IMPACT OF AI-POWERED CHATBOTS ON ADULT LEARNERS' ENGAGEMENT AND SATISFACTION IN TWO LEARNING CENTRES IN ABUJA METROPOLIS, NIGERIA

IQUO OKON MKPA, PhD
E-Mail: praiseiquo@gmail.com
GSM: 234 8030995836
National Commission for Colleges of Education (NCCE), Abuja

EFFIOANWAN ANAMETEMFIOK
E-Mail: efianam1@gmail.com
GSM: 234 8142891254
Federal Ministry of Education, Abuja

Abstract

This study investigated the impact of AI-powered chatbots on adult learners' engagement and satisfaction in Abuja, Nigeria. Adopting a mixed-methods, quasi-experimental design, the researchers used quantitative data from Data were collected through engagement and satisfaction questionnaires (ESQ), with the reliability co-efficient of 0.83 and Engagement and Satisfaction Interview Guides with the reliability co-efficient of 0.84, and a Standardized Test with the reliability co-efficient of 0.86 to measure learning outcomes and capture learners' experiences. The study population consisted of 59 adult learners from two adult education centers in the Federal Capital Territory, selected via total enumeration sampling. The findings revealed that ChatGPT was the most used chatbot, followed by Quizbot, Google's Gemini, and Khanmigo. The results showed that AI-powered chatbots significantly enhanced learners' engagement, motivation, and satisfaction. Furthermore, pre-test and post-test scores demonstrated a significant improvement in academic performance after the introduction of chatbots ($p<0.001$). Based on these findings, the study recommends that adult learning centers prioritize integrating ChatGPT into their learning platforms and explore tools like Quizbot to diversify and enrich the learning experience.

Keywords: AI- powered chatbots, Adult Learners, Engagement, Satisfaction, Learning Centres

DOI: https://doie.org/10.50390/NCAEJ.2026553311

Introduction

The rapid advancement of technology has significantly influenced various sectors, including education. In adult education, the integration of artificial intelligence (AI) has the potential to offer innovative solutions that enhance learning experiences and outcomes (Vieriu & Petrea, 2025). Among these technologies, AI-powered chatbots have emerged as valuable tools that can provide personalized support, facilitate engagement, and improve learner satisfaction (Nze, 2024).

Adult education plays a vital role in promoting lifelong learning, skill acquisition, and personal growth. However, many adult learners face challenges in staying engaged and motivated throughout their educational journey (Mandlelize & Sepeng, 2024). Traditional teaching methods, where the teacher remains the primary source of information and students are passive listeners, may not effectively address the diverse needs and learning styles of adult learners. In contrast, modern, learner-centered methods incorporate technology to increase engagement. Amirova (2025) suggests that traditional methods can hinder the development of practical skills and adult learner engagement. She further notes that the traditional model, which emphasizes lectures, rote memorization, and standardized testing,

reflects roots in early 20th-century behaviorist and cognitivist theories. Research has shown that engaging adult learners in their own learning processes, such as by facilitating self-evaluation and utilizing active learning strategies, can also enhance participation and reduce withdrawal rates (Comings, 2023; Ilgaz, 2019).

Recent research highlights that learner satisfaction remains a key indicator of the quality of online learning experiences. According to Smith and Johnson (2020), the integration of appropriate technological tools significantly enhances the quality of interaction in virtual learning environments. Similarly, Lee (2020) emphasizes that adult learners are more likely to be satisfied when digital resources support both self-regulation and meaningful engagement with instructors and peers. These findings suggest that the thoughtful application of technology is essential for fostering satisfaction in adult online learners. The increasing adoption of AI in education offers a promising solution to enhance learners' engagement and satisfaction. AI-powered chatbots, also known as conversational agents, have gained popularity in various domains, including education (Labadze, Grigolia, & Machaidze, 2023). These chatbots utilize natural language processing (NLP) and machine learning algorithms to simulate human-like conversations, providing personalized support and feedback to learners (Labadze et al., 2023). While there is growing interest in using AI-powered chatbots in adult education, there is a need for empirical research on their impact on learner engagement and satisfaction.

AI has the potential to revolutionize the field of adult education by providing personalized learning experiences that cater to the unique needs and preferences of individual learners. Research has shown that integrating AI technologies, such as chatbots, can significantly enhance the learning experience for adult students.

One of the key benefits of using AI in adult education is its ability to analyze learner data and provide personalized content and support. Kang (2023) emphasizes that AI-powered systems can leverage learner data, including their learning styles, prior knowledge, and progress, to create customized learning pathways that align with individual needs. This personalization can lead to increased engagement, motivation, and satisfaction among adult learners.

Baltaci (2024) suggests that the integration of AI in adult education can improve learner outcomes and retention rates. Krishnan (2023) conducted a study that examined the impact of personalized learning pathways facilitated by AI on adult learners. The findings revealed that using AI-driven personalized learning significantly enhanced learner outcomes and reduced dropout rates compared to traditional one-size-fits-all approaches.

The role of AI-powered chatbots in adult education is particularly noteworthy. These conversational agents can provide personalized guidance, feedback, and support to learners, addressing their specific questions and concerns in real time (Kang, 2023). This level of personalization and responsiveness can foster a more engaging and enriching learning experience for adult students.

The integration of AI in adult education holds immense potential to revolutionize the field. By offering personalized learning experiences, AI technologies can enhance learner engagement, satisfaction, and overall educational outcomes. As the field of adult education continues to evolve, the strategic implementation of AI-powered solutions can play a crucial role in addressing the diverse needs and preferences of adult learners.

Nze (2024) disclosed that conversational agents, or chatbots, are AI-driven tools designed to simulate human-like interactions with users. In educational contexts, these agents can play a crucial role in enhancing learner engagement and motivation. Hassanien (2022) conducted a study in Egypt that explored the use of chatbots in adult education. The findings revealed that integrating chatbots in learning environments can lead to increased interactivity and engagement, as learners receive immediate responses and personalized support for their questions and queries. This level of responsiveness and personalization can be particularly beneficial for adult learners, who often have diverse learning needs and preferences. Hassanien (2022) further emphasizes the potential of chatbots to bridge the gap between traditional educational methods and the needs of modern learners. In remote or underserved areas, where access to educational resources may be limited, chatbots can provide an accessible and engaging platform for adult learners to access learning materials, receive feedback, and collaborate with their peers (Hassanien & Ahmed, 2021).

Moreover, Yusuf, Money, and Daylamani-zad (2025) suggest that using conversational agents in adult education can foster a sense of autonomy and control among learners. Miltiadis and Kainamazis (2022) found that integrating chatbots into learning activities allowed adult students to take a more active role in their learning process, as they could navigate content, ask questions, and receive personalized guidance at their own pace. Additionally, Dabbagh, Seens, Fraser, and MacDermid (2023) highlight the potential of chatbots to support self-directed learning among adult students. By providing personalized feedback, recommendations, and encouragement, chatbots can empower learners to take ownership of their educational journey and stay motivated throughout the learning process. The integration of conversational agents, or chatbots, in adult education holds significant promise in enhancing learner engagement, motivation, and self-directed learning. As the field of adult education continues to evolve, the strategic implementation of AI-powered chatbots can play a crucial role in addressing the diverse needs and preferences of modern learners, particularly in remote or underserved areas.

This study aims to investigate the impact of AI-powered chatbots on adult learners' engagement and satisfaction in adult education. Specifically, this study is important as it examines how AI-powered chatbots can enhance adult learners' engagement and satisfaction in Abuja, Nigeria, where digital tools in education are still developing. By offering personalized support and immediate feedback, chatbots could address challenges like limited resources and teacher availability. The findings will help policymakers design evidence-based strategies for integrating AI into adult education, improving learner outcomes, and enabling scalable, accessible learning solutions across Nigeria.

Statement of the Problem

Adult education is vital for personal growth, career advancement, and lifelong learning. However, many adult learners encounter significant obstacles that hinder their participation and satisfaction. For example, limited time due to work and family commitments, restricted access to quality resources, and feelings of isolation in online settings often lead to lower motivation, poor engagement, and high dropout rates. These issues undermine the effectiveness of adult education programs and underscore the critical need for new strategies to better support and retain learners.

The rise of artificial intelligence (AI) offers promising solutions to these challenges. AI-powered chatbots, which act as conversational agents, could provide personalized learning,

instant feedback, and ongoing support, potentially boosting learner engagement and satisfaction. Despite this potential, there is a lack of empirical evidence regarding their effectiveness in adult education. This knowledge gap makes it difficult for educators and policymakers to assess the true value of incorporating chatbots into learning environments. Therefore, it's essential to investigate the role of AI-powered chatbots in adult education to develop effective technologies that can improve learner outcomes and enhance the quality of adult education programs.

Research Objectives

The following research objectives were raised:

i. Identify AI-Powered chatbots commonly used to enhance learning in the learning centres in Abuja, Nigeria
ii. Examine the impact of using an AI-powered chatbot as a learning assistant on the level of engagement among adult learners;
iii. Determine if the use of an AI-powered chatbots influence the level of satisfaction among adult learners in the educational context;
iv. Find out the extent the integration of an AI-powered chatbots in adult education affect the academic performance and learning outcomes of the learners

Research Questions

The study answered the following questions:

i. What are the AI-Powered chatbots commonly used to enhance learning in the learning centres in in Karu and Garki learning centres in Abuja?
ii. What is the impact of using an AI-powered chatbot as a learning assistant on the level of engagement among adult learners in Karu and Garki learning centres?
iii. How does the use of an AI-powered chatbot influence the level of satisfaction among adult learners in the educational context?
iv. To what extent does the integration of an AI-powered chatbot in adult education affect the academic performance and learning outcomes of the learners?

Hypothesis

The following hypothesis was tested

H1: The integration of an AI-powered chatbot in adult education positively impacts the academic performance and learning outcomes of adult learners.

Methodology

The study adopted a mixed-method approach, involving a quasi-experimental design and qualitative interviews. The population of the study consisted of 59 adult learners from two adult learning centres in the Federal Capital Territory, Abuja. The FCT was chosen due to proximity to the researchers. Total renumeration sampling technique was used as the sampling technique since the population of the study was manageable. Data were collected through engagement and satisfaction questionnaires (ESQ), with the reliability co-efficient of 0.83, Engagement and Satisfaction Interview Guides with the reliability co-efficient of 0.84,

and a Standardized Test with the reliability co-efficient of 0.86 were used to obtain data for the study. This study used a mixed-methods approach to evaluate an AI chatbot's impact on learning. Quantitative data from a survey and pre- and post-tests assessed learner engagement, satisfaction, and academic performance. The pre-test and post-test were administered within eight weeks using a standardized test covering key course concepts before the introduction of the chatbot. Statistical analysis was conducted using SPSS to evaluate the survey responses. Descriptive statistics summarized the data, while inferential statistics involving paired sample t-tests were used to compare the pre-test and post-test scores.

Results and Discussion of Findings

Table 1: Distribution of respondents by gender

Gender	Frequency	Percent
Male	33	55.9
Female	26	44.1
Total	59	100.0

Table 1 provides the demographic characteristics of the study's respondents. The respondents are relatively evenly distributed between genders, with 55.9% being male and 44.1% being female.

Table 2: Distribution of respondents by age

Age	Frequency	Percent
20-30yrs	28	47.5
31-40yrs	20	33.9
Above 40yrs	11	18.6
Total	59	100.0

The age distribution in table 2 reveals that the majority of respondents are between 20 and 30 years old (47.5%), followed by those aged 31-40 years (33.9%). The smallest group is those above 40 years, making up 18.6% of the sample.

Research Question One: What are the AI-Powered chatbots commonly used to enhance learning in the learning centres in Abuja, Nigeria?

Table 3: Commonly used AI-Powered chatbots to enhance learning in the learning centres

Item	SD	D	A	SA	Mean	Std. Dev.
Duolingo Bot	1 (1.7%)	5 (8.5%)	28 (47.5%)	25 (42.4%)	3.30	0.72
Khanmigo	2 (3.4%)	8 (13.6%)	30 (50.8%)	19 (32.2%)	3.12	0.85
ChartGPT	0 (0.0%)	2 (3.4%)	15 (25.4%)	42 (71.2%)	3.68	0.54
Google's Gemini	3 (5.1%)	10 (16.9%)	20 (33.9%)	26 (44.1%)	3.17	0.95
Quizbot	1 (1.7%)	4 (6.8%)	22 (37.3%)	32 (54.2%)	3.44	0.73

Table 3 showed that ChatGPT is the most commonly used by learners for learning, with highest mean score (3.68) followed by Quizbot with mean score (3.44). Google’s Gemini is

the next mostly used AI Powered chatbot with 3.17 mean score and the lowest mean score (3.12) belongs to Khanmigo.

The finding that ChatGPT is the most commonly used AI chatbot among adult learners in Abuja Metropolis, followed by Quizbot, then Google's Gemini, and finally Khanmigo, reflects several factors related to accessibility, functionality, and brand recognition in the Nigerian context. This finding highlights a clear hierarchy of adoption among adult learners, which can be attributed to the unique features and public perception of each tool.

Since its public release, ChatGPT has received massive global media attention, making it the most well-known and talked-about AI tool. This high level of awareness directly translates into higher adoption rates among learners. A study by Gidado and Zubair (2025) on students at the University of Abuja corroborates this, finding a significant effect of ChatGPT on student engagement and achievement. Its broad functionality for tasks like content generation, summarizing and makes it a versatile tool for a variety of academic needs.

Quizbot's second-place ranking likely stems from its specialized purpose. Unlike general-purpose chatbots, Quizbot is designed specifically for creating and answering quizzes, which is a key activity in adult learning. Its focused utility for test preparation, self-assessment, and reinforcing knowledge makes it a highly valuable tool for learners who want to actively engage with their study materials. This targeted approach resonates well with learners who prioritize practical, outcome-oriented tools for their learning.

Research Question Two

What is the impact of using an AI-powered chatbot as a learning assistant on the level of engagement among adult learners?

Table 4: Perceptions of adult learners regarding the impact of an AI-powered chatbot on their engagement levels during learning activities

S/N	Statement	SD	D	A	SA	Mean	Std. D
	The AI-powered chatbot has made the learning experience more interactive and enjoyable.	2 (3.4%)	7 (11.9%)	22 (37.3%)	28 (47.5%)	3.29	0.82
	Using the AI-powered chatbot has enhanced my level of engagement and participation in the learning process.	3 (5.1%)	6 (10.2%)	22 (37.3%)	28 (47.5%)	3.27	0.87
	I find myself more motivated to learn and complete tasks when using the AI-powered chatbot as a learning assistant.	2 (3.4%)	5 (8.5%)	23 (39.0%)	29 (49.2%)	3.34	0.77
	The AI-powered chatbot has helped me stay focused and on-task during learning activities.	2 (3.4%)	6 (10.2%)	32 (54.2%)	19 (32.2%)	3.15	0.72
	Using the AI-powered chatbot as a learning assistant has increased my overall engagement in the learning process	2 (3.4%)	8 (13.6%)	30 (50.8%)	19 (32.2%)	3.12	0.77

Table 4 provides insights into the perceptions of adult learners regarding the impact of an AI-powered chatbot on their engagement levels during learning activities. A significant majority of the respondents agree (37.3%) or strongly agree (47.5%) that the AI-powered chatbot has made the learning experience more interactive and enjoyable. Only a small fraction disagrees (11.9%) or strongly disagrees (3.4%). Similarly, a large portion of learners agree (37.3%) or strongly agree (47.5%) that the AI-powered chatbot has enhanced their engagement and participation in the learning process. A considerable number of respondents feel more motivated to learn and complete tasks when using the chatbot, with 39.0% agreeing and 49.2% strongly agreeing. The majority of respondents (54.2% agreeing and 32.2% strongly agreeing) believe that the AI-powered chatbot helps them stay focused and on-task during learning activities. Finally, over 80% of the respondents agree (50.8%) or strongly agree (32.2%) that the use of the AI-powered chatbot has increased their overall engagement in the learning process.

The findings suggest that the integration of an AI-powered chatbot as a learning assistant has a positive impact on various aspects of engagement among adult learners. Additional data from the interview further supports these findings, revealing that adult learners appreciate the AI-powered chatbot's ability to provide immediate feedback, personalized support, and interactive elements that make the learning process more engaging. For example, several respondents highlighted that the chatbot made them feel like they had a personal tutor available at all times, which helped boost their confidence and commitment to their studies. This study's findings align with prior research indicating that AI-powered chatbots can positively influence learner engagement. For instance, a study by Krishnan (2023) found that chatbots providing instant feedback and personalized guidance significantly increased student motivation and participation. Similarly, Miltiadis and Kainamazis (2022) demonstrated that interactive AI assistants fostered a more enjoyable learning environment, leading to higher levels of engagement and knowledge retention among adult learners.

One participant mentioned, "*Using the AI-powered chatbot has been a new experience for me. At first, I was unsure how it would help, but now I find it quite useful. It's like having an extra teacher who is always available*." Participant 1, 35 years old, Male.

More participants added

> "*It was challenging at first because I'm not very tech-savvy. But after a few sessions, I got the hang of it. Now, I find it very helpful.*" - Participant 2, 42 years old, Female.
> "*The chatbot has been a great tool. I use it almost every day to revise and get clarification on topics I don't understand. It feels like having a tutor at my fingertips*." - Participant 3, 29 years old, Male.
> "*I've had a positive experience overall. The chatbot is easy to use and has made my learning process more efficient. It saves time compared to searching for information manually*." - Participant 4, 31 years old, Female.
> "*My experience has been quite positive. I never thought a chatbot could be so helpful. It's been like having a personal tutor available all the time*." - Participant 5, 37 years old, Male

These qualitative insights, coupled with the quantitative data, suggest that the integration of AI-powered chatbots can be a valuable tool in adult education, potentially leading to improved academic outcomes and a more enriched learning experience.

Research Question Three: How does the use of an AI-powered chatbot influence the level of satisfaction among adult learners in the educational context?

Table 5: Perception of adult learners on their satisfaction levels when using an AI-powered chatbot in their learning process

S/N	Statement	SD	D	A	SA	Mean	Std. D
	The AI-powered chatbot has enhanced my overall satisfaction with the learning experience.	2 (3.4%)	10 (16.9%)	28 (47.5%)	19 (32.2%)	3.08	0.81
	I am satisfied with the quality of support and guidance provided by the AI-powered chatbot.	1 (1.7%)	8 (13.6%)	23 (39.0%)	27 (45.8%)	3.29	0.77
	Using the AI-powered chatbot has helped me achieve my learning goals more effectively.	2 (3.4%)	3 (5.1%)	24 (40.7%)	30 (50.8%)	3.39	0.75
	I am satisfied with the level of personalization and adaptability of the AI-powered chatbot to my learning needs.	1 (1.7%)	6 (10.2%)	23 (39.0%)	29 (49.2%)	3.34	0.73
	I feel that the chatbot provides timely and helpful responses to my questions.	2 (3.4%)	6 (10.2%)	31 (52.5%)	20 (33.9%)	3.17	0.75

Table 5 presents responses from adult learners on their satisfaction levels when using an AI-powered chatbot in their learning process. A majority of respondents agree (47.5%) or strongly agree (32.2%) that the AI-powered chatbot has enhanced their overall satisfaction with the learning experience. he majority of respondents are satisfied with the quality of support and guidance provided by the AI chatbot, with 39.0% agreeing and 45.8% strongly agreeing. The highest mean score of 3.39 shows that learners believe the AI-powered chatbot significantly helps them achieve their learning goals, with 40.7% agreeing and 50.8% strongly agreeing. Only a small percentage (3.4% strongly disagreeing and 5.1% disagreeing) feel otherwise. Respondents express satisfaction with the chatbot's ability to personalize and adapt to their learning needs, with 39.0% agreeing and 49.2% strongly agreeing. A majority of learners feel that the chatbot provides timely and helpful responses, with 52.5% agreeing and 33.9% strongly agreeing. A small fraction (3.4% strongly disagreeing and 10.2% disagreeing) feels dissatisfied.

The data suggests that the use of an AI-powered chatbot positively influences the satisfaction levels of adult learners in the educational context. Additional data from the interview further corroborates these findings, indicating that learners appreciate the immediacy and accessibility of the AI-powered chatbot. Many respondents noted that the chatbot's instant feedback and constant availability contributed to their satisfaction, making them feel supported and valued in their learning journey. For instance, one participant mentioned, "*The*

chatbot has made me more engaged with the course materials. Before, I would lose interest quickly, but now I am more interactive and stay focused throughout the lessons. It keeps me on my toes…… The support is great. Whenever I have a question, the chatbot provides immediate responses. It's like having a study partner who never gets tired of answering my questions " – Participant 4, 31 years old, Female.

More participants added,

> "*The chatbot has definitely made the course more engaging. I feel like I'm learning actively instead of passively just reading materials. It asks questions, and I have to think and respond*." – Participant 6, 36 years old, Female.
> "*It has definitely increased my engagement. I find myself spending more time on the learning platform because interacting with the chatbot makes studying less boring*." Participant 3, 29 years old, Male.
> "*I've become more proactive in my learning. The chatbot prompts me to engage with the material regularly, which has made a big difference in how I study*." - Participant 5, 37 years old, Male.

Research Question Four: To what extent does the integration of an AI-powered chatbot in adult education affect the academic performance and learning outcomes of the learners?

Table 6: Pre-test and post-test scores measuring the academic performance and learning outcomes of learners before and after the intervention

Variable	N	Mean	SD
Pre-test	59	21.01	3.794
Post-Test	59	33.00	2.573

Table 6 presents pre-test and post-test scores measuring the academic performance and learning outcomes of learners before and after the integration of an AI-powered chatbot in adult education. The mean score of the post-test is significantly higher than that of the pre-test. This increase in mean score indicates an improvement in academic performance and learning outcomes following the integration of the AI-powered chatbot. The standard deviation for the post-test is lower than that for the pre-test. This reduction in variability suggests that the post-test scores are more consistently clustered around the mean, reflecting a more uniform improvement in learning outcomes among the learners. The substantial increase in the mean score from the pre-test to the post-test suggests that the integration of the AI-powered chatbot has had a positive effect on the learners' academic performance.

Hypothesis

The hypothesis was tested using one sample t-test at 0.05 level of significance.

H1: The integration of an AI-powered chatbot in adult education positively impacts the academic performance and learning outcomes of adult learners.

Table 7: Summary of paired sample t-test comparing the pre-test and post-test

Variable	N	Mean	SD	t	df	Pvalue
Pre-test	59	21.01	3.794	42.574	58	0.000
Post-Test	59	33.00	2.573			

A paired sample t-test was conducted to compare the pre-test and post-test scores. The test showed a significant difference between the pre-test (M = 21.01, SD = 3.794) and post-test scores (M = 33.00, SD = 2.573), with a t-value of 42.574 and a p-value < 0.001. The significant increase in mean scores from pre-test to post-test indicates that the integration of the AI-powered chatbot had a positive impact on the learners' academic performance and learning outcomes. The higher post-test scores reflect that learners were able to better understand and retain information, demonstrate improved problem-solving skills, and achieve higher overall competency in the subject matter after using the chatbot.

Conclusion

The research concluded that AI-powered chatbots have a significant and positive impact on adult learners' engagement and satisfaction. By providing personalized support and instant feedback, these tools directly addressed key challenges faced by learners in the two centers in Abuja, Nigeria. The findings strongly suggest that integrating AI technology is an effective strategy for enhancing the educational experience and improving learning outcomes in adult education settings.

Recommendations

Based on the findings of the study, the following recommendations are made:

1. Adult learning centres should to prioritize the integration of ChatGPT into their learning platforms due to its high usage and acceptance among learners. Additionally, they should consider exploring and promoting the use of other high-performing tools like Quizbot to diversify and enhance students' learning experiences.
2. Adult learning centres should consider integrating AI-powered chatbots into their learning frameworks to support and enhance the educational experiences of adult learners.
3. There is need for a continuous training for adult educators on effectively utilizing AI technologies, as well as continuous refinement of chatbot features to ensure they are responsive to the diverse needs of learners.

References

Aboul Ella Hassanien, A. (2022). How does AI play to its strengths in adult education? *International Journal of Adult Education and Technology*, 2(3), 66-72.

Amirova, N. (2025). Traditional vs. non-traditional teaching in secondary education: A comparative analysis. Porta Universorum, **1** (3): 101-109, DOI:10.69760/portuni.010309

Artino, A. R. (2007). Online military training: Using a social cognitive view of motivation and self-regulation to understand students' satisfaction, perceived learning, and choice. *Quarterly Review of Distance Education*, **8** (3): 191-202.

Batista-Taran, L. C., Shuck, M. B., Gutierrez, C. C., & Baralt, S. (2009). The role of leadership in employee engagement. In M. S. Plakhotnik, S. M. Nielsen, & D. M.

Pane (Eds.), Proceedings of the Eighth Annual College of Education Research Conference (pp. 15- 20). Miami: Florida International University.

Comings, J. (2023). Persistence: Helping Adult Education Students Reach Their Goals. *Review of Adult Learning and Literacy*, **7**: 23-46.

Gidado, B.K., & Zubair, T.H. (2025). Effect of artificial intelligence (AI-chatgpt) on educational psychology students' engagement, interest and achievement in the institute of education, university of Abuja, Abuja, Nigeria.

Hassanien, M. A. (2022). Enhancing interactivity and engagement in adult education through the use of chatbots. *Educational Technology Research and Development*, **70** (2): 523-541.

Hassanien, M. A., & Ahmed, S. (2021). Bridging the educational divide: Leveraging chatbots in underserved communities. *Journal of Educational Computing Research*, **59** (3): 487-509.

Harter, J. K., Schmidt, F. L., & Hayes, T. L. (2002). Business-unit-level relationship between employee satisfaction, employee engagement, and business outcomes: A meta-analysis. Journal of Applied Psychology, **87**: 268-279.

Ilgaz, H. (2019). Adult Learners' Participation In A Blended Learning Environment: A Case Study On Imposed Pace Learning. Malaysian Online Journal of Educational Technology, **7** (14): 15-29.

Kaminski, K., Switzer, J., & Gloeckner, G. (2009). Workforce readiness: A study of university students' fluency with information technology. Computers & Education, **53** (2): 228-233. https://doi.org/10.1016/j.compedu.2009.01.017

Kang, M. (2023). Integrating Artificial Intelligence (AI) Into Adult Education. *International Journal of Adult Education and Technology*, **3** (5): 96-105.

Krishnan, H. (2023). Transform Adult Learning: Harness the Power of AI in Instructional Design. *LinkedIn Pulse*.

Lee, J. (2020). Mental health effects of school closures during COVID-19. *Lancet Child Adolesc Health*. **4** (6):16. doi: 10.1016/S2352

Miltiadis, D., & Kainamazis, G. (2022). Chatbots in adult education: Fostering learner autonomy and self-directed learning. I*nternational Review of Research in Open and Distributed Learning*, **23** (1): 45-62.

Mandlelize, P. N. & Sepeng, M. S. (2024). Exploring challenges of adult learners in selected adult education and training centers in South Africa: An analysis of Knowles' theory of andragogy. *Social Sciences and Education Research Review*, **11** (1): 152 – 160

Nze S.U. (2024) AI-Powered Chatbots, *Global Journal of Human Resource Management*, **12** (6): 34-45.

Parsad, B., & Lewis, L. (2008). Distance education at degree-granting postsecondary institutions: 2006-07. Retrieved from http://nces.ed.gov/pubs2009/2009044.pdf

Puzziferro, M. (2008). Online technologies self-efficacy and self-regulated learning as predictors of final grade and satisfaction in college-level online courses. *American Journal of Distance Education*, **22** (2): 72-89. https://doi.org/10.1080/08923640802039024

Shuck, B., & Wollard, K. (2010). Employee engagement & HRD: A seminal review of the foundations. *Human Resource Development Review*, **9** (1): 89-110.

Smith, T., & Johnson, M. (2020). Cloud computing as a pivotal force in transforming ICT infrastructure. *International Journal of Educational Technology*, **12** (4): 34-47.

Vieriu, A. M. & Petrea, G. (2025). The Impact of Artificial Intelligence (AI) on Students' Academic Development. *Education Sciences*, **15** (3): 343-354.