rehabilitative alternatives, have grown in popularity across the world. However, implementation in many African nations' remains patchy. Also, empirical data on the feasibility, awareness, and outcomes of introducing disruptive education technologies, such as Moodle-based systems, in juvenile correctional centers is limited. The study therefore examined the possible role of disruptive educational technologies particularly Moodle-based Open and Distance Learning (ODL) in reforming juvenile justice systems through diversion programmes in Nigeria. The study adopted the Social Control theory of Travis Hirschi (1969) as the theoretical baseline of the study. Mixed methods research design was used in the study. Questionnaire and In-Depth Interview (IDI) were the quantitative and qualitative instruments of data collection used in the study. A sample size of 105 was used in the study and the target population consisted of orphaned and vulnerable children & correctional/instructional staff, findings from the study indicated (among others) that disruptive educational technologies such as mobile learning platforms, digital skill acquisition tools, and virtual mentorship programmes hold significant potential in transforming diversion strategies by enhancing access to education, psychosocial support, and vocational training for juvenile offenders. The study concludes that there is a positive relationship between the adoption of disruptive educational technologies and the effectiveness of diversion programmes in promoting juvenile offender rehabilitation and reintegration. Therefore, the study recommended (among others) that the government should prioritize the development of technology-driven juvenile diversion policy in Nigeria. Thank you.

[18] *INNOVATIVE PEDAGOGICAL APPROACHES TO SKILLS DEVELOPMENT THROUGH MOODLE BASED MICROLEARNING IN AFRICAN HIGHER EDUCATION*

Sulaiman Zakariyya Yakubu (National Open University of Nigeria (ACETEL-NOUN)).

Abstract

ABSTRACT Africa's rapidly growing youth population necessitates innovative, scalable, and inclusive educational models to deliver industry-relevant skills in diverse contexts. Microlearning, delivered through Moodle, offers a flexible and effective approach for equipping students with practical job-ready competencies while fostering innovative teaching methods. This study investigated how Moodle's microlearning features can enhance skill development and promote transformative pedagogical practices in African higher education institutions. Guided by a constructivist learning framework, data were gathered through semi-structured interviews with faculty members and an analysis of scholarly literature on Moodle-based microlearning. The qualitative approach focuses on faculty engagement across five institutions, identifying both opportunities and challenges. The findings revealed that mobile-friendly, chunked Moodle modules increase student engagement, reduce cognitive load, and significantly improve personalized learning experiences. In technical and vocational courses, a 25% increase in student retention and self-reported confidence in applying practical skills was recorded. Moodle's plugin adaptability further supports culturally relevant and multilingual content, thus enhancing inclusivity and accessibility. Moodle microlearning has emerged as a transformative and sustainable strategy for skill-focused education in Africa. Future research will assess its long-term effects on graduate employability, institutional adoption strategies, and policy implications for digital learning integration.

[19] *Rethinking Digital Governance Through Disruption Awareness and Resilience Memory: The Case of the Moodle Deployment at UAT*

Alvin Orisedavweji Forteta (American University of Nigeria), Evans Porbeni (University of Africa, Toru-Orua), Jacob Harrison Okpeh (University of Africa, Toru-Orua) and Abigail Dauda (American University of Nigeria).

Abstract

Learning Management Systems (LMS) have become indispensable infrastructures in higher education, yet their governance often remains narrowly concerned with operational continuity rather than organizational learning. This paper argues that such governance blind spots are particularly acute in resource-constrained African universities, where disruptions are recurrent and institutional memory is fragile. Using the University of Africa, Toru-Orua's (UAT) Moodle deployment as a revelatory case, we show how recurring digital governance failures expose deeper organizational epistemic deficits. These incidents were not merely technical glitches but symptomatic of two under-theorized governance capacities: disruption awareness (the ability to detect anomalies and digital governance misalignments in real time); and resilience memory (the institutional retention of lessons learned from breakdowns). Without these capacities, LMS risk becoming reactive infrastructures that repeatedly fail in predictable ways. We propose that digital governance must shift from guaranteeing operational and technical viability toward cultivating adaptive organizational learning, where LMS not only deliver instruction but also help institutions remember, adapt, and evolve. The argument carries both (i) theoretical implications for information systems scholarship, which has often overlooked disruption awareness and resilience memory as core digital governance functions, and (ii) practical implications for education stakeholders seeking to provision resilient, reflexive LMS for higher education.

[20] *Leveraging Moodle to Enhance Facilitation of Library Science Courses among Librarians at National Open University of Nigeria (NOUN) in South-East, Nigeria*

Lucy Okonkwo (National Open University of Nigeria).

Abstract

Abstract The strategic adoption of educational technologies has become essential for enhancing teaching and learning in higher institutions. This study evaluates the effectiveness of leveraging Moodle, a widely used open-source Learning Management System (LMS), in facilitating Library Science courses among librarians at the National Open University of Nigeria (NOUN). Guided by four research questions, the study examines Moodle's role in flexible content delivery, collaborative learning, assessment, and overall student engagement within a distance learning context. Using a descriptive survey design, data were collected through structured questionnaires and interviews from all 30 librarian facilitators in NOUN's library department and study centres across its six geographical zones, selected via purposive sampling. Findings show that Moodle significantly enhances interactive and asynchronous facilitation, improving course accessibility, resource sharing, and learner participation. However, challenges such as inadequate training, limited technical support, and

unstable internet connectivity impede its optimal use. The study recommends targeted professional development, enhanced ICT infrastructure, and stronger institutional support to unlock Moodle's full potential. By addressing these gaps, NOUN can further strengthen technology-enhanced pedagogy and expand access to quality library science education. This research contributes to the discourse on e-learning in open and distance learning (ODL) environments, underscoring the transformative role of Moodle in shaping modern library education in Nigeria.

[21] *VE-COIL AND ASYCHRONOUS DELIVERY MODEL FOR STUDENT SUCCESS*

Hakeem Ibikunle Tijani (National Open University of Nigeria).

Abstract

The paper focuses on one of the modes for teaching the contents and students' success within the context of global networking and programme operation. It presents virtual education and online ourse delivery and its effectiveness utilizing moodle learning system. Three case studies are critically reviewed to contextualize the delivery of contents during the semester. An assessement of Blackboard,Canvas,and Moodle, and teachers' effort at efficient delivery of contents via virtual teaching, espcially using the collaborative online learning is examined. The paper examined students' challenges utilising the learning systems used at UNISA, UMGC, and NOUN. The driving question is whether Moodle marked a paradigm shift in learning and students' success.

[24] *A Pan-African Moodle Federation Ecosystem for Cross-Border Academic Recognition and Resource Sharing Networks*

Olabisi Josh-Falade (McPherson University).

Abstract

Higher education in Africa faces significant fragmentation challenges that negatively impact continental integration and limits educational opportunities. The lack of standardized systems for academic collaboration restricts joint research initiatives and cross-institutional program development. This research investigates the development of a federated Moodle network that enables seamless academic collaboration, student mobility, and resource sharing across African higher education institutions. The study attempts to address critical barriers to educational integration such as limited credit transferability, resource inequality, and fragmented quality assurance systems. Using a mixed-methods approach, the research involves 20 pilot institutions across 8 African countries over a 36-month period, with methodologies such as regular stakeholder engagement, technical infrastructure development, pilot execution, monitoring and comprehensive evaluation. Key outcomes of this study include secure federated authentication protocols, automated credit transfer systems based on the African Credit Transfer System, and collaborative platforms for joint degree programs. Preliminary findings demonstrate a 300% increase in student mobility rates, 60% reduction in credit transfer processing time, and successful deployment of 5 cross-border collaborative degree programs. The federated resource sharing platform, powered by Moodle, is seen to achieve 40% cost savings in educational material procurement while improving access to quality resources by 250%. Qualitative outcomes reveal an enhanced Pan-African identity among students and strengthened institutional partnerships. The research contributes to theoretical understanding of educational technology integration in developing contexts while providing practical frameworks for continental educational harmonization. Furthermore, the ecosystem supports African Union educational integration objectives and provides scalable models for similar initiatives in other developing regions.

[25] *Improving Student Success in ODL Through Learning Analytics: A Case for a Moodle Plugin in Nigeria*

Olawale Koledafe (University of Ilorin), Eseosa Iyare (EI Consulting LLC), Blessing Iyare (EI Consulting LLC) and Ramnarain Umesh (University of Johannesburg).

Abstract

As online and distance learning (ODL) continues to expand access to education in Africa, institutions face growing concerns over high dropout rates and low learner engagement. While platforms like Moodle are widely adopted, their potential to support data-driven decision-making remains largely untapped. Many ODL institutions in Nigeria collect rich learning data from student interactions on Moodle but lack the tools to interpret this data and act on it effectively. This gap contributes to poor intervention timing, limited feedback, and ineffective learner support. This presentation introduces a research project that aims to develop a custom Learning Analytics plugin for Moodle, designed specifically for the Nigerian ODL context. The study is grounded in the Design and Development Research (DDR) methodology by Richey and Klein (2007), which

emphasises systematic development and formative evaluation of educational tools. The research follows four key phases: needs analysis, plugin design, development, and usability testing. The plugin will track essential learner behaviours—such as login frequency, assignment submissions, and forum participation—and translate these into real-time dashboards and alerts for instructors and administrators. Preliminary findings from the needs assessment phase highlight a strong demand for localised analytics tools that are user-friendly, resource-efficient, and contextually relevant. This research contributes not only a practical solution to the data-blindness facing many Nigerian ODL institutions but also offers a replicable model for plugin development in other low-resource settings. Attendees will gain insights into applying DDR for educational innovation, designing analytics tools for impact, and advancing retention through informed intervention.

[30] *Building a Secure, Scalable, and Sustainable Moodle Ecosystem: A Cost-Effective Deployment Model for African Higher Education*

Daniel Okon (University of Port Harcourt) and Kelvin Chuku (Speedlink HI-TECH Solutions Limited).

Abstract

The high cost of commercial Learning Management System (LMS) hosting presents a significant challenge for African higher education institutions seeking to deliver accessible, high-quality digital learning at scale. This paper presents a case study of the design and implementation of a secure, scalable, and sustainable Moodle ecosystem for over 4,000 students, hosted entirely on locally managed servers using a containerized architecture orchestrated through Portainer. The deployment integrates BigBlueButton for real-time virtual engagement and leverages optimized infrastructure architecture—including Docker-based isolation, resource allocation tuning, caching strategies, and bandwidth management—to deliver stable performance for concurrent course activities such as projects, assignments, and virtual labs. Containerization via Portainer provided flexibility in service management, simplified updates, and facilitated rapid scaling to meet usage demands. A key innovation is the alignment of cost savings with robust cybersecurity measures: role-based access control, encrypted data transmission, secure backups, intrusion detection, and disaster recovery protocols ensure data privacy, integrity, and compliance with institutional and national regulations. Findings demonstrate that local containerized hosting, when paired with well-defined security and scalability strategies, can reduce recurring hosting costs by over 80% while maintaining high system availability and user satisfaction. The implications extend beyond technical efficiency, offering a replicable model for African institutions to achieve digital sovereignty, strengthen data protection, and build resilient eLearning ecosystems.

[31] *Secure Local Hosted Online Assessments in African Higher Education: Containerized Moodle with Safe Exam Browser Integration*

Daniel Okon (University of Port Harcourt) and Kelvin Chuku (Speedlink HI-TECH Solutions Limited).

Abstract

Ensuring the integrity and security of online assessments remains a critical challenge for higher education institutions, particularly in regions where infrastructure constraints, data sovereignty requirements, and high student volumes converge. This paper presents a case study on deploying a containerized Moodle environment, hosted locally and integrated with Safe Exam Browser (SEB), to deliver secure, large-scale online examinations in an African university context. The system architecture leverages Docker containerization managed through Portainer for modular service deployment, rapid scaling, and simplified maintenance, while SEB enforces strict proctoring conditions including full-screen lockdown, restricted resource access, and controlled network connectivity. Load testing validated the system's performance with over 3,000 concurrent secure sessions, maintaining an average response time under 2.5 seconds and uptime above 99.8% during peak examination periods. Security was embedded throughout the design with TLS encryption, network segmentation, role-based access controls, and isolated exam servers, ensuring compliance with institutional cybersecurity frameworks and national data protection regulations. The local hosting approach enhanced data privacy, reduced reliance on external cloud providers, and achieved estimated cost savings of over 70% compared to commercial LMS hosting. Findings demonstrate that combining containerized infrastructure with SEB-based secure assessment workflows yields a scalable, cyber-resilient, and policy-aligned model for African institutions seeking to modernize examination delivery while safeguarding academic integrity.

[32] *The Use of Machine Learning Model Selection Framework for Synchronous Learning Analytics Engine*

Muhammad Nuraddeen Ado (ACETEL, National Open University of Nigeria), Shafii Abdulhamid (Community College of Qatar) and Adamu Abubakar Aliyu (ACETEL, National Open University of Nigeria).

Abstract

Learning management systems (LMS) such as Moodle have become the backbone of digital learning environments across Africa, generating extensive interaction data that can inform learner support and early interventions. Yet, most institutions still rely on descriptive dashboards or conditional filtering methods that classify students using static thresholds. Such approaches lack adaptability, overlook hidden behavioural patterns, and provide limited support for improving student success. This study introduces the use of Machine Learning Model Selection Framework for Synchronous Learning Analytics Engine, applying collaborative filtering principles to benchmark multiple algorithms against a rule-based conditional filtering baseline. Eleven algorithms were tested: five supervised (Logistic Regression, Decision Tree, Random Forest, Support Vector Machine, k-Nearest Neighbors), five unsupervised (K-Means, Hierarchical Clustering, DBSCAN, Gaussian Mixture Models, Self-Organizing Maps), one ensemble method (XGBoost), and two DL models (Multi-Layer Perceptron, Multi-Task Neural Network). Learners' performance was modelled across three dimensions—participation, engagement, and precision—using NAU LMS data (486 students). Evaluation metrics included confusion matrices, accuracy, precision, recall, and F1-scores. Results show that tree-based supervised models, specifically Decision Tree and Random Forest, achieved perfect classification performance with Accuracy, Precision, Recall, and F1-score all equal to 1.00. The ensemble XGBoost model also delivered near-perfect results with an Accuracy of 0.98 and an F1-score of 0.976. Both approaches substantially outperformed the conditional filtering baseline, which achieved only 0.79 for both Accuracy and F1-score. These findings demonstrate that interpretable tree-based and ensemble methods are best suited for Moodle analytics, providing scalable and context-sensitive tools for proactive interventions in African higher education.

[33] *Securing the Future Classroom: A Zero Trust Framework for Building Digital Trust in Africa's Transformed Educational Ecosystems*

Ayobami Mesioye (Department of Cyber Security, College of Computing, McPherson University, Seriki Sotayo, Ogun State, Nigeria), Adebayo Rufai (Department of Computer Science, Tai Solarin Federal University of Education, Ijagun, Ijebu Ode, Ogun State, Nigeria) and Johnson Oluwagbemi (Department of Computer Science, College of Computing, McPherson University, Seriki Sotayo, Ogun State, Nigeria).

Abstract

Africa's educational landscape has witnessed a huge digital transformation powered by disruptive technologies such as cloud-based LMS and immersive VR/AR, which have introduced significant cybersecurity vulnerabilities that traditional security models cannot address. This paper positions a need for a Zero Trust Architecture (ZTA) that is built on a digital trust for such a transformation to succeed. We introduce ZTA-Edu, a conceptual framework that operationalizes NIST principles by integrating real-time signals from modern identity Providers (IdP), Endpoint Detection and Response (EDR) tools, and cloud-native security analytics platforms. This ecosystem operates on the tenet of "never trust, always verify" and evaluates access based on three pillars of Verified Identity, Secured Endpoints, and Data-Centric Protection. To validate our framework, a comparative simulation analysis, modeling a 10,000–user university environment was conducted and compared to the traditional perimeter-based security model. The experimental results reveal a profound improvement in security posture with 99.5% and 85.2% in prevention rate in ZTA-Edu and the traditional model respectively. Crucially, the Mean Time to Detect a breach from over 24 hours in ZTA-Edu is reduced drastically to approximately 15 minutes and contained a-95% post-breach lateral movement. In addition, ZTA-Edu provides a resilient paradigm which enables secure access from untrusted networks for 92% of legitimate requests. This framework offers a strategic and quantifiable guideline for building a trustworthy digital infrastructure required to secure Africa's future learners and thus explore the full benefit in educational transformation.

[34] *Empowering Skills Development and Innovative Pedagogies with Moodle.*

Fortunate Masudze (Bindura University of Science Education), Tarirai Mukabeta (Bindura University of Science Education) and Tafadzwa Musinachirevo (Bindura University of Science Education).

Abstract

This case study examines how structured Moodle training workshops empower lecturers at Bindura University of Science Education (BUSE) to develop innovative pedagogical skills and enhance course delivery within Zimbabwe's higher

education sector. The workshops guided lecturers beyond basic content uploading toward creating interactive learning experiences using Moodle tools such as quizzes, discussion forums, H5P interactive content, and lesson modules. Participants engaged in hands-on sessions focused on instructional design, learner engagement strategies, and effective technology integration in teaching.

Post-training evaluations revealed that lecturers gained practical skills in designing interactive, learner-centered courses. These skills translated into improved student participation, engagement, and overall learning outcomes. Lecturers reported increased confidence in using Moodle to foster collaboration and critical thinking among students, and they began integrating multimedia resources and peer assessment into their courses.

Instructional designers at BUSE supported ongoing collaboration and mentoring, building a community of practice around e-learning that sustained these innovations. The case study highlights that empowering lecturers with digital competencies at BUSE enhances teaching practices and supports the broader transformation of higher education in Zimbabwe through innovative use of educational technology. This initiative demonstrates the potential of targeted professional development programs in fostering innovative pedagogy and bridging the gap between traditional and technology-enhanced learning environments.

[35] *Harnessing AI-Enhanced Moodle to Advance Equitable Higher Education and Workforce Readiness in Sub-Saharan Africa: A Mixed-Methods Study*

Johnson Oluwagbemi (McPherson Univerisity) and Ayobami Mesioye (McPherson University).

Abstract

As Sub-Saharan Africa contends with a rapidly expanding youth population and an evolving global labor market, integrating Artificial Intelligence (AI) into digital learning platforms emerges as a transformative strategy. This study investigates the impact of embedding AI-powered tools into Moodle an open-source Learning Management System (LMS) to enhance higher education outcomes and workforce preparedness in Nigeria. We employed a mixed methods across five tertiary institutions, the research evaluates changes in learner engagement, digital literacy and academic performance following the execution of adaptive learning modules, an AI-driven chatbot and predictive analytics. The quantitative results show a 35% increase in platform engagement and an 18% improvement in digital literacy scores and qualitative findings reveal positive perceptions of AI tools, alongside infrastructural and ethical challenges. Our research offers a scalable implementation framework steered by Technological Pedagogical Content Knowledge and Substitution Augmentation Modification Redefinition models and aligned with Sustainable Development Goals. Our recommendations include targeted policy interventions, faculty development programs, hybrid infrastructure models and transparent ethical governance.

[36] *Moodle Meets AI: A Smarter Way to Support Students*

Sean Marx (iLite).

Abstract

Across African higher-education contexts, virtual learning platforms such as Moodle are central to delivering flexible, high-quality education. Yet, while course materials are increasingly accessible, students often struggle to interpret, apply, or connect this information without expert guidance. Traditional support models, dependent on a small pool of available tutors, struggle to serve diverse and geographically dispersed learners, particularly in settings where internet connectivity and bandwidth are unreliable.

To address this, we piloted a bespoke AI chatbot (coached.ssisa.com) integrated with a Moodle-based sports science platform (ssisaed.com) to provide students with on-demand, expert-curated course knowledge.

The system employs a retrieval-augmented generation (RAG) pipeline to ingest Moodle resources such as pages, PDFs, glossaries, and images, into a structured knowledge base. Content is chunked, embedded, and indexed so the chatbot grounds responses strictly in approved materials, linking directly to Moodle sources. Role-based access controls, moderation guardrails, and data governance policies ensure academic integrity and privacy. Unlike general-purpose AI tools, this system draws exclusively on institution-approved materials, ensuring alignment with learning objectives and safeguarding academic integrity.

The pilot is being conducted in live courses using a mixed-methods evaluation framework, combining platform analytics, instructor workload indicators, and learner feedback. This approach is designed to be replicable across sectors, adaptable to low-bandwidth and multilingual contexts, and supportive of educators rather than replacing them.

Planned expansions include administrative support applications and broader subject coverage, positioning AI as a catalyst for contextually responsive, equitable, and innovative Moodle ecosystems across Africa.

[37] *M-RES: An Inclusive Moodle Framework for Health and Agricultural Extension Services in Sub-Saharan Africa*

Emmanuel Onwuka Ibam (Federal University of Technology Akure) and Olabisi Josh-Falade (McPherson University).

Abstract

The effectiveness of rural health and agricultural extension services in Sub-Saharan Africa is critically hampered by the persistent gap of workers' access to timely training and reliable information. This paper proposes the Moodle-Centric Rural Extension Services (M-RES) Ecosystem, an innovative framework that repositions Moodle as a 3-pronged integrated hub for learning, data collection, and strategic support. The framework's development and evaluation follows a Design-Based Research (DBR) methodology, involving iterative design, implementation, and refinement of the ecosystem in a pilot program with extension workers. The M-RES architecture integrates a core Moodle LMS with emerging open-source tools such as KoBoToolbox for offline-first field data collection, the Matrix protocol for secure, low-bandwidth peer communication, and Leaflet.js for embedded geospatial data visualization. Results from M-RES pilot in a small community in Northern Nigeria presented 48% improvement in knowledge retention through interactive content, 40% improved accuracy and efficiency of field data reporting, and the creation of a vibrant, real-time community of practice. The significance of the M-RES framework is twofold; for the Moodle community, it demonstrates a powerful, replicable model for extending Moodle beyond a traditional LMS into a sector-specific operational hub. For the larger society, it offers a tangible and scalable solution to strengthen the capacity of frontline workers, directly impacting food security and public health outcomes in Africa's most remote communities.

[38] *Upskilling For Industry-Ready Learners: A Practitioner's Window To The COLEAD State-Of-The-Art E-Learning Platform Powered by Moodle*

Adegboyega David Sodade (COmmittee Linking Entrepreneurship-Agriculture-Development (COLEAD)).

Abstract

COLEAD Intervention, from an operational standpoint, as a network and technical assistance tool for the sustainable and inclusive development of the private sector – micro, small and medium-sized enterprises (MSMEs), has been hugely upscaled through the COLEAD Moodle E-learning platform, among other operational strategies. COLEAD has developed a system of technical cooperation and vocational training (TVET) via a distinctive "cascading" training-of-trainers methodology available as an open-source self-study course for Training Institutions in Africa, the Caribbean and the Pacific (ACP)

The deployment of Moodle's innovative applications through the pedagogically reinforced COLEAD training system in learners' capacity building has been shown to support increased competitiveness and sustainability of the agri-food sector, and will be key in the future for the transformation of the food systems entrenched in the COLEAD Vision of "Growing People"

This presentation will explore the practicality of Moodle implementation for training for long-term enhancement of learners' skills, specifically in the agricultural sector across the ACP region. The presentation will dive into the COLEAD platform and the associated state-of-the-art E-resources for skill and knowledge development/competencies-based learning with improved accessibility & offline solutions, and a mobile application explained.

The presentation will spotlight the relevance of the COLEAD as an ISO 21001 Certified Training Management system for professional development and as well as capacity building for students through different Moodle Activities/applications. This applies particularly to African countries, which are well placed to become the driving force behind a new sustainable agricultural model.

[39] *Using Moodle-Based Learning Analytics for Early Alerts, Student Tracking, and Targeted Interventions: A Comprehensive Review*

Jacob Oluwafemi Orimaye (National Open University of Nigeria).

Abstract

Harnessing learning analytics for timely and targeted interventions is important with the rise of digital learning platforms to improve student retention and achievement. This structured narrative review investigates the application of Moodle as a learning management system (LMS) in higher education, focusing on learning analytics for enhancing student engagement, retention, and achievement. The analysis focuses on 47 peer-reviewed papers published between 2015 and 2023, synthesising evidence on adoption patterns, methodological approaches, geographical distribution, and reported effects. The search produced 1,283 initial records, refined to 162 full-text articles, ultimately resulting in 47 studies that satisfied the

inclusion criteria, following a structured PRISMA methodology. The findings indicate a consistent rise in research about Moodle-related learning analytics, with significant expansion observed since 2019. Empirical studies (about 66%) dominate, followed by mixed-methods and conceptual papers, with the highest concentration in Europe and the Asia-Pacific region. Log files, assessment scores, and forum activity were commonly analysed using techniques including logistic regression, decision trees, and neural networks. The reported impacts included improved course completion rates, early identification of at-risk students, and enhanced instructional decision-making. Nonetheless, methodological variability, dependence on singular data sources, and restricted large-scale application pose obstacles to generalisability. The evaluation highlighted the potential of Moodle-based analytics to enhance evidence-based teaching and advocated for integrated, multi-institutional research to strengthen the reliability and scalability of these treatments across various higher education settings. This blend provides an analytical foundation for policymakers, instructional designers, and institutional leaders interested in implementing scalable and ethically responsible Moodle-based analytics systems.

[40] *Dynamic Machine Learning Model Selection using Bayesian Optimization-driven Controller for Assessment Selection Classification.*

Godwin Otu (Air Force Institue of Technology Kaduna), Oludele Awodele (Babcock University) and Adenike Adeniji (University of Abuja).

Abstract

Accurate classification of educational assessment types is a critical challenge in learning analytics, as misclassification can lead to inappropriate pedagogical interventions and flawed academic evaluations. This work addresses the problem of dynamically selecting the most suitable machine learning model for classifying assessment types assignments, examinations, group work, projects, and quizzes by overcoming the limitations of static model selection and manual hyperparameter tuning. To solve this, a Bayesian optimization-driven controller is implemented to automate both model selection and hyperparameter optimization across three ensemble classifiers: Random Forest, AdaBoost, and a Stacking ensemble that combines Random Forest and AdaBoost with logistic regression as a meta-learner. The methodology leverages real student assessment data, where categorical features are encoded and a binary intervention target is derived from academic performance, while Bayesian optimization navigates a hybrid search space to maximize cross-validated accuracy. The results demonstrate that the Stacking ensemble outperforms the other models with an accuracy of 97.85%, an F1-score of 97.85%, and a near-perfect ROC AUC of 0.9999, committing only two misclassifications across 95 test instances. Random Forest also performs well with 96.77% accuracy, showing robustness to feature overlap, while AdaBoost lags significantly at 53.76% accuracy due to its sensitivity to noise and class ambiguity. The confusion matrices confirm the Stacking model's superior ability to distinguish between subtly overlapping assessment formats, validating its effectiveness in handling complex educational data. These findings establish that dynamic model selection via Bayesian optimization significantly enhances classification performance and generalization in educational assessment tasks.

[41] *Federated Learning for Intrusion Detection in IoT-Based Smart Home Ecosystems*

Ifeanyi Nwokoro (Rhema University Aba Nigeria), Edgar Osaghae (National Open University of Nigeria), Saheed Kayode (National Open University of Nigeria), Tombari Sibe (Digital Foot Prints), Augustina Nebechi Nwatu (Alex Ekwueme Federal University Ndufu-Alike Ebonyi State), Muhammad Qaim Aliyu Sambo (Five Stars ICT Ltd) and Ifeanyi Eze (First Bank of Nigeria Ltd).

Abstract

The rapid proliferation of Internet of Things (IoT) devices in smart home ecosystems has revolutionized automation, comfort, and energy efficiency, but it has also significantly expanded the attack surface for cyber threats. Traditional centralized intrusion detection systems (IDS) rely on aggregating sensitive data at a central server, which introduces privacy risks, bandwidth burdens, and scalability limitations in heterogeneous IoT environments. To address these challenges, this study investigates the application of Federated Learning (FL), a decentralized machine learning paradigm, as a foundation for privacy-preserving intrusion detection in IoT-based smart homes. FL leverages distributed computational resources at the network edge, enabling multiple devices to collaboratively train detection models without sharing raw data. Using benchmark datasets such as UNSW-NB15 and simulated smart home traffic (e.g., BoT-IoT), this research evaluates an FL-based IDS in terms of detection accuracy, false positive rate, communication overhead, and model convergence. Experimental results demonstrate that federated models achieve competitive performance, with accuracy above 92%, while ensuring data privacy and scalability. Furthermore, the study explores challenges such as non-IID data distributions, adversarial robustness, and communication efficiency, which are critical in dynamic IoT ecosystems. The findings suggest that federated learning is a viable and secure approach to intrusion detection in smart home networks. Beyond improving

detection performance, FL also enables the development of more resilient, adaptive, and privacy-aware IoT security frameworks, paving the way for integration with edge computing, blockchain trust mechanisms, and cross-domain IoT collaborations.

[42] *Empowering Skills Development and Innovative Pedagogies with Moodle*

Adewale Odukogbe (ACETEL - National Open University of Nigeria).

Abstract

Abstract Background: The global shift toward knowledge-driven economies and digital integration in education demands flexible, learner-centered approaches. Learning Management Systems (LMS), particularly Moodle, are increasingly recognized as key tools for rethinking teaching and learning beyond traditional classrooms. Purpose: This paper examines how Moodle, an open-source and customizable platform, supports skills development and fosters innovative pedagogies aligned with contemporary educational needs. Methods: A review of theoretical perspectives and case-based applications of Moodle is undertaken. The study focuses on how core features—course design, multimedia integration, discussion forums, and assessment tools—shape skills development and pedagogical practices across diverse educational contexts. Findings: Moodle enables interactive, inclusive, and skill-focused learning environments. It promotes digital literacy while cultivating critical thinking, problem-solving, creativity, and lifelong learning. Its ability to support online and blended models broadens access to quality education, particularly in resource-limited settings. However, barriers such as poor connectivity, limited teacher training, and resistance to pedagogical change constrain effective use. Successful adoption is most likely when supported by sound instructional design, institutional readiness, and ongoing professional development. Implications: Moodle is more than a technology platform; it represents a catalyst for advancing equity, enriching pedagogy, and preparing learners for future workforce demands. This study contributes to debates on technology-enabled educational transformation, particularly in developing and global contexts.

[43] *Skills Acquisitions and the Pedagogy of Sociological Content Analysis toward Sustainable-Innovative Development in Nigeria*

Tajudeen Oduwole (National Open University Of Nigeria, Abuja, Nigeria) and Zainab Duhu (National Open University of Nigeria, Abuja, Nigeria).

Abstract

Society is the aggregate of the social selves and the various social activities they engage in, daily. In other words, society is changeable, flowing current and created daily out of the processes of social construction of realities by the people themselves. Suffice, the newly advent of GenAI as a high-tech tool for educational expansion and research about the society in Africa and Nigeria to be specific, coupled with already noted diverse challenges (Western-focused, lack of learners' diverse needs/realities, etc..,) remarkably drew the attention of the study. Therefore, the much ado about empowering skills development and innovative technologies for Africa's educational transformation is highly valued, but the criticism bedeviling the use of GenAI ineptitudes in analyzing subjective phenomenon cut the need of this study to recap on one of the burning societal phenomena- the Military-theater of operations and Boko- Haram saga in Nigeria. Hence, the paper adopted symbolic interactionist- a sociological discourse to x-ray age long insurgency issue (Boko Haram/ISWAP) in order to juxtapose GenAI efficacy in this regard. The apriori for the study is to develop and implement inclusive specifications for GenA1 system and implement institutional measure to protect linguistic and cultural diversities when deploying GenA1 in education and research at scale in a way of ensuring inclusive technologies for Africa's educational transformation and sustainability.

[44] *AN EXPLORATORY STUDY TO INVESTIGATE ACADEMIC INTEGRITY CHALLENGES IN AI-DRIVEN ASSESSMENTS*

Riana Prins (IMM Graduate School).

Abstract

Generative AI (GenAI) is threatening academic integrity by blurring the line between human and machine-generated work and making traditional assessments less valid. Since AI detection tools are unreliable and often produce false positives, higher education institutions must adapt their assessment methods.

One South African institution is tackling this challenge through an action research study. Acknowledging that current summative assessments are not effective against AI-generated content, the study explores alternative assessment methods that focus on critical thinking, ethical reasoning, and original work.

The research has three phases. In phase one, exit-level modules were redesigned with alternative assessments that included real-world applications and allowed for the ethical use of AI. Phases two and three are investigating undergraduate students' and staff's perceptions of these new assessment methods. Using the PrACT Model, the study will evaluate how practical, authentic, consistent, and transparent the new assessments are. Phase four will add process-based authenticity checks and analyse student inquiries.

Preliminary findings from phase one are promising, showing that alternative assessments can reduce academic dishonesty and improve student engagement. Phases two and three are ongoing, with results expected in late 2025. Early indicators from phase four suggest that a holistic strategy combining alternative assessments with enhanced detection methods is a promising way to maintain academic integrity. The full findings will determine the overall success of this approach in creating AI-resilient assessments that accurately measure student learning.

[45] IMPACT OF GAMIFICATION ON ACADEMIC PERFORMANCE AND MOTIVATION AMONG UPPER BASIC SCIENCE STUDENTS IN KADUNA METROPOLIS, NIGERIA

Dr. Ashaolu Emmanuel (NOUN Staff School NOUN CHRD) and Hadiza Isa Muhammed (NTI Kaduna).

Abstract

This study explores the effects of gamification on the academic performance and motivation of upper basic science students in Kaduna metropolis, Nigeria. Utilizing a quasi-experimental design, the research involved two groups: an experimental group exposed to gamified learning strategies and a control group receiving traditional instruction. Data were collected using standardized achievement tests and motivation scales. The findings indicate that gamification significantly enhances both academic performance and student motivation, suggesting its potential as an effective pedagogical tool in Nigerian science education.

[47] LEVERAGING THE POWER OF DISRUPTIVE TECHNOLOGIES FOR AFRICA'S EDUCATIONAL TRANSFORMATION: INCLUSIVE ACCESS AND STUDENT SUCCESS WITH MOODLE IN NIGERIA

Angela Okpala (National Open University of Nigeria), Victor Wagwu (Ignatius Ajuru University of Education, Rumuorlumeni ,Port-Harcourt, Rivers State) and Caroline Okoro (Michael Okpara University of Agriculture Umudike, Abia State).

Abstract

The use of learning management systems (LMS) such as Moodle has become central in improving teaching, learning, and research in higher education. Moodle, being open-source and flexible, offers tools that support inclusive access to educational resources and foster student success using disruptive technologies. However, its level of adoption and effective use in Nigerian universities remains underexplored. This study will investigate how Moodle contributes to inclusive access and student success in universities, with specific attention to its application in university libraries in Nigeria. A descriptive survey research design will be employed, using questionnaires to collect data from librarians. The population of the study will consist of all librarians working at the National Open Universities (NOUN) in the South-South region of Nigeria. The study will focus on assessing the extent of Moodle use, the benefits it provides for inclusiveness and student achievement, and the challenges faced in its implementation. It aims to identify practical strategies that can strengthen Moodle's role in supporting equitable access to learning opportunities and improving academic outcomes. Findings from the study are expected to guide university administrators, educators, and policymakers in enhancing the use of Moodle for inclusive and student-centered education in Nigeria and beyond

[48] Enhancing Self-Directed Learning through AI-Powered Teaching Assistants in Moodle for Contextualized Adult Education

Rotimi Michael Akande (National Open University of Nigeria).

Abstract

The rapid growth of online education has intensified the need for adaptive and learner-centered technologies, especially for adult learners who often juggle multiple responsibilities while pursuing education. Moodle, a widely adopted learning management system (LMS), offers robust functionalities but lacks the dynamic, personalized support required to foster self-directed learning in adult education contexts. Moodle, a widely used learning management system, provides robust functionalities but lacks the dynamic interactivity and real-time assistance necessary to address the unique challenges adult learners face, such as limited time, diverse learning goals, and varying levels of digital literacy. This paper argues for

the integration of AI-powered teaching assistants within Moodle to enhance contextualized adult education. By leveraging artificial intelligence, these assistants can offer personalized feedback, adaptive guidance, and resource recommendations, thereby fostering autonomy, engagement, and improved learning outcomes. Grounded in the principles of andragogy, self-directed learning theory, and connectivism, the paper posits that contextually relevant AI-driven solutions will transform adult education by promoting flexibility, inclusivity, and efficiency in the digital learning environment.

[49] *Exploring the Potential of Gamified Moodle for Innovative Pedagogies in LIS Education: Evidence from Federal Universities in North Central Nigeria*

Babarotimi Opeyemi Oluwaseun (National Open University of Nigeria).

Abstract

The growing demand for innovative pedagogies in Library and Information Science (LIS) education has prompted exploration of disruptive technologies that can transform teaching and learning. Gamification, when integrated into learning management systems such as Moodle, has the potential to increase motivation, engagement, and academic performance. Despite these prospects, the adoption of gamified Moodle in Nigerian universities remains underexplored, particularly in Federal Universities within the North Central region. This study investigates the perceptions and adoption readiness of gamified Moodle as a pedagogical innovation in LIS education in this context. Anchored on the Technology Acceptance Model (TAM) and Diffusion of Innovation (DOI) theory, the research examines LIS students' and lecturers' awareness of gamification, perceived usefulness, readiness for adoption, and perceived challenges hindering implementation. Data will be collected using questionnaires and interviews administered across selected Federal Universities in North Central Nigeria. Descriptive statistics, correlation, and regression analysis will be employed to analyse relationships among awareness, perceived usefulness, readiness, challenges, and adoption intention. The findings are expected to provide empirical insights into the preparedness of LIS stakeholders to adopt gamified Moodle, while identifying institutional and infrastructural factors influencing its feasibility. The study will propose a conceptual adoption framework tailored to the Nigerian context, offering practical recommendations for leveraging gamification to strengthen innovative pedagogies in LIS education and contribute to Africa's educational transformation agenda.

[50] *Continuous professional development to improve online teaching presence for student support in an online distance e-learning institution*

Phumza Makgato-Khunou (UNISA) and Piera Biccard (UNISA).

Abstract

The shift to online instruction in higher education has highlighted the importance of having a strong teaching presence and providing effective student support in virtual environments. However, the potential of peer-facilitated Continuous Professional Development (CPD) to enhance lecturers' online teaching methods has not been widely studied. This research investigates the effectiveness of a peer-led CPD program as a strategy for promoting the sharing of best teaching practices and improving online teaching presence. The study utilizes the Community of Inquiry (CoI) framework to guide professional development activities and assess their impact on teaching approaches, aiming to address the lack of literature on the effects of peer teaching in online pedagogy.

Six professors who acted as peer facilitators in the CPD program participated in a qualitative case study. Data was collected through semi-structured interviews and document analysis, and content analysis methods were employed to examine the findings. The results indicate that peer teaching can significantly boost lecturers' confidence and skills in providing effective online student support, especially when based on real-world presentations. This study contributes to the limited research exploring the use of the CoI framework in CPD contexts and offers new insights into how peer collaboration can help bridge the gap between enhanced online teaching presence and professional development.

[51] *A sense of Ubuntu: reflections of a learning management system migration at an Open Distance and e-Learning institution*

Piera Biccard (UNISA) and Phumza Makgato-Khunou (University of South Africa).

Abstract

Open distance e-learning institutions are plagued by low throughput and high dropout rates. A supportive and inclusive digital environment is crucial to fostering engagement among both students and lecturers. We explore the integration of a sense of place and the African Ubuntu philosophy to understand lecturer experiences of a learning management system migration. Through an online open-ended question, we analyze 124 responses to lecturers' experiences of the migration

that took place from one learning management system to another. We used the We used Seroto's (2016) five categories under the Ubuntu framework, namely: survival, spirit of solidarity, compassion, respect and dignity to code the data, focusing on aspects such as belonging, identity, and communal values. We found that the participants did not experience high levels of compassion, respect, or dignity during the migration process while their personal identity was lost, and they experienced strong emotions caused by fear and frustration. The lack of transparent communication and institutional support further exacerbated these challenges. We recommend more human-centered migration processes when staff are introduced to new forms of technology, emphasising participatory decision-making, emotional support, and collaborative learning to foster a more inclusive and empowering transition.

[52] *Emerging Technologies and Accessibility in Enhancing Moodle for Students with Disabilities at the National Open University of Nigeria*

Mercy Enefu Okwoli (National Open University of Nigeria) and Babarotimi Opeyemi Oluwaseun (National Open University of Nigeria).

Abstract

Moodle is the primary learning management system (LMS) used by the National Open University of Nigeria (NOUN) to support teaching and learning in an open and distance education context. While Moodle provides flexible access to diverse learners, accessibility challenges persist for students with disabilities. Emerging technologies such as artificial intelligence (AI), assistive tools, adaptive interfaces, and immersive media offer new opportunities to enhance Moodle's inclusivity and ensure equitable learning experiences. This study investigates how such technologies can improve Moodle's accessibility for students with disabilities at NOUN. Guided by the principles of Universal Design for Learning (UDL) and the Technology Acceptance Model (TAM), the study pursues four objectives: to assess awareness of Moodle's accessibility features among students with disabilities and lecturers; to examine perceptions of the usefulness of emerging technologies in enhancing accessibility; to determine readiness and willingness to adopt such innovations; and to identify barriers to their effective implementation. A mixed-methods design will be employed, involving surveys and structured interviews with students with disabilities and lecturers at NOUN. Quantitative analysis will explore relationships between awareness, perceived usefulness, readiness, and adoption intention, while qualitative findings will provide contextual insights into the barriers and needs of learners with disabilities. The expected outcome is a framework for integrating emerging technologies into Moodle at NOUN to promote inclusive education. This will contribute both theoretically, by extending discourse on digital inclusivity in African distance learning, and practically, by guiding institutional strategies for leveraging disruptive technologies to support students with disabilities.

[53] *Revolutionizing Academic Assessment: A Generative AI-Powered Moodle Plugin for Automated Assignment Marking*

Lebato Tswaledi (Adapt IT).

Abstract

Background & Problem Statement Traditional assignment marking in higher education faces significant scalability challenges, with lecturers spending countless hours providing feedback on student submissions while struggling to maintain consistency and timeliness. As enrolment numbers continue to grow and educational institutions embrace digital transformation, the need for intelligent, automated assessment tools has become critical. Core Moodle installations don't come with sophisticated AI-driven marking capabilities, creating bottlenecks in the educational workflow and limiting the quality of feedback students receive. Solution Overview To address this challenge, we are developing a groundbreaking Generative AI Moodle Plugin that integrates seamlessly with the Moodle learning management system to automate assignment marking. This solution leverages advanced natural language processing and machine learning models to provide accurate, fair, and timely feedback on student submissions. By automating routine grading tasks, the plugin reduces administrative workload for lecturers, accelerates turnaround times, and enhances the learning experience for students through consistent and constructive feedback. This presentation will outline the design and development of the plugin, its integration with Moodle's grading workflow, and its potential impact on academic efficiency and student outcomes. Furthermore, it will highlight key considerations around transparency, academic integrity, and the ethical use of AI in education.

[55] *Implementing Zero Trust Architecture to Enhance Cybersecurity in Africa's Innovative E-Learning Environments*

Oladapo Adeduro (Department of Cyber Security, McPherson University, Seriki-Sotayo), Adesola Falade (Department of Cyber Security, McPherson University, Seriki-Sotayo), Ayodele E Awokoya (McPherson University, University of Ibadan), Grace Jokthan (Africa Centre of Excellence on Technology Enhanced Learning, NOUN, Abuja) and Olatunji Okesola (Africa Centre of Excellence on Technology Enhanced Learning, NOUN, Abuja).

Abstract

The rapid adoption of cloud-based learning platforms has transformed education in Africa, offering increased accessibility and flexibility. However, this digital transformation has exposed educational institutions to escalating cybersecurity threats, challenging traditional perimeter-based security models. Zero Trust Architecture (ZTA), which enforces continuous verification and least-privilege access, emerges as a promising framework to enhance security in these cloud environments. This study employs a systematic literature review guided by the PRISMA methodology to critically examine existing research on applying ZTA within African cloud-based educational ecosystems. Analyzing 45 studies, the review identifies significant benefits of ZTA, including enhanced protection of sensitive student data and improved threat containment, alongside persistent challenges such as infrastructural limitations, organizational readiness, and regulatory fragmentation. The findings underscore the necessity of context-sensitive, phased ZTA implementations supported by robust policy frameworks and capacity-building initiatives. The paper concludes that while ZTA can significantly strengthen Africa's educational cybersecurity posture, its successful deployment requires coordinated efforts addressing technical, socio-organizational, and legal dimensions, ultimately supporting sustainable and secure digital education transformation across the continent.

[56] *Leveraging Parameter-Efficient Fine-Tuning of Nllb Models for Enhancing English-to Yoruba Translation in E-Learning Contexts*

Ayodele E Awokoya (Department of Cyber Security, McPherson University, University of Ibadan), Oladapo Adeduro (McPherson University, Seriki-Sotayo. Africa Centre of Excellence on Technology Enhanced Learning, NOUN, Abuja, Nigeria), Falade Adesola (Department of Cyber Security, MCPherson University Nigeria) and Prof. Olatunji Okesola (Africa Centre of Excellence on Technology Enhanced Learning, NOUN, Abuja).

Abstract

Machine Translation (MT) has a very strong relationship with education supporting SDGs 4 and 10. Till-date, state-of-the-art systems exhibit high disparity in their performance on high-resource languages as compared to low-resource languages, such as Yoruba, constraining their usefulness in learning platforms like Moodle for most Yoruba users. Our target is on the use of Moodle in West Africa, with Yoruba as the case study. We aim to improve English–Yoruba translation with Language-Specific Fine-Tuning and Parameter-Efficient method (LSPEFT) applied on the No Language Left Behind (NLLB) model series. Our approach adjusts the multi-head attention and feedforward networks of the model's transformer layers through Low-Rank Adaptation while keeping base weights frozen, in order to lower compute and storage costs while preserving general capabilities. Our experimental results on the publicly available English-Yoruba benchmark shows range of +2-5 BLEU over the untuned base, depending on the NLLB variant. Inferencing with adapters achieves performance comparable to fully fine-tuned models, thus enabling easy deployment on the available GPUs/CPUs in African institutions. We propose a practical integration of our workflow into Moodle: a lightweight translation microservice fronted by Moodle filter/local plugin to translate course pages, labels and quiz strings on demand; caching to control costs and latency; an instructors "review & edit" screen to keep humans-in-the-loop for assessment items and culturally sensitive content. We demonstrate a prospective path for inclusive Yoruba learners on Moodle by combining state-of-the-art MT with deployable, resource-aware engineering. We anticipate similar gains for related Niger-Congo languages with minimal additional tuning.

[57] *Prediction of Mental Health Well-being: A Depression Analysis in Higher Education Students*

Falade Adesola (Department of Cyber Security, MCPherson University Nigeria), Oladapo Adeduro (McPherson University, Seriki-Sotayo. Africa Centre of Excellence on Technology Enhanced Learning, NOUN, Abuja, Nigeria), Ayodele E Awokoya (McPherson University, University of Ibadan), Grace Jokthan (Africa Centre of Excellence on Technology Enhanced Learning, NOUN, Abuja) and Prof. Olatunji Okesola (First Tech University).

Abstract

The prevalence of depression among higher education (HE) students in the United Kingdom has become a growing public health concern, necessitating the development of predictive tools for early detection and intervention. This study proposes an ensemble machine learning framework to predict depression levels among HE students using a publicly available dataset sourced from Kaggle. The methodology involves data preprocessing, feature selection, and the implementation of multiple ensemble models including Random Forest, XGBoost, and a soft Voting Classifier. These models were evaluated using classification metrics such as accuracy, precision, recall, F1-score, and ROC-AUC. Among them, the Voting Classifier achieved the highest performance with an accuracy of 91% and ROC-AUC of 0.94. The findings underscore the potential of ensemble approaches in mental health prediction tasks and offer a foundation for integrating AI-driven support systems into student mental health services. The study concludes with a discussion on ethical considerations, model interpretability, and directions for future research.

[59] *Transforming Science Education Teacher Professional Development in Nigeria's Distance Learning through Enabled Technology: Virtual Reality, and Gamified Moodle Platforms*

Mutiat Olawale (National Open University of Nigeria).

Abstract

Science education in Nigeria's distance learning institutions faces significant challenges, including inadequate access to functional laboratories, limited teacher-student interaction, and insufficient professional development for educators. These gaps often produce graduates with sound theoretical knowledge but weak practical competencies, thereby limiting the transformative potential of distance education. To address these challenges, there is a growing need to adopt disruptive technologies that can redefine teacher training and improve science instruction. This study argues that technology-enabled learning, particularly through Virtual Reality (VR) and gamified Moodle platforms, provides a strategic pathway for enhancing teacher professional development in Nigeria's distance learning ecosystem. VR enables immersive laboratory simulations, allowing teachers to demonstrate and practice complex scientific concepts even where physical infrastructure is lacking. Gamification within Moodle fosters engagement, collaboration, and sustained participation, promoting a learner-centered and practice-oriented approach to professional growth. The paper advocates for the integration of these tools in institutions such as the National Open University of Nigeria (NOUN) and calls on policymakers, instructional designers, and teacher training bodies to leverage VR and gamified Moodle for improving instructional quality and student outcomes. It contributes to ongoing discussions on using disruptive technologies to drive inclusive, innovative, and future-ready science education in Nigeria.

[60] *INNOVATIVE MOODLE ECOSYSTEMS: AN INTEGRATION OF DIGITAL MEDIA LITERACY IN THE RELIGIOUS STUDIES PROGRAM OF THE GRADUATE THEOLOGICAL UNION (GTU), UNITED STATES OF AMERICA AND NATIONAL OPEN UNIVERSITY OF NIGERIA (NOUN)*

Adeyemo Abduljeleel Taiwo (National Open University of Nigeria (NOUN)) and Faqiah Afolake Adeaga (Syracuse University).

Abstract

Religious Studies requires dynamic pedagogical tools to address modern learners' expectations and technological fluency. Moodle offers a flexible environment where educators can integrate Religious knowledge into interactive modules, supported by multimedia resources. By embedding both media literacy and Religious Studies within Moodle and Learning Content Management System (LCMS), GTU and NOUN create a holistic learning space. This study examines how academics deliver instructional materials and videos to impact effective pedagogical contents on the students of Religious Studies at the Graduate Theological Union (GTU), California, United States of America and the National Open University of Nigeria (NOUN), Nigeria. The participant pool consisted of 100 individuals, including faculty members, Religious Studies students, and ICT/Moodle course administrators. A purposive sampling method was employed to ensure representation across teaching, learning, and administrative perspectives. Data collection included document analysis, institutional reports, semi-structured interviews, and Moodle course reviews. Course outlines, screenshots, and multimedia lesson samples were analyzed to illustrate integration in practice. Data were thematically coded to evaluate pedagogical innovation, sustainability, and cultural adaptation. Student engagement was measured through participation logs, assignment submissions, and qualitative feedback, while learning outcomes were assessed via instructor evaluations and observed knowledge application. Findings reveal that Moodle fosters deeper interaction, enhances teacher innovation, and sustains equitable access to Islamic Studies education across diverse contexts. The study recommends strengthening Moodle ecosystems through digital pedagogy training and cross-institutional collaborations to promote sustainable, inclusive, and

culturally authentic theological education.

[61] *Building Context-Aware Virtual Assistants on Moodle Using RAG and Generative AI*

Eseosa Iyare (Ei Consulting).

Abstract

The integration of Retrieval-Augmented Generation (RAG) with learning management systems such as Moodle offers a transformative approach to instant tutoring and learner support. Traditional chatbots often fail to provide accurate, context-specific responses in educational settings because they lack alignment with course materials. By contrast, RAG-enabled virtual assistants leverage vector embeddings and retrieval pipelines to ground generative models in course-specific content, ensuring that responses remain both accurate and pedagogically relevant. This work explores the design and deployment of a RAG chatbot architecture using Amazon Bedrock with Claude, DeepSeek and LLaMA models as the generative backbone. Course resources—including lecture notes, quizzes, and supplementary readings—are indexed into a vector store to enable precise retrieval of context prior to generation. Fine-tuning strategies are applied to align the chatbot with Moodle-specific semantics, including grading rubrics, glossary terms, and activity modules, thereby enhancing domain relevance. Beyond technical design, the study highlights measurable benefits to learner engagement and academic performance. Real-time analytics track question frequency, knowledge gaps, and interaction patterns, providing instructors with actionable insights into student progress. Early pilot results suggest that RAG-driven assistants not only reduce response latency and cognitive friction for learners but also extend the reach of instructors by offering scalable, personalized tutoring. This approach underscores the potential of generative AI in fostering more adaptive, inclusive, and data-informed e-learning ecosystems.

[62] *Advancing Moodle for Digital Transformation: The role of E-Learning and Curriculum Design at Sol Plaatje University*

Godfrey Rudolph (E-Learning & Curriculum Design Manager at Sol Plaatje University).

Abstract

There is a persistent resistance among lecturers in universities to fully engage with the learning management system as the driving innovation in learning and teaching. The significance of this study lies in advancing the Diffusion of Innovations (DoI) theory and through practical models that support Moodle-enabled innovation, inform quality assurance and digital strategies, and provide a transferable Moodle integration framework prioritising access, equity, and sustainability. Moodle is the dominant learning management system at universities in Africa, but the use of the institutional e-learning platform varies. Consequently, Moodle highlights not only as a platform for course delivery but also as a catalyst for learning and teaching transformation in Africa, as opposed to focusing on the digital learning platform as an environment for content depository. Document analysis, semi-structured interviews with academic staff, and surveys with students will be employed to explore how Moodle adoption is embedded within institutional practices. Therefore, this proposed study uses qualitative case study design, applying the DoI and socio-technical theories. The E-Learning and Curriculum Design unit at Sol Plaatje University has implemented initiatives that include AWS-based Moodle hosting, course consistency models, integrated digital learner engagement analytics, and the use of complementary e-learning tools such as H5P, Panopto, Turnitin, and Inspera. However, there is limited systematic analysis of how Moodle-enabled interventions contribute to broader institutional and Africa-wide digital transformation goals.

[63] *An Evaluation of Moodle-Based Teaching and Learning Strategies in Science Education: Implications for Tertiary Institutions*

Mutiat Olawale (National Open University of Nigeria) and Benneth Uzoechi (Nasarawa State University, Keffi).

Abstract

The integration of Learning Management Systems (LMS) such as Moodle has transformed teaching and learning in tertiary education, especially in science education where interactive and practical engagement is essential. This study evaluates the effectiveness of Moodle-based teaching and learning strategies in enhancing science education among postgraduate students in the Department of Science Education. A descriptive survey research design was adopted, and a total of 200 postgraduate students were selected using a purposive sampling technique. Data were collected through a Google Forms questionnaire developed by the researchers. The instrument underwent expert validation to ensure content accuracy and relevance, while its reliability was established using Cronbach's alpha, yielding a coefficient of 0.86, indicating high internal consistency. Findings reveal that Moodle facilitates greater student engagement, supports collaborative learning, and

improves conceptual understanding through its features such as quizzes, video-based demonstrations, discussion forums, and interactive assignments. However, the study also identifies significant challenges, including unstable internet connectivity, inadequate ICT infrastructure, and insufficient technical support for instructors and students. Despite these limitations, Moodle-based strategies were found to enhance learner autonomy, motivation, and participation in science-related tasks. The study concludes that Moodle holds substantial potential for strengthening science education in tertiary institutions. It recommends improved institutional support, enhanced digital literacy training, and the adoption of blended learning models to maximize Moodle's effectiveness and sustainability in postgraduate science education.

[64] *Transforming African Higher Education: AI and XR Integration in Moodle-Based ODL*

Joseph Oju (National Open University of Nigeria), Gregory Onwodi (National Open University of Nigeria) and Olufunke Rebecca Vincent (Federal University of Agriculture, Abeokuta, Nigeria).

Abstract

Background: Moodle-based Open and Distance Learning (ODL) in African higher education continues to face significant challenges related to access, equity, and quality. Integrating Artificial Intelligence (AI) and Extended Reality (XR) technologies is increasingly recognised as a viable strategy to address these barriers and enhance learning experiences. Objectives: This scoping review sought to identify and synthesise research on the integration of AI and XR into Moodle platforms in African higher education, with a focus on their effects on access, student engagement, and academic performance. Design: Peer-reviewed articles and reviews published between 2015 and 2025 were systematically sourced from online databases. Relevant papers were analysed, including empirical studies, theoretical frameworks, and regional case studies. Results: Most research has focused on AI and XR as targeted interventions for students at risk of underperformance and for addressing infrastructural and pedagogical challenges in ODL. AI applications, such as adaptive learning and intelligent tutoring, improved personalisation and outcomes, while XR provided immersive learning opportunities. However, studies largely emphasised enhancements to existing teaching strategies rather than transformative uses. Persistent issues include infrastructural deficits, digital divides, and limited research on broader, systemic integration of these technologies. Conclusions: Current research and practice remain narrowly focused, with AI and XR mainly extending traditional pedagogies. The review calls for broader, more innovative, and context-sensitive research and practice to advance access, equity, and quality in African higher education.

[65] *Building Sustainable Digital Learning Ecosystems: ACETEL's Experience in Strengthening EdTech Infrastructure*

Grace Jokthan (Africa Center of Excellence on Technology Enhanced Learning. National Open University of Nigeria), Sinan Ismaila Idris (Africa Center of Excellence on Technology Enhanced Learning. National Open University of Nigeria) and Abubakar Bello (Africa Center of Excellence on Technology Enhanced Learning. National Open University of Nigeria).

Abstract

The Africa Centre of Excellence on Technology-Enhanced Learning (ACETEL) at the National Open University of Nigeria (NOUN) exemplifies a unique approach to harnessing technology for developing sustainable and inclusive digital learning ecosystems across Africa. Founded under the World Bank–funded Africa Centres of Excellence (ACE) Impact programme, ACETEL has contributed to establishing a strong digital infrastructure at the national Open University of Nigeria, including a modern Data Centre, specialised laboratories, and a Centre of Competence in Digital Education (C-CoDE). This infrastructure has enabled scalable postgraduate programmes in Artificial Intelligence, Cybersecurity, and Management Information Systems, while promoting professional certifications through the Cisco Networking Academy and international collaborations such as Coursera. This case study explores how ACETEL utilises technology to advance teaching, research, and community impact. It specifically highlights the Centre's efforts to strengthen institutional resilience, safeguard data sovereignty, and broaden educational access for remote learners through blended and mobile-friendly methods. The paper also addresses the role of ACETEL's C-CoDE in capacity development and digital pedagogy, emphasising how integration with the Nigerian Research and Education Network (NgREN) enhanced collaboration, quality assurance, and resource sharing. Findings indicate that ACETEL's learning ecosystem not only links theory with practice but also establishes the Centre as a continental hub for scalable, inclusive, and sustainable digital education. The lessons learned provide replicable strategies for higher education institutions across Africa aiming to deploy technology for transformative impacts in education.

[66] *Innovation Dynamics and Sustainability of Moodle Environments in Institutions of Higher Education*

David Nzuki (Kenyatta University) and Mathias Nduwingoma (University of Rwanda).

Abstract

Sustainability issues of virtual learning environments are of concern in institutions of Higher Education that fail to establish the feasibility of Learning Management Systems (LMS) prior to acquisition and deployment. The open-source nature of Moodle LMS endears many Institutions of Higher Education to adopt it due to the associated factors that translate to sustainability of the virtual environment. The artificial intelligence integration into Moodle environment enhances the capability to cater for inclusivity, equity, and lifelong learning in accordance to Sustainable Development Goal 4. The purpose of the study was to explore how innovation dynamics affect Moodle environment sustainability in Institutions of Higher Education. The study sought to determine the role of Artificial Intelligence capability, communication channels, social systems in the sustainability of Moodle environments in Institutions of Higher Education. The Diffusion of Innovations theory and Resource-Based View theory were used to underpin the study. The scoping review methodology was used to review literature that informed the study. The study revealed that Artificial Intelligence capability, communication channels, and social systems led to the sustainability of Moodle environments. The findings are helpful to managers of Institutions of Higher Education, scholars, and policy makers in regard to the innovations dynamics and sustainability of Moodle environments

[67] *From Infrastructure to Impact: Optimising Learning Technology Systems through Strategic Relationships at Stellenbosch University*

Lianne Keiller (Stellenbosch University).

Abstract

Stellenbosch University (SU) has undertaken a dual transformation in its digital learning environment: the technical optimisation of its Learning Management System (SUNLearn) and the strategic evolution of its Learning Technology Systems (LTS) governance and partnerships. This presentation explores how SU has aligned infrastructure improvements with relationship-driven collaboration to support teaching, learning, and assessment (TLA) at scale.

The SUNLearn continual improvement project addresses performance, scalability, and sustainability challenges through infrastructure virtualisation, disaster recovery planning, and the deployment of discipline-specific LMS environments. These efforts are guided by robust governance frameworks (RACI/DACI), data-informed decision-making, and alignment with institutional policies on privacy, intellectual property, and digital pedagogy.

In parallel, SU's LTS journey reflects a shift from siloed support to a collaborative model involving IT, the Division for Learning and Teaching Enhancement (DLTE), and faculty-based Blended Learning Coordinators (BLCs). These relationships have enabled agile responses to crises such as #FeesMustFall and the COVID-19 pandemic, while supporting long-term initiatives like hybrid learning, curriculum renewal, and digital literacy.

This case study demonstrates how leveraging strategic relationships - alongside technical excellence - has enabled SU to build a resilient, responsive, and future-ready digital learning ecosystem.

The presentation will explore how collaborative governance, agile infrastructure, and shared ownership seeks to transform the institution's LMS into a strategic enabler of academic success.

[68] *Assessing University Lecturers' Perceptions on the Sustainability of Moodle as an Instructional Platform*

Oluwasogo Ogunleye (NATIONAL OPEN UNIVERSITY OF NIGERIA).

Abstract

The sustainability of digital learning platforms is critical to improving instructional delivery in higher education. Moodle, as an open-source Learning Management System (LMS), has been widely adopted by universities to enhance teaching, learning, and assessment processes. However, its long-term viability depends largely on the perceptions and acceptance of academic staff who serve as primary users. This study assessed university lecturers' views on the sustainability of Moodle as an instructional platform in South-West Nigeria. A descriptive survey design was employed, targeting 320 lecturers across six universities using stratified random sampling. Data were collected through a validated questionnaire structured around three dimensions: technical reliability, pedagogical relevance, and institutional support. Descriptive statistics (mean and standard deviation) and inferential statistics (ANOVA and t-tests) were used to analyze responses. Results showed that 74% of lecturers rated Moodle as pedagogically relevant, while only 52% believed institutional support was adequate.

Approximately 68% agreed that Moodle is technically reliable, though 61% cited unstable internet access as a barrier. Significant differences were observed in perceptions by teaching experience ($p < 0.05$), with younger lecturers expressing higher confidence in Moodle's long-term viability. The study concludes that while Moodle holds strong potential as a sustainable instructional tool, its success depends on continuous capacity building, reliable infrastructure, and supportive policies. The findings provide actionable insights for university administrators and policymakers to strengthen Moodle adoption and ensure its long-term integration into academic practice.

[69] *Equity in Open and Distance Learning: Moodle's Role in Expanding Educational Opportunities*

Sheriff Olatunji (National Open University of Nigeria).

Abstract

The use of technology-enabled learning platforms is an essential part of the 21st century's pursuit of inclusive and egalitarian education. An open-source learning management system called Moodle has been a game-changer, democratising access to education while promoting quantifiable student achievement in a variety of learning environments. This study examines Moodle's potential as a catalyst for inclusive access by examining how well it accommodates students with disabilities, how well it supports multilingual and multicultural interaction, and how well it adheres to universal design for learning. Furthermore, it explores how Moodle improves student achievement by supporting early interventions for at-risk learners using personalised learning pathways, integrated assessment tools, interactive collaborative spaces, and predictive learning analytics. The report examines best practices, difficulties, and innovations in using Moodle for global educational impact, drawing on case studies in higher education as well as open and distance learning environments. The paper's conclusion is that Moodle is more than just a platform; it is a driving force behind a rethinking of education as a more open, egalitarian, and student-focused endeavor. The findings shared are meant to encourage researchers, educators, and politicians to use Moodle to create inclusive futures where no student is left behind.

[70] *Multilingual and Multicultural Inclusivity: Moodle as a Tool for Global Learner Engagement*

Sheriff Olatunji (National Open University of Nigeria) and Lilian Ugaduh (National Open University of Nigeria).

Abstract

Classrooms are increasingly bilingual and multicultural due to the globalisation of education, presenting both opportunities and challenges for inclusive teaching and learning. Language diversity and cultural plurality enhance the educational process; however, if ignored, they can create obstacles to participation, equity, and academic achievement. Moodle, a popular open-source learning management system, offers features that make it essential for overcoming these challenges and promoting inclusive, global access to education. This study investigates how Moodle's customisable interfaces, multilingual content support, real-time translation plugins, and culturally relevant teaching resources foster inclusivity. The research highlights effective strategies, best practices, and innovations that leverage Moodle to create equitable and engaging learning environments. By drawing on global case studies in higher education and open and distance learning contexts, this paper argues that Moodle is not merely a learning platform but a transformative ecosystem that celebrates diversity. Moodle redefines student participation in the global classroom by amplifying voices from diverse linguistic and cultural backgrounds. The findings of this study aim to inspire academics, educators, and policymakers to rethink digital pedagogy, ensuring that no student is excluded from the educational opportunities offered by a globalised society.

[71] *KOHA Software as a Catalyst for Effective Library Automation: A Case Study of the National Open University of Nigeria*

Lucy Okonkwo (National Open University of Nigeria (NOUN)) and Babarotimi Oluwaseun (National Open UNiversity of Nigeria (NOUN)).

Abstract

Abstract The adoption of open-source Integrated Library Systems (ILS) is gaining momentum globally as a cost-effective and adaptable solution for automating library operations. KOHA, one of the most widely deployed platforms, provides comprehensive modules for cataloguing, circulation, acquisitions, serials control, and online public access catalogues (OPAC). This study investigates KOHA as a catalyst for effective library automation at the National Open University of Nigeria (NOUN), focusing on its impact, challenges, and prospects in academic library service delivery. A descriptive survey design was employed, targeting sixty-five (65) professional librarians across NOUN's six geopolitical study centres. Data were

collected through structured questionnaires and will be analysed using descriptive statistics, including frequencies, percentages, mean, and standard deviation. It is expected that the findings will demonstrate how KOHA has improved access to resources, streamlined cataloguing and circulation processes, and enhanced user satisfaction through OPAC, while also highlighting persistent challenges such as inadequate funding, unstable electricity supply, limited staff training, and technical maintenance gaps. The anticipated outcome will provide insights into KOHA's potential in advancing NOUN's mission of quality open and distance learning, as well as its broader applicability in transforming academic libraries across Nigeria and Africa. The study is expected to conclude that KOHA has positively influenced library operations at NOUN, and will recommend sustained staff capacity building, stronger institutional investment in ICT infrastructure, and active participation in the global KOHA community. These findings will offer practical implications for libraries seeking affordable and scalable automation solutions in developing contexts.

[72] ENHANCING SKILLS DEVELOPMENT AND INNOVATIVE PEDAGOGIES IN LIBRARY AND INFORMATION SCIENCE THROUGH MOODLE INTEGRATION

Dr. Isah Seidu Osimetha (National Open University of Nigeria).

Abstract

Abstract The rapid transformation of higher education has created a pressing need for innovative pedagogical approaches and the cultivation of 21st-century skills among graduates. In Library and Information Science (LIS), where professionals must adapt to evolving digital environments, the integration of technology into teaching and learning has become indispensable. This study examines the role of Moodle, an open-source Learning Management System (LMS), in enhancing skills development and fostering innovative pedagogies in LIS education. Grounded in constructivist learning theory, connectivism, and the Technological Pedagogical Content Knowledge (TPACK) model, the study positions Moodle as a platform that enables active, student-centred, and skills-oriented learning. The literature reviewed reveals that Moodle supports pedagogical innovations such as blended learning, flipped classrooms, and problem-based learning, which strengthen digital literacy, research competence, collaboration, communication, and critical thinking. Furthermore, the study emphasizes mediating factors—including infrastructure, institutional support, faculty readiness, and student engagement—that influence the success of Moodle integration. Findings suggest that when effectively implemented, Moodle transcends its role as a digital repository to become a transformative tool that enriches LIS pedagogy and equips graduates with competencies required in the dynamic information society. Recommendations are offered for educators, institutions, and policymakers to strategically support Moodle adoption and sustain skill-oriented, innovative teaching practices in LIS education.

[74] Assessing the Impact of Moodle Learning Management System on Students Performance in Nigerian tertiary institutions using Machine Learning Techniques

Hadiza Umar (Bayero University, Kano) and Ibrahim Lawan (Bayero University, Kano).

Abstract

The utilization of Learning Management Systems (LMS) for lecture delivery has transformed the way e-learning is carried out in educational institutions. LMS has enabled tutors to create, share, monitor, and maintain various kinds of educational content that has proven to be the driving force in enhancing online learning. One of such LMS is the Moodle, an open-source platform that has highly scalable and customizable features that facilitates effective lecture delivery in Nigerian tertiary institutions. Students' learning outcomes have greatly improved through the interactive features and mobile accessibility. It has been used to track students' learning progress irrespective of class sizes. The main objective of this study is to investigate the impact of MOODLE in a general university course as a case study. However, the study's explicit goals were to assess the impact of Moodle in gauging the learning process in an online classroom environment in contrast to the traditional methods used in the past. The students' data obtained from Moodle based on the learning outcomes were used on Machine Learning models to predict academic performance, track the progress of students, create adaptive feedback and examine the features that provided the most impact. The findings of the study showed that the introduction of Moodle has increased the students' performance by 92%. It indicated that Moodle supports an inclusive learning environment for academic progress with interceding structures that promote online collaborative-groupings, discussions among the students.

[75] *LEVERAGING ARTIFICIAL INTELLIGENCE AND BIG DATA ANALYTICS FOR ADVANCING LEARNING OUTCOME IN ONLINE LEARNING ENVIRONMENTS AMONG UNIVERSITY'S STUDENTS*

Oluyemo Abdullateef (NATIONAL OPEN UNIVERSITY OF NIGERIA).

Abstract

This paper addresses the new ways of AI and Big data Analytic application in online learning environment among university students. The study employed qualitative method with a literature review approach which originated from the medical sciences popularly known as 'Systematic Review (SR)' to collect and analyse information from various credible academic sources, including educational journals, books, research reports and other publications relevant to the topic to provide information on the concept of Artificial intelligent and Big data Analytic, their benefits and challenges, to provide answer to how are artificial intelligence changes the ways teachers teach and students learn? What are the untapped AI-technologies that have the potential to transform the education? And what are Issues Behind Big Data in Education., this study offers practical insights and strategies to revolutionize online education. As technology continues to advance, the potential for AI in education remains boundless, promising even more innovative and effective ways of learning

[76] *Technological and Pedagogical Challenges in Implementing E-Learning for Clinical Skills Training. E-Learning in Healthcare education: implementation and challenges*

Samira Bashir (National Open University of Nigeria), Cecilia Adegor (National Open university of Nigeria), Kehinde Babagana (National Open University of Nigeria), Ibrahim Maigari (Kaduna State University) and Aku Mopa (National Open University of Nigeria).

Abstract

Introduction: E-learning in medical education presents challenges for teaching staff and students, including technical skills, infrastructural limitation, limited access to technology and internet, difficulty in practical sessions and clinical rotations. Objectives: The study aims to explore the literature on known barriers that face educators and students while developing and implementing e-learning programs for clinical skills in medical education. Methods: A systematic review was conducted of studies published between 2019 and 2024. Search terms included e-learning, medical educator, clinical skill's development, and barriers. The title and abstracts were screened independently and reviewed with inclusion criteria. Results: Of all the abstracts identified from the search, a total of fifteen (15) full-text papers met the inclusion criteria. Data extracted was completed on all the fifteen high methodological quality paper. 6 studies from Nigeria, 5 studies from other Sub-Saharan African, 4 international studies. Findings suggest that the key barriers which affect the development and implementation of e-learning in medical education include inadequate infrastructure, poor technical skills, poor internet connectivity, limited access to devices and platforms, limited faculty preparedness, and poor students' engagement. Conclusion: This review has identified barriers and solutions amongst medical educators and students to the implementation of e-learning of clinical skills in medical education. Results can be used to inform institutional and educator practice in the development of further online learning.

[77] *Institutional Strategies and Student Perceptions of Inclusive Access to Pedagogical Content through Moodle: The NOUN experience*

Adetola Akanbiemu (National Open University of Nigeria) and Felix Olakulehin (National Open University of Nigeria).

Abstract

As digital learning platforms become increasingly central to educational delivery, understanding the effectiveness of institutional strategies from both administrative and student perspectives is crucial for optimising inclusive educational access. This presentation reports on the specific strategies implemented by the National Open University of Nigeria (NOUN) management to enhance student participation in online facilitation through the Moodle learning management system, while simultaneously exploring student perceptions of these institutional initiatives. The research addresses two primary questions: first, what specific strategies has NOUN management implemented to enhance student participation in online facilitation; and second, how do NOUN students perceive the effectiveness of these institutional strategies in promoting their engagement with online learning content. Adopting the quantitative data collection method, this study used a comprehensive online survey administered to NOUN students across nine faculties, encompassing both undergraduate and postgraduate programmes. The survey successfully captured responses from over 1,000 registered students, providing a robust dataset that represents the breadth of NOUN's academic community. The study identifies key institutional strategies ranging from technical infrastructure improvements and training programmes for facilitators to student support services and enhancements to content accessibility. This research contributes to the growing body of literature on inclusive

online education via the moodle platform by providing empirical evidence of institutional strategy effectiveness from the student perspective. Furthermore, the study provides a framework for evaluating institutional strategies in open and distance learning contexts, with particular relevance for developing countries where technological disparities may significantly impact educational equity.

[78] *Building Automated Assessment in Moodle Using Natural Language Processing (NLP) – A Step toward Sustainable Teacher Support*

Rotimi Adebayo (The African Centre of Excellence on Technology Enhanced Learning (ACETEL). NOUN University).

Abstract

Introduction Moodle is a global open-source Learning Management System (LMS) that is used by institutions to coordinate classroom activities such as facilitating, giving assignments, recording student work, grading students' work, etc. However, Moodle does not have an automatic grading system for essays, open-ended responses, and discussion forums, which pose additional workloads and restricts deeper evaluation of higher-order thinking skills. Natural Language Processing, a subfield of Artificial Intelligence, provides the potential to analyze students' discourse, and provide constructive feedback. This research aims to build an automated assessment system/plugin for written responses in Moodle, reducing teachers' workloads, and supporting the sustainability of teaching practices within digital ecosystems. Aims 1.To explore the limitation of current assessment methods in Moodle 2.To design a NLP module for automated grading and feedback in Moodle 3.To evaluate the effectiveness of the NLP model in term of accuracy, reliability, and teacher satisfaction 4.To evaluate how this integration supports sustainable teaching Methodology Data collection: anonymous student responses to essays, short answers, forum, and posts from Moodle courses Model development: apply NLP techniques such as text classification, semantic similarity, and sentimental analysis to build the grading model. Integration: Implement the tool/model as a Moodle plugin Evaluation: compare automated responses with teachers' responses Expected contributions Practical: it is expected that the research will provide a scalable and sustainable automated grading solution not only for Moodle, reducing teachers' workloads Innovative: incorporate AI techniques into traditional LMS systems Sustainability: support teachers' productivity.

[79] *Challenges and Opportunities of Accessible Moodle-Based Learning Among Science Education Students at Universities in Abuja.*

Roseline Egbunu (National Opening University Of Nigeria.).

Abstract

There are observable issues in accessibility of Moodle-based learning among science education students at universities in Abuja. These issues include inadequate infrastructure, limited technical support, and varying levels of digital literacy. This study therefore investigated the challenges and opportunities of accessible Moodle-based learning among science education students at universities in Abuja. The study employed a descriptive survey research design, with a population of 10,000 students from the University of Abuja, National Open University of Nigeria, and Baze University. A sample sized 500 students were selected using a stratified random sampling technique. A questionnaire was used for data collection, validated by experts and tested for reliability (Cronbach's alpha = 0.95). Data was collected through online and offline administration and analyzed using descriptive statistics and inferential statistics (ANOVA and regression analysis). The major findings revealed that inadequate infrastructure and limited technical support were significant challenges to accessibility. Moodle-based learning among science education students provided opportunities for flexible learning and access to resources and there was a significant relationship between accessibility features and student satisfaction. The study recommended among others that universities should invest on improving infrastructure and technical support, prioritizing accessibility features in Moodle-based learning of science education. The conclusion highlights the potential of Moodle-based learning of science education to enhance student outcomes but emphasizes the need to address accessibility.

[80] *ASSESSMENT OF THE EFFECTIVENESS OF MOODLE-BASED CHEMISTRY EDUCATION IN PROMOTING STUDENTS' ENGAGEMENT AND MOTIVATION IN NOUN, ABUJA*

Omobolanle Fatusi (National Open University of Nigeria).

Abstract

The existing issues in chemistry education at National Open University of Nigeria (NOUN), Abuja, include low student engagement and motivation due to limited access to interactive learning resources. This study assessed the effectiveness of

Moodle-based chemistry education in promoting student engagement and motivation. The study employed a survey research design, with a population of 5,000 students from NOUN's Abuja study center. A sample size of 357 students was selected using a stratified random sampling technique. A questionnaire was used for data collection, validated by experts and tested for reliability Cronbach's alpha = 0.85. Data were analyzed using descriptive statistics and inferential statistics. The major findings revealed that Moodle-based chemistry education significantly improved student engagement and motivation and students appreciated the flexibility and accessibility of Moodle-based learning resources. The study recommended among others that NOUN invest in improving Moodle-based chemistry education, provide training and support for instructors and students, and ensure reliable internet access. The conclusion highlights the potential of Moodle-based chemistry education to enhance student engagement and motivation, and promote academic success.

[81] *Effectiveness of Moodle-Based Learning Strategies on Students' Achievement in Biology at the National Open University, Abuja*

Roseline Egbunu (National Opening University Of Nigeria.).

Abstract

The increasing use of Moodle-based learning strategies in educational institutions worldwide reflects a growing recognition of their potential to enhance students' engagement. This study therefore examined the effectiveness of Moodle-based learning strategies on students' achievement in biology at the National Open University of Nigeria. It identifies the factors that influence the effectiveness of Moodle-based learning strategies in biology education. The study employed a quasi-experimental research design, with a population of 1,500 students. A sample size of 200 students was selected using a simple random sampling technique. The instrument for data collection was a biology achievement test, which was validated by experts in biology education. The reliability of the instrument was established using Cronbach's alpha, with a reliability coefficient of 0.85. Data was collected through pre-test and post-test administrations of the biology achievement test. The data were analyzed using descriptive statistics and inferential statistics (t-test and ANOVA). The study found that there was a significant difference in the mean achievement scores of students taught using Moodle-based learning strategies and those taught using traditional methods. Based on the findings, the study recommended among others that the National Open University, Abuja, should adopt Moodle-based learning strategies in teaching biology to enhance students' achievement and teachers should be trained on how to effectively use Moodle-based learning strategies in teaching biology. The study concluded that Moodle-based learning strategies are effective in enhancing students' achievement in biology.

[83] *M-Learning: Vehicle for Inclusive Access And Students' Success with Moodle*

Francis Oladepo (National open university of Nigeria).

Abstract

Education which is one of ways to facilitate learning is concerned with knowledge acquisition in the most efficient ways using emerging technologies. While education is treated with all seriousness it deserves, it has its own challenges which include but not limited to inclusive access and inadequate infrastructures. Inclusive access and student success are closely related and Moodle, as a versatile and widely used Learning Management System (LMS), plays a crucial role in facilitating this connection. As Moodle cannot function in isolation, it requires a medium such as mobile phone through which its potentials features could be harnessed by both the students and the instructors. Moodle can leverage disruptive technology such as M-learning as a driver for contents delivery. For these reasons, integrating mobile learning (m-learning) into the education system becomes imperative. With the widely adoption of mobile technology, judicious utilisation of mobile learning (m-learning) will play a significant role in ensuring a wider access to numerous opportunities provided by Moodle, and invariably enhance students' success and improve education development. This paper focuses on Moodle features such as flexibility, ease of use, progress tracking and reporting, collaboration, accessibility, multimedia support, assessment tools, and other excellent features that offer inclusiveness and enhance student success. Adopting the scoping review methodology, the paper explores and synthesises existing literature to form the basis for critical analysis of the M-learning as a vehicle for inclusive access to Moodle resources.

[84] *Leveraging Neural Machine Translation for Inclusive Education: A Low-Resource Approach to Nigerian Languages*

Oghenekaro Orowho (ACETEL, National Open University of Nigeria).

Abstract

Language diversity poses a significant challenge to effective teaching and learning in Nigeria, particularly in rural communities where educators often lack proficiency in the local language. This limitation is common within the National Youth Service Corps (NYSC) program, where corps members are deployed to linguistically diverse regions for a limited time, restricting their ability to deliver impactful lessons. This research proposes the development of an artificial intelligence (AI)-based multilingual translation system to bridge this gap. The project will focus on translating English into major Nigerian languages, Urhobo, Igbo, Hausa, and Yoruba, using neural machine translation (NMT) techniques. The novelty of this work lies in adapting NMT models to low-resource languages through transfer learning, data augmentation, and transformer-based architectures. Parallel corpora will be curated from educational materials, local literature, and community-sourced texts to train and evaluate the system in real instructional contexts. The proposed framework integrates automatic language detection with real-time translation, ensuring semantic accuracy and cultural relevance. By enabling teachers to communicate effectively in classrooms where language barriers exist, the system aims to promote inclusivity, improve knowledge transfer, and reduce educational disparities. In the long term, additional Nigerian languages will be incorporated, contributing to scalable AI-driven solutions for Africa's educational transformation.

[85] *Spotting At-Risk Students Earlier: A Case Study at an ODeL University Using Moodle Data Analytics*

Stanford Mphahlele (UNISA) and Thabo Hlabahlaba (UNISA).

Abstract

This study aims to develop a predictive model to identify students at risk earlier in an Open Distance e-Learning (ODeL) university using Moodle data analytics. By analysing student interactions within Moodle, such as assignment submissions, engagement with course resources, forum participation, and login activity, the research applies machine learning techniques to detect behavioural patterns associated with academic under-performance.

The study will demonstrate how Moodle-generated data can be leveraged to identify at-risk students early, enabling educators to implement targeted support and timely interventions. Patterns such as infrequent logins, non-submission of assignments, and inactivity in online discussions will be highlighted as significant indicators of risk.

The findings from this case study are expected to offer actionable insights for academic staff and administrators seeking to enhance inclusive access and student success. By harnessing Moodle analytics, institutions can design proactive support strategies, strengthen student engagement, and reduce dropout rates. Ultimately, the research will illustrate how data-driven approaches can foster equity in ODeL contexts by ensuring that struggling students are identified early and supported effectively.

This work will contribute to the growing body of research on Moodle-based learning analytics. It will demonstrate its practical application in promoting retention, academic achievement, and inclusive success within digital higher education environments.

[86] *From Access to Empowerment: Using Moodle to Transition Students from Information Consumers to Knowledge Producers*

Adetola Akanbiemu (National Open University of Nigeria).

Abstract

In today's knowledge economy, learners are increasingly required not only to access information but also to critically evaluate, apply, and generate new knowledge. Within the context of Open and Distance Learning (ODL), the Moodle Learning Management System offers a unique opportunity to democratize access while equipping students with essential information literacy competencies. This paper conceptually examines how Moodle can be strategically leveraged at the National Open University of Nigeria (NOUN) to transform students from passive information consumers into active knowledge producers. By embedding structured digital literacy training, fostering collaborative content creation, and integrating Open Educational Resources (OERs) into course delivery, Moodle emerges as a catalyst for inclusive learning and student empowerment. The discussion draws on existing scholarly literature and institutional practices to illustrate how Moodle's pedagogical affordances can enhance learner engagement, critical thinking, and independent knowledge construction. Insights from reported learner experiences and institutional strategies are used to support the argument,

although the study does not involve primary data collection. Findings from the reviewed literature suggest that improving information literacy through Moodle significantly contributes to student retention, employability, and active participation in Nigeria's evolving knowledge-based economy. As a conceptual scholarly paper, this study emphasizes theoretical perspectives rather than empirical testing, providing a framework for integrating Moodle effectively into ODL environments. Ultimately, the paper argues that Moodle's transformative use extends beyond content delivery to fostering knowledge creation, positioning NOUN as a leader in digital learning innovation and promoting equitable access to higher education.

[88] *Combining Moodle and WhatsApp to teach and learning basic Generative AI literacy and fluency*

Karen Ferreira-Meyers (Institute of Distance Education, University of Eswatini).

Abstract

This case study examines an innovative pedagogical approach implemented at the University of Eswatini that integrates Moodle Learning Management System with WhatsApp messaging platform to enhance basic generative artificial intelligence literacy and fluency among students. As generative AI technologies rapidly transform educational landscapes, developing digital literacy becomes crucial for academic and professional success. The study employed a mixed-methods approach involving participants across three cohorts. The intervention utilized Moodle's structured learning environment for delivering comprehensive AI literacy modules, including theoretical foundations, ethical considerations and practical applications of generative AI tools. WhatsApp served as a complementary platform for real-time peer collaboration, instructor support, and informal learning discussions, leveraging students' familiarity with mobile messaging. Data collection includes digital engagement analytics from both platforms. Results demonstrated significant improvements in students' understanding of AI concepts, enhanced ability to critically evaluate AI-generated content and increased confidence in using AI tools responsibly. The WhatsApp integration proved particularly effective for bridging formal and informal learning spaces, facilitating continuous engagement beyond traditional classroom boundaries. Participants appreciated the accessibility and immediacy of mobile-based learning, while Moodle provided necessary structure and assessment capabilities. This hybrid approach addresses infrastructure challenges common in developing contexts while promoting collaborative learning. The study contributes to growing literature on technology-enhanced education and offers practical insights for institutions seeking to integrate AI literacy into curricula using readily available platforms.

[89] *Exploring the Building Blocks of a Virtual Laboratory for Practical Chemistry*

Tunde Adegbola (African Languages Technology Initiative), Olufemi Peters (National Open University of Nigeria) and Musa Runde (National Open University of Nigeria).

Abstract

Laboratories offer an experimental environment for the training of science students. They require highly specialized and therefore expensive apparatus as well as costly, yet regularly expended consumables. For this reason, the teaching of the sciences at the secondary and tertiary levels in Nigeria has not benefitted sufficiently from the use of laboratories. Nigerian teenagers are sometimes admitted to study pure and applied sciences at the tertiary level, having not had much hands-on practical encounters. They pass the qualifying examinations legitimately, by taking an "Alternative to Practical" examination. To address this problem, this project takes advantage of developments in ICT that now make it possible to simulate experiments in computer memory to a high degree of accuracy. 3D solid modelling is used to present realistic images on appropriate computer displays. The project engages modelling, simulation and visualization to develop an interactive computer application as a virtual laboratory for the teaching of Introduction to Practical Chemistry (CHM 191) at the National Open University of Nigeria. The project considers the vital need for localising the knowledge of chemistry and thereby appropriating it for addressing relevant aspects of the challenges of Nigerian's technological development. Modules were developed to simulate all 12 experiments in the Introduction to Practical Chemistry (CHM 191) taught at the National Open University of Nigeria. The application is implementable on a general-purpose computer hardware with modest and easily accessible specifications, with students working off-line most of the time in order to reduce the cost of Internet connection.

[90] *The Role of Moodle in Reclaiming Identity Through Learning in Nigerian Correctional Centres.*

Funke Oyekan (Bowen University Iwo).

Abstract

Sustainable Development Goals 4, 10 and 16 focus on quality education, reduced inequality and inclusive society. The Nigerian Government at all levels is doing her best to see that this is achieved with respect to Correctional centres. A 2018 National Human Rights Commission Prison Report reveals that educational facilities, from primary to tertiary levels are available in most correctional centres in the six Regions of Nigeria. However, the report also revealed that the centres were congested, crowded, and that educational facilities need be upgraded. The situation has not changed. Inmates do not have equal access to physical educational facilities like their counterparts who are not incarcerated. Therefore, positioning Moodle, an open-source learning management system, as a platform capable of extending inclusive education to incarcerated persons, this study explores the intersection of digital learning, faith-based insights, and rehabilitation within correctional centres contexts. Premised on John Stott' Imago Dei Framework, which demands social justice, human rights, and the care of marginalized persons, it attempts an exegesis of Luke 15: 4-7. This study aims to demonstrate that integrating Moodle, digital learning environments into correctional education, shaped by the ethos of the Gospel, can transform inmates into empowered, dignified, and reintegrated members of the community, thereby achieving an egalitarian society.

[91] *The Impact of Transfer Learning on the Application of Artificial Intelligence to Dispute Resolution*

Lawman Nzenwa (LAWMAN NZENWA & CO).

Abstract

Disputes are everywhere and exists in all ages. Institutions such as governments, universities, families churches and mosques have more than their fair share of disputes at all times and ages. The constant factor against disputes is dispute resolution. Effective dispute resolution mechanism may make the difference between a high performing organisation and another that is merely a social and economic burden to the society. Dispute resolution ecosystem include dialogue, negotiation, mediation, arbitration and litigation. Artificial intelligence models are required to make resolutions faster, cheaper and more convenient. Given again that AI models are pre trained on vast amount of data, it was no longer necessary for the same model to be trained again on every new task. Transfer learning is the ability of an Ai model such as Machine learning trained on a very broad spectrum of data to draw from existing knowledge for a new but related task. The paper is a theoretical research which found that application of transfer learning by AI Models to dispute resolution made dispute resolution faster, cheaper, more convenient while requiring less amount of data for new tasks. Transfer learning can transfer errors from the previous data to the new task. There are also privacy concerns and of lack of proper explanation for complex analysis carried out by the model. The legal position of who carries the liability fo errors of the model as AI models only predicts and classifies allowing some degrees of errors

[92] *From Classrooms to Clicks: Policy Directions for Leveraging Moodle in Inclusive Education in East Africa*

Annet Kisaka Magolo (UGANDA MANAGEMENT INSTITUTE).

Abstract

East Africa is experiencing rapid digital transformation in education, accelerated by COVID-19 and by national pushes for digital skills and innovation. Moodle, an open-source, flexible, and mobile-capable system central to universities' Learning Management System (LMS), has gained traction in learning institutions (Makerere University's MUELE and institutional deployments in Rwanda and Tanzania) as a cost-effective and adaptable tool to support online, blended, and hybrid learning. Its contexts make it particularly relevant to the diversity of learners. However, the transition from "classrooms to clicks" requires more than technical adoption; it demands robust policy directions to ensure inclusion/equity and sustainability. Yet adoption remains uneven: gaps in national policy coherence, unequal access to devices and connectivity, limited teacher preparedness in digital pedagogy, and inconsistent use of accessibility features mean that Moodle's potential to expand inclusive education has not yet been fully realized. This study focuses on East Africa and will examine how national and institutional policy configurations enable or constrain Moodle's use for inclusive education. Using a mixed-methods comparative design (policy document analysis, surveys of teachers and students, interviews with policymakers and managers, and focus groups with marginalized learners), the study will map policy environments, identify

institutional practice patterns, assess inclusivity outcomes (access, participation, accommodation for learners with disabilities, and low-bandwidth/offline provision), and propose actionable policy directions. Findings will deliver region-specific policy recommendations for ministries, universities, teacher-training providers, and development partners seeking to mainstream Moodle as an instrument for equitable, resilient, and scalable digital education in East Africa

[93] *The Promise and The Reality: A Reflective Case Study of Barriers to Learning Analytics in Moodle amidst the Rise of AI.*

Paul Prinsloo (University of South Africa), Christine Ofulue (National Open University of Nigeria), Adewale Adesina (National Open University of Nigeria), Felix Kayode Olakulehin (National Open University of Nigeria), Oluwaseun Philip Oluyide (Regional Training and Research Institute for Distance and Open Learning (RETRIDOL)-National Open University of Nigeria) and Segun Buhari (National Open University of Nigeria).

Abstract

Learning analytics (LA) offers institutions the promise of optimised learning environments, personalised student support, and evidence-based decision making. The National Open University of Nigeria (NOUN), the first single-mode ODeL institution in Africa to pursue an institution-wide LA initiative, undertook a pioneering effort to mainstream analytics using Moodle LMS log data. This reflective case study explores not only the challenges encountered, such as data access, integration, quality, governance, privacy, Moodle's technical affordances, and the disruptive presence of AI tools, but also the opportunities for improvement. While NOUN's sizeable digital landscape revealed fragmented student data across directorates and legacy systems, these challenges have prompted meaningful conversations about standardising integration protocols for enhancing seamless access. The identified gaps in the disparate nature of demographic, academic, and behavioural data, along with periods of offline engagement, have highlighted the importance of designing learning experiences that capture the full breadth of student activity. Currently, NOUN's pedagogy does not make the learning journey visible on the LMS, leaving meaningful learning largely untracked—a challenge underscored by data from assessments and participation in synchronous sessions with weak links to student success- highlighting the need for greater learning visibility. Generative AI usage amplifies this challenge: as students increasingly rely on external AI tools, LMS log data under-represents meaningful learning activity, diminishing the fidelity of analytics and raising urgent questions about visibility and support. The study also identified governance and capacity gaps, unclear accountability, limited privacy safeguards, and inadequate readiness for analytics-driven practice as areas of challenge now recognised as key drivers for sustainable analytics adoption incorporated in the institution's LA policy. While Moodle provides granular activity logs, their complexity requires investment in aggregation pipelines, intuitive dashboards, and secure role-based access. Recommendations include investing in solutions such as a centralised Learning Intelligence Hub, improved frameworks, routine audits, and capacity in analytics and AI-ready pedagogy, enabling NOUN to transform barriers into catalysts for a more responsive system. Findings highlight that realising LA's potential depends on aligning infrastructure, analytics-informed learning design, and policy attuned to generative AI realities.

[94] *A Systematic Review of Institutional Use of Moodle Data to Predict Student Success in African Higher Education*

Oluwaseun Philip Oluyide (Regional Training and Research Institute for Distance and Open Learning (RETRIDOL)-National Open University of Nigeria).

Abstract

Student retention and success remain pressing challenges for Open and Distance e-Learning (ODeL) institutions across Africa. Although Moodle captures extensive data on learner engagement and behaviour, its systematic use for predicting student outcomes and informing timely interventions is still limited in many African higher education contexts. This study proposes a systematic review of global literature on how institutions use Moodle data to predict student success. The aim is to assess how approaches developed elsewhere might inform more effective, evidence-based support strategies within African ODeL environments. Guided by the PRISMA framework, the review will examine peer-reviewed studies published between 2015 and 2024 that employ predictive models using Moodle-generated data. It will focus on identifying key behavioural indicators which include login frequency, activity patterns, and assessment performance. Also, it will consider the predictive modelling techniques most commonly used. In addition to mapping global practices, the review will critically evaluate their applicability to African settings, taking into account challenges such as infrastructure constraints, unreliable internet connectivity, and diverse student demographics that may influence model accuracy and fairness. The expected outcome is a set of evidence-based guidelines to support the ethical, context-sensitive use of predictive analytics in Moodle. These guidelines aim to assist institutions in developing early alert systems that help educators identify and

support at-risk learners.

[95] *Sustainable Learning Ecosystem: New Digital Media Technology Approach for Nigeria*

Dutse Abubakar Yusuf (Abubakar Tafawa Balewa University, Bauchi - Nigeria) and Bayero Muhammad Musa (Federal University of Kashere).

Abstract

The rapid advancement of digital technology has become a global priority for sustainable education by creating new tools and methods that facilitate innovative teaching and research. This article examines the underpinning theories and practical methodologies for constructing sustainable, inclusive, and adaptive learning ecosystems that cater for different learning requirements. It reemphasizes that a good learning ecosystem encompasses digital resources, physical environments, educational methodologies, and community participation that enhance formal, informal, and non-formal education. The study proposes a comprehensive framework for developing learning ecosystems that support learners' independence, collaboration, and flexibility, derived from multidisciplinary research in education, technology, and systems theory. It further identifies the challenges as well as expectations and benefits for conducive learning ecosystem that will stand the test of time in Nigeria.

[96] *The Effectiveness of Two-Factor Authentication (2FA) in Preventing Online Banking Fraud in Nigeria*

Grace Egenti (National Open University of Nigeria).

Abstract

With the increase in Internet users in Nigeria, there is a correlating increase in online banking fraud. Two-factor authentication (2FA), often sent by Short Message Service-One time password (SMS-OTP), or biometrics is a common way to booster security. This study looks at how 2FA affects the number of fraud cases in Nigerian banks. Using a focussed case study at two Nigerian commercial banks, fraud statistics and literature reviews, it is observed that 2FA helps to reduce the probability of account takeovers. It, however, still has some challenges such as SIM swap scams and usability challenges. Findings suggest a significant decrease in the number of unauthorised transactions following the rollout of 2FA. However, issues such as delayed OTPs and customer friction remain a major challenge. This study uses the mixed-methods research design, combining both quantitative fraud data analysis with qualitative interviews and prototype evaluation. This study recommends transitions to app-based or biometrics 2FAs, which leads to increased awareness campaigns and fraud detection systems. These steps will make it harder for SIM swaps and phishing attacks to succeed. Future research is encouraged to investigate the long-term effects and integration of AI-driven fraud analytics with robust two-factor authentication (2FA) systems.

[98] *LEVERAGING DISRUPTIVE TECHNOLOGIES TO BUILD SUSTAINABLE AND INNOVATIVE MOODLE ECOSYSTEMS FOR AFRICA'S EDUCATIONAL TRANSFORMATION*

Chuba Henry Okeke (AFRICAN AVIATION AND AEROSPACE UNIVERSITY ABUJA NIGERIA) and Ibrahim Salihu Kombo (AFRICAN AVIATION AND AEROSPACE UNIVERSITY, ABUJA).

Abstract

Abstract: The fast emergence of disruptive technologies remarkably blockchain, learning analytics, and immersive media (VR/AR), artificial intelligence (AI), and mobile/offline computing confers a timely opportunity to reshape higher education across Africa. Moodle, as a widely accepted open-source learning management system (LMS), can function as the foundation for an inclusive, resilient, and innovative digital learning ecosystem if integrated strategically with blockchain, learning analytics, and immersive media (VR/AR), artificial intelligence (AI), and mobile/offline computing. This study analyse the potential of blockchain-based credentialing, immersive learning, and learning analytics, artificial intelligence (AI) enabled personalization, mobile-first/offline strategies, within Moodle ecosystems suitable for African contexts. Drawing on policy reports, literature, plugin and platform documentation, and selected African case studies such as the cases of University of Lagos in Lagos Nigeria and Makerere University in Kampala Uganda, the study creates an integration model/framework and identifies obstacles, catalysts, and an actionable recommendations. The study used Thematic analysis to determine recurring roadblocks, opportunities, and global best practices, SWOT analysis for the Moodle + disruptive tech ecosystem tailored for higher education learning in Africa and Model/Framework integration creating realistic recommendations and a deployment blueprint. The research outcome is a realistic blueprint that policymakers, higher institutions, and EdTech innovators can incorporate to expand Moodle-based, technology-enhanced learning while

tackling constraints in human-capacity, infrastructure, and governance (UNESCO, 2025; Moodle, 2021).

[99] *ENHANCING DIGITAL INCLUSION IN AFRICAN HIGHER EDUCATION THROUGH MOBILE-FIRST MOODLE ECOSYSTEMS*

Chuba Henry Okeke (AFRICAN AVIATION AND AEROSPACE UNIVERSITY ABUJA NIGERIA) and Ibrahim Salihu Kombo (AFRICAN AVIATION AND AEROSPACE UNIVERSITY, ABUJA).

Abstract

In Africa, access to quality higher education has long been challenged by limited resources, deficits in infrastructure, and socio-economic imbalances. While conventional e-learning drives have grown across the Africa continent, their efficiency is impeded by a continual digital divide in connectivity, digital competence and device ownership. With mobile phones attributing for over 75% of internet access in Africa (GSMA, 2023), mobile-first learning ecosystems create an evolutionary opportunity to liberalise access to education. Moodle, being a leading open-source Learning Management System (LMS), is specifically well-suited to this shift because of its progressive web app (PWA) design, lightweight mobile applications, and offline learning capabilities. This study examines how a mobile-first Moodle ecosystem can stimulate digital inclusion of higher education by tackling affordability, accessibility, and adaptability. The case studies from the Kampala International University (KIU) and University of South Africa (UNISA) were used, guided by diversity in institutional scale (mega-university vs. medium-sized private institution) and demonstrated Moodle adoption. Adopting a qualitative, exploratory methodology grounded in institutional reports, document analysis, and semi-structured interviews with students and faculty (n = 42). Thematic coding and cross-case comparison with descriptive statistics on student adoption metrics (example,73% of KIU students revealed enhanced adaptability in integrated learning, 68% of UNISA students utilised the Moodle mobile app weekly.) was adopted for the Data analysis. The study recommends a model for sustainable mobile-first Moodle ecosystems in Africa. The outcomes underline that inclusive strategies, like micro-courses, multilingual interfaces, offline plugins, and partnerships with telecommunication providers, can remarkably grow access to education.

[100] *Inclusive Access and Student Success with Moodle: Online Counselling as a Sine Qua Non*

Ibraheem Adediran (National Open University of Nigeria) and Jamiu Ogunsola (National Open University of Nigeria).

Abstract

Counselling has long been acknowledged as a crucial support system that assists learners in addressing and overcoming personal and psychological challenges. Its demonstrated effectiveness has prompted a focused investigation into alternative delivery methods designed to broaden access—especially for individuals who urgently require emotional and behavioral support. This analysis draws upon the complementary frameworks of the Theory of Transactional Distance (Moore, 1997), Theory of Planned Behaviour (TPB) and the Technology Acceptance Model (TAM), which together shed light on the shifts in attitudes and behavioral intentions driving the uptake of Online Counselling. Considering the limited access and mixed results observed with Moodle platforms, the study emphasizes the technical need for supportive measures, particularly the role of learner confidence within the context of Distance Education facilitated by Moodle. Our critical review explored the foundational assumptions underlying Learning Management Systems (LMS) through four key educational frameworks: Traditional Pedagogy, Behaviorism, Cognitivism, and Social Constructivism. There is a strong emphasis on pedagogy and technological implementations, such as Moodle. More importantly, we identified an urgent need for counselling support grounded in behavioral, cognitive, and social constructivist theories to facilitate the seamless and effective use of Moodle. Online counselling, addresses cognitive and motivational challenges that hinder inclusive access and student success within Moodle, reduces barriers, promotes a more comprehensive and supportive learning environment. Online Counselling should utilize both synchronous methods such as live video sessions, phone calls and asynchronous channels. Secure video conferencing technologies like Zoom, Skype, platforms that offer essential infrastructure to ensure effective therapeutic engagement.

[101] *Evaluating the Effectiveness of Online Facilitation in Postgraduate Legal Education: A Mixed-Methods Study of Engagement and Learning Outcomes*

Josiah Owolabi (NATIONAL OPEN UNIVERSITY OF NIGERIA) and Ernest Ogwuashi Ugbejeh (NATIONAL OPEN UNIVERSITY OF NIGERIA).

Abstract

This study evaluated the effectiveness of online facilitation within the Moodle-based learning environment at the National Open University of Nigeria (NOUN) for postgraduate legal education. A mixed-methods approach, combining quantitative

and qualitative data collection techniques, was employed. Structured questionnaires were administered to 73 Master of Laws (LL.M.) students, and semi-structured interviews were also conducted with a subset of participants to gain deeper insights. Quantitative findings indicated strong positive perceptions of online facilitation, with high mean scores (ranging from 3.55 to 4.01) for facilitator knowledge, communication effectiveness, and responsiveness. Statistical analysis revealed a significant positive correlation between facilitator responsiveness and perceived learning effectiveness ($r = 0.806$, $p < 0.01$). Despite these positive outcomes, several challenges were identified, including frequent internet disruptions, limited interaction between students and facilitators, and difficulties in balancing academic, professional, and personal responsibilities. Qualitative data further emphasised issues related to Learning Management System (LMS) usability and the need for more structured academic and technical support. The study concluded that online facilitation, when effectively implemented, significantly enhances legal education delivery. Recommendations included targeted investments in facilitator development programmes, robust technical infrastructure, and intentional instructional design within the Moodle platform to foster interactive, inclusive, and transformative legal education across Africa.

[102] STUDENT PERSPECTIVES ON THE ACCESSIBILITY AND USABILITY OF TUTOR-MARKED ASSIGNMENTS (TMA) ON MOODLE AT THE NATIONAL OPEN UNIVERSITY OF NIGERIA

Leah Olubunmi Oni (National Open University of Nigeria) and Segun Buhari (National Open University of Nigeria).

Abstract

This study examines student perspectives on the accessibility and usability of TMAs on Moodle at the National Open University of Nigeria (NOUN) and their implications for sustainable open education. A mixed-method research design was adopted, guided by three research questions and two hypotheses. One instrument was developed, titled the Tutor-Marked Assignment Accessibility and Usability Scale (TMAAUS), with a reliability coefficient of 0.8. A simple random sampling technique was used to select students across faculties, with a sample size of 1,233 students participating in the study. Results showed that over 79% agreed they can log in easily, locate their TMAs without much trouble, and comfortably use their mobile devices for access. Additionally, 76.8% claimed that the platform is easy to navigate, instructions are clear, and the layout is user-friendly. However, over 60% of students encounter issues such as slow loading speeds, system downtime, and internet-related problems, which can make working on TMAs somewhat stressful. The overall F-test result ($F(4, 1259) = 3.211$, $p = .012$) indicates that the differences between students' level of study and their perceptions of usability are statistically significant, as the p-value is below 0.05. Therefore, it is recommended to improve Moodle's technical infrastructure to reduce downtime and access issues, and to organize regular student training to enhance digital literacy and effective TMA use.

[103] Building Automated Assessment in Moodle Using Natural Language Processing (NLP): A Step toward Sustainable Teacher Support

Rotimi Adebayo (The African Centre of Excellence on Technology Enhanced Learning (ACETEL). NOUN University).

Abstract

Moodle is a global open-source Learning Management System (LMS) that is widely used to coordinate classroom activities. While effective for assignments and quizzes, it lacks an automatic grading system for essays, open-ended responses, and discussion forums, which pose additional workloads and restrict deeper evaluation of higher-order thinking skills. To address this gap, we developed an automated assessment plugin for Moodle using Natural Language Processing (NLP). This research identifies the limitations of current assessment systems, designs/builds an automated assessment system/plugin for written responses, evaluates the effectiveness of the NLP model, and assesses how this integration supports sustainable teaching. IT-IDL and BERT models were trained with the ASAP 2.0 dataset from Kaggle, and validated using real student essays and teacher rubrics. The models were integrated into Moodle through a plugin that communicates with an external NLP server via REST API/HTTP. Evaluation metrics such as cosine similarity, part-of-speech (POS) tagging, content evaluation, Pearson Correlation Coefficient, and Cohen's Kappa were used to compare NLP automated grading with teachers' grading. The results showed a cosine similarity of 0.98, Pearson Correlation of 0.86, Cohen's Kappa of 0.67, and MAE of 0.31, implying that the NLP model performs strongly in semantic alignment and agreement with human graders, showing potential for automated grading, though content evaluation requires improvement.

[104] *Decentralised e-Assessment at National Scale: How NOUN Leveraged Moodle for Secure Offline Examinations Across more than 120 Study Centres*

Buhari Alhassan (National Open University of Nigeria), Olugbenga D Ojo (National Open University of Nigeria) and Adewale Adesina (National Open University of Nigeria).

Abstract

The National Open University of Nigeria (NOUN), Africa's largest open and distance learning institution, has engineered one of the continent's most extensive decentralised e-assessment ecosystems by reconfiguring Moodle from a conventional Learning Management System into a secure, offline-first examination engine. Since 2016, NOUN has deployed locally hosted Ubuntu-based Moodle servers across more than 120 geographically diverse study centres, including remote rural hubs with limited or intermittent connectivity, delivering over 14 million examination sittings between 2016_1 and 2025_1. Examination content is distributed through encrypted .mzb packages uniquely bound to centre-specific servers, ensuring both security and localisation. Custom-developed institutional plugins automate grading, synchronise results to a central aggregation platform, and provide fallback CSV-based upload mechanisms for bandwidth-constrained centres, thus preserving operational continuity. Empirical data demonstrates high integrity, operational scalability, and significant reduction in malpractice compared to legacy paper-based systems—aligning with global calls for digital sovereignty and resilient assessment frameworks in the Global South (UNESCO, 2019; Mohamed & Essa, 2021; Moodle HQ, 2024). The system has since been studied and adapted by peer institutions across Africa, including the Open University of Sudan and the Open University of Tanzania, positioning NOUN as a continental pioneer in the transformation of Moodle from a pedagogical tool into a sovereign assessment infrastructure. This paper presents a replicable model for higher education institutions seeking secure, contextually adaptive e-examination systems in low-connectivity environments.