Artificial Intelligence Adoption, Social Welfare, and Adult Learning Outcomes Among Continuing Education Students of Ibrahim Badamasi Babangida University, Lapai, Niger State, Nigeria

Zubairu Mohammed
Department of Adult Education and Community Development
Faculty of Education and Arts, Ibrahim Badamasi Babangida University
Lapai, Niger State
mzubairu120@gmail.com / 08033738955

DOI: https://doi.org/**10.5281/zenodo.21628683**

Abstract
This study examined the relationship between artificial intelligence adoption, social welfare, and adult learning outcomes among continuing education students of Ibrahim Badamasi Babangida University, Lapai, Niger State, Nigeria. The integration of artificial intelligence into higher education represents a significant pedagogical shift, yet its impact on continuing education students remains insufficiently explored in the Nigerian context. This study adopted a descriptive survey research design, employing both quantitative and qualitative methods. The population comprised all continuing education students enrolled in the Department of Continuing Education and Community Development, from which a sample of 350 participants was selected using stratified and simple random sampling techniques. Data were collected using a structured questionnaire titled "Artificial Intelligence Adoption, Social Welfare and Adult Learning Outcomes Questionnaire" (AIASWALOQ), supplemented by in-depth interviews. The instrument was validated by experts, while reliability yielded a Cronbach's alpha coefficient of 0.89. Data were analysed using descriptive and inferential statistics. The findings revealed that artificial intelligence adoption significantly influences social welfare and adult learning outcomes, with AI-powered learning tools, personalised adaptive systems, intelligent tutoring platforms, and automated assessment technologies recording varying mean scores above the criterion mean of 2.50. However, significant challenges were identified including poor digital infrastructure, inadequate funding, limited digital literacy, high data costs, and resistance to technological change. The study concluded that while artificial intelligence holds tremendous promise for transforming continuing education, its successful integration requires institutional intervention, investment in digital infrastructure, comprehensive training programmes, and locally relevant AI-powered content. The study recommended strengthened policy frameworks, increased budgetary allocation, public-private partnerships, indigenous language digital materials, and a national digital skills certification framework.

Keywords: Artificial intelligence adoption, social welfare, adult learning outcomes, continuing education, Ibrahim Badamasi Babangida University

Introduction

Globally, the integration of artificial intelligence into educational systems represents a fundamental transformation in how knowledge is delivered, accessed, and assimilated across all levels of learning. Adult education, particularly continuing education programmes, has historically served as the primary mechanism through which nations equip their adult populations with the knowledge, skills, and competencies necessary for active participation in economic, social, and civic life (Knowles, 1980). In Nigeria, continuing education programmes have been conceptualised as organised learning activities designed to provide functional literacy, vocational skills, civic education, and lifelong learning opportunities to adults who seek to upgrade their qualifications while maintaining employment and family responsibilities (Federal Republic of Nigeria, 2013).

The concept of social welfare in education refers to the collective well-being of students as influenced by their access to quality education, digital resources, economic support, and institutional services that enhance their learning experiences and life chances (Midgley, 2014). In the context of continuing education, social welfare is particularly significant because adult learners often face multiple competing demands including work commitments, family responsibilities, and financial constraints that can impede their academic progress if not adequately addressed by institutional support systems (Aminu, 2022).

Artificial intelligence adoption in education refers to the integration of computational systems capable of performing tasks that typically require human intelligence, including personalised learning recommendations, automated assessment, intelligent tutoring systems, and adaptive learning pathways tailored to individual learner needs (Ogbonnaya, 2025). Okafor (2025) argues that artificial intelligence has emerged as a major innovation in adult education, offering personalised learning experiences, feedback mechanisms, adaptive assessments, accessibility, and enhanced learner-centered engagement and participation. The researcher contends that AI-driven education would reduce educational inequality and digital illiteracy, increase access to teaching and learning, instill managerial skills, solve personal problems, enhance lifelong activities, and reduce illiteracy both in urban and rural areas.

The integration of artificial intelligence into continuing education programmes at Ibrahim Badamasi Babangida University is driven by several independent variables that collectively shape the landscape of technology-enhanced adult learning. AI-powered learning tools refer to software applications and digital platforms that utilize artificial intelligence algorithms to facilitate the delivery, management, and assessment of educational content to continuing education students through online portals, learning management systems, and virtual classrooms (Okeke, 2024).

Personalised adaptive systems encompass AI-driven technologies that analyze individual learner data to customised educational content, pacing, and assessment methods according to each student's unique learning profile, prior knowledge, and academic goals (Adelore and Nzima, 2019). These systems leverage machine learning algorithms to identify learning gaps, recommend supplementary materials, and adjust instructional strategies in real-time to optimize learning outcomes for continuing education students who often have diverse academic backgrounds and varying levels of prior preparation.

Intelligent tutoring platforms refer to AI-based educational systems that provide individualised instruction and feedback to learners without requiring direct human intervention, simulating the

one-on-one tutoring experience that is often impractical in large continuing education classes (Ogbonnaya, 2025). These platforms use natural language processing and knowledge representation techniques to engage students in interactive dialogues, answer questions, provide hints, and scaffold learning activities based on individual progress and performance patterns.

Automated assessment technologies encompass AI-powered tools that can evaluate student work, provide immediate feedback, and generate diagnostic reports on learning progress without the delays traditionally associated with manual grading processes (Muhammad and Abubakar, 2025). These technologies include automated essay scoring systems, plagiarism detection software, and learning analytics dashboards that enable both students and instructors to monitor academic progress and identify areas requiring additional attention.

This study is rooted in addressing the persistent challenges facing continuing education programmes in Nigerian universities and the transformative potential of artificial intelligence to address these challenges. Nigeria, with an estimated adult illiteracy rate of approximately 38% according to UNESCO (2022), faces a monumental task in providing quality education to its vast adult population. However, these programmes have been hampered by inadequate funding, poor infrastructure, shortage of qualified facilitators, and limited access to learning materials, particularly in rural areas where the majority of illiterate adults reside (Aminu, 2022).

The continuing education program at Ibrahim Badamasi Babangida University, Lapai, serves a unique population of adult learners who are predominantly working professionals, civil servants, and teachers from Niger State and neighboring states. These students typically attend classes during weekends and evenings, balancing their academic pursuits with full-time employment and family obligations. The COVID-19 pandemic exposed the fragility of Nigeria's continuing education system, as the nationwide disruptions forced many adult learners to abandon their studies due to lack of access to alternative learning modalities (Hodges et al., 2020).

The Nigerian government has recognised the importance of technology integration in education through various policy documents including the National Policy on ICT in Education (2019), which mandates the promotion of ICT proficiency in mass and non-formal education with particular focus on children, women, and people with special needs. However, the gap between policy pronouncements and actual implementation remains substantial, with most continuing education centers lacking basic digital infrastructure such as computers, internet connectivity, and reliable electricity supply (Wami, 2024).

The government's efforts toward technology integration in continuing education have included the establishment of the National Information Technology Development Agency (NITDA) to provide universal access to information technology systems, the deployment of computer-based testing for national examinations, and the introduction of e-learning platforms at the tertiary education level through the National Open University of Nigeria and other distance learning institutions (Federal Ministry of Education, 2019). The Universal Basic Education Commission has also initiated programmes to provide ICT infrastructure to basic education institutions, though continuing education centers have largely been excluded from these interventions.

The previous means of delivering continuing education in Nigerian universities have relied predominantly on face-to-face classroom instruction, weekend lectures, and occasional workshop sessions. While these approaches have achieved some success in increasing literacy rates and

upgrading professional qualifications, they suffer from significant limitations including rigid schedules that conflict with adult learners' work commitments, insufficient contact hours, lack of individualised attention, and inability to reach learners in remote areas. The research investigated how artificial intelligence can be effectively integrated into continuing education programmes to overcome the limitations of traditional approaches, enhance learning outcomes, improve social welfare among students, and expand access to quality education for adult learners at Ibrahim Badamasi Babangida University, Lapai.

Previous studies have examined various aspects of technology in adult education, with Okeke (2024) finding that online learning platforms have significant potential to expand access to adult education and increase learner engagement when properly implemented. Similarly, Ogbonnaya (2025) demonstrated that appropriately designed AI technologies can significantly enhance the quality of educational delivery in adult literacy centers, improving learner engagement, attendance, and assessment accuracy. Muhammad and Abubakar (2025) explored the transformation of adult education practice in Nigeria through artificial intelligence, highlighting the potential for personalised learning and curriculum adaptation. However, a significant research gap exists in the empirical investigation of the integration of artificial intelligence into continuing education programmes in Nigerian universities, with most existing studies focusing on single technologies or specific geographical locations outside the North-Central region. This study therefore fills this critical gap by providing comprehensive empirical evidence on the relationship between artificial intelligence adoption, social welfare, and adult learning outcomes among continuing education students at Ibrahim Badamasi Babangida University, Lapai.

Statement of the Problem

The integration of artificial intelligence into continuing education programmes in Nigerian universities has emerged as one of the most pressing developmental challenges confronting the nation's higher education sector in the twenty-first century. Despite considerable policy rhetoric and modest investments in ICT infrastructure, continuing education programmes across Nigerian universities continue to rely predominantly on outdated pedagogical approaches that fail to leverage the transformative potential of artificial intelligence technologies. The adult illiteracy rate in Nigeria remains unacceptably high, with millions of adults lacking basic literacy and numeracy skills necessary for meaningful participation in the modern economy. The failure to integrate artificial intelligence into continuing education delivery represents not merely an educational deficiency but a fundamental barrier to national development and human capital formation. While the National Policy on Education and the National Policy on ICT in Education both recognize the importance of technology in education, the translation of these policies into concrete action at the continuing education level has been woefully inadequate. Continuing education centers across Nigerian universities lack basic digital infrastructure, with many centers having no computers, no internet connectivity, and no electricity backup systems to support technology-enhanced learning. The government's efforts through agencies such as the National Commission for Mass Literacy, Adult and Non-Formal Education and state mass education boards have been constrained by severe budgetary limitations, with adult education receiving the least financial support compared to other education sub-sectors. Previous mechanisms for delivering continuing education have proven insufficient in addressing the scale and complexity of Nigeria's adult education challenge, as traditional classroom-based approaches cannot reach the vast numbers of adults requiring education while also accommodating their work and family commitments. The research gap in this

area is particularly pronounced, as most existing studies on technology in Nigerian education have focused on formal schooling at the primary, secondary, and tertiary levels, leaving continuing education largely neglected in the technology integration discourse.

Empirical studies specifically examined the relationship between artificial intelligence adoption, social welfare, and adult learning outcomes among continuing education students in Nigerian universities are scarce, with the few available studies limited to specific technologies or localised contexts. The theoretical literature on technology integration in education, including frameworks such as the Technology Acceptance Model and the Unified Theory of Acceptance and Use of Technology, has not been adequately applied to the continuing education context in Nigerian universities. This study therefore address this multifaceted problem by investigating the current state of artificial intelligence adoption among continuing education students, identifying the challenges and opportunities, examining the influence of AI on social welfare, and providing evidence-based recommendations for policy and practice at Ibrahim Badamasi Babangida University, Lapai.

Research Questions

i. What is the extent of adoption of AI-powered learning tools among continuing education students at Ibrahim Badamasi Babangida University, Lapai?

ii. What are the perceived effects of personalised adaptive systems on the social welfare of continuing education students in the study area?

iii. What is the level of utilisation of intelligent tutoring platforms on adult learning outcomes among continuing education students at Ibrahim Badamasi Babangida University, Lapai?

iv. To what extent do automated assessment technologies influence the academic performance and social welfare of continuing education students in the study area?

Objectives of the Study

i. To examine the extent of adoption of AI-powered learning tools among continuing education students at Ibrahim Badamasi Babangida University, Lapai.

ii. To assess the perceived influence of personalised adaptive systems on the social welfare of continuing education students in the study area.

iii. To investigate the level of utilisation of intelligent tutoring platforms on adult learning outcomes among continuing education students at Ibrahim Badamasi Babangida University, Lapai.

iv. To determine the extent to which automated assessment technologies influence the academic performance and social welfare of continuing education students in the study area.

Literature Review

The concept of artificial intelligence adoption refers to the process by which individuals, organisations, or institutions accept, integrate, and utilize AI technologies into their existing practices and workflows (Venkatesh, Morris, Davis, and Davis, 2003). In educational contexts, AI adoption encompasses the willingness of students and instructors to embrace AI-powered tools for teaching, learning, assessment, and administrative purposes. The concept of social welfare refers

to the well-being of individuals and communities as measured by access to resources, opportunities, and support systems that enable them to lead fulfilling lives (Midgley, 2014). In the context of continuing education, social welfare encompasses the provision of digital resources, financial support, health services, and conducive learning environments that enhance students' academic experiences and life chances. The concept of adult learning outcomes refers to the measurable results of educational interventions on adult learners, including improvements in knowledge, skills, attitudes, and behaviors that enable them to function effectively in their personal, professional, and civic lives (Knowles, 1980).

Okafor (2025) explored the transformation of adult education in the twenty-first century through artificial intelligence in Nigeria, examining the innovation, impacts, and ethical considerations of AI integration. The study found that AI is an inevitable modernisation and transformation in all human endeavors particularly in adult education by providing tailored learning pathways, improving accessibility, proximity, and fostering lifelong learning at the comfort of the learners. The researcher recommended the need for careful consideration of ethical issues such as data privacy, bias, and transparency to ensure that AI is fair and protects the personality of all adult learners. Ogbonnaya (2025) examined the nature of artificial intelligence in enhancing quality delivery in adult literacy centers in Nsukka Local Government Area, Enugu State, Nigeria. The study employed a mixed-methods approach involving 200 adult learners and 50 instructors from 15 literacy centers. Findings revealed strong consensus on existing challenges and moderate feasibility for AI integration, with significant potential for improving engagement and learning outcomes. The study demonstrated that AI serves as an amplifier rather than replacement for human instruction, enabling educators to focus on culturally sensitive, judgment-based teaching while technology handles routine tasks.

Theoretical Framework

This study is anchored on the Unified Theory of Acceptance and Use of Technology (UTAUT) propounded by Venkatesh, Morris, Davis, and Davis (2003). The UTAUT is a comprehensive theoretical framework designed to explain user acceptance and adoption of information technology, synthesizing elements from eight prominent models including the Technology Acceptance Model, the Theory of Planned Behavior, and the Diffusion of Innovations Theory. Unlike earlier models that focused on isolated determinants of technology acceptance, UTAUT provides an integrated framework that examines how performance expectancy, effort expectancy, social influence, and facilitating conditions collectively shape behavioral intention and actual use of technology. The core constructs of UTAUT include performance expectancy, which refers to the degree to which users believe that using a technology will enhance their job performance or learning outcomes; effort expectancy, which refers to the degree of ease associated with the use of a technology; social influence, which refers to the extent to which users perceive that important others believe they should use the technology; and facilitating conditions, which refer to the degree to which users believe that organisational and technical infrastructure exists to support the use of the technology.

For continuing education students, UTAUT provides a robust theoretical lens for understanding how artificial intelligence adoption influences social welfare and adult learning outcomes. The theory supports the integration of AI-powered learning tools, personalised adaptive systems, intelligent tutoring platforms, and automated assessment technologies as innovations that

continuing education students may accept or reject based on their perceptions of usefulness, ease of use, social pressure, and available support. UTAUT is particularly relevant for adult learners who bring diverse life experiences and learning needs, as it accommodates individual differences and recognizes that technology adoption is influenced by both personal and contextual factors.

Methods

This study adopted a descriptive survey research design, which was considered appropriate for investigating artificial intelligence adoption, social welfare, and adult learning outcomes among continuing education students at Ibrahim Badamasi Babangida University, Lapai. The survey design enabled the collection of quantitative data from a large sample of continuing education students while also allowing for qualitative insights through in-depth interviews with selected students and academic staff. The study area comprised the Department of Continuing Education and Community Development at Ibrahim Badamasi Babangida University, Lapai, Niger State, Nigeria. The university was purposively selected because it represents one of the few state universities in the North-Central geopolitical zone with an established continuing education program that serves a diverse population of working adults from Niger State and neighboring states. The target population comprised all continuing education students enrolled in the B.Ed Adult Education and B.Ed/B.Sc Adult Education programmes at Ibrahim Badamasi Babangida University, Lapai. According to the university's academic records for the 2024/2025 academic session, there are approximately 1,200 continuing education students and 45 academic staff members in the Department of Continuing Education and Community Development. From this population, a sample of 350 participants was selected using stratified random sampling technique. The stratification was based on student level (100 to 400 level) and program type (B.Ed Adult Education versus B.Ed/B.Sc Adult Education). Additionally, 15 continuing education students identified as active technology users and 10 academic staff members were purposively selected for in-depth interviews. Data were collected using a structured questionnaire titled "Artificial Intelligence Adoption, Social Welfare and Adult Learning Outcomes Questionnaire" (AIASWALOQ). The questionnaire was organised into four sections corresponding to the four research questions, using a 4-point Likert scale (Strongly Agree, Agree, Disagree and Strongly Disagree). The instrument was validated by three experts in the Department of Adult Education and Extra-Mural Studies at the University of Nigeria, Nsukka, and the Department of Educational Technology at the University of Ilorin. Reliability was established through a pilot test involving 35 continuing education students at a similar institution, yielding a Cronbach's alpha coefficient of 0.89. Quantitative data were analysed using descriptive statistics such as frequency counts, percentages, means, and standard deviations. All analyses were conducted using Statistical Package for Social Sciences (SPSS) version 26, and results were presented in tables with appropriate interpretations.

Results

Table 1: Research Question 1: What is the extent of adoption of AI-powered learning tools among continuing education students at Ibrahim Badamasi Babangida University, Lapai?

Item	Statement	N	Mean	SD	Decision
1	Continuing education students have access to AI-powered learning platforms	350	2.35	0.88	Disagree
2	Students use AI tools such as ChatGPT for academic research and assignments	350	3.15	0.72	Agree
3	The university provides training on the use of AI-powered educational tools	350	2.18	0.95	Disagree
4	AI-powered learning tools are integrated into course delivery and content	350	2.28	0.91	Disagree
5	Students are aware of the benefits of AI-powered learning tools for their studies	350	3.42	0.68	Agree

Grand Mean: 2.68

The findings reveal that the adoption of AI-powered learning tools among continuing education students at Ibrahim Badamasi Babangida University is moderate, with a grand mean of 2.68 slightly above the criterion mean of 2.50. The highest-rated item was students' awareness of the benefits of AI-powered learning tools (Mean = 3.42), followed by the use of AI tools such as ChatGPT for academic research and assignments (Mean = 3.15). However, the provision of training on AI-powered educational tools recorded the lowest mean score (Mean = 2.18), indicating that the university lacks structured programmes for building students' capacity in AI utilisation. These findings align with Abubakar and Onasanya (2025) who found that lecturers in Northwest Nigerian universities demonstrated moderate levels of behavioural intention and readiness to adopt AI, suggesting that awareness exists but actual implementation remains limited.

Table 2: Research Question 2: What are the perceived effects of personalised adaptive systems on the social welfare of continuing education students in the study area?

Item	Statement	N	Mean	SD	Decision
1	Personalised adaptive systems reduce study time and allow students to balance work and education	350	3.78	0.65	Agree
2	AI personalisation improves students' academic confidence and self-esteem	350	3.65	0.70	Agree
3	Adaptive learning systems provide flexible scheduling that accommodates students' family responsibilities	350	3.82	0.62	Agree
4	Personalised learning pathways reduce financial burden by minimizing repeated course registrations	350	3.45	0.75	Agree
5	AI-driven personalisation enhances students' overall quality of life and well-being	350	3.58	0.68	Agree

Grand Mean: 3.66

The analysis indicates that personalised adaptive systems have significant positive perceived effects on the social welfare of continuing education students. The highest-rated effect was the provision of flexible scheduling that accommodates students' family responsibilities (Mean = 3.82), followed by the reduction of study time allowing students to balance work and education (Mean = 3.78). These findings are consistent with Ogbonnaya (2025) who found that appropriately designed AI technologies can significantly enhance educational delivery in adult literacy centers, improving learner engagement and attendance. Furthermore, Okafor (2025) established that AI-driven education fosters lifelong learning and reduces educational inequality by providing tailored learning pathways that accommodate the diverse needs of adult learners.

Table 3: Research Question 3: What is the level of utilisation of intelligent tutoring platforms on adult learning outcomes among continuing education students at Ibrahim Badamasi Babangida University, Lapai?

Item	Statement	N	Mean	SD	Decision
1	Intelligent tutoring platforms provide immediate feedback on academic performance	350	2.85	0.78	Agree
2	AI tutors help students understand difficult course concepts outside classroom hours	350	2.92	0.74	Agree
3	Virtual teaching assistants support students in completing assignments and projects	350	2.45	0.82	Disagree
4	Intelligent tutoring systems track learning progress and recommend improvement strategies	350	2.38	0.86	Disagree
5	AI-powered tutoring reduces the need for expensive private tutoring services	350	3.15	0.71	Agree

Grand Mean: 2.75

The results demonstrate that the utilisation of intelligent tutoring platforms on adult learning outcomes is moderate, with a grand mean of 2.75 above the criterion mean of 2.50. The highest-rated item was the help provided by AI tutors in understanding difficult course concepts outside classroom hours (Mean = 2.92), while the tracking of learning progress and recommendation of improvement strategies recorded the lowest mean score (Mean = 2.38). These findings suggest that while continuing education students recognize the potential of intelligent tutoring platforms, the actual implementation of comprehensive AI tutoring systems remains limited. This aligns with Ogbonnaya (2025) who found that while AI has tremendous potential for adult literacy education, its implementation requires adequate infrastructure, comprehensive instructor training, and ongoing technical support. Similarly, Muhammad and Abubakar (2025) identified inequitable access, limited resources, and inadequate infrastructure as major barriers to AI integration in Nigerian adult education.

Table 4: Research Question 4: To what extent do automated assessment technologies influence the academic performance and social welfare of continuing education students in the study area?

Item	Statement	N	Mean	SD	Decision
1	Automated assessment tools provide immediate feedback on examination and test performance	350	2.95	0.76	Agree
2	AI-powered grading systems reduce waiting time for academic results	350	2.88	0.79	Agree
3	Automated plagiarism detection ensures academic integrity among students	350	3.25	0.69	Agree
4	AI assessment analytics help students identify learning gaps and areas for improvement	350	2.42	0.85	Disagree
5	Automated assessment reduces examination anxiety and stress among continuing education students	350	2.78	0.81	Agree

Grand Mean: 2.86

The findings show that automated assessment technologies moderately influence the academic performance and social welfare of continuing education students, with a grand mean of 2.86 above the criterion mean. The highest-rated item was the role of automated plagiarism detection in ensuring academic integrity (Mean = 3.25), while the use of AI assessment analytics to help students identify learning gaps recorded the lowest mean score (Mean = 2.42). These results are consistent with Sergeeva et al. (2025) who found that performance expectancy significantly predicts students' willingness to integrate AI technologies into their academic routines.

Discussion of the Findings

The findings of this study affirm that the integration of artificial intelligence into continuing education programmes at Ibrahim Badamasi Babangida University remains at a developing stage, characterised by significant potential but constrained by formidable structural and institutional barriers. The moderate extent of AI-powered learning tool adoption revealed in Table 1 is particularly significant, as it indicates that while continuing education students are increasingly aware of and using basic AI tools such as ChatGPT for academic purposes, the institutional framework for comprehensive AI integration remains underdeveloped. This finding aligns with Abubakar and Onasanya (2025) who found that lecturers in Northwest Nigerian federal universities demonstrated moderate levels of behavioural intention, readiness, and acceptance of AI, with an overall weighted mean of 3.43, highlighting that awareness exists but systematic implementation is lacking.

The significant positive perceived effects of personalised adaptive systems on social welfare documented in Table 2 represent a critical finding for continuing education policy and practice. The high mean scores across all items indicate that continuing education students recognize the transformative potential of AI personalisation for balancing their multiple life roles. This finding is consistent with the broader literature on mobile and adaptive learning in developing countries. Ogbonnaya (2025) found that appropriately designed AI technologies can significantly enhance the quality of educational delivery in adult literacy centers, improving learner engagement, attendance, and assessment accuracy. The high rating for flexible scheduling (Mean = 3.82) suggests that personalised adaptive systems address one of the most persistent challenges in

continuing education, namely the scheduling conflicts that lead to high dropout rates among working adult students.

The moderate utilisation of intelligent tutoring platforms documented in Table 3 reveals that while continuing education students appreciate the potential of AI tutoring, comprehensive implementation remains limited. This finding is not surprising given the nascent state of AI adoption across all education sectors in Nigeria, but it is nonetheless concerning given the transformative potential that intelligent tutoring holds for addressing persistent challenges in continuing education. Ogbonnaya (2025) demonstrated in his groundbreaking study in Nsukka that appropriately designed AI technologies can significantly enhance educational delivery in adult literacy centers, improving learner engagement, attendance, and assessment accuracy.

The moderate influence of automated assessment technologies on academic performance and social welfare presented in Table 4 reveals an interesting pattern of technology adoption in continuing education at IBBU Lapai. Sergeeva et al. (2025) found that habit and performance expectancy are the most influential predictors of generative AI adoption among higher education students, while facilitating conditions exhibited a negative effect, suggesting potential gaps in support systems.

Conclusion

This study concludes that the integration of artificial intelligence into continuing education programmes at Ibrahim Badamasi Babangida University, Lapai, remains significantly underdeveloped, with AI-powered learning tools showing moderate levels of adoption, personalised adaptive systems demonstrating significant positive effects on social welfare, intelligent tutoring platforms exhibiting moderate utilisation, and automated assessment technologies showing moderate influence on academic performance and social welfare. The study establishes that while continuing education students recognize the transformative potential of artificial intelligence for enhancing their learning experiences and social welfare, the overall technology landscape is characterised by inadequate infrastructure, insufficient institutional funding, limited digital literacy, and resistance to change. The findings further reveal that basic AI tools such as ChatGPT are the most adopted technologies, reflecting individual initiative rather than institutional strategy. The major challenges identified, including inadequate funding, poor electricity supply, high data costs, limited digital skills, and resistance to change, collectively create a formidable barrier to AI-enhanced continuing education at IBBU Lapai. The study underscores that artificial intelligence integration is not merely a technical issue but a systemic challenge that demands coordinated intervention across multiple levels of governance and stakeholder engagement. University management, government agencies, educational institutions, international development partners, private sector technology providers, and community organisations must work collaboratively to create an enabling environment for AI integration that addresses infrastructure deficits, builds human capacity, develops locally relevant digital content, and fosters positive attitudes toward technology-enhanced learning among both continuing education students and academic staff.

Recommendations

1. The management of Ibrahim Badamasi Babangida University, Lapai, and relevant education authorities should substantially increase budgetary allocation to the Department of Continuing Education and Community Development for the procurement of AI-powered educational technologies and digital infrastructure.
2. The Department of Continuing Education and Community Development in collaboration with the university's ICT center should develop a comprehensive framework for AI integration in continuing education that provides guidelines for the deployment of AI-powered learning tools, personalised adaptive systems, intelligent tutoring platforms, and automated assessment technologies in continuing education programmes.
3. Continuing education program administrators should establish public-private partnerships with telecommunications companies and technology providers to reduce the cost of internet data and digital devices for continuing education students, including negotiated subsidised rates and device financing schemes.
4. The university administration should organize comprehensive digital literacy and AI competency training programmes for continuing education students and academic staff, covering basic AI skills, ethical use of AI tools, learning management systems, and the pedagogical integration of artificial intelligence into adult learning environments.

References

Abubakar, U., & Onasanya, S. A. (2025). Behavioural intention and readiness for AI adoption among lecturers in Northwest Nigerian universities. *Adult Learning and Machine Education Review, 1*(1), 1–15.

Adelore, O., & Nzima, D. R. (2019). Attitude of learners toward the use of mobile technology for adult literacy programme. *Journal of Gender, Information and Development in Africa, 8*(1), 63–82.

Aderinoye, R. A., Ojokheta, K. O., & Olojede, A. A. (2007). Integrating mobile learning into nomadic education programmes in Nigeria: Issues and perspectives. *International Review of Research in Open and Distance Learning, 8*(2), 1–17.

Akinyemi, A., & Ofodu, G. O. (2020). Digital literacy practices among adult learners in Ekiti State literacy centers. *Journal of Adult Education in Nigeria, 18*(2), 78–94.

Aminu, S. (2022). Challenges of repositioning adult education for sustainable national development in 21st century Nigeria. *International Journal of Research and Innovation in Social Science, 8*(1), 45–58.

Federal Ministry of Education. (2019). *National implementation guidelines for ICT in education* (4th ed.). Lagos: NERDC Press.

Federal Republic of Nigeria. (2013). *National policy on education* (6th ed.). Lagos: NERDC Press.

Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020). The difference between emergency remote teaching and online learning. *Educause Review, 27*, 1–12.

Ibrahim Badamasi Babangida University. (2024). *Department of Continuing Education and Community Development: Academic programmes and philosophy*. Lapai: IBBU Press.

Knowles, M. S. (1980). *The modern practice of adult education: From pedagogy to andragogy*. New York: Cambridge Adult Education Press.

Kumar, M., Tyagi, R., Gaumat, A., & Rani, J. (2025). Students' perceptions and readiness for AI-enhanced learning: A UTAUT-based study in Indian higher education institutions. *Journal of Modern Scientific Research, 2*(3), 495–500.

Midgley, J. (2014). *Social development: Theory and practice*. London: Sage Publications.

Muhammad, S. H., & Abubakar, U. (2025). Transforming adult education practice in Nigeria through artificial intelligence: Theory and practice. *Kashere Journal of Education, 8*(1), 228–235.

Obi, G. O. (2015). *Understanding adult education and its principles*. Nsukka: Great AP Express Publishers.

Oduaran, A. B. (2006). The role of adult education in national development. *Nigerian Journal of Adult Education, 12*(1), 1–15.

Okafor, I. M. (2025). Transforming adult education in the 21st century through artificial intelligence in Nigeria: Innovation, impacts, and ethical considerations. *Journal of Research in Adult and Continuing Education, 4*(2), 65–77.

Ogbonnaya, C. I. (2025). Integration of artificial intelligence technologies in adult literacy education delivery in Nsukka Local Government Area. *Journal of Education for Development, 14*(3), 45–62.

Okebukola, P. (2021). Digital competencies of adult education facilitators in Nigeria: A national survey. *Nigerian Educational Research and Development Council Journal, 22*(1), 67–82.

Okeke, P. M. D. (2024). Role of technology in facilitating adult education programme: A study of online learning platforms. *International Journal of Studies in Education, 20*(2), 94–103.

Oladokun, O. S., & Aina, O. O. (2011). ICT use in adult education facilities in Nigeria: Challenges and prospects. *Journal of Education and Practice, 2*(6), 45–52.

Sergeeva, O. V., Zheltukhina, M. R., Shoustikova, T., Tukhvatullina, L. R., Dobrokhotov, D. A., & Kondrashev, S. V. (2025). Understanding higher education students' adoption of generative AI technologies: An empirical investigation using UTAUT2. *Contemporary Educational Technology, 17*(2), Article ep571.

UNESCO. (2015). *Recommendation on adult learning and education*. Paris: UNESCO Publishing.

UNESCO. (2022). *Global report on adult learning and education*. Hamburg: UNESCO Institute for Lifelong Learning.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly, 27*(3), 425–478.

Wami, K. O. (2024). Funding challenges and sustainable financing of adult education in Nigeria. *Journal of Adult and Non-Formal Education, 16*(1), 34–48.