OPTIMIZING OPEN EDUCATIONAL RESOURCES THROUGH INTERNET-BASED ADAPTIVE PEDAGOGIES TO FOSTER COLLABORATION AMONG DISTANCE LEARNERS AT THE NATIONAL OPEN UNIVERSITY OF NIGERIA

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Abstract

This study explored internet-based adaptive pedagogies to optimise the utilisation of Open Educational Resources (OERs) in promoting collaboration and the development of learning communities among distance learners at the National Open University of Nigeria (NOUN). Employing a quantitative research approach, data were gathered through a structured questionnaire distributed via Google Forms. A multistage sampling method selected 925 undergraduate students from the Awka, Enugu, and Umudike study centres, with 862 valid responses analysed (93.2% response rate). The questionnaire, validated through expert review and pilot testing (α = 0.85 for IBAP access; α = 0.90 for OER use), assessed students' experiences with digital learning tools, including challenges, engagement, and collaboration. Results indicated high awareness of OERs (81.9%) and adaptive learning tools (77.4%). Although platforms like the NOUN student portal and Moodle were widely utilised, daily engagement was limited, with only 17.9% and 26.5% reporting daily use of OERs and adaptive tools, respectively. Challenges such as poor internet connectivity, high data costs, and lack of training significantly impeded effective utilisation. Nonetheless, most respondents viewed these tools as beneficial for enhancing learning and fostering collaboration. The study concludes that despite growing adoption, infrastructural and support barriers remain. It recommends improving internet access, strengthening digital literacy, and expanding training and institutional support to fully harness the transformative potential of IBAPs and OERs in distance education, ensuring equitable and student-centred learning experiences.

Keywords: Internet-Based, Adaptive Pedagogies, Open Educational Resources (OER), Collaboration, Distance Learners

Introduction

Open Educational Resources (OERs) are vital in expanding access to quality education, particularly within Open and Distance Learning (ODL) frameworks. As freely available and adaptable materials, OERs enable "5R activities" retaining, remixing, revising, reusing, and redistributing, thus promoting collaboration and innovative pedagogical practices (Clinton-Lisell, 2021; Hewlett, 2024). Supported by organisation such as UNESCO (2019), OERs foster inclusive and participatory learning environments, aiming to mitigate the high costs associated with commercial textbooks that often limit student access and academic performance (Hilton et al., 2019). At institutions like the National Open University of Nigeria (NOUN), OERs facilitate affordable education for a diverse range of learners; however, challenges such as limited digital literacy, infrastructural deficits, and insufficient integration into teaching practices hinder their effective adoption (Njeze, 2020).

Emerging adaptive pedagogies incorporating artificial intelligence, learning analytics, and recommendation systems offer promising avenues for personalising learning experiences and cultivating collaborative communities, thereby enhancing OER adoption and student engagement (El-Sabagh, 2021). Recent research underscores the importance of integrating technological innovations to overcome barriers and optimise OER utilisation in distance education contexts. Tools like Moodle and TPACK-based platforms play crucial roles in fostering collaboration and improving learning outcomes, especially when combined with adaptive pedagogies that tailor content to individual learner needs. By leveraging these developments, NOUN can adopt strategies that drive participation, enhance peer engagement, and build vibrant learning communities, ultimately shaping a more inclusive and effective open education system.

Problem Statement

Although Open Educational Resources (OERs) offer considerable potential to expand access to learning in distance education, many students at NOUN struggle to effectively navigate and utilize these resources. The lack of adaptive learning support and limited collaborative opportunities often results in reduced participation, learner isolation, and elevated dropout rates. Many institutions still adopt one-size-fits-all approaches that ignore learner differences, lowering satisfaction and increasing attrition. As El-Sabagh (2021) noted, low interactivity and inadequate adaptability further worsen dropout tendencies. Both practical experience and scholarly research highlight a critical gap in understanding how adaptive, internet-based pedagogical approaches can enhance OER utilization, personalize learning experiences, and foster stronger communities of practice. This study therefore seeks to develop and implement pedagogical frameworks that integrate adaptive learning and collaboration in order to optimize OER use and strengthen community engagement in open and distance learning contexts, particularly at the National Open University of Nigeria.

Research Questions

1. What is the level of access and utilization of Internet-Based Adaptive Pedagogies and OERs among distance learners at NOUN, Awka study centre?
2. How do Internet-Based Adaptive Pedagogies facilitate collaboration and the formation of learning communities among distance learners?
3. What are the challenges hindering the effective utilization of Internet-Based Adaptive Pedagogies and OERs, and what strategies can be implemented to overcome them?

Literature review

Access and Utilization of Internet-Based Adaptive Pedagogies and OERs among Distance Learners

Internet-Based Adaptive Pedagogies (IBAPs) have significantly reshaped global education by leveraging on technology to enhance access to knowledge (Khosravi, Kitto & Buckingham Shum, 2020). The internet, as a central tool, supports academic engagement, learner autonomy, and broad educational accessibility (Onah, Altinay & Altinay, 2021). In Nigeria, it aids in research and teaching, helping universities provide timely and relevant information beyond traditional libraries. At the National Open University of Nigeria (NOUN), IBAPs and Open Educational Resources (OERs) are increasingly integrated to create flexible, student-centered learning environments (UNESCO, 2020).

However, persistent issues such as high data costs, poor connectivity, and infrastructural gaps hinder full utilisation. Yet, access and utilisation remain uneven due to factors like electricity instability, low internet penetration, limited digital literacy, and varying awareness levels (Afolabi, 2019; Okonkwo and Yusuf, 2021; Eze, 2021). Although platforms like Moodle and Coursera are available, many learners use them primarily to download materials, neglecting interactive features such as quizzes and forums. Key barriers at NOUN Awka Study Centre include limited internet access, insufficient devices, and inadequate institutional support (Okonkwo & Chiemeka, 2022). Also, Jegede (2021) notes that despite learners' familiarity with online learning, actual engagement with adaptive and open resources remains moderate due to technical and infrastructural constraints.

Facilitation of Collaboration and Learning Communities through Internet-Based Adaptive Pedagogies

Internet-Based Adaptive Pedagogies (IBAPs) play a vital role in fostering collaboration and building learning communities in distance education by promoting interactive, personalized, and peer-supported environments. They enable real-time learner-instructor and peer-to-peer engagement through tools like forums, group projects, social media, and virtual classrooms (Eze, Chinedu-Eze, & Bello, 2022). As universities globally invest in internet infrastructure, the benefits include quicker access to knowledge, multidisciplinary collaboration, and reduced reliance on costly hardcopy resources (Adeola, & Okonkwo, 2025). According to Connectivism theory, the internet supports dynamic knowledge networks, making collaborative learning more decentralized (Udo & Nwachukwu, 2024).

In Nigeria, the internet is indispensable for students and staff, providing access to up-to-date scholarly content and enhancing intellectual and professional development (Khosravi, Kitto & Buckingham, 2020). At the National Open University of Nigeria (NOUN), tools like Moodle, Zoom, and WhatsApp groups have strengthened collaboration and engagement

(Adewuyi & Okonkwo, 2020; NOUN Directorate of Learning Content Management Systems, 2022). However, Eze (2021) noted that participation is often low without instructor motivation and structured tasks. IBAPs support learning communities by encouraging peer interaction, enabling feedback, and facilitating co-construction of knowledge (Okonkwo, & Oluwaseun, 2023; Ojedokun & Owolabi, 2021), thus mitigating the isolation typical of distance learning.

Challenges Faced by Distance Learners and the Impact on the Effective Utilization of Internet-Based Adaptive Pedagogies and Open Educational Resources (OERs).

Distance learners face numerous challenges that hinder the effective use of Internet-Based Adaptive Pedagogies (IBAPs) and Open Educational Resources (OERs). Technological barriers, such as limited high-speed internet, inadequate hardware, and lack of digital literacy, especially in rural areas, significantly impact access and navigation of learning platforms (López et al., 2022; Alvarez et al., 2021). Personal factors, including time constraints from balancing work, family, and education, reduce learner engagement, while low motivation and self-discipline further impede the use of IBAPs and OERs (Kebritchi et al., 2020; Moore et al., 2021; Wang, 2023). Social isolation due to limited face-to-face interaction affects learners' sense of connection, lowering satisfaction and retention (Garrison et al., 2021).

Inadequate support systems, such as academic advising and peer interaction, also hinder engagement (Bennett et al., 2022). Additionally, concerns about the quality and curriculum alignment of OERs, along with inconsistent updates, reduce learners' trust and reliance on them (Hew et al., 2021; Cronin & MacLaren, 2022). Institutional barriers, including misalignment of pedagogies with curricula and lack of faculty training, further affect outcomes (Bishop et al., 2023; Pérez & Sampaio, 2022). Addressing these interrelated challenges requires strategic institutional, policy, and technological interventions to enhance equitable and effective distance education.

Methodology

This study adopted a quantitative research design, utilizing a structured questionnaire to collect data on students' access to and utilization of Internet-Based Adaptive Pedagogies (IBAPs) and Open Educational Resources (OERs) among distance learners. This design enabled the researcher to objectively measure variables and analyze trends using statistical methods. The research was conducted across three study centres of the National Open University of Nigeria (NOUN): Awka, Enugu, and Umudike. These centres were selected due to their strategic relevance in serving a diverse population of distance learners, providing a suitable setting for investigating digital learning practices. The target population consisted of 7,254 undergraduate students that enrolled across nine faculties at the selected NOUN study centres. A multistage sampling technique was employed to select a representative sample of 925 students. The sampling process involved stratification by study centre and faculty to ensure proportional representation. Random sampling was also employed to select participants with stratum representing varying backgrounds and demographics. Out of the 925 distributed questionnaires, 862 completed responses were received via Google Forms, representing a 93.2% response rate, which was deemed sufficient for robust analysis. Data were collected using a structured questionnaire titled Internet-Based Adaptive Pedagogies for Effective Utilization of Open Educational Resources (IBAPEUOER). The instrument consisted of closed-ended questions designed to gather data on internet access and connectivity, Awareness and usage of OERs and adaptive tools, Frequency and platforms of use, Perceived effectiveness of digital learning tools, Participation in online collaborative learning, and Challenges encountered in digital learning environments. To ensure content validity, the questionnaire was reviewed by subject-matter experts in educational technology and distance learning. A pilot test was also conducted, and items were refined based on feedback. Reliability was evaluated using Cronbach's Alpha, yielding access to IBAPs: $\alpha = 0.85$, OER Utilization: $\alpha = 0.90$. These coefficients reflect high internal consistency, indicating that the instrument reliably measured the intended constructs.

Data Analysis

The responses were analyzed using the Statistical Package for the Social Sciences (SPSS). The analysis included descriptive statistics (frequencies, percentages) to summarize demographic data and usage patterns of IBAPs and OERs.

Presentation of results

Table 1: Respondents' Age Range

Age Range	Frequency	Percent	Valid Percent	Cumulative Percent
18–24	225	26.1	26.1	26.1
25–34	302	35	35	61.1
35–44	214	24.8	24.8	86
45 and above	121	14	14	100
Total	**862**	**100**	**100**	—

Table 1 reveals that most NOUN respondents (61.1%) are young adults aged 18–34, with 35% in the 25–34 age group and 26.1% aged 18–24. Middle-aged learners (35–44) account for 24.8%, while only 14% are aged 45 and above. This indicates that NOUN primarily serves a younger adult population, yet still attracts a substantial number of older learners, highlighting its broad appeal across age groups. The age distribution suggests a diverse learner demographic, which may influence the design and delivery of digital learning tools and support services to meet varied generational needs.

Table 2: Respondents' Gender

Gender	Frequency	Percent	Valid Percent	Cumulative Percent
Female	379	44	44	44
Male	483	56	56	100
Total	**862**	**100**	**100**	—

Table 2 details the gender distribution of the respondents. Males represent a slight majority, comprising 56% of the sample, while females account for 44%. Although the gender distribution is not perfectly balanced, it indicates a reasonably equitable level of participation among both genders. The moderate male predominance may reflect broader trends in access to or interest in distance learning programs among different gender groups within the Nigerian educational context.

Table 3: Level of Study at the National Open University of Nigeria

Level of Study	Frequency	Percent	Valid Percent	Cumulative Percent
Undergraduate	765	88.7	88.7	88.7
Postgraduate	97	11.3	11.3	100
Total	**862**	**100**	**100**	—

As reflected in Table 3, most respondents are enrolled in undergraduate programs, comprising 88.7% of the sample. In contrast, postgraduate students make up only 11.3% of the respondents. This distribution underscores the National Open University of Nigeria's primary focus on undergraduate education. The relatively low proportion of postgraduate students may be attributed to limited program availability at the postgraduate level or a greater demand for undergraduate qualifications among the broader population.

Table 4: Duration of Study at NOUN

Duration	Frequency	Percent	Valid Percent	Cumulative Percent
Less than 1 year	347	40.3	40.3	40.3
1–3 years	447	51.9	51.9	92.1
4–6 years	68	7.9	7.9	100
Total	**862**	**100**	**100**	—

As shown in Table 4, most respondents (51.9%) have been enrolled at NOUN for between one and three years. Those with less than one year of study account for 40.3%, while only 7.9% have studied for four to six years. This suggests that most students are in the early or intermediate stages of their academic journey, indicating potential for ongoing engagement with institutional resources such as OERs.

Access and Utilization of IBAPs and OERs among distance learners at NOUN

Table 5: Familiarity with Open Educational Resources (OERs)

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	706	81.9	81.9	81.9
No	156	18.1	18.1	100
Total	**862**	**100**	**100**	—

Table 5 reveals a high level of awareness regarding OERs among respondents, with 81.9% indicating familiarity and only 18.1% reporting unfamiliarity. This widespread recognition underscores the growing role of OERs in the academic environment at NOUN.

Table 6: Frequency of OER Use in Learning

Frequency of Use	Frequency	Percent	Valid Percent	Cumulative Percent
Daily	154	17.9	17.9	17.9
Weekly	285	33.1	33.1	50.9
Occasionally	250	29	29	79.9
Rarely	173	20.1	20.1	100
Total	**862**	**100**	**100**	—

As shown in Table 6, usage patterns of OERs vary among students. While only 17.9% use OERs daily, 33.1% report weekly use, and 29% access them occasionally. A notable 20.1% of respondents rarely use OERs. This distribution suggests that although awareness is high, consistent utilization remains uneven, pointing to opportunities for increased integration of OERs into regular learning activities.

Table 7: Platforms Used to Access OERs

Platform	Frequency	Percent	Valid Percent	Cumulative Percent
NOUN Student Portal	408	47.3	47.3	47.3
YouTube	92	10.7	10.7	58
OER Commons	121	14	14	72
NOUN Student Portal, YouTube	34	3.9	3.9	76
NOUN Student Portal, YouTube, OER Commons	59	6.8	6.8	82.8
NOUN Student Portal, YouTube, OER Commons, MIT OpenCourseWare	148	17.2	17.2	100
Total	**862**	**100**	**100**	—

The data presented in Table 7 indicates that the NOUN Student Portal is the most frequently used platform for accessing Open Educational Resources (OERs), with nearly half of the respondents (47.3%) relying on it. A significant minority also utilize comprehensive platform combinations, notably NOUN Student Portal, YouTube, OER Commons, and MIT OpenCourseWare (17.2%). Use of single platforms like YouTube (10.7%) and OER Commons (14%) was less common, suggesting that while centralized institutional access points are preferred, some students diversify their sources to broaden their learning resources.

Table 8: Awareness of Adaptive Learning Platforms or Tools at NOUN

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	667	77.4	77.4	77.4
No	66	7.7	7.7	85
Not sure	129	15	15	100
Total	**862**	**100**	**100**	—

Table 8 shows that a substantial majority of students (77.4%) are aware of adaptive learning platforms or tools available at the National Open University of Nigeria (NOUN), though a small segment remains unaware (7.7%) or uncertain (15.0%). This high level of awareness sets a favourable context for the integration and effectiveness of such tools.

Table 9: Frequency of Adaptive Learning Tool Use

Frequency	Frequency	Percent	Valid Percent	Cumulative Percent
Daily	228	26.5	26.5	26.5
Weekly	314	36.4	36.4	62.9
Occasionally	235	27.3	27.3	90.1
Rarely	85	9.9	9.9	100
Total	**862**	**100**	**100**	—

Usage frequency data in Table 9 shows that 36.4% use adaptive tools weekly, 26.5% daily, and 27.3% occasionally. Only 9.9% reported rare use, suggesting that adaptive tools are regularly integrated into students' learning routines.

IBAPs and the Facilitation of Collaboration and Learning Communities

Table 10: Participation in Online Learning Communities Through NOUN

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	580	67.3	67.3	67.3
No	282	32.7	32.7	100
Total	**862**	**100**	**100**	—

Table 10 shows that engagement in online learning communities through NOUN is robust, with 67.3% of respondents participating. This level of involvement suggests that online peer interaction is a prominent feature of the learning environment and potentially contributes to collaborative knowledge building.

Table 11: Perception of Group Collaboration Support by Adaptive Tools

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	630	73.1	73.1	73.1
No	109	12.6	12.6	85.7
Not sure	123	14.3	14.3	100
Total	**862**	**100**	**100**	—

Finally, Table 11 shows that a substantial majority (73.1%) believed adaptive tools have supported group collaboration. Only 12.6% disagreed, while 14.3% were unsure. This affirms the perceived value of adaptive technologies in facilitating interactive learning experiences among peers.

Table 12: Platforms Used for Collaboration

Platform	Frequency	Percent	Valid Percent	Cumulative Percent
WhatsApp groups	224	26	26	26
NOUN Moodle forums	69	8	8	34
Google Classroom	9	1	1	35
Telegram groups	40	4.6	4.6	39.7
WhatsApp groups, NOUN Moodle forums	100	11.6	11.6	51.3
WhatsApp groups, Google Classroom, Telegram groups	43	5	5	56.3
WhatsApp, NOUN Moodle, Google Classroom, Microsoft Teams, Telegram	37	4.3	4.3	60.6
NOUN Moodle forums, Telegram groups	150	17.4	17.4	78
WhatsApp groups, Telegram groups	38	4.4	4.4	82.4
WhatsApp, NOUN Moodle, Google Classroom, Telegram	75	8.7	8.7	91.1
WhatsApp groups, Google Classroom	24	2.8	2.8	93.9
WhatsApp, NOUN Moodle, Google Classroom, Microsoft Teams	8	0.9	0.9	94.8
WhatsApp, NOUN Moodle, Google Classroom	30	3.5	3.5	98.3
None	15	1.7	1.7	100
Total	**862**	**100**	**100**	—

Table 12 reveals that WhatsApp groups (26.0%) and NOUN Moodle forums in various combinations (e.g., Moodle + Telegram at 17.4%) are the most used platforms for collaboration. The preference for informal tools such as WhatsApp, even in multi-platform combinations, reflects a student-driven trend toward accessible and mobile-friendly collaboration environments, although formal platforms like Google Classroom and Microsoft Teams remain underutilized.

Challenges affecting the effective utilization of IBAPs and OERs

Table 13: Major Challenges in Using OERs and Adaptive Tools

Challenges	Frequency	Percent	Valid Percent	Cumulative Percent
Inadequate internet connectivity	137	15.9	15.9	15.9
High cost of internet/data	184	21.3	21.3	37.2
Lack of training or technical support	59	6.8	6.8	44.1
Insufficient or irrelevant content	8	0.9	0.9	45
Inadequate internet connectivity, Lack of training or technical support	119	13.8	13.8	58.8
Inadequate internet, High cost, Lack of support, Navigation issues, Insufficient/irrelevant content	23	2.7	2.7	61.5
Lack of support, Insufficient/irrelevant content	188	21.8	21.8	83.3
Inadequate internet, High cost of internet/data	86	10	10	93.3
Inadequate internet, High cost, Navigation issues	10	1.2	1.2	94.4
Inadequate internet, High cost, Lack of support	20	2.3	2.3	96.8
Inadequate internet, Lack of support, Navigation issues	28	3.2	3.2	100
Total	**862**	**100**	**100**	**—**

Table 13 outlines the major challenges faced in using OERs and adaptive tools. High cost of internet/data (21.3%) and inadequate internet connectivity (15.9%) were the most frequently reported standalone challenges. Notably, 21.8% cited a combination of lack of training and insufficient or irrelevant content as significant barriers. This highlights persistent infrastructural and capacity issues affecting digital learning adoption.

Table 14: Training Received to Use Adaptive Learning Tools

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	394	45.7	45.7	45.7
No	309	35.8	35.8	81.6
Not sure	159	18.4	18.4	100
Total	**862**	**100**	**100**	—

Despite high awareness and perceived effectiveness, Table 14 highlights a gap in capacity building, as only 45.7% of respondents reported receiving adequate training on using adaptive learning tools. A notable 35.8% indicated they had not received any training, while 18.4% were unsure. This underscores the need for structured orientation and continuous support mechanisms.

Discussion of findings

The study highlights key trends and challenges in the use of Internet-Based Adaptive Pedagogies (IBAPs) and Open Educational Resources (OERs) among distance learners at NOUN. Most learners (61.1%) are aged 18–34, a digitally literate demographic and gender distribution is nearly balanced (56% male), reflecting inclusive access (UNESCO, 2020). A majority (88.7%) are undergraduates, with over 92% enrolled for less than three years, indicating a cohort in need of orientation (Afolabi, 2019). OER awareness is high (81.9%), largely introduced by lecturers (54.2%) (Ellore et al., 2014), yet only 17.9% use them daily, reflecting underutilization. The NOUN Student Portal is the main access point (47.3%) with increasing multi-platform usage. While 77.4% are aware of adaptive tools, only 45.7% received formal training, echoing concerns on preparedness (Pérez & Sampaio, 2022). Despite this, perceived effectiveness is strong, 79.6% find them effective, and 74.8% report improved learning outcomes.

Collaboration is robust, with 67.3% active in learning communities and 73.1% affirming group work benefits, mainly via WhatsApp and Moodle (Adewuyi & Okonkwo, 2020), supporting Connectivism (Siemens, 2005). Challenges include high internet costs (21.3%) and limited access (15.9%) (López et al., 2022; Okonkwo & Chiemeka, 2022), along with digital illiteracy and time constraints (31.1%) (Garrison et al., 2021; Kebritchi et al., 2020). Learners prefer videos (21.8%) and e-textbooks (18.3%) and Moodle is the dominant platform (62.6%) with emerging AI tool use (10.8%).

Despite high awareness, effective utilization is limited by infrastructure, skills, and institutional support, requiring strategic investment in connectivity, training, and learner services (Jegede, 2021; Bishop et al., 2023).

Summary of findings

The study at NOUN found high awareness of OERs (81.9%) and IBAPs (77.4%), but daily usage remains low. Lecturers are key in introducing OERs, with platforms like Moodle and the student portal being most used. Adaptive tools are seen as effective, yet challenges like poor internet access, high data costs, and limited training hinder usage. Collaboration through WhatsApp and other platforms is common, though also affected by digital skill gaps and connectivity issues. Most learners are undergraduates in early academic years, favoring multimedia resources like videos and e-textbooks for learning.

Conclusion

IBAPs and OERs at NOUN enhance student engagement and academic performance; however, their utilization remains constrained by technological, institutional, and individual barriers. Although awareness of these resources is high, actual adoption rates are still low. Achieving greater impact requires addressing these challenges and strengthening support systems to foster digital inclusion and encourage ongoing academic involvement.

Recommendations

1. To enhance the use of IBAPs and OERs at NOUN, key strategies include improving internet access and affordability, providing structured digital literacy training, and increasing institutional support through onboarding and helpdesks.
2. The university should curate updated, curriculum-aligned OERs and promote collaborative learning via both formal and informal platforms.
3. Faculty engagement and AI-based adaptive technologies should be encouraged to support diverse learning needs. Finally, regular monitoring of usage patterns is essential to identify challenges and inform targeted interventions, ensuring sustained engagement and academic success.

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