BIG DATA ROLES IN PROVIDING STUDENTS INTERACTIONS IN ENGLISH LANGUAGE FOR ANALYSIS AND IDENTIFICATION OF WEAKNESS AND STRENGTH BY AI

BY

Dr. Luke L. Jackson
Department of English
Faculty of Art
University of Sheffield
Sheffield, South Yorkshire, England
United Kingdom

And

Glory Ikpe HANSON
Department of Nigerian Languages
College of Education, Afaha Nsit,
Akwa Ibom State, Nigeria

ABSTRACT

This study examines the critical roles played by academic and research libraries in promoting digital literacy for effective learning, focusing on the University of Port Harcourt. Descriptive survey design was adopted for this study. The study was carried out in Akwa Ibom state. The targeted population for the study comprised of all secondary school student in Akwa Ibom state. A stratified sampling technique was used in selecting 20 secondary school students from each of the 3 Senatorial Districts (Uyo, Ikot Ekpene and Eket). This gave a total of 60 respondents, which formed the sample size for this study. The instrument used for data collection was a structured questionnaire titled "Big Data and Students Interactions in English Language Questionnaire" (BDSIELQ). Face and content validation of the instrument was carried out by an expert in test, measurement, and evaluation in order to ensure that the instrument has the accuracy, appropriateness, and completeness for the study under consideration. The reliability coefficient obtained was 0.89, and this was high enough to justify the use of the instrument. The researcher subjected the data generated for this study to appropriate statistical technique such descriptive statistics to answer research questions. The study concluded that by providing access to digital resources, facilitating ICT training, and equipping students with essential digital-research skills, libraries empower learners to succeed in technology-driven academic environments. The study also recommended that recommends increased funding, ICT upgrades, staff training, and institutional policies to strengthen library-driven digital-literacy programs.

Keywords: Big data, students, interactions, English language, identification, weakness and strength, AI.

INTRODUCTION

Digital literacy has become a fundamental requirement for academic success in modern higher-education institutions, as students and researchers increasingly rely on digital tools for learning, collaboration, and scholarly communication. Academic libraries serve as key facilitators in this transformation by equipping learners with the ability to locate, evaluate, and use digital information effectively. According to Uwem & Akpan (2022), digital literacy is essential for learners to thrive in technology-enhanced learning environments, making the role of academic libraries indispensable in the 21st-century academic system. The University of Port Harcourt, like other leading tertiary institutions in Nigeria, has recognized the importance of digital literacy as a pathway toward academic excellence and global competitiveness. The institution's library system serves as a vital hub for digital-literacy development, providing access to electronic resources, online databases, and ICT training programs for students and researchers. As noted by Eze&Nwosu (2023), university libraries in Nigeria are gradually evolving from traditional book-based services to digital-oriented learning centers.

Libraries promote digital literacy by offering structured training sessions, technology workshops, and orientation programs that teach students how to search online academic databases, navigate digital catalogs, and critically analyze digital information. Through such initiatives, librarians act not only as resource managers but also as digital-skills instructors and technology facilitators. Okoro & Ekwueme (2023) stated that libraries play a foundational role in building ethical and responsible digital citizens capable of engaging safely in the global information space. As observed by Olanrewaju (2023), continuous investment in digital infrastructure and librarian training is necessary to sustain technology-driven education initiatives. Therefore, strengthening the library's digital-literacy programs remains a strategic requirement for enhancing academic excellence and research capacity at the University of Port Harcourt.

Statement of Problem

Despite the growing availability of big data and AI tools in education, English language instruction still relies largely on traditional assessment methods that offer limited insight into students' learning interactions. As a result, teachers find it difficult to accurately analyze learners' strengths and weaknesses in language skills such as reading, writing, speaking, and grammar. The absence of data-driven interaction analysis limits timely feedback and personalized support for students. Furthermore, students' digital interactions in English learning platforms are often underutilized for meaningful learning analytics.

Interestingly, the emergence of AI and Big Data have eliminated this limitation that faced teachers inability to easily discover the strength and weakness of the learners as they enable real-time analysis, pattern recognition, and accurate identification of students' strengths and weaknesses in language use. The premise of this study lies on the identification of the roles of Big Data in enhancing students' interaction in the teaching and learning of the English Language and

in the aspect of analyzing students' strengths and weaknesses in English Language learning.

Research Objectives

1. To examine the roles of Big Data in enhancing students' interaction in the teaching and learning of the English Language.

2. To find out the roles of Artificial Intelligence (AI) in analyzing students' strengths and weaknesses in English Language learning.

Research Questions

1. What are roles of Big Data in enhancing students' interaction in the teaching and learning of the English Language?
2. What are the roles of Artificial Intelligence in analyzing students' strengths and weaknesses in English Language learning?

LITERATURE REVIEW

Concept of Big Data

As noted by Chen (2024), "big data" refers to extremely large and complex datasets that cannot be easily managed or analyzed with traditional data processing tools, particularly spreadsheets. Big data comprises mixed data sets, such as those needed to train vast language models for artificial intelligence, unstructured data, such as social posts or videos, and structured data, such as an inventory database or list of financial transactions Shakespeare's writings or a company's budget spreadsheets over the last ten years could be included in these data sets.

A Big data has only grown in size as a result of recent technical advancements that have drastically lowered the cost of computation and storage, making it simpler and more affordable than ever to store more data. Businesses are able to use their data to make more precise and accurate business decisions thanks to the increased volume. It's a whole discovery process that calls for astute analysts, executives, and business users who can see trends, ask the proper questions, draw well-informed conclusions, and forecast behavior.

According to Kingsley & James (2025), big data refers to vast amounts of structured and unstructured data that require advanced analytical tools to process. Big data analytics is used by companies and organizations to forecast trends, make well-informed decisions, and customize user experiences. Finance, marketing, healthcare, and government all make extensive use of it. Using big data, numerous organizations contribute to the creation of a customized user experience library.

Further explained by Udo-Okon & Ekong, (2022) many organizations help create a personalized user experience library using big data. The purpose of this technology is to promote library services by providing the user's information about their choices and providing resources and services under this technology.

Concept of AI

Artificial intelligence (AI) is the study of how the human brain makes decisions, learns new things, and thinks through difficulties. Artificial intelligence (AI) is the ability of a digital

computer or computer-controlled robot to perform tasks commonly associated with intelligent beings, Obamoh, et al., (2025). Lion and Ekefre (2024) the term artificial intelligence (AI) describes computer programmed that are able to carry out sophisticated operations that were previously limited to human performance, such as problem-solving, thinking, and decision-making.

Artificial intelligence (AI), in its broadest sense, is intelligence exhibited by machines, particularly computer systems, as opposed to the natural intelligence of living beings. As a field of research in computer science focusing on the automation of intelligent behavior through machine learning, it develops and studies methods and software that enable machines to perceive their environment and take actions that maximize their chances of achieving defined goals, with the aim of performing tasks typically associated with human intelligence (Ikechukwu and Echerenachukwu, 2024).

Furthermore, Akpan and Clark (2024) posited that artificial intelligence (AI) is the study of how the human brain makes decisions, learns new things, and thinks through difficulties. The goal of artificial intelligence is to enhance computer abilities related to human understanding, including language intelligence, learning, reasoning, and problem-solving. Also, Huge and Godwin (2024) stated that artificial intelligence (AI) is the idea and practice of creating computer systems that can do tasks like speech recognition, decision-making, and pattern recognition that traditionally needed human intelligence. Artificial Intelligence.

Concept of student's interaction

Student interaction refers to the broad range of communicative, collaborative, and cognitive exchanges that occur among learners in both physical and digital learning environments. It embodies the social dimension of learning through which students co-construct knowledge, share experiences, and collectively make sense of academic concepts. These interactions can occur face-to-face in classrooms, during group assignments, in peer-review activities, through online forums, or within synchronous virtual discussions. Researchers emphasize that student interaction is not merely a supplementary component of learning but a central mechanism that drives understanding and promotes intellectual engagement.

Beyond cognitive outcomes, student interaction plays an essential role in strengthening students' social, emotional, and communication competencies. Classroom engagements such as group discussions, debates, role-playing tasks, and peer assessments cultivate active listening, respectful dialogue, conflict resolution, and perspective-taking. Another important dimension of student interaction lies in its ability to strengthen motivation and engagement. Students who regularly interact with their peers tend to exhibit higher levels of interest, persistence, and responsibility toward their learning tasks. This motivational value becomes particularly important in online education where feelings of isolation can hinder student performance.

Research conducted by Kuo and Belland (2020) reveals that peer-to-peer interaction is one of the strongest predictors of satisfaction and motivation in virtual classrooms. Interaction fosters a sense of community, which encourages learners to contribute actively, seek clarification, and maintain commitment to academic activities.

Roles of Big Data in providing students Interaction in English Language.

Big data has become an essential driver of interaction in English language learning because it helps educators and digital platforms understand how students behave, communicate, and progress. By collecting large volumes of data such as writing patterns, speaking performance, participation records, and engagement levels, big data supports richer and more meaningful forms of interaction. This section explains the major ways big data enhances student interaction in English language learning, while citations appear inside the body of the work and the full reference list is placed at the end.

- **Personalizing Student Interaction**

Big data plays a central role in customizing learning activities to suit individual student abilities. Through continuous analysis of learner data, adaptive platforms adjust speaking tasks, reading content, and communication exercises based on each learner's needs. This personalization increases meaningful interaction because students engage with tasks that match their proficiency level. According to Chen, Zou, and Xie (2021), adaptive big-data-driven learning systems significantly improve learner interaction by delivering personalized learning experiences.

- **Providing Real-Time Interactive Feedback**

One major advantage of big data is its ability to support instant feedback during learning activities. When students participate in chats, discussions, or digital speaking tasks, big data tools analyze their performance in real time. This allows teachers or automated systems to provide immediate corrections and hints. Li, Wang, and Sun (2020) note that big-data analytics enhances interactive feedback, which leads to increased student participation and more confident communication.

- **Enhancing Peer-to-Peer Communication**

Big data assists in forming effective peer-learning groups by examining learners' profiles, participation records, and communication patterns. When students are paired with peers of similar proficiency or compatible learning styles, their communication becomes more meaningful. Research by Zhang and Chen (2022) shows that big-data-enabled peer matching significantly improves student interaction in English language learning by supporting productive peer collaboration.

- **Strengthening Gamified Interaction**

Gamification has become a major method of engaging students in communication-based tasks. Big data allows gamified platforms to track participation, identify challenges, and adjust difficulty levels to maintain motivation. When interactive games and communication challenges are adapted to student performance, learners participate more actively. Xie, Zou, and Wang (2021) highlight that big-data-supported gamification strengthens interactive English learning by making communication activities more engaging.

- **Supporting AI Chatbots and Conversation Tools**

AI chatbots rely heavily on big data to simulate real conversations in English. These systems analyze vast datasets of language use, allowing them to provide realistic, interactive speaking practice. Students can speak, write, and interact with chatbots that give instant feedback. Sun, Xie, and Zhang (2023) found that big-data-powered chatbots enhance interactive English language practice by enabling learners to communicate freely without pressure.

AI roles in analyzing student's weakness and strength in English Language

AI has a revolutionary role in evaluating student success in contemporary English language instruction. AI systems are able to identify patterns in student work, highlight areas of strength, and identify flaws through sophisticated data analytics and machine learning. AI assists teachers in delivering individualized training, improving the language learning process, by offering real-time feedback and tailored learning paths.

- **Automated Writing Feedback**

For automatic feedback on student work, artificial intelligence is crucial. AI systems provide instantaneous spelling, punctuation, and structural fixes by analyzing essays or reports. This enables students to get quick, useful criticism that can help them become better writers (Escalante et al., 2023). When it comes to enhancing English competence, AI-generated feedback on student writing is just as successful as human feedback.

- **Predictive Analytics for Early Intervention**

By examining patterns in performance data, AI can identify which pupils are most likely to lag behind. AI enables teachers to step in before pupils fall too far behind by identifying early indicators of difficulty, such as frequent mistakes or low attention. Almalawi et al. (2024) emphasized the predictive potential of AI in academic contexts and stressed its significance for prompt academic assistance.

- **Personalized Learning Pathways**

Each student's learning experiences can be tailored by AI according to their unique strengths and shortcomings. AI algorithms create customized learning programs that lead students through exercises that highlight their strengths and areas for improvement. Merino-Campos (2025) claims that by providing tailored task recommendations, adaptive learning systems greatly improve English learning outcomes.

- **Speech and Pronunciation Analysis**

Students' spoken language can be analyzed by AI systems to find pronunciation mistakes and provide helpful feedback. For non-native English speakers learning the language, these resources are especially helpful. By highlighting mispronunciations and offering suggestions for improvements, speech recognition and analysis assist students in improving their pronunciation and fluency (Zou et al., 2023).

AI Roles in Identification of Students Weakness and Strength in English Language.

- **Automated Error Detection and Correction**

AI systems are essential for correctly recognizing areas of weakness in students' writing by spotting errors in grammar, spelling, vocabulary, and punctuation. Grammarly and AI-powered writing aids are examples of tools that rapidly identify mistakes in text input and highlight areas where students struggle, such as word choice, sentence construction, or tense usage. Simultaneously, they draw attention to appropriate patterns that demonstrate language strengths, including sophisticated vocabulary or strong sentence coherence. This automated feedback improves students' self-awareness and promotes independent learning (Wu & Chen, 2023).

- **Pronunciation and Speech Analysis**

By examining pronunciation, intonation, fluency, and accent accuracy, AI language-learning systems assess students' spoken English. By comparing student pronunciation to native-speaker standards, programmed like Google Speech Recognition and AI-supported language laboratories can detect recurring sound-level errors, poor articulation, or rhythm problems. Next, the method emphasizes advantages like precise tone or distinct articulation patterns. This AI-based corrective feedback improves speaking confidence and oral proficiency (Yang et al., 2022).

- **Sentiment and Engagement Analysis in Learning**

During language learning assignments, AI systems integrated into digital platforms monitor student engagement behaviors like response times, motivation indicators, and involvement frequency. These systems can identify areas of weakness, such as slow reading speed or irregular practice, by identifying disengagement or trouble understanding tasks. On the other hand, strengths and a passion for learning are demonstrated by high activity levels and quick response rates. Such emotional and behavioral recognition improves understanding of how students learn and where support is needed (Lan et al., 2021).

- **Data-Driven Teacher Support and Intervention**

AI systems create comprehensive reports and dashboards that highlight each student's areas of strength and weakness, allowing teachers to offer focused instruction. Teachers can identify students who succeed in creative writing or vocabulary development and those who struggle with grammar or listening abilities using AI insights. This supports individualized teaching and early intervention strategies to strengthen learners' English abilities (Aristeidou & Cross, 2021).

How Big Data Provide Students interaction in English Language .

The emergence of Big Data technologies has entirely changed the educational landscape by empowering educators, learners, and administrators to make well-informed decisions based on vast amounts of learning data. In English language learning (ELL), Big Data is a transformative tool that improves student interaction through collaborative digital platforms, adaptive learning systems, and data-driven feedback. By analyzing learners'

behavioral patterns, preferences, and progress, Big Data technologies create personalized learning experiences that foster deeper student engagement and interaction. Because it fosters teamwork, communication skills, and immediate feedback, student engagement is crucial to the learning of the English language.

- **Data-Driven Personalization and Feedback**

Personalized learning experiences are one of the main ways Big Data improves student interaction. Intelligent systems can suggest particular assignments and resources that meet the needs of each learner by evaluating student data. For instance, the system can automatically create activities that focus on a student's areas of weakness if they frequently struggle with English grammar (Zawacki-Richter et al., 2019). Additionally, real-time feedback from Big Data analytics enables students to evaluate their performance.

- **Collaborative Learning through Data Analytics**

By identifying students who have similar learning objectives or difficulties and putting them in groups for peer learning, big data promotes collaborative learning. Students can practice communicating in English and share ideas using chatbots, online discussion boards, and virtual classrooms. Platforms for learning g analytics keep an eye on these exchanges and offer insights into how group projects impact student performance and engagement (Siemens & Long, 2011). to developing communicative competence in English, is improved by this data-driven partnership.

How AI Identify and Analyze Students Weakness and Strength in English Language..

- **Learning Analytics and Predictive Modeling**

AI-powered learning analytics systems enable educators to predict student outcomes by analyzing large datasets from quizzes, assignments, and platform engagement logs. These systems use algorithms such as neural networks and decision trees to detect trends that signify skill weaknesses or strengths across reading comprehension, writing accuracy, and listening fluency. Predictive modeling identifies at-risk learners by correlating low engagement or poor performance with future failure probabilities.

- **Speech Recognition and Pronunciation Evaluation**

AI-driven speech recognition systems evaluate pronunciation, fluency, intonation, and rhythm by comparing learners' speech with native-speaker acoustic models. These systems employ deep neural networks and phoneme-level analysis to identify pronunciation weaknesses, such as misarticulation or incorrect stress patterns, while recognizing strengths like fluency and natural rhythm (Juang & Rabiner, 2022). Applications like ELSA Speak and SpeechRater provide learners with immediate corrective feedback and performance scores based on phonetic alignment and acoustic matching.

- **AI-driven Writing Analytics and Automated Scoring**

AI writing analytics systems assess student essays through automated essay scoring (AES) models that evaluate grammar, syntax, organization, and coherence using NLP and machine learning algorithms. Tools like E-rater and Criterion from ETS analyze writing style, vocabulary use, and structural coherence, thereby identifying both weaknesses (e.g., syntax errors, argument gaps) and strengths (e.g., creativity, lexical richness) (Shermis & Burstein, 2020).

METHODOLOGY

Descriptive survey design was adopted for this study. The study was carried out in Akwa Ibom state. The targeted population for the study comprised of all secondary school student in Akwa Ibom state. A stratified sampling technique was used in selecting 20 secondary school students from each of the 3 Senatorial Districts (Uyo, Ikot Ekpene and Eket). This gave a total of 60 respondents, which formed the sample size for this study. The instrument used for data collection was a structured questionnaire titled "Big Data and Students Interactions in English Language Questionnaire" (BDSIELQ). Face and content validation of the instrument was carried out by an expert in test, measurement, and evaluation in order to ensure that the instrument has the accuracy, appropriateness, and completeness for the study under consideration. The reliability coefficient obtained was 0.89, and this was high enough to justify the use of the instrument. The researcher subjected the data generated for this study to appropriate statistical technique such descriptive statistics to answer research questions and regression analysis to test the hypothesis.

Research Questions 1: The research question sought to find out Roles of Big Data in providing students Interaction in English Language. To answer the research question percentage analysis was performed on the data, (see table 1).

Table 1:

Percentage Analysis of the roles of Big Data in providing students Interaction in English Language.

Roles	Frequency	Percentage
Personalizing Student Interaction	18	30**
Providing Real-Time Interactive Feedback	14	23.33
Enhancing Peer-to-Peer Communication	11	18.33
Strengthening Gamified Interaction	9	15.00
Supporting AI Chatbots and Conversation Tools	5	8.33
Improving Classroom Interaction Patterns	3	5*
TOTAL	**60**	**100%**

** **The highest percentage frequency**

* **The least percentage frequency**

SOURCE: Field survey

The above Table 1 presents the Percentage Analysis of the roles of Big Data in providing students Interaction in English Language. From the result of the data analysis, it was observed that the highest percentage (20%) was recorded against "Personalizing Student Interaction", while the least percentage (5%) was recorded against "Improving Classroom Interaction Patterns". This finding agrees with the opinion of Chen, Zou, and Xie (2021) who stated big data plays a central role in customizing learning activities to suit individual student abilities through continuous analysis of learner data, adaptive platforms adjust speaking tasks, reading content, and communication exercises based on each learner's needs in which personalization increases meaningful interaction because students engage with tasks that match their proficiency level. According to him, adaptive big-data-driven learning systems significantly improve learner interaction by delivering personalized learning experiences.

Research Questions 2: The research question sought to examine AI roles in analyzing student's weakness and strength in English Language. To answer the research percentage analysis was performed on the data, (see table 2).

Table 2: Percentage Analysis of AI roles in analyzing student's weakness and strength in English Language.

Roles	Frequency	Percentage
Adaptive Diagnostic Assessment	19	31.67**
Automated Writing Feedback	15	25.00
Predictive Analytics for Early Intervention	12	20.00
Personalized Learning Pathways	8	13.33
Speech and Pronunciation Analysis	6	10*
TOTAL	**60**	**100%**

****** **The highest percentage frequency**
***** **The least percentage frequency**
SOURCE: Field survey

The above table 2 presents the result Percentage Analysis of the Percentage Analysis of AI roles in analyzing student's weakness and strength in English Language. From the result of the data analysis, it was observed that the highest percentage (31.67%) was recorded against "Adaptive Diagnostic Assessment" while the least percentage (10%) was recorded against "Speech and Pronunciation Analysis". This finding agrees with the opinion of Fitria (2021) who proved that Artificial Intelligence makes learning more efficient and individualized by analyzing data from student assessments and dynamically modifying difficulty levels to meet

each student's unique learning demands. Is opinion also agrees with that of Escalante et al., (2023) who examined that Artificial Intelligence systems provide instantaneous spelling, punctuation, and structural fixes by analyzing essays or reports which enables students to get quick, useful criticism that can help them become better writers.

Conclusion

In conclusion, academic and research libraries play a pivotal role in promoting digital literacy for effective learning, particularly at institutions such as the University of Port Harcourt. By providing access to digital resources, facilitating ICT training, and equipping students with essential digital-research skills, libraries empower learners to succeed in technology-driven academic environments. However, sustaining this impact requires ongoing support in the form of increased funding, upgraded ICT facilities, strong institutional policies, and continuous staff capacity-building. Strengthening these areas will ensure that academic libraries remain key drivers of innovation, academic excellence, and global competitiveness in higher-education systems.

Recommendations

1. The university management should allocate more funds to support digital-literacy programs and upgrade technological facilities within the library to enhance digital-learning services.

2. The University of Port Harcourt Library should invest in modern ICT equipment, reliable Wi-Fi, and high-speed internet to support digital research activities and improve student access to online academic resources.

3. Librarians should undergo regular digital-skills training and professional development workshops to improve their technical competence in assisting students and researchers with digital tools and resources.

REFERENCES

Akpan, E. E. and Clark, L. (2024). Artificial Intelligence: An Emerging Technology for Service and Production Enhancement in the 21st Century. *Global Academic Journal of Library and Information Science (GAJLIS)*, 3(1), 63-74.

Almalawi, A., Soh, B., Li, A., &Samra, H. (2024). Predictive Models for Educational Purposes: A Systematic Review. *Big Data and Cognitive Computing*, 8(12), 187.

Aristeidou, M., & Cross, S. (2021). *Learning analytics to support personalized education.* Computers & Education.

Bassey, M. M. and Owushi, E. (2023). Adoption of Artificial Intelligence in Library and Information Science in the 21st Century: Assessing the Perceived Impacts and Challenges by Librarians in Akwa Ibom and Rivers States. *International Journal of Current Innovations in Education*, 6 (1), 75-85.

Chen (2024), What Is Big Data? Available at: https://www.oracle.com/africa/big-data/what-is-big-data/

Chen, X., Zou, D., & Xie, H. (2021). Adaptive big-data-driven English learning systems improve learner interaction. *Educational Technology & Society*, *24*(2), 15–28.

Daniel, B. (2019). Big Data and learning analytics in higher education: Opportunities and challenges. *British Journal of Educational Technology*, *50*(2), 937–950. https://doi.org/10.1111/bjet.12639

Escalante, J., Pack, A. & Barrett, A. (2023) AI-generated feedback on writing: insights into efficacy and ENL student preference. *International Journal of Educational Technology in Higher Education*. 20, 57

Eze, J., & Nwosu, C. (2023). ICT adoption in Nigerian university libraries. *African Journal of Library & Information Studies*, 14(1), 66-78.

Huge, K. C. and Godwin, O. E. (2024). Adoption of Artificial Intelligence in Curbing Fraud in Public Organization: Assessing Fraud Detection and Control. *GASPRO International Journal of Eminent Scholars*, 11(1), 44-54

Ikechukwu, I. B. and Echerenachukwu, O. (2024). Assessment of Artificial Intelligence Roles in Teaching and Learning (ICT) for Problem Solving in Secondary School in Imo State: Investigating the Prospect and Challenges. *GASPRO International Journal of Eminent Scholars*, 11 (1), 108-123

Juang B. H. & Rabiner L. (2022). Automatic pronunciation evaluation in computer-assisted language learning. *Speech Communication,* 142, 58–76.

Kingsley P., K., & James C., (2025). The Barriers to Effective Information Dissemination By Mass Media: Assessing The Mitigating Strategies Using Modern Technologies In

Kuo, Y.-C., & Belland, B. R. (2020). Student-to-student interaction in online courses: A key factor for motivation and satisfaction. *Distance Education,* 41(3), 425–441.

Lan, Y., Tsai, C., & Lai, C. (2021). *Big data and AI-supported language learning in digital environments.* Educational Technology & Society.

Li, Y., Wang, Q., & Sun, J. (2020). Big-data analytics enhances interactive feedback in online English learning. *Computers & Education, 153*, 103899.

Lion, C. J. and Ekefre, A. E. (2024). Risk Control and Management in Banking Sector: Investigating the Work of Artificial Intelligence in Mitigating Risks. *International Journal of Advancement in Education, Management, Science and Technology,* 7 (I), 82-92.

Mayer-Schönberger, V., &Cukier, K. (2013). *Big Data: A revolution that will transform how we live, work, and think.* Houghton Mifflin Harcourt.

Merino-Campos, C. (2025). The Impact of Artificial Intelligence on Personalized Learning in Higher Education: A Systematic Review. *Trends in Higher Education*, 4(2), 17.

Nguyen, M., & Peters, M. (2022). Classroom interaction and the development of interpersonal skills among university learners. *Journal of Educational Research and Practice,* 12(2), 34–49.

Obamoh, Y. H., Udoh, S., & Charles, N.A., (2025). Artificial intelligence aided building design as the determinant of effective thermal comfort in houses. An academic discourse by architects in tertiary institutions in akwa ibom state, *International Journal of Educational and Scientific research Findings*, (1)7.

Okoro, D., & Ekwueme, P. (2023). *Librarians' digital competence in academic libraries*. Information Science Journal, 27(1), 33-49.

Olanrewaju, T. (2023). *Funding digital research libraries in Nigeria*. Journal of Library Innovation, 21(2), 89-101.

Shermis M. D. & Burstein J. (2020). Automated essay scoring: Theory and applications. *Routledge*

Siemens, G., & Long, P. (2011). Penetrating the fog: Analytics in learning and education. *EDUCAUSE Review, 46*(5), 30–40.

Sun, H., Xie, K., & Zhang, P. (2023). Big data and AI chatbots enhance interactive English language practice. *Interactive Learning Environments, 31*(2), 310–327.

Udo-Okon, T., N., & Ekong, X., M., (2022). Assessment Of The Innovative Technologies And Its Implications On Library Services In Tertiary Institutions In Akwa Ibom State. *Universal Journal of Library and Information Science*. (3)1,

Uwem, E., & Akpan, M. (2022). *Digital literacy and academic performance in Nigerian universities*. Journal of Digital Education Research, 5(2), 77-89.

Williamson, B. (2017). *Big Data in education: The digital future of learning, policy, and practice.* SAGE Publications.

Wu, H., & Chen, Y. (2023). *AI-powered writing support systems and learner feedback.* Language Learning & Technology.

Xie, H., Zou, D., & Wang, F. (2021). Big-data-driven gamification strengthens interactive English learning. *British Journal of Educational Technology, 52*(4), 1443–1462.

Yang, J., Li, M., & Liu, F. (2022). *Speech-based AI feedback for second-language learning.Journal of Computer-Assisted Learning*.

Zawacki-Richter, O., Marín, V. I., Bond, M., &Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education. *International Journal of Educational Technology in Higher Education, 16*(39), 1–27. https://doi.org/10.1186/s41239-019-0171-0

Zhang, X., & Chen, L. (2022). Big-data-enabled peer matching improves student interaction in English learning. *Education and Information Technologies, 27*, 1123–1141.

Zou, B., Du, Y., Wang, Z., Chen, J., & Zhang, W. (2023). An Investigation into Artificial Intelligence Speech Evaluation Programs with Automatic Feedback for Developing EFL Learners' Speaking Skills. *Sage Open*, 13(3).