

## ADOPTION OF ARTIFICIAL INTELLIGENCE FOR ENHANCING DATA PROCESSING AND DATA MANAGEMENT IN GOVERNMENT OWNED COLLEGES OF EDUCATION IN BENUE STATE OF NIGERIA

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### ABSTRACT

*This paper assessed the adoption of artificial intelligence (AI) for enhancing data processing and data management in government owned Colleges of Education in Benue State. A descriptive survey research design was used and the population of the study consisted of administrators, ICT personnel, academic staff, and students. The sample size of the population is 150 respondents. In this study, multistage sampling technique involved cluster, purposive and simple random sampling techniques were used to arrive at the selection of the desired respondents. AI has the potential to improve efficiency, accuracy, and security in data processing and data management, its adoption in these institutions remains limited. Therefore, the paper recommended that government should allocate more funds to support AI adoption in colleges of education by providing financial resources for infrastructure development, training, and AI software acquisition. Improved ICT infrastructure, enhanced data security measures among others.*

**Keywords :** artificial intelligence, data processing, data management, government, colleges of education

### INTRODUCTION

In ancient times, traditional method was recognized for data processing and management. Data processing and management have evolved significantly over time, but traditional methods laid the foundation for modern approaches. Traditional data processing methods were primarily manual or batch-oriented, relying on sequential processing and centralized data storage. These methods were widely used before the advent of real-time and cloud-based solutions. One of the earliest methods of data processing was batch processing, where data was collected, processed, and stored at scheduled intervals (Srinivasan, 2018). This approach was efficient for handling large volumes of data, but it lacked real-time processing capabilities. Examples include payroll processing and bank statement generation.

The rapid evolution of digital technologies has revolutionized various sectors, including education. Among these technologies, artificial intelligence (AI) has emerged as a powerful tool for enhancing data processing and data management across institutions. AI-driven solutions have significantly improved efficiency, accuracy, and decision-making processes in educational management (Kumar & Sharma, 2021). Globally, tertiary institutions and technological landscape have continued to change and

will continue to change even in the future. The institutions therefore key into the pervasive and changing technology in order to remain relevant, optimize value and increase access for effective and efficient management delivery. Government-owned colleges of education in Nigeria, particularly in Benue State, face numerous challenges in data handling, including inefficient record-keeping systems, delays in data retrieval, and security concerns. The adoption of AI has the potential to address these issues by automating administrative tasks, improving data integrity, and ensuring real-time access to critical information.

Artificial Intelligence refers to the development of computer systems and machines capable of performing tasks that typically require human intelligence (AFSA, 2022; Ogunode & Gregory, 2023). These tasks include learning, reasoning, problem-solving, perception and natural language understanding. Artificial Intelligence technologies encompass various techniques and approaches, such as machine learning, deep learning, natural language processing, computer vision and robotics. These technologies enable computers to analyze vast amounts of data, recognize patterns, make predictions and automate complex processes. Artificial Intelligence has applications across numerous fields, including health care, finance, transportation, customer service and education. It has the potential to transform industries, improve efficiency

and create new opportunities (AFSA 2022).

Data processing and management are crucial components of educational administration. In many government-owned institutions, manual methods and outdated software often result in inefficiencies, data redundancy, and security vulnerabilities (Adepoju & Olatunji, 2020). AI-driven data management systems can enhance efficiency by employing machine learning algorithms to analyze, organize, and retrieve large volumes of data with minimal human intervention (Oladimeji, 2022). By implementing AI technologies, institutions in Benue State can streamline student record management, automate grading systems, and enhance decision-making through predictive analytics.

Moreover, AI-powered tools such as natural language processing (NLP) and robotic process automation (RPA) can play a vital role in administrative functions, reducing human errors and optimizing workflow processes (Zhou et al., 2021). These innovations can significantly improve institutional effectiveness by facilitating seamless communication, accurate reporting, and better resource allocation. However, despite the potential benefits of AI adoption, challenges such as inadequate infrastructure, limited funding, and resistance to technological change hinder its implementation in Nigeria's educational sector (Eze et al., 2020).

The government of Nigeria has recognized the need for digital transformation in education and has initiated policies to promote the integration of technology in academic institutions (Federal Ministry of Education, 2021). However, the extent to which AI has been embraced in government-owned colleges of education remains limited, particularly in Benue State. It is against this background that this paper is therefore design to harness the potential of artificial intelligence for enhancing data processing and data management in government owned colleges of education.

### **Statement of the problem**

Government-owned colleges of education in Nigeria, particularly in Benue State, face significant challenges in data processing and management. The reliance on traditional and often manual methods for handling student records, academic performance data, staff records, and financial transactions has led to inefficiencies, inaccuracies, data redundancy, and security vulnerabilities. These issues hinder effective decision-making, reduce operational efficiency, and contribute to administrative bottlenecks. One of the primary concerns is the slow retrieval and processing of information, which affects timely decision-making. Many institutions still operate with paper-based systems or outdated digital platforms that lack the necessary features to support

real-time data management (Adepoju & Olatunji, 2020). This leads to delays in student enrollment, transcript processing, examination records management, and financial reporting, which in turn affects institutional effectiveness. Another critical issue is data security and integrity. With increasing cyber threats and risks of data breaches, many government-owned colleges lack robust security frameworks to protect sensitive information. The absence of AI-driven security mechanisms, such as anomaly detection and encryption, makes these institutions vulnerable to unauthorized access and data loss. This raises concerns about the confidentiality and reliability of academic and administrative records.

Furthermore, the lack of automated and intelligent data analysis tools in these institutions prevents effective forecasting, planning, and resource allocation. AI-driven predictive analytics can help educational administrators identify patterns, monitor student performance trends, and allocate resources more efficiently (Oladimeji, 2022). However, the absence of such technologies limits the ability of these institutions to make data-driven decisions that could enhance overall academic and administrative efficiency. Despite the growing awareness of AI's potential, the adoption of AI-driven solutions in government-owned colleges of education remains minimal due to infrastructural limitations, financial constraints, and resistance to change. Many institutions including government owned colleges of education in Benue State lack the technical expertise and funding required to implement AI-based data management systems, leaving them reliant on outdated and inefficient processes.

The scenario discussed above appears not to be different from that of colleges of education in Benue State. Despite all these challenges, not much empirical studies have been carried out to harness the potential of artificial intelligence for enhancing data processing and data management in government owned colleges of education. Scholars such as Adepoju and Olatunji, (2020) studied the challenges of data management in Nigerian educational institutions: A case for digital transformation, Eze, Chinedu-Eze and Bello (2020) assess critical factors influencing digital transformation in Nigerian higher education institutions, Kumar and Sharma, (2021) studied artificial intelligence in education: Opportunities and challenges. None of these studies was carried out in colleges of education in Benue State. Therefore, this paper intends to fill the gap.

### **Research questions**

In the light of the above, the following research questions guided the study;

- (i) To what extent have government-owned colleges of education in Benue State adopted artificial intelligence technologies for data processing and management?
- (ii) What are the challenges hindering the implementation of artificial intelligence-base data management systems in these institutions?
- (iii) What are strategies for integrating artificial intelligence into data processing and management to enhance institutional efficiency, security, and decision-making within government-owned colleges of education in Benue State?

### Significance of the study

Data processing and data management is a serious issue worldwide, hence the significance of this study cannot be overemphasized. This study has both theoretical and practical significance. Theoretically, this study will contribute to the body of knowledge on artificial intelligence application in educational administration. It will extend the Artificial Intelligence Theory by demonstrating how artificial intelligence-driven solutions enhance data management. It will provide a framework for future research on artificial intelligence adoption in the Nigerian education sector. Practically, the study will be of significant to; government, school administrators/management and student. To the government, the study will provide policymakers with insights on the need for AI-driven educational reforms. It will inform policy decisions regarding investments in AI infrastructure for government-owned colleges and it will help in the formulation of guidelines for AI adoption in educational institutions. To the school administrators/management, the study will offer practical recommendations on how AI can streamline administrative operations. It will highlight AI's role in improving record-keeping, decision-making, and resource allocation and it will help administrators understand the challenges of AI integration and strategies for effective implementation. To the students, AI-enhanced data management will ensure accurate and timely processing of academic records. AI-driven predictive analytics can help improve academic performance tracking and personalized learning. Secure and efficient data management will enhance the overall student experience in government-owned colleges.

### Theoretical framework

#### Artificial Intelligence Theory

Artificial Intelligence (AI) Theory was first conceptualized by Alan Turing in 1950 through his groundbreaking work on machine intelligence. Turing proposed that machines could be designed to simulate human

cognitive processes and problem-solving abilities (Turing, 1950). This theory laid the foundation for the development of AI systems, enabling computers to learn, reason, and make decisions based on data. The tenets of AI Theory include:

- (1) **Machine Learning** – AI systems improve over time through experience and data training.
- (2) **Automation** – AI enables the automation of repetitive tasks, reducing human workload.
- (3) **Cognitive Simulation** – AI aims to replicate human-like reasoning and decision-making.
- (4) **Pattern Recognition** – AI can detect trends, anomalies, and relationships in large datasets.

#### Strengths of AI theory

- It facilitates the development of intelligent systems that enhance productivity and efficiency.
- AI applications improve decision-making through data-driven insights.
- It allows for automation, reducing human intervention in administrative tasks.

#### Weaknesses of AI theory:

- AI systems require large amounts of data to function effectively.
- Ethical concerns, such as bias in AI decision-making, remain a challenge.
- The high cost of AI implementation can limit accessibility in developing regions.

#### Relevance to the study

AI Theory is crucial to this research as it underpins the use of AI in data processing and management in government-owned colleges of education. The theory supports the integration of AI-driven solutions to enhance administrative efficiency, automate repetitive tasks, and improve data security in educational institutions.

### OBJECTIVES

The main objective of this paper is to assess the adoption of artificial intelligence for enhancing data processing and data management in government owned colleges of education in Benue State. The specific objectives of the study include;

- (i) To assess the extent to which government-owned colleges of education in Benue State adopted artificial intelligence

technologies for data processing and management.

- (ii) To identify the challenges that hinder the implementation of artificial intelligence-based data management systems in these institutions.
- (iii) To suggest strategies for integrating artificial intelligence into data processing and management to enhance institutional efficiency, security, and decision-making within government-owned colleges of education in Benue State

**METHODOLOGY**

This study adopted a descriptive survey research design. This design is appropriate as it allows for the systematic collection, analysis, and interpretation of data on AI adoption and its impact on data processing and management in government-owned colleges of education.

Benue State, situated in the North-Central region of Nigeria, was established on February 3, 1976. The state derives its name from the Benue River, the second-largest river in Nigeria, which traverses the region. Makurdi serves as the state capital and functions as a significant commercial and administrative center. The prominent colleges of education include: College of Education, Katsina-Ala, College of Education, Oju and Federal College of Education, Odugbo

The target population for this study include administrators, ICT personnel, academic staff, and students in government-owned colleges of education in Benue State. These populations are directly involved in or affected by data management processes in these institutions.

The sample size of the population is 150 respondents. In this study, multistage sampling technique involved cluster, purposive and simple random sampling techniques were used to arrive at the selection of the desired respondents. The table below showed how the area was clustered in line with the existing stratified colleges of education in the study.

**Table 1: Existing colleges of education in benue state for the study**

Sr. No.	College of Education	Respondents
1	Katsina-Ala	50
2	Oju	50
3	Odugbo	50

This paper employed one method of data collection which is questionnaire. The questionnaire consisted of both closed-ended and open-ended questions to gather data on AI adoption, challenges, and potential benefits. The segment was divided into sections. The first section dealt with socio-

demographic data of the respondents, second section dwelt on adoption of artificial intelligence for enhancing data processing and data management in government owned colleges of education in Benue State. Thus, a total number of 150 questionnaires were administered to 150 respondents in the study area; however, only 144 questionnaires were returned and found valid, 6 questionnaires were missing. Thus, data was collected from 144 respondents in this study.

The data collected data was analyzed using quantitative techniques. Descriptive statistics such as frequency, and percentage distributions were used to summarize the data.

**RESULTS AND DISCUSSION**

**Socio-demographic data of the respondents**

**Table 2: Socio-demographic Data of the Respondents**

(n=144)

Sr. No.	Respondents	Frequency	Percent
<b>1</b>	<b>Sex</b>		
a	Male	89	61.8
b	Female	55	38.1
<b>2</b>	<b>Age</b>		
a	18-25 years	12	8.3
b	26-30 years	25	17.3
c	31-35	56	38.8
d	36 years and above	51	35.4
<b>3</b>	<b>Occupation</b>		
a	Employed (staff)	129	89.5
b	Students	15	10.4
<b>4</b>	<b>Educational qualifications</b>		
a	Primary school	05	03.4
b	Secondary school	27	18.7
c	Tertiary	112	77.7
<b>5</b>	<b>Marital status</b>		
a	Single	53	36.8
b	Married	91	63.1

Source: Field Survey, 2025

Table 2 above presented data collected on the socio-demographic data of the respondents. The data presented indicate that in terms of sex, 89 (61.8%) of the respondents were males, while 55 (38.1%) of the respondents were females. Thus, this implies that male respondents were more accessible than female ones during field work. In view of age, the available data shows that 12 (8.3%) of the respondents were between the ages of (18-25) years, 25 (17.3%) of the respondents were within the age brackets of (26-30) years, 56 (38.8%) of the respondents were between the ages of (31-35) years, while 51 (35.4%) of the respondents were between

36 years and above. Thus, this implies that majority of the sampled respondents were between (31-35) years and have been in service to know much about the challenges of data processing and data management in their respective colleges. Regard to occupation, the study found out that 129 (89.5%) of the respondents were employed (staff) of the colleges, while 15 (10.4%) of the respondents were students of the colleges. This implies that majority of the sampled respondents were staff of the school and know much about the issues of data processing and data management in the colleges.

In terms of educational qualification, the data presented indicate that 5 (3.4%) of the respondents had first school leaving certificate (FSLC), 27 (18.7%) of

the respondents were holders of senior school certificate examination (SSCE), while 112 (77.7%) of the respondents had national diploma (ND), national certificate in education (NCE), B.Sc., B.Ed., B.A degree, M.Sc. and PhD degree. Thus, this implies that majority of the sampled respondents had tertiary education, work in tertiary institutions and know much about the challenges of data processing and data management in colleges of education. In respect to marital status, the data presented show that 53 (36.8%) of the respondents were single men and women, while 91 (63.1%) of the respondents were married men and women. This implies that majority of the sampled respondents were family men and women.

**Table 3: Respondents’ views on the extent government-owned colleges of education in Benue State had adopted AI technologies for data processing and management** (n=144)

Sr. No.	Response	Frequency	Percent
1	AI has been fully implemented in data processing and management	09	6.2
2	AI adoption has improved administrative efficiency in my institution	12	8.3
3	Staff and administrators have received adequate training in AI applications	14	9.7
4	The government has provided sufficient support for AI adoption in colleges of education	96	66.6
5	AI has significantly reduced errors and inefficiencies in data management	13	9.0

Source: Field Survey, 2025

Table 3 presented data collected on the extent government-owned colleges of education in Benue State adopted artificial intelligence technologies for data processing and management. The data presented indicate that 9 (6.2%) of the respondents said artificial intelligence has been fully implemented in data processing and management, 12 (8.3%) of the respondents averred that artificial intelligence adoption has improved administrative efficiency in their institutions, 14 (9.7%) of the respondents said staff and administrators have

received adequate training in AI applications, 96 (66.6%) of the respondents were of the opinion that government has provided sufficient support for AI adoption in colleges of education, while 13 (9.0%) of the respondents submitted that AI has significantly reduced errors and inefficiencies in data management. Thus, this implies that government has provided sufficient support for AI adoption in colleges of education but its utilization in terms of data processing and data management has been minimal.

**Table 4: Chi-Square Analysis on Artificial intelligence and potentials for enhancing data processing and data management in government owned colleges of education in Benue State** (n=144)

Response	Observed Frequency	Expected Frequency	$\chi^2_{Cal}$	$\chi^2_{tab}$	df	Sig.	Remarks
SA	71	36	304.78	9.488	4	0.000	Significant
A	59	36					
D	9	36					
SD	5	36					

$\chi^2 = 304.78, df = 2, P < 0.05$

Table 4 presents the summary of  $\chi^2$  analysis on artificial intelligence and adoption for enhancing data processing and data management in government owned colleges of education in Benue State. The result

revealed that at 0.05 level of significance given degree of freedom 4, p-value of 0.000, based on the result, the null hypothesis which stated that artificial intelligence has no significant potentials for enhancing data processing and data management in government owned colleges of education is

rejected. Thus, the study concludes that artificial intelligence has significant potentials for enhancing data processing and data management in government owned colleges of education in Benue State.

## CONCLUSION

The study on adoption of artificial intelligence (AI) for enhancing data processing and data management in government-owned colleges of education in Benue State revealed both opportunities and challenges. While AI has the potential to improve efficiency, accuracy, and security in data processing and data management, its adoption in these institutions remains limited. The findings indicate that the extent of AI implementation is still in its infancy, with most institutions relying on traditional data management systems due to financial, infrastructural, and human resource constraints.

## RECOMMENDATIONS

- (1) Increased Government Investment – The government should allocate more funds to support AI adoption in colleges of education by providing financial resources for infrastructure development, training, and AI software acquisition.
- (2) Improved ICT Infrastructure – Investments should be made in upgrading internet connectivity, establishing data centers, and equipping colleges with modern computing facilities to support AI-driven data management.
- (3) Capacity Building and Training – Regular AI training programs should be introduced for academic and administrative staff to enhance their digital skills and ensure effective implementation and management of AI systems.
- (4) Policy Formulation and Implementation – Clear policies and regulatory frameworks should be developed to guide AI adoption in educational institutions, ensuring ethical data usage, privacy protection, and cybersecurity measures.

## REFERENCES

- Adepoju, S. A., & Olatunji, O. S. (2020). Challenges of data management in Nigerian educational institutions: A case for digital transformation. *African Journal of Education and Information Technology*, 9(2), 45-58.
- AFSA. (2022). Artificial intelligence and education. Retrieved June 22, 2023 from <https://www.theschoolleader.org/news/artificial-intelligence-and-education>

- org/news/artificial-intelligence-and-education
- Eze, S. C., Chinedu-Eze, V. C., & Bello, A. O. (2020). Critical factors influencing digital transformation in Nigerian higher education institutions. *Education and Information Technologies*, 25(3), 1929-1950.
- Eze, S. C., Chinedu-Eze, V. C., & Bello, A. O. (2020). Critical factors influencing digital transformation in Nigerian higher education institutions. *Education and Information Technologies*, 25(3), 1929-1950.
- Eze, S. C., Chinedu-Eze, V. C., & Bello, A. O. (2020). The adoption of ICT for academic management in Nigerian universities: Challenges and solutions. *Education and Information Technologies*, 25(6), 1-23.
- Federal Ministry of Education. (2021). *National digital education policy framework*. Abuja, Nigeria: Government Press.
- Kumar, R., & Sharma, M. (2021). Artificial intelligence in education: Opportunities and challenges. *International Journal of Educational Technology*, 18(1), 23-38.
- Ogunode, N. J. & Gregory, D. M. (2023). Artificial Intelligence (AI) in educational administration. *International Journal on Orange Technologies*, 5(10), 7-16.
- Oladimeji, O. (2022). Artificial intelligence applications in higher education administration. *Journal of Digital Transformation in Education*, 4(2), 56-78.
- Oladimeji, T. O. (2022). Machine learning and data analytics in educational institutions: A systematic review. *Journal of Emerging Technologies in Education*, 5(1), 75-90.
- Srinivasan, S. (2018). *Cloud computing basics*. Springer.
- Zhou, L., Han, J., & Li, Y. (2021). AI in education: A systematic review and future directions. *Computers and Education*, 163, 104123.
- Zhou, Y., Li, H., & Wang, X. (2021). Enhancing administrative efficiency in higher education through AI applications. *Computers & Education*, 168, 104195.