Impact of Artificial intelligence in Curriculum Development in Nigerian Tertiary Education.

Odunaya M. Oluyemisi
marianyem@gmail.com
Department of Curriculum Instruction, School of Education, Federal College of Education, (Technical) Akoka, Yaba. Lagos.

Abstract

This study investigates the transformative impact of Artificial Intelligence (AI) on curriculum implementation in Nigerian tertiary institutions. Drawing insights from a comprehensive review of existing literature and framed within the context of Self-Determination Theory (SDT), the research explores the multifaceted contributions of AI across various stages of curriculum development and execution. The study reveals that AI technologies, including machine learning and natural language processing, play a pivotal role in enhancing educational practices. Notably, AI facilitates personalized learning experiences, automates assessments, and optimizes curriculum design by analyzing extensive datasets on student performance. The findings underscore the potential of AI to address scalability issues in education, offering a dynamic approach to curriculum development that considers individual learner needs and ensures the delivery of high-quality educational content. Moreover, the study identifies future prospects for AI in education, envisioning advancements in adaptive learning systems, intelligent tutoring, and expanded applications of AI-driven virtual assistants. Despite the positive impacts, the research acknowledges challenges, such as ethical concerns and the imperative for workforce re-skilling. The study concludes with recommendations for increased governmental funding and effective deployment of AI technologies in tertiary institutions to harness the full benefits of AI in shaping the future of education.

Keywords: *Artificial intelligence, Curriculum, Technology, Learning, Tertiary institutions, Education*

Introduction

The global landscape of education has undergone a profound transformation, compelled by the challenges posed by the COVID-19 pandemic. Beyond reshaping societal norms and interpersonal interactions, the pandemic has prompted a re-evaluation of traditional teaching and learning methodologies. To address the imperative of remote learning, the integration of technologies, particularly information communication technology (ICT),

becomes indispensable. This necessitates a paradigm shift in national curricula, formalizing a new educational normal characterized by innovative approaches. This paper explores the convergence of curriculum innovation and the integration of artificial intelligence (AI) in Nigeria's educational landscape, recognizing the pivotal role of curriculum in shaping the vision for education.

Curriculum, as the blueprint for educational systems, plays a pivotal role in fostering innovation. Consequently, there is a growing recognition that curriculum innovation is imperative for bridging the gap between outdated educational practices and the evolving needs of contemporary learners.

Recognizing the need for education to transcend spatial constraints, the integration of AI into curriculum development emerges as a vital imperative. AI, characterized by machine learning algorithms, neural networks, and natural language processing, represents an advanced technological paradigm that simulates human intelligence processes. In the context of education, AI holds the promise of revolutionizing learning experiences. Although the application of AI is still in its nascent stages in developing countries like Nigeria, its potential has already manifested in personalized learning experiences, real-time feedback mechanisms, and early detection of learning obstacles. In this regard, the paper emphasizes the critical role of AI in aligning educational practices with the demands of a rapidly evolving digital era.

As the dialogue on the intersection between AI and education gains momentum, it is crucial to acknowledge the dual nature of AI's impact—presenting both threats and opportunities. The Council of Europe's Committee of Ministers highlights the multifaceted influence of AI in education, noting its potential while also recognizing inherent threats (Holmes et al., 2022). Machine learning (ML) and AI, recognized as essential drivers of innovation and growth across sectors, including education, have faced a measured acceptance within the education technology (EdTech) domain. However, the pandemic catalyzed a paradigm shift, with a remarkable 86 percent of educators advocating for the integral role of technology in education (Madhurjya, 2022). This shift underscores the urgency of reconsidering traditional approaches to education and embracing the transformative potential of AI.

This paper contributes to the discourse by investigating the role of AI in curriculum development, specifically focusing on higher education in Nigeria. Through an analysis of major AI technologies employed in higher education, an examination of Nigerian government initiatives to incorporate AI into the national educational curriculum, and a comprehensive review of literature on the impact of AI in curriculum development, the study aims to elucidate the potential benefits and challenges. Drawing on empirical

evidence from past studies, the paper discusses the deployment of AI in tertiary institutions and its potential to enhance curriculum implementation. By doing so, the findings not only contribute to the burgeoning literature on AI in education but also present a compelling case study of Nigeria—a country endowed with robust internet infrastructure yet grappling with lower levels of digitalization in its economy.

Overview of Artificial Intelligence

Artificial intelligence (AI) stands as an advanced technological frontier, simulating human intelligence through machine learning algorithms, neural networks, and natural language processing (NLP). Its transformative impact extends across diverse industries, encompassing healthcare, finance, and manufacturing. In recent years, AI has emerged as a potent force in educational management, revolutionizing the learning landscape. It contributes to enhancing the learning process, elevating student outcomes, and streamlining administrative tasks. Positioned at the forefront of the fourth educational revolution, AI represents a key driver of technological progress, reshaping societies and economies globally.

The study of intelligent machines and software capable of reasoning, learning, knowledge acquisition, communication, manipulation, and perception defines the realm of Artificial Intelligence (Verma, 2018). Rooted in computer science, AI focuses on designing intelligent systems that emulate human behaviors associated with reasoning, language processing, perception, vision recognition, and spatial processing (Ocana et al., 2019). As Strusani and Houngbonon (2019) emphasize, AI involves harnessing vast data volumes and computing power to simulate diverse human intellectual abilities, marking a pivotal era in technological evolution.

The integration of AI into education signifies a paradigm shift, presenting opportunities for unprecedented advancements in the learning process and administrative efficiency. As AI becomes integral to educational systems, the implications for student engagement, personalized learning, and resource optimization are substantial, promising a future where technology plays a central role in shaping a more adaptive and effective educational landscape.

Key Artificial Intelligence Technologies in Education

Artificial Intelligence (AI) has unequivocally emerged as a transformative force, permeating various facets of human life, with educational management standing as a notable beneficiary. Scholars and researchers have extensively explored the applications of AI in education, highlighting its multifaceted impact. Among the major AI technologies instrumental in reshaping educational practices are machine vision, expert

systems, machine learning, natural language processing, deep learning, and robotics.

1. Machine Vision (MV): Machine vision, synonymous with computer vision, stands as a pivotal technology within the realm of Artificial Intelligence. Richter, Marín, Bond, & Gouverneur (2019) describe machine vision as a capability that empowers software to recognize patterns, make predictions, and adapt discovered patterns to unforeseen situations. Operating with high speed, precision, and accuracy, machine vision replicates human visual perception, utilizing cameras and computers for functions such as recognition, tracking, object measurement, and image processing. This technology finds applications in video surveillance, facial recognition, biometric face scanning, autonomous driving, medical image analysis, and archaeology (Chen, 2019). In the educational context, machine vision proves invaluable for tasks like attendance recording, monitoring students' facial expressions, and detecting signs of confusion in learners. However, the incorporation of machine vision into education holds immense promise for improving attendance tracking, enhancing classroom dynamics through facial expression monitoring, and providing targeted support for students facing challenges in comprehension.

2. Automated Facial Recognition (FR): Machine vision seamlessly integrates with Automated Facial Recognition (FR) for attendance marking in educational settings (Richter et al., 2019). The FR system streamlines the attendance process, optimizing class time for both teachers and students while eliminating the need for manual cross-checking. Cameras embedded with machine vision track movements and monitor students' facial expressions during classes and examinations, adding a layer of intelligent surveillance to the educational environment (Chen, 2019). The utilization of Automated Facial Recognition, coupled with machine vision, not only streamlines administrative tasks but also contributes to a more efficient use of instructional time, fostering an environment conducive to focused and productive learning.

3. Expert System (ES): Expert systems (ES) represent a pivotal facet of Artificial Intelligence (AI), embodying the capacity of computer software to replicate human expertise within a specific domain, facilitating problem-solving through a meticulously organized knowledge base. Nwigbo and Madhu (2016) underscore the utilization of expert systems in education, particularly within the Intelligent Tutoring System (ITS). These systems function as adept tutors, delivering personalized learning experiences by considering students' prior knowledge and abilities. Notably, AI-driven career coaches embedded with expert systems provide individualized advice to students, incorporating historical data, experiences, locational preferences, skills, and career requirements (Khare et al., 2018). The integration of expert systems into educational frameworks holds

significant implications for personalized learning and career guidance. By replicating human expertise, these systems contribute to a tailored and adaptive educational experience, aligning with the diverse needs and aspirations of students.

4. Natural Language Processing (NLP): Natural Language Processing (NLP) stands at the intersection of AI and linguistic communication, focusing on emulating human natural language patterns. This technology facilitates interaction with intelligent systems using natural languages, both written and spoken. Kolodny (2017) emphasizes the integration of NLP into various applications, such as talking calculators, enabling oral dictation of numbers and signs. Furthermore, NLP broadens access to information for individuals with visual impairments, hearing difficulties, and motor challenges, fostering independent conversations. Common services like Google Translate and chatbots exemplify the practical applications of NLP, providing multilingual access to information. The incorporation of Natural Language Processing into educational contexts offers avenues for enhanced language learning, spelling and grammatical corrections, and multilingual support. AI-driven writing assistants based on NLP and Machine Learning present opportunities to augment the writing process, providing corrective feedback and recommendations for improvement.

5. Machine Learning (ML): Machine learning (ML) stands as the forefront of Artificial Intelligence, encompassing the design, training, and deployment of models to applications, processes, and other machines. Chen (2019) delineates ML's core components, including algorithms, Application Programming Interfaces (APIs), development and training toolkits, data, and computing power. Goksel and Bozkurt (2019) emphasize ML's dynamic application, utilizing existing data for predictive analysis. In education, ML plays a pivotal role in optimizing course material selection through content providers, employing feedback and scoring systems for assignment grading, plagiarism detection, and student progress assessment. Integration with Natural Language Processing enhances applications like text-to-speech and language translation, exemplified by Google Translate. ML transforms information retrieval by automating suggestions and recommendations based on geographic location, search history, and user preferences, providing students and lecturers' access to a wealth of internet knowledge. The integration of Machine Learning into educational practices not only streamlines administrative tasks but also enhances the learning experience, offering personalized content recommendations and revolutionizing information retrieval for academic purposes.

6. Deep Learning (DL): Deep Learning (DL), synonymous with deep neural networks, represents a sophisticated facet of machine learning primarily utilized in pattern recognition and classification applications with substantial datasets. Chen (2019) highlights DL's capacity to enable virtual assistants to detect and comprehend speech, images, sound, and videos. In the realm of education, DL significantly augments online learning efficiency, as adaptive educational software tailors content to meet individual student needs. This fosters personalized learning experiences, providing avenues for students to receive additional assistance from tutors, thereby enriching the overall learning process. The incorporation of Deep Learning into online learning platforms presents a transformative potential, offering personalized learning experiences and reinforcing the role of technology in addressing individual learning needs.

7. Robotics: Robotics, encompassing the design, construction, operation, and application of robots, represents a multifaceted science and technology domain. The Robot Institute of America's definition underscores the reprogrammable, multifunctional nature of robots, capable of executing various tasks through programmed motions. Odoh (2018) emphasizes that robots are equipped with sensory capabilities akin to human environmental perception. In the educational context, robots offer synchronous lessons to absent students, exemplified by Avatarion's technology connected to Microsoft Azure IoT Hub. This facilitates full video and audio connections for students in hospitals or homes, allowing them to actively participate in the learning process through a tablet-controlled robot. This innovative approach bridges the gap for physically absent students, transforming traditional learning dynamics. The integration of robotics into education holds significant implications for inclusivity, enabling absent students to engage actively in the learning process. This technological advancement fosters a more accessible and participatory educational environment.

AI in Curriculum Development.

Artificial Intelligence (AI) has become a focal point in Nigeria's educational landscape, exemplified by the establishment of the National Agency for Research in Robotics and Artificial Intelligence (NARRAI) in 2018. The government, recognizing the transformative potential of AI, entrusted NARRAI with the coordination and oversight of all AI and robotics research endeavors. Minister of Science and Technology, Dr. Ogbonnaya Onu, emphasized NARRAI's commitment to collaboration with international research bodies, partnership with tertiary institutions, and the facilitation of Nigeria's proficiency in leveraging AI technologies for economic growth (Ladeinde, 2019). This strategic initiative reflects the government's proactive stance in integrating AI into the national curriculum.

Nigerian Government's Endeavors in AI Integration

In alignment with its commitment to advancing AI, the Nigerian government has taken substantial steps, as illustrated by the formation of NARRAI. Bobai Ephraim Kato's accomplishment in developing a functional AI robot for his final year project further exemplifies the individual initiatives within the country. Kato's creation, capable of puzzle-solving, underscores the potential for AI to contribute meaningfully to problem-solving in education (Ogbonnia, 2017). Initiatives like ScholarX, a Nigerian social impact start-up, are pivotal in addressing educational disparities. ScholarX focuses on providing access to quality education for young Africans from low-income backgrounds through scholarships, crowdfunding, and e-learning initiatives (Nsehe, 2019). Additionally, the AI innovation from the Obafemi Awolowo University iLab team, particularly the Remote Lab developed by Ishola Babatunde Isaac, showcases the practical integration of AI in educational settings. This system allows students to control laboratory equipment remotely, overcoming constraints of time and space for experimentation in Nigerian universities (Ogbonnia, 2017).

Furthermore, global technology giant Google's establishment of an AI research hub at the University of Lagos in June 2018 highlights the international recognition of Nigeria's potential in AI research and development (Hussain, 2018). These collective efforts, both at the governmental and individual levels, demonstrate a comprehensive approach to integrating AI into the fabric of Nigerian education, with far-reaching implications for curriculum development. The active involvement of the Nigerian government and innovative individuals in fostering AI initiatives signals a paradigm shift in curriculum development. The establishment of NARRAI and various AI applications in education imply a commitment to enhancing learning experiences, promoting problem-solving skills, and preparing students for a technologically advanced future. The synergy between government initiatives and grassroots innovations holds the promise of a curriculum that aligns with the evolving demands of the digital age.

Artificial Intelligence Based Curriculum Development

Artificial Intelligence (AI) plays a pivotal role in revolutionizing curriculum development, primarily leveraging Machine Learning and Text Mining methods (Somasundaram et al., 2020; Tavakoli et al., 2020; Molavi et al., 2020; Pattanshetti et al., 2018). Somasundaram et al. (2020) propose an innovative educational program model grounded in AI back-propagation concepts, tailoring curriculum elements (prerequisites, content, expected outcomes) to meet labor market demands. While the model exhibits promise, its focus remains confined to the realm of Internet of Things (IoT). Pattanshetti et al. (2018) contribute to content delivery by employing Natural Language Processing

(NLP) techniques to create knowledge graphs of Open Educational Resources (OERs), enhancing targeted dissemination. However, the concentration on content level rather than higher-level learning goals limits its scope. Additional studies (Pattanshetti et al., 2021; Tavakoli et al., 2020) introduce automated quality assessment approaches for educational resources, aiding content providers in filtering out low-quality materials. Molavi et al. (2020) pioneer a method utilizing Latent Dirichlet Allocation (LDA) algorithms to extract topics from educational resources, shaping learning pathways, albeit within the context of text mining education.

Despite steps in personalized educational systems (Rojas-López et al., 2022), scalability remains a significant challenge. Current approaches focus on key content domains and may compromise on the quality of educational content due to scalability issues (Tavokoli et al., 2020; Zhang et al., 2020). There is an urgent need for a scalable and dynamic curriculum development approach that caters to individual learner needs, encompasses relevant knowledge areas, integrates high-quality educational content, and requires minimal maintenance efforts (Zhang et al., 2020). The integration of AI into curriculum development heralds a new era of personalized education, aligning with individual learner needs and labor market demands. However, addressing scalability issues is imperative for sustained success, ensuring that educational systems can adapt dynamically to evolving requirements while maintaining high standards of content quality and relevance.

Theoretical Frameworks

Self-determination Theory (SDT)

The Self-determination Theory (SDT) is a valuable framework for understanding educators' motivations and psychological needs when adopting educational innovation in Nigerian educational environments when looking at the integration of AI into curriculum creation. Based on the work of Ryan and Deci (2000), SDT proposes that individuals have three fundamental psychological needs: autonomy, relatedness, and competence. These needs play a crucial role in driving educators' intrinsic motivation to participate in curriculum development processes (Niemiec & Ryan, 2009). In the context of AI integration, autonomy refers to educators' sense of control and freedom to innovate with AI technologies in curriculum design. Relatedness emphasizes the importance of fostering a sense of community and shared purpose among educators as they collaborate on AI-driven curriculum initiatives. Additionally, competence reflects educators' confidence in their ability to effectively utilize AI tools to enhance teaching and learning experiences. By addressing these psychological needs, educational institutions in Nigeria can create an environment that promotes educators' intrinsic motivation, thereby facilitating the successful integration of AI into curriculum development.

Furthermore, applying SDT within the Nigerian educational landscape has implications for the effective utilization of AI in curriculum development. By prioritizing educators' autonomy, relatedness, and competence, educational stakeholders can empower teachers to embrace AI technologies as tools for innovative pedagogy. This approach not only enhances educators' motivation and engagement but also fosters a culture of continuous improvement and adaptation in response to evolving educational needs. Moreover, by aligning curriculum development efforts with educators' intrinsic motivations, educational institutions can enhance the quality and relevance of educational offerings, ultimately contributing to the advancement of the Nigerian educational system in the era of AI integration.

The implications of SDT for introducing innovations suggest that school leaders should adopt autonomy-supportive strategies instead of controlling ones (Ryan & Deci, 2000). In an autonomy-supportive environment, leaders should prioritize teachers' perspectives, provide them with choices in planning, and reduce unnecessary stress. This allows teachers to exercise autonomy in making curriculum decisions based on their self-efficacy, fostering a sense of empowerment (Chiu & Churchill, 2016; Patrick & Canevello, 2011). Schools can further support competence by providing professional training and granting teachers freedom in their professional development (Chiu & Churchill, 2016; Ryan & Deci, 2000). For example, schools may allow and encourage teachers to pursue relevant courses during school hours. Relatedness, although less extensively studied, is crucial and often manifests in mentorship and collaborative learning experiences (Sparks et al., 2016). However, current research primarily focuses on self-oriented benefits rather than other-oriented community contributions, indicating an area for further exploration within SDT and education literature. Overall, empowering teachers to internalize their curriculum planning experiences is key to sustaining curriculum development efforts, complementing the importance of understanding teachers' motivations alongside curriculum planning approaches.

Empirical Evidence of AI Impact in Curriculum Development

The impact of Artificial Intelligence (AI) on curriculum development is substantiated by empirical evidence across various educational domains. Intelligent tutoring systems, employing AI, are pivotal in providing personalized instruction tailored to individual learning styles (Zhang & Li, 2021). Ecker, Langer, König, & Schmitz (2018) Ecker et al. (2018) affirm that automated grading systems, a manifestation of AI in education, exhibit accuracy comparable to human graders, contributing to time efficiency and grading consistency.

AI's analytical capabilities extend to identifying at-risk students through data analysis, enabling timely and targeted interventions (Wang et al., 2020). Predictive analytics, as Wang et al. (2020) suggest, empower educators to foresee potential dropout risks or course failures, facilitating proactive measures. Personalized learning, a core outcome of AI integration, enhances overall learning outcomes and boosts student engagement (Chen, Li, Li, & Li, 2021). AI-driven systems analyze individual student strengths, weaknesses, and learning styles to craft personalized learning paths (Chen et al., 2021).

In another study, Smith (2021 & 2022) outlines a spectrum of applications for Artificial Intelligence (AI) in educational management. These applications include personalized learning, where AI tailors learning paths to individual students based on their unique attributes; intelligent tutoring systems providing real-time feedback and individualized learning experiences; student performance prediction utilizing AI algorithms to analyze various data factors and intervene proactively; automated grading for multiple-choice and short-answer questions, freeing up teacher time; learning analytics aiding educators in analyzing student data for trends and patterns; AI-powered chatbots and virtual assistants offering instant answers to common queries; campus safety through AI-powered surveillance systems; recruitment and admissions with AI analyzing applicant data; financial aid and student services automation; and AI's role in informing curriculum development by analyzing job market trends and identifying future skill needs.

Antara (2023) further buttress this by discussing the benefits and challenges of AI in curriculum development, emphasizing its role in expediting lesson design but acknowledging concerns about students potentially misusing AI tools. Harve's (2023) blog post explores AI's transformative potential in learning and development, highlighting personalization, automated assessments, intelligent recommendations, and enhanced learner engagement. Plitnichenko (2020) observes the global adoption of technology, particularly AI, in education, emphasizing its disruptive impact on customizing learning experiences. Xia and Li's (2022) article delves into the development of higher education and the enhancement of teaching skills through AI, employing specific problem analysis methods to draw conclusions.

Xia and Li (2022) delve into the development of higher education and the enhancement of teaching skills through artificial intelligence (AI). The article employs specific problem analysis methods to examine the challenges and solutions in the higher education development process, offering a focused exploration of key considerations.

Igbokwe's (2023) study aims to explore the application of AI in educational management, emphasizing its benefits and challenges. Employing a systematic review methodology, the research examines literature on AI in educational management, highlighting advantages like improved student engagement, personalized learning, and cost-effectiveness. However, the study acknowledges challenges, including ethical concerns, potential biases, and the need for workforce re-skilling. It concludes that while AI holds tremendous potential for enhancing educational management, careful and cautious deployment is crucial.

The joined findings from the reviewed studies on artificial intelligence (AI) in education signal a transformative horizon in educational management. The implications are twofold, encompassing opportunities and challenges. Firstly, Chiu and Chai's (2020) advocacy for a holistic curriculum development approach suggests a shift towards comprehensive AI-driven frameworks, harmonizing content, product, process, and praxis elements. Secondly, Xia and Li's (2022) emphasis on AI's potential to enhance teaching skills in higher education indicates a pathway for educators to leverage AI-driven tools for innovative pedagogical practices. Kandula's (2020) focus on AI as the linchpin of intelligent tutor systems implies a role in fostering critical thinking and decision-making skills among students. Lastly, Igbokwe's (2023) systematic review underscores AI's capacity to improve educational management but underscores the need for judicious deployment, considering ethical concerns and workforce re-skilling. In essence, while AI promises advancements in teaching and learning, its integration necessitates a cautious and strategic approach, balancing opportunities with ethical considerations and ongoing professional development..

AI role in Curriculum Implementation in Nigerian Higher Education.

In the context of Nigerian higher education, the deployment of Artificial Intelligence (AI) holds significant potential for enhancing various aspects of curriculum implementation. Lecture planning and preparation, a crucial step in curriculum delivery, is streamlined through AI's ability to automate routine tasks such as lesson planning, scheduling, attendance marking, grading, and record-keeping (Ogunode, 2020). This automation not only reduces the administrative burden on academic staff but also allows educators to focus on improving educational quality. Additionally, AI tools can generate automated alerts, report cards, and communication with parents, fostering efficient communication channels.

Furthermore, the preparation of instructional resources for effective lecture implementation is a responsibility often shouldered by academic staff. AI's role in this domain involves the creation of smart content, ranging from digital textbooks to instructional snippets and videos. Ogunode et al. (2021) highlight the potential for AI to facilitate personalization in education, a global trend that aligns with the future of learning. AI tools can create customized learning environments based on educational strategies and goals, including augmented reality/virtual reality (AR/VR) lessons and web-based content. Monitoring and evaluation tools powered by AI and machine learning algorithms contribute to identifying areas for curriculum improvement, ensuring that content aligns with diverse learning styles and effectively addresses areas of weakness. This adaptive approach enhances the overall quality of instructional resources and supports educators in refining their teaching methodologies.

In Nigerian higher education, the preparation of instructional resources for lecture implementation stands as a critical responsibility for academic staff. This task demands meticulous planning and organization, and Artificial Intelligence (AI) emerges as a valuable ally in this endeavor. Ogunode et al. (2021) assert that AI contributes to the creation of "smart content," encompassing digital textbooks, guides, instructional snippets, videos, and customized environments tailored to educational objectives. This aligns with the global trend of personalization in education, where AI tools facilitate the development of augmented reality/virtual reality (AR/VR)-based learning environments and web-based lessons. Furthermore, AI Monitoring and Evaluation tools play a pivotal role in streamlining content to accommodate diverse learning styles and pace variations, identifying areas for improvement in the curriculum.

Lecture presentation, a crucial aspect of curriculum implementation, is enhanced by AI in tertiary institutions. The quality of teaching contents and methods has been improved, adapting to the needs and capabilities of colleges and universities (Ohiare et al., 2021). AI contributes to the establishment of an artificial intelligence literacy framework within the general education system, fostering students' general interest, sustainable development, and global governance. By analyzing students' learning styles and abilities, AI facilitates the creation of personalized learning experiences, allowing educators to customize teaching methods, curricula, and materials to meet individual needs.

The assessment of students, a responsibility often shouldered by lecturers, sees advancements through AI, particularly in the administration of online tests. AI automates the assessment and grading process, saving time and ensuring objective evaluation

(Oztok and Zingaro, 2019). Large datasets of student information, including assessment scores and behavioral patterns, can be analyzed by AI to identify areas where students may be struggling, enabling targeted interventions (Singh and Singh, 2021). Additionally, the marking of students' scripts is streamlined through AI-powered grading software, combining machine learning to replicate the human grading process efficiently (Smith, 2021). These tools integrate seamlessly into virtual environments or cloud-based platforms, offering swift and accurate grading, particularly beneficial when handling a substantial number of papers.

Lecturers can leverage AI to assign assignments to students online, fostering student involvement in the curriculum. Smith (2022) underscores the capability of AI in assisting lecturers and teachers with the assignment process, facilitating the issuance and submission of online assignments by students. Furthermore, AI contributes significantly to the preparation and release of students' results, a crucial aspect of curriculum implementation. The technology aids administrators and teachers in analyzing extensive datasets, encompassing student performance data, attendance records, and resource allocation (Westagilelabs, 2022). AI-powered systems discern patterns and trends, providing valuable insights for informed decision-making. This empowers administrators to formulate data-driven strategies for improving student outcomes, allocating resources efficiently, and evaluating programs.

The selection of an appropriate teaching method, a pivotal responsibility of lecturers, is streamlined with AI assistance. Intelligent auxiliary teaching systems, applied extensively in colleges and universities, collect and analyze data, match learning styles, and establish effective communication between teachers and students. This innovation aids in designing teaching plans, collecting materials, online question answering, testing, and evaluating teaching, thereby reducing daily work burdens and introducing new teaching methods to foster students' innovative thinking and social skills (Westagilelabs, 2022).

Moreover, the monitoring of students' progress is revolutionized through AI in tertiary institutions. Xiaolin and L. Xiaojun (2022) highlight how teachers can remotely monitor students' learning trajectories, deliver personalized learning resources, and provide real-time guidance through intelligent teaching platforms. These platforms facilitate interactive sessions between teachers and students, allowing personalized learning guidance based on data analysis of students' classroom learning. Additionally, AI algorithms analyze various student factors, including performance and attendance, predicting students at risk of falling behind and enabling early intervention (Zawacki-Richter and Anderson, 2014).

In essence, the integration of AI into Nigerian higher education significantly contributes to efficient lecture planning, personalized instructional resources, improved lecture presentation, streamlined assessment processes, and expeditious script marking, ultimately enhancing the overall quality of curriculum implementation.

Implications for Curriculum Development and Future Prospects.

Implications for Curriculum Development:

The integration of artificial intelligence (AI) in curriculum development presents profound implications for the education landscape. As evidenced in the study, AI technologies, such as machine learning and natural language processing, enable personalized learning experiences, automate assessments, and enhance learner engagement (Harve, 2023; Singh and Singh, 2021). The ability of AI to analyze vast amounts of student data contributes to the optimization of curriculum design and delivery, ensuring that educational content aligns with individual learning styles and needs (Somasundaram et al., 2020). Moreover, the study highlights the role of AI in addressing scalability challenges and fostering dynamic curriculum development, emphasizing the need for an approach that considers learners' needs, relevant knowledge areas, and high-quality educational content (Tavakoli et al., 2020). These implications underscore the transformative potential of AI in shaping more adaptive, personalized, and data-driven curricula.

Future Prospects:

Looking ahead, the future prospects of AI in education are promising, with implications reaching beyond the current capabilities outlined in the study. As AI technologies continue to evolve, the educational sector may witness advancements in adaptive learning systems that can respond dynamically to individual student progress, further enhancing the personalization of education (Rojas-López & García-Peñalvo , 2022). Additionally, the integration of AI in curriculum development may lead to the emergence of intelligent tutoring systems with enhanced capabilities to provide real-time feedback, adapt to diverse learning needs, and track student progress more effectively (Smith, 2021). The ongoing development of AI-driven chatbots and virtual assistants could play a pivotal role in providing instant support to students, potentially expanding their use to more complex problem-solving scenarios (Singh and Singh, 2021).

Challenges and Considerations:

While the study emphasizes the positive impacts of AI in curriculum development, it also highlights challenges and considerations that warrant attention. Ethical concerns, potential biases, and the need for re-skilling the workforce are recognized as challenges

associated with the adoption of AI in education (Igbokwe, 2023). Striking a balance between harnessing the benefits of AI and addressing these challenges will be crucial for the successful and ethical integration of AI technologies in shaping the future of education. Ongoing research and collaboration among educators, policymakers, and technologists will be essential to navigate these challenges and unlock the full potential of AI in advancing curriculum development and educational outcomes.

Conclusion

In conclusion, curriculum changes are prompted by evolving societal needs, cultural shifts, and responses to economic, social, and political dynamics. Technological advancements, such as the integration of artificial intelligence (AI), play a pivotal role in reshaping curriculum implementation within tertiary education. This paper has explored the multifaceted contributions of AI in Nigerian tertiary institutions, emphasizing its impact on lecture planning, instructional resource preparation, presentation, student assessment, script marking, assignment allocation, student preparation, and teaching method selection.

The study, relying on secondary data from diverse sources, affirms that AI has significantly enhanced various facets of curriculum implementation. The paper underscores the transformative potential of AI in streamlining administrative tasks, optimizing learning experiences, and fostering personalized education. As AI continues to revolutionize educational practices, it is crucial for governments to prioritize increased funding for tertiary institutions and ensure the effective deployment of AI technologies. Recognizing the indispensable role of AI in curriculum implementation, these recommendations aim to support the continued integration of advanced technologies, thereby contributing to the evolution and improvement of the educational landscape.

Recommendations

Based on the findings of this study, the following recommendations are suggested:

1. School leaders should prioritize creating autonomy-supportive environments to empower teachers in curriculum planning. This can be achieved by considering teachers' perspectives, providing them with choices in planning, and reducing unnecessary stress and demands on teachers.
2. Government through appropriate agencies should provide professional training and freedom, granting teachers the opportunity to pursue relevant courses during school hours, to support their competence and enhance their contribution to curriculum development.

3. Employee of educators and school leaders should foster collaborative learning experiences among teachers, utilizing mentorship programs and group activities, to enhance relatedness, promote a sense of belonging and community among educators, and increase their motivation and engagement in curriculum planning.
4. There is need for continuously evaluate the effectiveness of autonomy-supportive strategies and professional development initiatives in fostering teachers' motivation and engagement and adapt approaches based on feedback and outcomes to ensure sustained commitment to curriculum development efforts.

References

Antara., H. (2023). AI in curriculum Development: Opportunities and challenges. Hurix.com. https://www.hurix.com/wp-content/uploads/2023/06/AI-in-Curriculum-Development- Opportunities-and-Challenges.jpg

Chen, H. (2019). Success factors impacting Artificial Intelligence adoption perspective from the telecom industry in China, Doctor of Philosophy Dissertation , submitted to Old Dominion University. DOI: 10.25777/a8q8-gm13. https://digitalcommons.odu.edu/businessadministration_etds/102

Chen, J., & Lerman, K. (2019). Ethical challenges of machine learning in education. In Proceedings of the 9th International Conference on Learning Analytics & Knowledge (pp. 481–485). ACM.

Chen, X., Li, L., Li, X., & Li, J. (2021). A review of personalized learning based on artificial intelligence. International Journal of Emerging Technologies in Learning, 16(4), 35-47.

Chiu, T. K. F., & Chai, C. (2020). Sustainable Curriculum Planning for Artificial Intelligence Education: A Self-Determination Theory Perspective. Sustainability, 12(14), 5568. https://doi.org/10.3390/su12145568

Chiu, T.K.F.; & Churchill, D. (2016). Design of learning objects for concept learning: Effects of multimedia learning principles and an instructional approach. *Interact. Learn. Environ*, *24*, 1355–1370.

Ecker, U. K. H., Langer, A. I., König, C. J., & Schmitz, E. A. (2018). Automated essay grading in the sociology classroom: Finding common ground. Teaching Sociology, 46(4), 283-292.

Goksel, N., & Bozkurt, A. (2019). Artificial Intelligence in education: Current insights and future perspectives. In S. Sisman-Ugur, & G. Kurubacak (Eds.), Handbook of Research on Learning in the Age of Trans humanism (pp. 224-236). Hershey, PA: IGI Global.

Holmes, W., Persson, J., Chounta, I.-A., Wasson, B., & Dimitrova, V. (2022). artificial intelligence and education A critical view through the lens of human rights, democracy and the rule of law. https://rm.coe.int/artificial-intelligence-and-education-a-critical-view-through-the- lens/1680a886bd

Hussain, K. (2018). Artificial Intelligence and its applications goal. International Research Journal of Engineering and Technology , 05(01), 838-841. Retrieved from www.irjet.net/

Igbokwe., I. C. (2023). "Application of Artificial Intelligence (AI) in Educational Management," International Journal of Scientific and Research Publications, vol. 13, no. 3, pp. 300-307, 2023.

Kandula, N. (2020). Role of Artificial Intelligence in Education. Alochana Chakra Journal, Volume 9(4), 305–309. Retrieved online from: https://www.researchgate.net/publication/351082272_Role_of_Artificial_Intelligence_in_Educati on

Khare, K., Stewart, B., & Khare, A. (2018). Artificial Intelligence and the student experience: An institutional perspective, IAFOR Journal of Education 6(3), 63-78. Retrieved from https://files.eric.ed.gov/fulltext/EJ1198691.pdf

Kolodny, L. (2017). Voiceitt lets people with speech impairments use voice-controlled technology . from: https://techcrunch.com/2017/06/01/voiceitt-letspeople-with-speech-impairments- use-voice-controlled/

Ladeinde, F. (2019). The Nigeria's agency for Robotics and Artificial Intelligence (RAI): A few pointers. Daily Trust. Accessed on 10th December 2019 from https://nigeriaagencyafewpointersdailytrust.mhtml/

Madhurjya, C. (2022). You are being redirected. Retrieved online from: Www.analyticsinsight.net. https://www.analyticsinsight.net/what-is-the-role-of-artificial-intelligence-in-the-education-sector/

Mahantesh., K., Pattanshetti, S. J., Vivek G., & Akshay R. (2018). The open corpus challenge in eLearning. Knowledge Management & E-Learning: An International Journal 10, 1 (2018), 67–85.

Mohammadreza., T., Ali. F., Stefan. T. M., & Gábor K.. (2020). OER Recommendations to Support Career Development. IEEE Frontiers in Education (FIE) , Vol. 1, No. 1, Article . Publication date.

Mohammadreza. M., Mohammadreza, T., & Gábor K. (2020). Extracting Topics from Open Educational Resources. In European Conference on Technology Enhanced Learning. Springer, 455–460.

Niemiec, C. P.; Ryan, R. M. (2009). Autonomy, competence, and relatedness in the classroom: Applying self-determination theory to educational practice. *Theory Res. Educ. 7*, 133–144.

Nsehe, M. (2019). Meet the 10 African startups competing for the 'Next Billion' EdTech prize in Dubai. Retrieved from https://www.forbes.com/sites/mfonobongnsehe/2019/02/25/meetthe-10-african-startups-competing-for-the-next-billion-edtech-prize-indubai/#29a70ac3e1bf

Nwigbo, S., & Madhu, B. K. (2016). Expert System: A catalyst in educational development in Nigeria, Journal of Mobile Computing & Application, 3(2), 08-11. DOI: 10.9790/0050-03020811.

Ocana, F. Y., Valenzuela-Fernandez, L., & Garro-Aburto, L. (2019). Artificial Intelligence and its implications in higher education. Propósitosy Representaciones, 7 (2), 536-568, DOI: 10.20511/pyr2019.v7n2.274

Odoh, L. C., Silas C. E., Ugwuanyi, U. B., & Chukwuani, N. V. (2018). Effect of Artificial Intelligence on the performance of accounting operations among accounting firms in South East Nigeria, Asian Journal of Economics, Business and Accounting, 7(2), 1-11, DOI: 10.9734/AJEBA/2018/41641

Ogbonnia, O. O. (2017). Artificial Intelligence as an imperative to the effective delivery of instructional materials' content, International Journal of Advanced Research and Publications, 1(5), 323-327, accessed from www.ijarp.org

Ogunode N. J., and Adamu, D. G. (2021). "Implementation of Sociology Programme in Nigerian public Universities: Problems and Solutions," Central Asian Journal of Innovations On Tourism Management and Finance, vol. 02, no. 04, pp. 33-40.

Ohiare U. M. F, Ogunode, N. J., & Sarafadeen. R. O. (2021). "Implementation of curriculum programme in Nigerian higher institutions: problems and the way forward," Academicia Globe: Index Science Research, vol. 2, no. 6, pp. 185-195, 2021.

Oztok M., and D. Zingaro. (2019). "Artificial intelligence in education," Springer.

Patrick, H.; Canevello, A. (2011). Methodological overview of a self-determination theory-based computerized intervention to promote leisure-time physical activity. *Psychol. Sport Exerc.*, *12*, 13–19

Plitnichenko, L. (2020). 5 Main Roles Of Artificial Intelligence In Education. ELearning Industry. https://elearningindustry.com/5-main-roles-artificial-intelligence-in-education.

Richter, O. Z., 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(39), 4-27, DOI: 10.1186/s41239-019-0171-0.

Rojas-López A., and García-Peñalvo. J. F. (2022). Personalized education for a programming course in higher education. In Research Anthology on Computational Thinking, Programming, and Robotics in the Classroom. IGI Global, 344–367.

Ryan, R. M.; Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *Am. Psychol*, *55*, 68

Singh, V., & Singh, A. (2021). Role of artificial intelligence in educational management. Journal of Education and Practice, 12(12), 78-85.

Smith, J. (2021). Applications of AI in Educational Management. International Journal of Educational Technology in Higher Education, 18(1), 1-17. https://doi.org/10.1186/s41239-021-00279-9

Smith, J. (2022). Applications of artificial intelligence in educational management. Educational Technology Research and Development, 70(2), 457-478. https://doi.org/10.1007/s11423-022-09981-1

Somasundaram, M., P Latha, and SA Saravana Pandian. 2020. Curriculum Design Using Artificial Intelligence (AI) Back Propagation Method. Procedia Computer Science 172 (2020), 134–138.

Sparks, C.; Dimmock, J.; Lonsdale, C.; Jackson, B. (2016). Modeling indicators and outcomes of students' perceived teacher relatedness support in high school physical education. *Psychol. Sport Exerc.*, *26*, 71–82.

Verma, M. (2018). Artificial intelligence and its scope in different areas with special reference to the field of education. International Journal of Advanced Educational Research, 3(1), 05-10. Retrieved from www.educationjournal.org

Westagilelabs, (2022). "How Artificial Intelligence (AI). is transforming education: 8 cutting-edge applications,". [Online]. Available: https://www.westagilelabs.com/blog/8-applications-of-artificial-intelligence-in-education/.

Xia, X., & Li, X. (2022). Artificial Intelligence for Higher Education Development and Teaching Skills. Wireless Communications and Mobile Computing, 2022, e7614337. https://doi.org/10.1155/2022/7614337

Xiaolin X., and L. Xiaojun, (2022). "Artificial Intelligence for Higher Education Development and Teaching Skills," Wireless Communications and Mobile Computing, pp. 1-10.

Zawacki-Richter., O., and T. Anderson. (2014). "Open educational resources and the use of technology in higher education: A strategic approach," Open Praxis, vol. 6, no. 1, pp. 29-43, 2014. doi: 10.5944/openpraxis.6.1.81.

Zhang. L., James D Basham, and Sohyun Yang. (2020). Understanding the implementation of personalized learning: A research synthesis. Educational Research Review, 100339.