



APPLICATION OF ARTIFICIAL INTELLIGENCE TOOLS IN ADULT EDUCATION DELIVERY: A STUDY OF ADULT LEARNING CENTRES IN AKAMKPA LOCAL GOVERNMENT AREA OF CROSS RIVER STATE, NIGERIA

Okora Elucate Ekom (Ph.D.)

Department of Adult and Continuing Education
University of Calabar
Calabar-Nigeria

E-mail: e.okora@gmail.com / okoraekom@unical.edu.ng

&

Acha Joseph Odama (Ph.D)

Department of Adult and Continuing Education
University of Calabar, Calabar-Nigeria

ABSTRACT

Artificial intelligence is entering educational practice through chatbots, voice assistants, translation applications, adaptive learning systems, automated feedback platforms and learning analytics. In adult education, these technologies may extend literacy instruction, support learner follow-up, improve local-language access and strengthen practical skill learning, although their usefulness depends heavily on the readiness of centres, facilitators and learners. This study examined the application of artificial intelligence tools in adult education delivery in adult learning centres in Cross River State. A descriptive cross-sectional survey design was adopted, with questionnaire responses obtained from 386 adult learners and facilitators drawn from selected urban, semi-urban and rural learning centres. The instrument assessed respondents' access profile and awareness of AI tools, the conditions considered necessary for effective AI-supported delivery, the extent to which those conditions were currently available, the major constraints to implementation and preferred intervention pathways. Analysis relied on frequencies, percentages, means, standard deviations, gap scores, tables and graphical summaries. Respondents regarded AI-supported delivery as highly relevant for literacy tutoring, local-language and voice support, adaptive feedback, learner monitoring and facilitator lesson preparation. At the same time, substantial deficits were reported in infrastructure, data access, device readiness, ethical guidance, local-language voice support and facilitator competence. Irregular electricity, poor connectivity, low AI literacy, inadequate devices, limited training and privacy concerns were all rated as very high challenges. The evidence suggests that AI can strengthen adult education delivery in Cross River State only when adoption is blended, human-centred, low-data and inclusive. Priority actions include facilitator training in AI pedagogy, community AI-assisted digital hubs, responsible-use guidelines, learner orientation and monitoring systems that capture literacy development, digital confidence and ethical use.

Keywords: Artificial intelligence; adult education; adult learning centres; AI tools; lifelong learning; digital inclusion; Cross River State; Nigeria; AI literacy; educational technology.



Introduction

Artificial intelligence now occupies a visible place in contemporary educational technology, not because it represents a single tool, but because it can support a growing range of teaching and learning tasks. Current applications can generate instructional materials, translate language, provide automated feedback, recommend learning pathways, assist with assessment, summarise texts and respond to learners through conversational interfaces (Etong, 2024). Much of the recent educational debate has centred on generative systems capable of producing text, images, audio, lesson outlines and learning activities. Adult education deserves similar attention (Miao & Holmes, 2023; Milana et al., 2024; Storey & Wagner, 2024).

Adult education cannot simply reproduce the assumptions of conventional schooling. Adults enter learning programmes with accumulated experience, immediate practical concerns, different literacy levels and uneven confidence in using digital technologies. Their priorities may include reading messages, completing forms, keeping small-business records, communicating with public institutions, improving occupational skills or participating more confidently in family and community affairs. Used in this context, AI is most useful as an aid to facilitation rather than a substitute for the adult educator. Offem & Arikpo (2026) sees artificial intelligence as a tool for promoting information literacy. Text-to-speech can connect written words with sound, speech-to-text can support early writing practice, translation applications can reduce language barriers, chatbots can provide reminders or simple exercises, and adaptive systems can adjust feedback as learners progress (Long & Magerko, 2020; Ng et al., 2021; Kasneci et al., 2023).

The case for considering AI in adult education also extends beyond classroom convenience. Literacy in everyday life is increasingly digital, and many routine activities now involve automated or data-driven systems. Adults encounter such systems in banking, social media, job applications, mobile payments, search engines, health information services and government portals. People who were already disadvantaged by limited formal schooling may therefore face a second form of exclusion if adult learning programmes do not help them understand and use emerging technologies with confidence. (Olanrewaju & Ojo, 2025). Policy ambition, however, does not guarantee that local learning centres can use AI in practice. Many centres continue to operate with unstable electricity, limited devices, expensive data, weak connectivity, few facilitators with relevant technical preparation and insufficient locally appropriate digital content. These practical conditions determine whether AI can become a genuine learning resource or remain largely aspirational within adult education delivery (National Communications Commission [NCC], 2024; World Bank, 2025).

Cross River State offers a useful setting for examining this tension because its adult learning centres operate across urban, semi-urban and rural communities with very different levels of digital access. Such centres may serve market women, farmers, artisans, transport workers, petty traders, out-of-school youths, home managers and older adults seeking another opportunity to learn. For these groups, AI could support audio-visual explanation, local-language assistance, vocational demonstrations, reminders and short practice activities. The same technology can also become exclusionary when meaningful use depends on continuous internet access, English-only interaction, costly smartphones, individual user accounts or digital skills that learners have not yet developed (Adelakun, et al, 2025).



Against this background, the study treats AI primarily as a question of adult education delivery rather than as a novelty in educational technology. The central concern is whether learning centres possess the conditions needed to use AI meaningfully, how far current provision falls short of those conditions, which barriers are most serious, and what forms of intervention are considered workable by learners and facilitators. The article therefore moves from the problem and research questions through conceptual and empirical literature, theory and methodology to the survey results, discussion, implications, contribution to knowledge, conclusion and recommendations.

Statement of the Problem

The growing promotion of artificial intelligence in education has created expectations of more flexible and responsive learning, yet the conditions under which such tools could function in adult learning centres remain unclear. Many adult education programmes still work with limited instructional materials, few digital devices, weak internet connectivity and irregular power supply. When AI use assumes reliable data, personal smartphones, confidence in English-language prompting or a technically prepared facilitator, learners in local communities may be disadvantaged rather than assisted. The practical problem, therefore, lies in the distance between the promise attached to AI-supported adult education and the actual capacity of many centres to sustain its use.

Technology is only one part of that problem. Adult education depends on relationships of trust, repeated explanation, patience and examples that make sense in learners' daily lives. Introducing AI without adequate facilitator preparation, learner orientation or clear ethical boundaries can undermine these conditions. Learners may become anxious about unfamiliar tools, accept incorrect information as reliable or struggle to judge outputs that are biased, inaccurate or culturally distant. These risks are more pronounced when systems offer weak support for local languages and community contexts (Akgun & Greenhow, 2022; European Commission, 2022; Miao & Cukurova, 2024).

Evidence specific to adult learning centres in Cross River State remains limited. Nigerian research has examined AI in education more broadly, but much of that work has concentrated on formal institutions and populations whose access, literacy and technology experience differ from those of community-based adult learners. Infrastructure, language, affordability, gendered access and levels of prior schooling can all shape whether a tool is usable in this setting. Without centre-level evidence, interventions risk being designed around assumptions that are too general, too costly or poorly matched to learners' circumstances. This study responds to that gap by examining required conditions, present availability, major implementation barriers and preferred pathways for AI-supported adult education delivery in Cross River State.

Objectives of the Study

The study will be guided by the following objectives:

1. To examine the AI-related delivery conditions required for effective adult education in adult learning centres in Cross River State.
2. To assess the gap between required AI-supported delivery conditions and the current level of availability in adult learning centres.



3. To identify the major challenges affecting the application of AI tools in adult education delivery in the study area.
4. To determine the preferred intervention pathways for improving AI-supported adult education delivery.
5. To propose a practical model for responsible, inclusive and sustainable AI-supported adult education in Cross River State.

Research Questions

1. What AI-based resources, structures and support systems are needed to improve adult education delivery in adult learning centres across Cross River State?
2. What is the difference between what is required for effective AI-supported adult education delivery and what is currently available in adult learning centres?
3. What are the major barriers limiting the effective application of artificial intelligence tools in adult education delivery within the study area?
4. What strategies can improve the adoption and use of AI tools in adult education delivery?
5. What practical framework can promote responsible, inclusive and sustainable AI-enhanced adult education delivery in Cross River State?

Conceptual Review

Artificial Intelligence Tools in Education Delivery

In educational settings, artificial intelligence tools are computer-based systems that use capabilities such as prediction, pattern recognition, language processing, content generation, recommendation and decision support to assist teaching or learning. Their forms vary widely: conversational chatbots, generative writing assistants, adaptive platforms, automated feedback systems, text-to-speech and speech-to-text applications, translation engines, assessment analytics and learner-support dashboards all fall within this broad category (Miao & Holmes, 2021; Kasneci et al., 2023).

Within adult education, these capabilities can be tied to very practical tasks. A facilitator may use AI to prepare a short reading passage, generate practice questions, simplify or translate an explanation, develop a vocational example or organise a lesson summary. Learners, in turn, may use voice tools, translation applications or chatbots to rehearse reading, ask basic questions, receive reminders and continue practising outside the centre. This can be especially useful where facilitator time is limited and repeated practice is needed. The value of these tools is nevertheless conditional (European Commission, 2022; Miao & Holmes, 2023).

Adult Education and Adult Learning Centres

Adult education comprises organised learning opportunities for adults and out-of-school youths who seek to strengthen literacy, numeracy, livelihood skills, civic participation or broader lifelong-learning capacity. Community-based adult learning centres are important because they allow learners to build such competencies at a pace and schedule that can accommodate work and household responsibilities. In Cross River State, these centres can provide a second route into learning for people who missed



formal schooling as well as for those who need additional skills for employment, enterprise and everyday life.

Any use of AI in these centres has to begin with the circumstances of the learners themselves. A trader may value help with digital payments and record keeping; a farmer may need access to weather, market or cooperative information; an artisan may learn more easily from a demonstration; and an older learner may first need confidence to read messages or navigate a mobile service (UIL, 2023; Milana et al., 2024).

AI-Enabled Adult Education Delivery Domains

AI-supported adult education can be understood through several overlapping delivery domains. One concerns literacy tutoring, where voice, text or chatbot applications provide practice in reading, spelling, numeracy and comprehension. A second involves language and accessibility, including translation, text-to-speech and speech-to-text support for learners who struggle with English-only materials (Storey & Wagner, 2024; Miao & Cukurova, 2024).

These domains become educationally meaningful only when they remain anchored in adult-learning principles. Technology can extend opportunities for practice and support learner autonomy, but it cannot replace the trust, encouragement and explanation that often sustain adult participation. A workable AI-enabled centre is therefore better conceived as a blended learning environment: facilitators remain responsible for judgement and guidance while digital tools extend access, repetition and feedback where they are useful. Ubana et al (2024) opined that Artificial Intelligence (AI) is a tool for combating unethical practices.

AI Literacy, Digital Readiness and Inclusion

AI literacy goes beyond knowing how to open or operate a digital application. It involves understanding what AI systems are, using them purposefully, evaluating their outputs and recognising the ethical responsibilities that accompany their use. Learners need to know, for example, that an AI system is not a human authority, that it can produce inaccurate answers, that the quality of a prompt can affect the response, and that personal information should be protected.

For many adult learners, these competencies have to be developed in stages. Someone who is still gaining confidence in basic reading cannot reasonably be expected to scrutinise complex AI-generated text without support. Digital readiness therefore includes more than device ownership: typing or voice interaction, confidence online, affordable data, electricity and the ability to frame a question in understandable language all matter (Banyan Global, 2023; NCC, 2024; World Bank, 2025). Helen et al (2025) affirmed that building digital literacy through social work education improve sustainable development. Andong et al (2025). Observed that incorporating digital technology improve adult literacy education programmes.

Facilitator Competence and Ethical Support

Facilitators occupy a pivotal position in AI-supported adult education because they mediate between the technology and the learner. Their decisions shape how a tool is introduced, how its outputs are explained, when errors are corrected and how digital activities connect with intended learning



outcomes. Competent facilitation may involve simplifying a prompt, checking a response before use, adapting examples to a local setting or helping a learner recognise misleading information. Without such capacity, AI may either be used uncritically or avoided altogether. The UNESCO AI Competency Framework for Teachers identifies a human-centred mindset, AI ethics, foundational knowledge, AI pedagogy and professional learning as key areas of educator preparedness (Miao & Cukurova, 2024). Harnessing security approach and artificial intelligence (AI) as tools to combat unethical practices promotes quality assurance (Ubana et al 2025).

Ethical support has to develop alongside technical competence. Adult learning centres need clear, understandable rules on privacy, accuracy, source checking, plagiarism, learner consent and the limits of AI-generated advice (Akgun & Greenhow, 2022; European Commission, 2022).

Review of Related Empirical Literature

Table 1: Summary of Related Empirical and Policy Literature

Author(s)	Design/Focus	Key Finding	Relevance to Present Study
Oyefeso and Abdulazeez (2024)	Survey of awareness and utilization of ChatGPT among academic staff in a Nigerian College of Education	The study found high awareness of ChatGPT among lecturers, although actual utilization remained moderate due to inadequate training and institutional support.	Demonstrates the importance of institutional readiness and capacity building for AI adoption.
Adedokun, Adeyemo, and Adedokun (2025)	Survey of generative AI awareness and utilization among Nigerian undergraduates	The researchers observed a significant gap between awareness and effective utilization of generative AI tools, with digital competence emerging as a key predictor of use.	Supports the AI literacy and digital readiness constructs.
Owoade and Egunjobi (2025)	Quantitative study of AI usage among undergraduate Computer Science students	AI-supported learning significantly improved students' engagement and academic performance, although responsible use remained essential.	Provides empirical evidence for AI-enhanced learning outcomes.
Ukume et al. (2025)	Quasi-experimental study on ChatGPT-assisted English language instruction	Students exposed to ChatGPT achieved significantly better academic performance and retention than those taught using conventional methods.	Supports the effectiveness of AI-assisted teaching and learning.
Etong (2024)	Conceptual analysis of ChatGPT in Business Education	The study highlighted the pedagogical benefits of ChatGPT while emphasizing concerns	Supports the ethical and pedagogical dimensions of AI integration.



		relating to ethics, academic integrity, and responsible use.	
Adelakun, Lasisi, and Kolawole (2025)	Conceptual governance framework for AI adoption in Nigerian tertiary education	The authors proposed that successful AI adoption requires governance structures, ethical policies, and institutional oversight.	Supports institutional governance and ethical AI implementation.
Olanrewaju and Ojo (2025)	Experimental study on AI-ChatGPT in undergraduate Physics	Students taught with ChatGPT demonstrated higher engagement and improved problem-solving abilities than those receiving traditional instruction.	Provides evidence of AI's contribution to academic performance.
Muazu (2025)	Qualitative study on AI tools and reading proficiency among Nigerian undergraduates	AI-assisted reading applications enhanced students' comprehension, vocabulary development, and overall reading proficiency.	Supports AI applications for learner support and literacy development.

Source: Author's synthesis of literature, 2026.

Gap in Literature

Nigerian scholarship on educational AI is expanding, but the evidence reviewed here remains concentrated in higher education and on relatively narrow aspects of adoption. Oyefeso and Abdulazeez (2024) and Adedokun et al. (2025), for instance, examined awareness and utilisation, with both lines of evidence pointing to a gap between familiarity with generative AI and the competence required to use it effectively. Studies by Owoade and Egunjobi (2025) and Ukume et al. (2025) focused more directly on learning outcomes and engagement, whereas Etong (2024) and Adelakun et al. (2025) drew attention to pedagogical opportunity, governance and responsible adoption. Muazu (2025) narrowed the discussion further to reading proficiency. Taken together, these studies show that AI can support learning but that successful use is shaped by competence, governance and context. What remains insufficiently examined is how AI literacy, digital readiness, ethical safeguards and institutional support interact within community-based adult learning centres, where learners' circumstances differ substantially from those of conventional university students. The present study addresses that empirical gap in Cross River State.

Theoretical Framework

The study draws on three complementary perspectives: andragogical adult learning, digital inclusion and AI literacy. Andragogy is particularly relevant because it treats adults as learners whose previous experience, immediate problems and practical goals shape engagement with education. From this standpoint, an AI application has value only when it helps learners address recognisable needs in literacy, livelihood, communication or digital participation. Voice-based practice, reminders, vocational examples and learner-centred feedback are therefore consistent with an andragogical



approach when they remain connected to real tasks and are mediated by active facilitators rather than offered as detached technology.

Digital inclusion broadens the analysis by showing why access cannot be measured simply by whether an internet-enabled device exists. Meaningful participation also depends on affordability, connectivity, electricity, language accessibility, learner confidence, facilitator support, ethical guidance and opportunities for purposeful use. This perspective fits the Cross River State context (Banyan Global, 2023; GSMA Intelligence, 2024). The AI literacy perspective addresses the knowledge and judgement needed once access is available. Learners and facilitators must understand both the capabilities and the limits of AI, know how to frame useful questions, check outputs and protect personal information. Bringing the three perspectives together, the study treats effective AI-supported adult education as dependent on nine delivery domains: infrastructure/data readiness, AI-assisted tutoring, local-language voice support, chatbot support, adaptive feedback, learner monitoring, facilitator competence, AI-supported content generation and ethical guidance. A delivery gap exists wherever respondents' assessment of current availability falls below the level they consider necessary. Figure 1 summarises this analytical relationship and the model used in the study.

Empirical Model for AI Tools in Adult Education Delivery

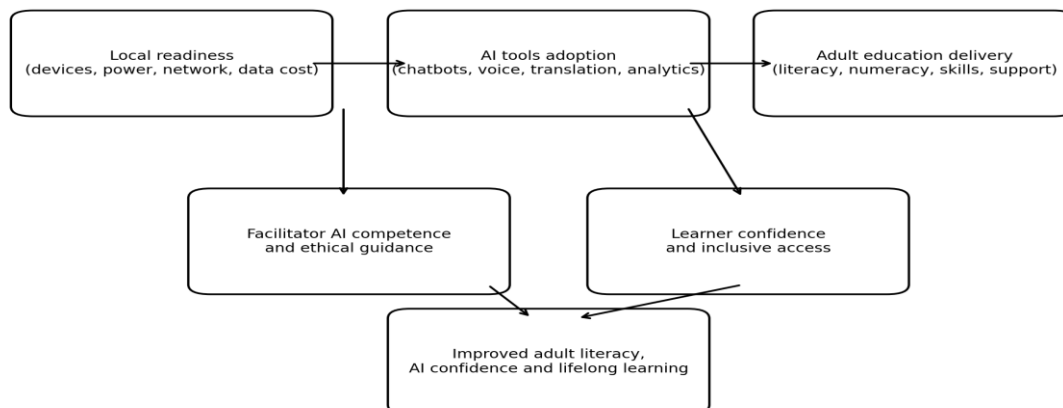


Figure 1. Empirical model for AI tools in adult education delivery.

Methodology

Research Design

A descriptive cross-sectional survey design was used to capture respondents' views at a single point in time. This design suited the study because the analysis required a structured comparison between the conditions considered necessary for effective AI-supported adult education and the conditions respondents believed were currently available in their learning centres. The survey format also supported the use of frequencies, percentages, means and graphical summaries, while the paired ratings



of required and current conditions made it possible to calculate delivery-gap scores across the different readiness and tool-use domains.

Population and Sample

The study population consisted of adult learners and literacy facilitators attending or working in adult learning centres across Cross River State. A total of 386 respondents participated, drawn from selected centres in urban, semi-urban and rural locations. Of these, 329 were adult learners and 57 were literacy facilitators. The sample was constituted to reflect variation in gender, age, centre location, occupational background, educational exposure, device ownership, experience of internet use and awareness of AI tools. With more than 300 respondents, the sample provided an adequate base for the descriptive comparisons, mean ratings and gap-score analysis used in the article.

Instrumentation

Data were gathered with a structured questionnaire organised into three sections. Section A recorded demographic and access information, including gender, age, respondent category, centre location, educational exposure, device ownership, internet use, electricity access and awareness of AI tools. Section B covered nine conditions relevant to AI-supported delivery: infrastructure/data/device readiness, AI-assisted literacy tutoring, local-language translation and voice support, mobile chatbot reminders and support, adaptive assessment and feedback, learner monitoring and analytics, facilitator AI competence, AI-supported lesson planning/content generation, and AI ethics, privacy and safety guidance. Each respondent rated both the level considered necessary for effective delivery and the level currently available in the centre on a five-point scale. Section C focused on major challenges and preferred intervention pathways.

Specialists in adult education, educational technology and measurement reviewed the questionnaire for face and content validity. Their feedback was used to clarify wording, remove ambiguity and keep the items relevant to adult learning-centre conditions. The instrument was then pilot-tested with 30 respondents from adult learning settings that were not included in the main sample. The reliability assessment yielded an internal consistency coefficient of 0.87, supporting the use of the questionnaire for the full survey.

Method of Data Analysis

Analysis was descriptive and followed the structure of the research questions. Frequencies and percentages summarised demographic characteristics, access indicators and preferred intervention pathways, while means and standard deviations were used for the ratings of major challenges. For each AI-related delivery condition, a gap score was obtained by subtracting the current-availability mean from the required-adequacy mean. Larger positive values therefore represented wider perceived deficits and a stronger need for intervention. Tables and figures were used to present the distributions and comparisons clearly.

Ethical Consideration

The survey was conducted without collecting personally identifying information. Participation was voluntary, and respondents were informed that their answers would be used only for academic analysis



and reported in aggregate form. Names, residential addresses, phone numbers and other sensitive identifiers were not requested. Although the study focused on perceptions of learning conditions and was therefore considered to involve minimal ethical risk, confidentiality, voluntary participation, respectful engagement with adult learners and responsible handling of completed questionnaires were maintained throughout the research process.

Results

The results are presented in a sequence that moves from the composition and access profile of respondents to the delivery-gap analysis, challenge ratings and preferred intervention pathways. This arrangement allows the descriptive evidence on who participated and what resources they could access to be considered alongside respondents' judgements about the conditions needed for AI-supported adult education.

Table 2: Demographic Distribution of Respondents (n = 386)

Variable	Category	Frequency	Percentage (%)
Gender	Male	168	43.5
Gender	Female	218	56.5
Age bracket	18-25 years	52	13.5
Age bracket	26-35 years	111	28.8
Age bracket	36-45 years	124	32.1
Age bracket	Above 45 years	99	25.6
Respondent category	Adult learners	329	85.2
Respondent category	Literacy facilitators	57	14.8
Centre location	Calabar urban/peri-urban centres	88	22.8
Centre location	Akamkpa rural/semi-urban centres	83	21.5
Centre location	Odukpani/Biase centres	65	16.8
Centre location	Ikom/Etung/Boki centres	78	20.2
Centre location	Ogoja/Obudu/Yala centres	72	18.7
Highest education exposure	No formal/primary incomplete	126	32.6
Highest education exposure	Primary completed	118	30.6
Highest education exposure	Secondary incomplete/completed	107	27.7
Highest education exposure	Post-secondary/vocational	35	9.1

Source: Field survey reporting template, 2026.

Women accounted for a larger share of the sample than men, while most respondents were older than 26 years. The age pattern indicates that the survey primarily captured adults likely to be balancing learning with work, family and community responsibilities. Adult learners formed the large majority of participants, with literacy facilitators represented because of their direct role in programme delivery. Respondents were also distributed across urban, semi-urban and rural centres, giving the descriptive results a spread across different learning environments within Cross River State.



Table 3: Respondents AI Awareness, Device and Internet Access Profile (n = 386)

Access indicator	Frequency	Percentage (%)
Owens a smartphone	223	57.8
Owens basic phone only	103	26.7
No personal phone/shared device	60	15.5
Has heard of AI tools	189	49.0
Has used any AI tool	96	24.9
Uses internet daily	102	26.4
Uses internet weekly	116	30.1
Uses internet occasionally	109	28.2
Rarely/never uses internet	59	15.3
Reports regular electricity access	59	15.3
Reports irregular electricity access	213	55.2
Reports very poor electricity access	114	29.5

Source: Field survey reporting template, 2026.

The access profile shows a clear difference between owning a smartphone and actually using AI. More than half of respondents reported smartphone ownership, yet only about one-quarter had used an AI tool. Internet access was similarly uneven, with substantial proportions going online weekly, occasionally or rarely rather than every day. Power supply presented an additional constraint: most respondents described electricity as irregular or very poor. Taken together, these conditions make an online-only delivery model unrealistic. A mobile-first approach that limits data use and retains facilitator guidance is better aligned with the access pattern reported by the sample.

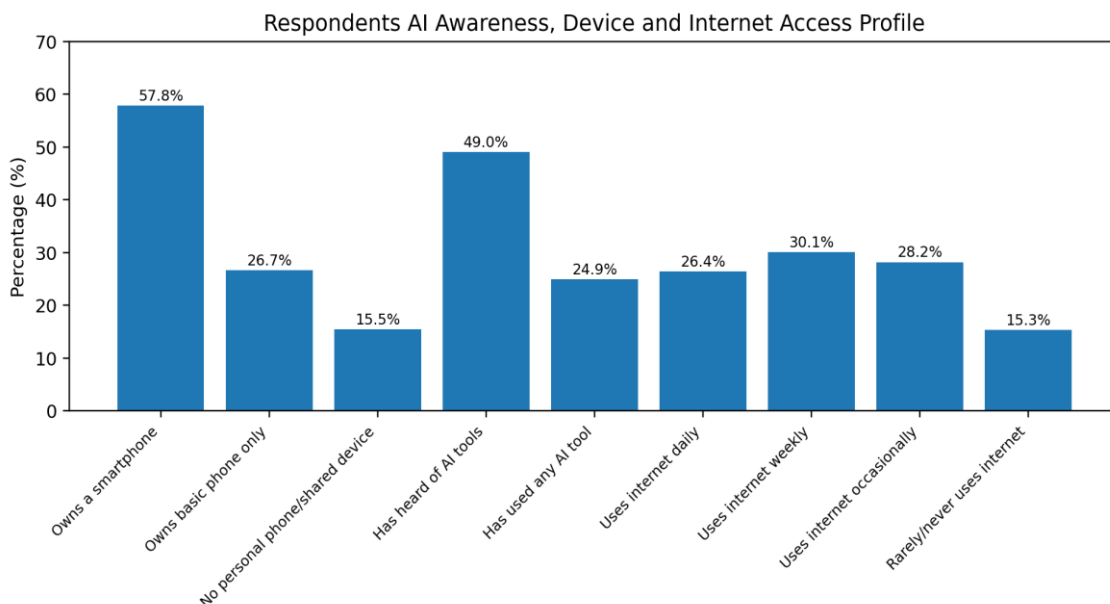


Figure 2. Respondents AI awareness, device and internet access profile.



Table 4: Required and Current Conditions for AI-Supported Adult Education Delivery

Delivery condition	Required mean	Current mean	Gap score	Gap rank
Infrastructure, data and device readiness	4.56	2.01	2.55	1
Local-language translation and voice support	4.43	2.08	2.35	2
AI ethics, privacy and safety guidance	4.41	2.07	2.34	3
AI-assisted literacy tutoring	4.50	2.18	2.32	4
Facilitator AI competence	4.48	2.28	2.20	5
Adaptive assessment and feedback	4.32	2.15	2.17	6
Mobile chatbot reminders and support	4.28	2.17	2.11	7
Learner monitoring and analytics	4.19	2.10	2.09	8
AI-supported lesson planning and content generation	4.37	2.46	1.91	9

Source: Field survey reporting template, 2026. Note: Gap score = required mean - current mean.

Across all nine domains, the mean rating for what respondents considered necessary was higher than the mean rating for what was currently available. The largest deficits concerned infrastructure/data/device readiness, local-language translation and voice support, AI ethics/privacy/safety guidance, AI-assisted literacy tutoring and facilitator AI competence. The pattern is consistent: respondents could see practical value in AI-supported delivery, but they did not believe the centres yet possessed the conditions required to implement it adequately.

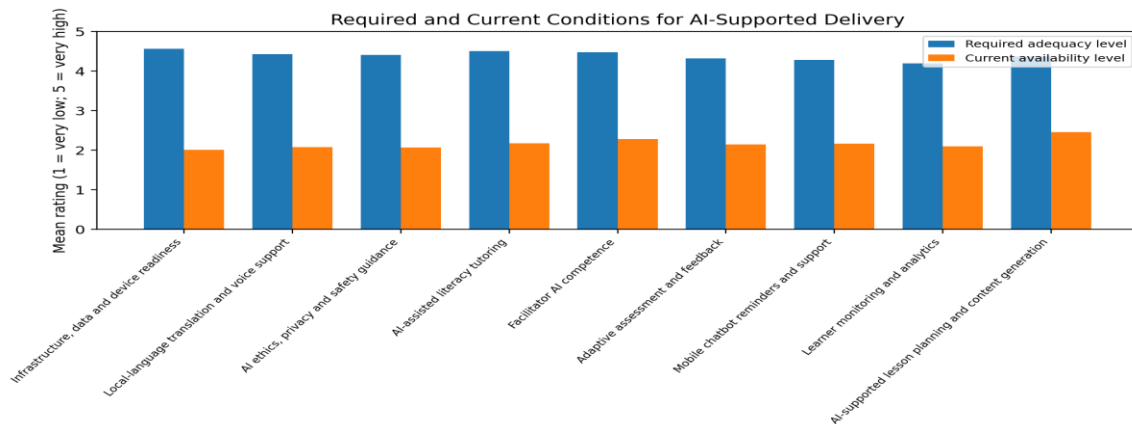


Figure 3. Required and current conditions for AI-supported delivery.

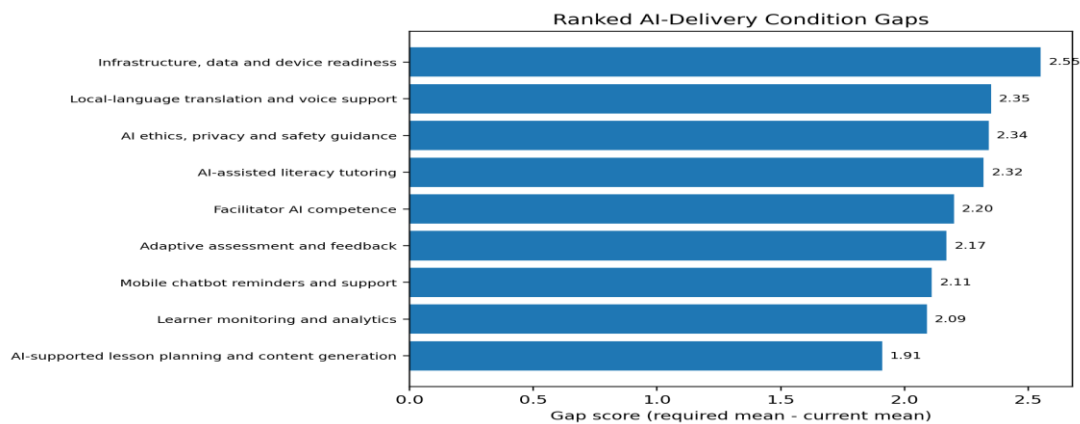


Figure 4. Ranked AI-delivery condition gap among respondents.

Table 5: Mean Rating of Major Challenges Affecting AI Tools in Adult Education Delivery

Challenge	Mean	SD	Decision
Irregular electricity supply	4.62	0.58	Very high
Weak internet connectivity and high data cost	4.58	0.63	Very high
Inadequate devices for AI-supported practice	4.52	0.69	Very high
Low AI literacy among adult learners	4.37	0.74	Very high
Limited facilitator training in AI pedagogy	4.31	0.79	Very high
Privacy, accuracy and misinformation concerns	4.22	0.81	Very high
Limited local-language and culturally relevant AI content	4.10	0.87	High
Gendered access and shared-device constraints	3.94	0.92	High
Weak centre-level policy and monitoring	3.88	0.90	High

Source: Field survey reporting template, 2026. Decision rule: 1.00-1.80 = very low; 1.81-2.60 = low; 2.61-3.40 = moderate; 3.41-4.20 = high; 4.21-5.00 = very high.

The challenge ratings reinforce the delivery-gap pattern. Irregular electricity, weak internet connectivity and high data cost, inadequate devices, low AI literacy, limited facilitator training and privacy-related concerns all fell within the very high category. Limited local-language content, gendered or shared-device access and weak centre-level monitoring were also rated high. The barriers therefore extend beyond the technology itself. They reflect an interconnected set of infrastructure, capability, inclusion and governance problems that can prevent relevant tools from being used consistently and responsibly.

Table 6: Preferred Intervention Pathways for Improving AI-Supported Delivery

Intervention pathway	Frequency	Percentage (%)
AI literacy orientation for adult learners	88	22.8
Facilitator AI-pedagogy training	78	20.2
Community AI-assisted digital learning hubs	73	18.9
Mobile/offline AI-supported literacy content	64	16.6
Responsible AI, privacy and safety guidelines	46	11.9



Subsidised data and device support	37	9.6
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Source: Field survey reporting template, 2026.

Respondents gave greatest priority to AI literacy orientation for adult learners, followed by facilitator training in AI pedagogy and the development of community AI-assisted digital learning hubs. Mobile or offline literacy content, responsible-use guidelines and subsidised data or device support were also selected. This ordering is revealing because it places basic capacity and supported access ahead of sophisticated AI systems. Respondents appear to favour interventions that first make the technology understandable, reachable and safe to use.

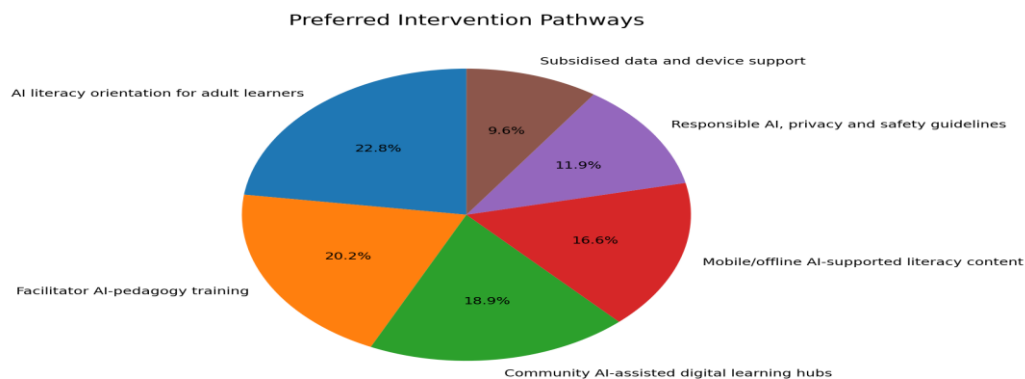


Figure 5. Preferred intervention pathways reported by respondents.

Table 7: AI-Delivery Gap Response Matrix for Adult Learning Centres in Cross River State

Delivery domain	Evidence from results	AI-supported response	Responsible actors
Infrastructure and data readiness	Widest gap; weak access to devices, data and stable electricity	Shared devices, low-data platforms, solar charging and centre-based practice	State adult education agency, LGA units, NGOs, development partners
AI-assisted literacy tutoring	High required mean but low current availability	Guided use of voice reading, text-to-speech, chatbots and simple practice exercises	Facilitators, ICT partners, adult education departments
Local-language/voice support	Wide gap in local-language AI tools and content	Translate prompts, use audio explanations and create culturally relevant learning examples	Facilitators, local-language specialists, content developers
Facilitator AI competence	Limited AI-pedagogy training	Hands-on training on prompts, output checking, lesson planning, learner safety and digital ethics	Teacher trainers, colleges of education, educational technology specialists
AI ethics and privacy	High concern about misinformation, privacy and unsafe use	Simple responsible AI guidelines, consent rules, source checking and privacy protection	Centre managers, state agencies, AI/digital policy partners
Learner confidence and inclusion	Low AI literacy among adult learners	Gradual AI orientation using familiar tasks such as voice	Facilitators, peer mentors, community groups



		search, reading practice and translation	
Monitoring and analytics	Weak tracking of literacy and digital confidence outcomes	Use simple progress checklists, not surveillance-heavy systems	Programme supervisors, facilitators, evaluators

Source: Author's field survey and analytical synthesis, 2026.

The response matrix translates the descriptive findings into an implementation sequence. Its strongest emphasis is on foundational measures: learner orientation, facilitator preparation, shared devices, low-data resources, solar charging support and clear ethical rules. These are practical entry points because they address the conditions that respondents identified as most deficient. More advanced applications can be introduced later, once learners and facilitators have gained confidence and centres have a more reliable basis for continued use.

Discussion of Findings

The survey results point to a dual finding. Adult learners and facilitators recognised several useful roles for AI in literacy tutoring, voice support, local-language assistance, lesson preparation, learner follow-up and feedback, yet they also reported large deficits in the conditions required to make those uses routine. This combination matters: favourable perceptions of educational usefulness do not by themselves amount to implementation readiness (Kasneci et al., 2023; Crompton & Burke, 2023; Storey & Wagner, 2024).

Infrastructure, data and device readiness produced the widest delivery gap. This suggests that the most immediate obstacle is not a lack of possible AI applications but the basic digital environment in which those applications would have to operate. Generative systems and chatbots commonly depend on smartphones, data access, electricity and a minimum level of user confidence. Where these conditions are unreliable, adoption can remain occasional or symbolic rather than becoming part of normal learning practice. Nigerian evidence on digital skills and access reports similar inequalities across population groups, which helps explain why a uniform centre-based rollout would be difficult to sustain (NCC, 2024; World Bank, 2025).

A similarly large deficit appeared in local-language translation and voice support. For many adult learners, formal English may not be the easiest language through which to engage with new material, making speech, audio and translation features potentially valuable. Their usefulness, however, depends on accuracy, affordability and cultural fit. A technically functional system can still fail educationally if its examples are unfamiliar, its language is too complex or its translations are unreliable. The result therefore strengthens the argument for localisation: AI-supported adult education needs content and interfaces that reflect the language practices and everyday realities of the communities being served (Milana et al., 2024).

Ethics, privacy and safety guidance also showed a substantial gap. This finding is especially important in an adult-learning context because some users may have limited experience judging the reliability of digital information or understanding what should not be shared with an automated system. Without guidance, learners may disclose personal details, accept inaccurate responses as authoritative or rely on an AI tool beyond its appropriate limits. The emphasis placed by the European Commission (2022)



and UNESCO guidance on transparency, privacy, human oversight and pedagogical validation is therefore directly relevant to the centre-level safeguards indicated by the survey (Miao & Holmes, 2023).

Facilitator competence was another area in which current provision fell well below perceived need. The result underlines the continuing importance of the adult educator even when AI is introduced. Tools may generate explanations or feedback, but someone still has to judge whether the output is accurate, understandable and appropriate for a particular learner. This requires more than general ICT familiarity.

The challenge ratings help explain why these delivery gaps persist. Electricity, connectivity, devices and AI literacy were not minor inconveniences; respondents rated them among the most serious constraints. Their combined effect can interrupt use at several points. A centre may have an appropriate application but lack power to charge devices, data to connect, enough hardware for learners or the confidence required to use the tool safely. Addressing only one of these factors is therefore unlikely to produce sustained adoption.

Respondents' preferred interventions reflect this practical reality. Learner orientation, facilitator training and community digital hubs were placed ahead of advanced AI systems, indicating a preference for gradual and supported adoption. Shared hubs can reduce the cost burden on individuals while making supervised practice, downloaded resources and facilitator assistance available in one place. Mobile and offline materials can further reduce dependence on continuous connectivity. The pattern suggests openness to AI, but on terms that fit the resources and learning conditions of adult education centres.

Taken together, the evidence favours a blended, human-centred model rather than a heavily automated one. Adult learners often rely on encouragement, repetition, explanation and trusted interpersonal support, all of which remain difficult to replace with software. A more appropriate arrangement is for facilitators to use AI in planning and verification, learners to use guided tools for practice, centres to provide shared access, and simple ethical rules to protect against misinformation and misuse of personal data. In this model, technology expands the reach of facilitation without displacing the relationships on which adult learning depends.

Implications for Adult Education Delivery

For planners, centre managers and facilitators in Cross River State, the findings point toward phased implementation rather than immediate full-scale adoption. An initial phase would strengthen digital access through shared devices, more reliable power arrangements, facilitator preparation and basic AI-literacy orientation. Once these foundations are in place, centres could introduce supervised chatbot practice, text-to-speech, translation tools, low-data exercises and AI-assisted lesson preparation. More demanding applications, including adaptive assessment, learner-progress dashboards and locally developed AI resources, would be more appropriate at a later stage when centres have the capacity to manage them.

Facilitator development should sit at the centre of this sequence. Purchasing or recommending AI tools without preparing those who will guide their use is unlikely to produce dependable learning benefits.



Training needs to cover prompt formulation, verification of outputs, privacy, bias, local-language adaptation, learner motivation and the boundaries of AI-generated advice. It should also show facilitators how to connect AI with reading, writing, numeracy, livelihood learning and digital safety so that technology remains tied to adult-education purposes rather than becoming an isolated demonstration of technical novelty.

Programme monitoring should also extend beyond attendance figures. Useful indicators would include whether learners can read and respond to digital messages, make sensible use of voice tools, ask AI-assisted questions safely, recognise when an output needs checking and apply new digital skills to ordinary tasks. Such monitoring does not require complex surveillance systems. Simple, respectful measures can provide enough evidence for centres to adjust teaching and support while protecting learner dignity and privacy.

Contribution to Knowledge

The main contribution of this study is to shift the discussion of AI in adult education from general claims about technological potential to a centre-level analysis of delivery readiness. By comparing what respondents considered necessary with what they reported as currently available, the study identifies concrete areas in which support is required before AI can become a dependable part of adult learning: infrastructure and data access, AI-assisted tutoring, local-language voice support, facilitator competence, learner confidence, ethical guidance and monitoring.

A second contribution is the use of a gap-score model to rank the difference between required adequacy and current availability across the delivery domains. This provides planners with a simple way of identifying where intervention pressure is greatest before introducing new AI-supported programmes. In the Cross River State context, the model directs attention toward shared access, low-data tools, facilitator preparation and responsible-use rules rather than treating AI adoption as a single undifferentiated investment.

The response matrix adds a practical layer to that contribution by linking each major gap with a corresponding intervention and the actors most likely to be responsible for it. In this way, the findings can inform state adult education agencies, local government education units, literacy facilitators, NGOs, technology partners and community leaders who need to translate a general interest in inclusive AI into specific centre-level actions.

Conclusion

Artificial intelligence can expand the range of support available in adult learning centres in Cross River State, particularly for literacy practice, local-language explanation, voice-based learning, reminders, feedback, lesson preparation and the monitoring of progress. These functions are potentially useful for adults whose education has to fit around trading, farming, employment, family care and community responsibilities because they can extend opportunities for practice beyond the time available for face-to-face sessions.



The survey nevertheless shows that potential and readiness are not the same. The largest gaps were recorded in infrastructure, data and device readiness, local-language support, ethical and privacy guidance, AI-assisted literacy tutoring and facilitator competence. Irregular electricity, weak connectivity, inadequate devices, low AI literacy, limited facilitator preparation and concerns about misinformation or privacy further constrain regular use. Unless these conditions improve, AI is unlikely to become a dependable part of adult education delivery regardless of the capabilities of the tools themselves.

A blended, inclusive and human-centred approach is therefore the most defensible path for the centres studied. Face-to-face adult education should remain the organising core, with AI used selectively to widen access to practice, feedback, communication and relevant information. Sustainable implementation will depend on learner orientation, facilitator training in AI pedagogy, shared devices, low-data or offline materials, responsible-use guidelines, local-language adaptation and simple measures of literacy progress and AI-related confidence.

Recommendations

Based on the findings of the study, the following recommendations were made

1. Adult learning centres in Cross River State should adopt blended AI-supported delivery models that combine face-to-face facilitation with supervised chatbot practice, voice learning, translation support, mobile reminders and offline digital materials.
2. The state adult education agency, local government education units and development partners should provide basic digital infrastructure to selected centres, including shared smartphones or tablets, projectors, power banks, solar chargers and secure storage facilities.
3. Facilitators should receive regular training in AI pedagogy. Training should focus on prompt writing, output checking, privacy protection, learner motivation, local-language adaptation and how to use AI for reading, writing, numeracy and livelihood skills.
4. AI literacy orientation should be provided for adult learners. The orientation should explain what AI tools are, what they can and cannot do, how to ask simple questions, how to avoid sharing sensitive information and how to check AI-generated answers with facilitators.
5. AI-supported delivery should be mobile-first and low-data because smartphones are more realistic than computers for many adult learners. Offline materials and downloadable audio-visual content should be prioritised for communities with weak internet access.
6. Adult learning centres should develop simple responsible-AI guidelines covering privacy, accuracy, consent, misinformation, plagiarism, human oversight and the ethical limits of AI-generated advice.
7. Monitoring systems should track not only attendance but also literacy progress, learner confidence, basic AI literacy, safe digital behaviour and practical application of learning in everyday life.



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