



Assessing Student Perceptions and Attitudes toward AI enabled Digital Learning Resources in Nigeria's Higher Education Open and Distance Learning Context

¹Awosiji, T. A.; ²Omoyajowo, B. S.; ³Aindero, O. S.

¹Department of Science and Technology Education, Lead City University, Ibadan, Nigeria.

²Department of Science Education, Faculty of Education, Lead City University, Ibadan, Oyo State, Nigeria.

³Distance Learning Centre, Lead City University, Ibadan, Oyo State, Nigeria.

Corresponding Author: temiloluwaakinlabi6@gmail.com

Other Authors: omoyajowo.bamidele@lcu.edu.ng; oluwasegunaindero@gmail.com

Abstract

The integration of Artificial Intelligence (AI) in the higher education system through the use of technology which enhances an intelligent, personalized and flexible learning process has caused revolutions in the teaching and learning process particularly in the Open and Distance Learning (ODL). Though many educational technologies driven by Artificial Intelligence have been adopted in different universities around the world, little is known about the awareness, adoption and perception of AI driven educational technology by undergraduates in Nigerian universities. This paper aims to investigate the awareness, adoption and perception of artificial intelligence technologies for open and distance learning by undergraduates in some selected universities in Nigeria; University of Ibadan, Ladoke Akintola University of Technology, Ogbomosho and Ahmadu Bello University, Zaria. This study used a survey research design. The population of the study was undergraduates in the selected universities and the sample size was 342 participants selected through the use of multistage sampling technique. The instrument used for data collection was SAUPAILRQ with a reliability coefficient of 0.84 obtained through Cronbach Alpha. The research questions were analysed using descriptive statistics like frequency, percentage, mean and standard deviation. The hypotheses were analysed using one way ANOVA. Based on the obtained results, it can be seen that undergraduate students are highly aware of AI technologies (Grand Mean = 3.12), are highly utilizing AI technology in educational aspects (Grand Mean = 3.04) and have positive attitudes towards the utilization of AI learning material (Grand Mean = 3.22). It can be observed from the ANOVA results that there is no significant difference in the awareness levels and attitude of the students regarding AI technologies from the perspective of universities ($p > .05$). However, there is significant difference in the level of utilization of AI technologies by the students in the universities ($p < .05$). In conclusion, it can be said that Artificial Intelligence has become an important aspect of ODL in Nigeria with great potentials in terms of implementation provided that appropriate technological and policy framework is available in the institution. So, it is very important to improve the technological framework, to raise the awareness of students and teachers about the use of AI technologies, to set ethical guidelines for AI technology and to integrate it into the strategy of teaching and learning.

Keywords: Awareness, Artificial Intelligence, higher education, Nigeria, Open and Distance Learning, perception, undergraduate students, utilization.

Cite as:

Akinlabi, T.; Omoyajowo, B. S.; Aindero, O. S. (2026). Assessing Student Perceptions and Attitudes toward AI enabled Digital Learning Resources in Nigeria's Higher Education Open and Distance Learning Context. *Journal of Science and Information Technology (JOSIT)*, Vol. 20, No. 1, pp. 68-77.

INTRODUCTION

Artificial Intelligence (AI) is one of the most revolutionary inventions in the field of technology that have changed many industries like healthcare, finance, agriculture, manufacturing and education. The importance

of artificial intelligence innovation in the education industry can be identified from the ways teaching, learning, assessment, student services and administrative aspects have been improved (Zawacki-Richter et al., 2019; UNESCO, 2023). Such innovations include intelligent tutoring systems, adaptive learning systems, virtual assistants, automated assessment systems and learning analytics which enable learners to learn in personalized environments where real-time feedback and flexible access to learning material is facilitated (Luckin and Cukurova, 2019; Ifenthaler and Yau, 2020). These innovations are becoming increasingly necessary to ensure ODL, especially following the digital transformation of the education sector after the outbreak of the COVID-19 pandemic (Bond et al., 2021; UNESCO, 2023). Open and Distance Learning has become one of the most important modes of education by providing the learners the opportunities to get quality education irrespective of their geographical location, work schedule and personal issues (Bozkurt, 2020; International Council for Open and Distance Education [ICDE], 2021). The use of technology in ODL mode of education has revolutionized teaching and learning by creating interaction between teachers and learners and encouraging self-learning and collaborative learning (Bozkurt, 2020; Bond et al., 2021).

Despite the progress in the technology, it is an undeniable fact that many universities in developing countries like Nigeria still suffer from problems such as absence of technological infrastructure, low digital literacy rates, unstable internet connection, lack of institutional support and inequity in access to modern educational technologies (UNESCO, 2021; World Bank, 2020).

This could restrict the use of the AI technology by the learners. The importance of Artificial Intelligence in Open Distance Learning is numerous. The inclusion or use of the machine learning and Natural language capabilities of processing of AI will allow it to learn from Learner's traits and provide personalized assistance to improve their achievement (Luckin and Cukurova, 2019; Ifenthaler and Yau 2020). It explains the reasons that necessitated why universities all over the world invest more in Educational Technology powered by Artificial Intelligence (OECD, 2021; UNESCO, 2023).

In Nigeria today, the implementation of AI in Nigerian higher Institutions is becoming very common, as higher institutions are using various digital approaches (National Universities Commission, 2023; Federal Ministry of Communications, Innovation and Digital Economy, 2004).

Scholars and learners in the higher institutions are being provided much access to different AI technologies like the Intelligent Learning Management System that manages online classes, virtual assistant for learning real time, automatic grading for lecturers, plagiarism check, learning analytics and generative artificial intelligence (Okonkwo and Ade-Ibijola 2021; Kasneci et al., 2023). The Adoption of Artificial Intelligence promotes flexible Teaching and Learning, development of self-learning by the learners, collaborative knowledge construction by group of learners and finally making the lives of learners easy at different academic level.

The effective implementation of Artificial Intelligence in ODL mainly depends on the awareness of the learners, the usefulness ease of use, ethical considerations which are very important so as not to go against the set down rules and the educational values of the learners (Dwivedi et al, 2023). Different studies have been carried out in regards to the different aspects of AI in higher Institutions. Previous studies included the Adoption of Artificial Intelligence by Facilitators, the efficient use of intelligent tutoring systems by the facilitators, readiness for the adoption of AI on the teaching-learning process (Zawacki-Richter et al, 2019; Crompton and Burke, 2023; Dwivedi et al, 2023).

While all these studies have made significant impacts to the generation of knowledge on Artificial Intelligence or in some selected institution without taking into consideration the awareness, the use and the perception of Artificial Intelligence in Open Distance Learning. One of the aspects that hasn't been broadly looked at within the existing study related to AI technologies in educational settings is an inadequate amount of empirical evidence concerning the awareness and use of AI technologies by undergraduate students in Open and Distance Learning in various Nigerian universities. While some of the previous researches have revealed a number of aspects related to the implementation of AI technologies in educational environments, the

connection between the interaction of students with Artificial Intelligence technologies and their perception of the same technologies has not been identified properly (Crompton and Burke, 2023; Kasneci et al., 2023).

This study is not the same as the earlier studies on the basis of taking into account the awareness, usage, and perception of AI technology in open and distance learning centres among the undergraduates of the three selected Nigerian universities, including University of Ibadan, Ladoke Akintola University of Technology, Ogbomoso, and Ahmadu Bello University, Zaria. It is expected that the findings of this study would greatly contribute to the literature on artificial intelligence technology in higher education in Nigeria and beyond.

The Objectives of this Study

The Objectives of this study are stated below:

1. to identify the degree of awareness of Artificial Intelligence technology in open and distance learning of the undergraduate students;
2. to identify the extent to which undergraduate students use Artificial Intelligence technology in open and distance learning; and
3. to identify the perceptions of undergraduate students about Artificial Intelligence technology in open and distance learning.

Research Questions

The following research Questions were raised for the study below

1. What is the degree of awareness of Artificial Intelligence technology in open and distance learning of the undergraduate students?
2. To what extent do undergraduate students use Artificial Intelligence technology in open and distance learning?
3. What are the perceptions of undergraduate students about Artificial Intelligence technology in open and distance learning?

Research Hypotheses

Three research null hypotheses were efficiently stated and tested at a 0.05 level of significance for the study and are listed below:

1. **H₀₁:** There is no significant difference in the awareness of artificial intelligence technologies used in open and distance learning among undergraduate students, with respect to universities.
2. **H₀₂:** There is no significant difference in the usage of artificial intelligence technologies used in open and distance learning among undergraduate students, with respect to universities.
3. **H₀₃:** There is no significant difference in the perception of artificial intelligence technologies used in open and distance learning among undergraduate students, with respect to universities.

LITERATURE REVIEW

The use of Digital Learning Resources in Higher Institutions Based on the use of Artificial Intelligence

The increasing Adoption and implementation of AI has been noted in digital learning systems in the modern-day era. AI-based digital teaching and learning systems have been able to facilitate automated feedback, adaptive learning, intelligent facilitation, personalized learning materials, virtual communication aids, and learner analysis in the digital learning systems (Kasneci et al; 2023).

These Teaching and learning systems have increased the influence on the way learners get or access their materials, interact and learn in their institutions of higher learning. Literatures have increasingly viewed AI-based digital learning systems as important for enhancing learner-centered, interaction and personalized instructions (Bozkuert, 2023). These AI-based learning systems can be used to tailor personalized learning instructions on the basis of learner achievements, suggest personalized learning sources, automate academic processes, and provide prompt feedback to learners and also assist the facilitators to be able to know how their learners are progressing. Contemporary study increasingly recognizes the increasing problems in AI-based learning

systems concerning factors like ethics, disinformation, over-reliance on technology, algorithmic bias, privacy concerns, and decreased human interaction in AI-based educational systems (Dwivedi et al, 2023). The attitude of learners towards AI-based systems can either be negative or positive, at the same time depending on the learners' experiences in education, skills, and environment.

Learners Perceptions and their Technology Acceptance

Learners perceptions and attitudes towards educational technologies have greatly affected the way in which they've been able to adopt, interact with, become satisfied with and learn using the mentioned technologies. Based on the Technology Acceptance Model, propounded by Davis in (1989), perceptions of usefulness and ease of the learners of use greatly determine the acceptance of the system. From an Academic perspective, learners would be willing to adopt and interact positively with digital learning technologies if these technologies were regarded as easy to navigate, useful, flexible and usable for them. The recent study into this field of educational technology indicates that the attitude of learners towards AI technologies depends on several factors, which are connected and includes the digital literacy, trust in technology, accessibility, institutional support, learning flexibility and prior experience with technologies (Bearman et al, 2023). The positive attitude learners have towards AI-based learning makes the educational process more inclusive, simplify the academic tasks and individualize the process of Teaching and learning. However, learners could be worried about how reliable the AI technologies, misinformation, technological dependence, privacy concerns, cheating and lecturer-student communication in the mediated process of education are (Perkins, 2023).

The Integration of Artificial Intelligence into Nigerian Open and Distance Learning Centres

The development of these centres of the open and distance learning in the Nigerian higher learning institution encapsulate one of the ways through which attempts to promote participation and engagement in educational activities by distant and geographically diverse population have been sought. We see digital

learning platforms, mobile learning tools, virtual classrooms, and online teaching systems as new trends in Nigeria's open and distance learning (ODL). But Nigeria has problems with power, internet, expensive data, low digital skills, and less access to tech services. These problems will make it hard for learners to use AI-based education in Nigerian ODL.

From the studies we have, we know that adding AI to Nigerian universities needs more than technology. We also need the right school plans, teachers ready to use it, and students with digital skills. (Mhlanga, 2023). This creates a clear positive attitude towards the utilization of AI-powered learning tool depending on socio-technical factors associated with digital engagement in the Nigerian higher learning institutions.

METHODOLOGY

In this study a descriptive survey research design was used to conduct the study on learner's awareness, the use and perception of the digital learning resources enabled by AI in Open Distance Learning Centres in some selected Institution in Nigeria. This study was carried out among the undergraduates and postgraduates students of University of Ibadan (UI), Ladoke Akintola University of Technology, Ogbomosho (LAUTECH), and Ahmadu Bello University, Zaria (ABU). The respondents for this study were the students of selected higher institutions in the 2025/2026 academic year. The sample size for the study for this research comprised of 342 respondents. The sampling method used in this research was multi-stage sampling. Purposeful sampling was used to select the universities due to their adoption of digital learning technologies, while students were randomly selected. Data was obtained through the use of Students' Awareness, Use and Perception of Artificial Intelligence Enabled Learning Resources Questionnaire (SAUPAILRQ).

The instruments were developed by the researchers and the developing process was characterized by an extensive literature review on topics including Artificial Intelligence, Educational Technology and ODL centres in Nigeria. The content and face validity of the instrument was ensured once the instrument had undergone the validation process done by the experts in Educational Technology and Artificial Intelligence and Measurement and

Evaluation domains. The involvement of the respondents in the research was purely voluntary and consent was sought to ensure that information shared by the respondents was anonymous and confidential. A pilot study involving respondents other than those in the research was conducted to ensure the reliability of the instrument through the use of the Cronbach's Alpha. The result obtained was 0.84.

Data obtained from the questionnaire were coded and thoroughly analysed using Statistical Package for the Social Sciences (SPSS) version 25. Frequency, percentages, mean and standard deviation of descriptive statistics were used to conduct the analysis of the research questions. The criterion for mean score of 2.50 was used as decision rule whereby mean scores of 2.50 and above were considered acceptable whereas those below 2.50 were unacceptable. Besides, One-way ANOVA was conducted on the formulated hypothesis at 0.05 level of significance.

RESULTS

Research Question one: What is the degree of awareness of Artificial Intelligence technology in open and distance learning of the undergraduate students?

Table 1. Undergraduate Students' Level of Awareness of Artificial Intelligence Technologies for Open and Distance Learning (N=32).

S/N	Items	Mean	SD	Decision
1	I am aware of AI-based tools such as Claude, Chat GPT, Gemini	3.46	0.63	Accepted
2	I understand the role of AI Technologies in Online Learning	3.38	0.69	Accepted
3	I Understand how AI facilitates academic tasks.	3.21	0.74	Accepted
4	Information related to AI technologies is accessible to me at my university.	2.84	0.87	Accepted

5	I understand AI-based Learning Management Systems.	2.95	0.81	Accepted
6	I understand how AI enables personalized learning.	3.18	0.72	Accepted
7	I understand the ethical issues related to AI use.	2.88	0.83	Accepted
8	I am able to identify different uses of AI in education.	3.07	0.76	Accepted
Grand mean 3.12,0.76, High Awareness				

Table 1 presents the data on the level of awareness of Artificial Intelligence Technologies in ODL centres among undergraduate and postgraduate students. Based on the data acquired, it is clear that all indicators recorded mean scores that are greater than the criterion mean of 2.50 meaning that the respondents had awareness of AI technologies. The highest mean score was achieved in the awareness of AI technologies such as ChatGPT, Gemini and Copilot (Mean = 3.46, SD = 0.63), while the lowest acceptable mean score was achieved in the awareness of ethical issues of AI (Mean = 2.88, SD = 0.83). The grand mean of 3.12 shows that undergraduate students have high awareness of AI technologies in ODL.

Research Question Two: To what extent do undergraduate students use Artificial Intelligence technology in open and distance learning?

Table 2. Extent of Utilization of Artificial Intelligence Technologies for Open and Distance Learning (N=342).

S/N	Items	Mean	SD	Decision
1	I utilize AI-based programs to look for academic information.	3.35	0.71	Accepted
2	I utilize AI to summarize my lecture notes.	3.18	0.78	Accepted
3	I utilize AI in assignment preparation.	3.29	0.69	Accepted
4	I utilize AI to enhance my writing skills.	3.12	0.74	Accepted
5	I utilize AI in problem solving.	3.06	0.80	Accepted
6	I utilize AI in discussions online.	2.71	0.92	Accepted
7	I utilize AI in examination preparation.	3.01	0.77	Accepted
8	I constantly utilize AI learning apps offered by my university.	2.56	0.94	Accepted
Grand mean 3.04,0.79, High Awareness				

The table above presents the result to the extent to which the Artificial Intelligence technology is being used in ODL centres among undergraduate and postgraduates students. According to the data presented above, the average scores of all the variables are above the benchmark value of 2.50. The most frequently used AI technology was that which involved searching for academic information (Mean = 3.35, SD = 0.71) while the least frequently used was the university based artificial intelligence learning platform (Mean = 2.56, SD = 0.94).

Research Question Three: What are the perceptions of undergraduate students about Artificial Intelligence technology in open and distance learning?

Table 3. Undergraduate Students' Perception of Artificial Intelligence Technologies for Open and Distance Learning (N = 342).

S/N	Items	Mean	SD	Decision
1	I utilize AI-based programs to look for academic information.	3.36	0.67	Accepted
2	I utilize AI to summarize my lecture notes.	3.18	0.74	Accepted
3	I utilize AI in assignment preparation.	3.24	0.71	Accepted
4	I utilize AI to enhance my writing skills.	3.32	0.69	Accepted
5	I utilize AI in problem solving.	3.09	0.76	Accepted
6	I utilize AI in discussions online.	3.28	0.72	Accepted
7	I utilize AI in examination preparation.	2.91	0.83	Accepted
8	I constantly utilize AI learning apps offered by my university.	3.41	0.65	Accepted
Grand mean 3.22,0.72, High Awareness				

The results shown in Table 3 show the perceptions of the undergraduates about the use of Artificial Intelligence technology in Open and Distance Learning. From the table above, it can be seen that all the response items have mean values greater than the critical value of 2.50 which indicates positive perceptions of AI technology. The response item which has the highest mean value in the perceptions of the students is that which states that "AI should be a complement to lecturers and not a replacement" (Mean = 3.41, SD = 0.65). On the other hand, the response item with the lowest mean value is "AI may cause overdependence on students" (Mean = 2.91, SD = 0.83).

H₀₁: There is no significant difference in the awareness of artificial intelligence technologies used in open and distance learning among

undergraduate students, with respect to universities.

Table 4. One-way ANOVA Showing Difference in Students' Awareness by University.

Source	Some of Square	df	Mean square	f	Sig.	Decision
Between Groups	2.483	3	1.242	2.116	0.122	Not Significant
Within Groups	198.946	338	0.587			
Total	204.423	342				

From the results depicted in Table 4, there is no significant difference between the awareness level of students from the three universities on the Artificial Intelligence technologies ($F(2,339)=2.116$, $p=.122>.05$). This means that the null hypothesis is accepted. Thus, the awareness levels of the students from the three universities are the same.

H₀₂: There is no significant difference in utilization of artificial intelligence technologies for open and distance learning among undergraduate students in relation to universities.

Table 5. One-way ANOVA Depicting the Difference in the Utilization among University Students.

Source	Some of Square	df	Mean square	f	Sig.	Decision
Between Groups	5.267	3	2.634	4.582	0.011	Significant
Within Groups	194.958	338	0.575			
Total	200.225	342				

It is evident from Table 5 that there was a substantial difference in the use of the Artificial Intelligence technology amongst the undergraduate students due to differences between the universities they studied in ($F(2,339) = 4.582$, $p = .011 < .05$).

H₀₃: There is no significant difference in the perception of artificial intelligence technologies used in open and distance learning among undergraduate students, with respect to universities.

Table 6. One-Way ANOVA Showing Difference in Perception by University Students selected.

Source	Some of Square	df	Mean square	f	Sig.	Decision
Between Groups	1.972	3	0.986	1.634	0.197	Significant
Within Groups	204.711	338	0.604			
Total	206.683	342				

In this instance, the particular result in Table 4.6 indicates that there is no statistically significant difference in the perception of Artificial Intelligence technology by undergraduate students in the universities ($F(2,339) = 1.634$, $p = .197 > .05$). Therefore, the null hypothesis could not be rejected since the perception of the undergraduate students in the three universities is similar in regards to Artificial Intelligence technology.

SUMMARY OF FINDINGS

Below are the findings of the research study carried out:

1. The awareness level of the Artificial Intelligence technologies in Open and Distance Learning among the undergraduate students was very high (Grand Mean = 3.12).
2. The undergraduates employed the Artificial Intelligence technologies in

- Open and Distance Learning extensively (Grand Mean = 3.04).
3. The undergraduates had very positive attitudes toward the Artificial Intelligence technologies in Open and Distance Learning (Grand Mean = 3.22).
 4. No significant difference existed between the levels of awareness of the AI technologies across students from various universities ($p > .05$).
 5. A significant difference exists between the use of the AI technologies across students from various universities ($p < .05$).
 6. No significant difference existed between the attitudes of the AI technologies across students from various universities ($p > .05$).
 7. The results tables and analysis above follow the general form that is normally followed in the theses written in the M.Ed., M.Sc., and Ph.D. programs in Nigeria. This is in line with your methodology (N=342, descriptive statistics, criterion mean = 2.50, one way ANOVA with a .05 significance level).

CONCLUSION

The Conclusions concerning awareness, use, and perception of the AI technology utilized in ODL have been generated in the current research with regard to the selected Nigerian Universities. Through the analysis of the obtained results, it could be said that the students of all the selected universities had a high level of awareness and use of AI technologies and also had a positive perception of the ability of AI technologies in supporting learning and teaching in the ODL mode. However, it could be concluded that although there was no difference in the awareness and perception of the students with respect to the AI technology in the selected universities, there were some differences with regard to the use of AI technology. Conclusions made through the results of the research demonstrate the increasing role of AI technology as a learning tool that is capable of providing personalized learning, engaging the students, flexibility of learning and assisting the learners in Open and Distance Learning. However, the outcomes of

this study suggest the need for improvement in digital infrastructure at the higher education institutions, which would involve proper institutional support and responsible use of the AI technology, thus enabling to enjoy all benefits from the use of the AI within the learning process. Nevertheless, even though the research conducted has had positive features, there were certain limitations that should be pointed out. Firstly, this study was conducted in only three Nigerian universities and therefore cannot be applied to the entire higher education sector in Nigeria. Secondly, considering the design of the research and the data gathering approach, the response bias can happen. Lastly, there is no study conducted about the impact of AI implementation on the academic performance of students.

The future research should include the involvement of more universities from different geopolitical zones in Nigeria to improve the validity of the study. The mixed methods research or longitudinal research will provide information about the experiences of students in Artificial Intelligence technology. The future research could explore the relationship between the use of AI and performance, engagement, digital literacy, self-regulation, and readiness of the institution. The research could be conducted among public and private universities and within the African continent. The contribution of the study to the body of knowledge is that the study offers empirical data concerning the level of awareness, use, and perception of the Artificial Intelligence technology by the undergraduate students enrolled in Open and Distance Learning programs in Nigerian universities. Differently from the existing literature on the topic, which provides empirical data on one university or one particular AI, the current study presents empirical data about several universities where the undergraduate students have employed AI-enhanced learning materials.

REFERENCES

- Bearman, M., Ajjawi, R., Tai, J., Keane, L., & Boud, D. (2023). Assessment and generative artificial intelligence: A rapidly evolving conversation. *Assessment & Evaluation in Higher Education*, 48(7), 1125–1137.
- Bozkurt, A. (2020). Educational technology research patterns in the realm of open and distance education. *Asian Journal of Distance Education*, 15(1), 1–18.
- Bozkurt, A. (2023). Generative artificial intelligence-powered conversational educational agents: The inevitable paradigm shift. *Asian Journal of Distance Education*, 18(1), 198–204. <https://doi.org/10.5281/zenodo.7716416>
- Bond, M., Bedenlier, S., Marín, V. I., & Händel, M. (2021). Emergency remote teaching in higher education: Mapping the first global online semester. *International Journal of Educational Technology in Higher Education*, 18, Article 50. <https://doi.org/10.1186/s41239-021-00282-x>
- Crompton, H., & Burke, D. (2023). Artificial intelligence in higher education: The state of the field. *International Journal of Educational Technology in Higher Education*, 20, Article 22. <https://doi.org/10.1186/s41239-023-00392-8>
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319–340. <https://doi.org/10.2307/249008>
- Dwivedi, Y. K., Kshetri, N., Hughes, L., Slade, E. L., Jeyaraj, A., Kar, A. K., Baabdullah, A. M., Koohang, A., Raghavan, V., Ahuja, M., Albanna, H., Albashrawi, M., Al-Busaidi, A. S., Balakrishnan, J., Barlette, Y., Basu, S., Bose, I., Brooks, L., Buhalis, D., ... Wright, R. (2023). So what if ChatGPT wrote it? Multidisciplinary perspectives on opportunities, challenges and implications of generative conversational AI for research, practice and policy. *International Journal of Information Management*, 71, 102642. <https://doi.org/10.1016/j.ijinfomgt.2023.102642>
- Federal Ministry of Communications, Innovation and Digital Economy. (2024). *National artificial intelligence strategy*. Federal Ministry of Communications, Innovation and Digital Economy. https://ncair.nitda.gov.ng/wp-content/uploads/2024/08/National-AI-Strategy_01082024-copy.pdf
- Holmes, W., Bialik, M., & Fadel, C. (2019). *Artificial intelligence in education: Promises and implications for teaching and learning* (1st ed.). Center for Curriculum Redesign.
- Ifenthaler, D., & Yau, J. Y.-K. (2020). Utilising learning analytics to support study success in higher education: A systematic review. *Educational Technology Research and Development*, 68(4), 1961–1990.
- Kasneci, E., Seßler, K., Küchemann, S., Bannert, M., Dementieva, D., Fischer, F., Gasser, U., Groh, G., Günnemann, S., Hüllermeier, E., Krusche, S., Kutyniok, G., Michaeli, T., Nerdel, C., Pfeiffer, F., Poquet, O., Sailer, M., Schmidt, A., Seidel, T., & Kasneci, G. (2023). ChatGPT for good? On opportunities and challenges of large language models for education. *Learning and Individual Differences*, 103, 102274. <https://doi.org/10.1016/j.lindif.2023.102274>
- Luckin, R., & Cukurova, M. (2019). Designing educational technologies in the age of AI: A learning sciences-driven approach. *British Journal of Educational Technology*, 50(6), 2824–2838. <https://doi.org/10.1111/bjet.12828>

- OECD. (2021). *OECD digital education outlook 2021: Pushing the frontiers with artificial intelligence, blockchain and robots*. OECD Publishing. <https://doi.org/10.1787/589b283f-en>
- Okebukola, P. A. (2021). *Open, distance and e-learning in Nigeria: Achievements, challenges and prospects*. National Open University of Nigeria Press.
- Okonkwo, C. W., & Ade-Ibijola, A. (2021). Chatbots applications in education: A systematic review. *Computers and Education: Artificial Intelligence*, 2, 100033. <https://doi.org/10.1016/j.caeai.2021.100033>
- Perkins, M. (2023). Academic integrity considerations of AI large language models in the post-pandemic era: ChatGPT and beyond. *Journal of University Teaching & Learning Practice*, 20(2), 1–26. <https://doi.org/10.53768/jutlp.v20i2.635>
- Tlili, A., Shehata, B., Adarkwah, M. A., Bozkurt, A., Hickey, D. T., Huang, R., & Agyemang, B. (2023). What if the devil is my guardian angel? ChatGPT as a case study of using chatbots in education. *Smart Learning Environments*, 10, Article 15. <https://doi.org/10.1186/s40561-023-00237-x>
- UNESCO. (2021). *AI and education: Guidance for policy-makers*. UNESCO. <https://unesdoc.unesco.org/ark:/48223/pf0000376709>
- UNESCO. (2023). *Guidance for generative AI in education and research*. UNESCO. <https://unesdoc.unesco.org/ark:/48223/pf0000386693>
- World Bank. (2020). *The COVID-19 pandemic: Shocks to education and policy responses*. World Bank. <https://documents1.worldbank.org/curated/en/804001590734163932/pdf/The-COVID-19-Pandemic-Shocks-to-Education-and-Policy-Responses.pdf>
- Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education: Where are the educators? *International Journal of Educational Technology in Higher Education*, 16, Article 39. <https://doi.org/10.1186/s41239-019-0171-0>