

# Deployment of Artificial Intelligence for Enhancing Monitoring and Evaluation of Schools in Nigeria: Challenges and Solutions

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**Abstract:** The effective monitoring and evaluation (M&E) of schools is a critical component of ensuring quality education, accountability, and optimal resource utilization in Nigeria. Traditional M&E methods have often been constrained by inefficiencies such as delayed data collection, inaccurate reporting, limited analytical capacity, and inadequate coverage of educational institutions, particularly in rural and underserved areas. In recent years, the deployment of Artificial Intelligence (AI) has emerged as a transformative approach to address these limitations, offering the potential to revolutionize how educational data is collected, analyzed, and applied for decision-making. This study examines the prospects, challenges, and policy implications of integrating AI into the M&E processes of Nigerian schools. The prospects of AI include real-time data capture and analysis, improved accuracy and reliability of school information, predictive analytics for proactive planning, personalized interventions for underperforming schools, and enhanced stakeholder engagement through data-driven insights. Despite these opportunities, the deployment of AI in the Nigerian education sector faces significant challenges, including inadequate infrastructure, limited technical expertise, high implementation costs, fragmented data systems, ethical and privacy concerns, and the absence of comprehensive legal and regulatory frameworks. The study underscores the need for robust policies that promote infrastructure development, capacity building, data standardization, ethical governance, and sustainable financing to facilitate effective AI integration. By highlighting both the potential benefits and the constraints, this study provides actionable insights for policymakers, education administrators, and development partners seeking to leverage AI to strengthen school monitoring and evaluation, improve educational outcomes, and enhance accountability in Nigeria's education system.

**Keywords:** Artificial Intelligence, Monitoring and Evaluation, Schools, Education, Policy, Nigeria, Data Analytics, Educational Planning.

## 1.0 Introduction

Monitoring and evaluation (M&E) constitute a critical component of educational management and quality assurance in any education system. Through effective monitoring and evaluation, education authorities are able to assess school performance, ensure compliance with educational policies, track instructional delivery, evaluate resource utilization, and improve learning outcomes. In Nigeria, the monitoring and evaluation of schools remain a major concern due to persistent challenges such as inadequate manpower, poor data management systems, irregular school inspections, limited funding, and weak feedback mechanisms. These challenges have continued to undermine the effectiveness of school supervision and the overall quality of education at basic and secondary school levels.

In recent years, rapid advancements in digital technologies have created new opportunities for transforming educational administration and quality assurance processes. Among these emerging technologies, Artificial Intelligence (AI) has gained global attention for its ability to process large volumes of data, identify patterns, generate predictive insights, and support evidence-based decision-making. Artificial intelligence refers to the simulation of human intelligence in machines that are programmed to think, learn, reason, and solve problems. In the education sector, AI is increasingly being deployed to support teaching and learning, student assessment, administrative management, and institutional planning.

The deployment of artificial intelligence in monitoring and evaluation of schools offers significant potential for addressing long-standing challenges in Nigeria's education system. AI-powered systems can automate data collection, analyze real-time school performance indicators, monitor teacher attendance, evaluate instructional practices, track students' learning progress, and generate timely reports for policymakers and education administrators. Through machine learning algorithms, AI systems can identify trends, detect anomalies, and predict areas of risk within schools, thereby enabling proactive interventions rather than reactive responses.

In the Nigerian context, monitoring and evaluation activities are often constrained by reliance on manual processes, paper-based records, and infrequent physical inspections. These traditional approaches are not only time-consuming and costly but also prone to inaccuracies, manipulation of data, and delayed reporting. The integration of artificial intelligence into M&E processes can significantly enhance efficiency, transparency, and accountability. For instance, AI-enabled dashboards can provide education managers with up-to-date information on school attendance, infrastructure status, teacher deployment, and student performance across multiple locations simultaneously.

Furthermore, artificial intelligence can strengthen evidence-based policymaking in education by improving the quality and accessibility of data. Reliable data is essential for planning, budgeting, and implementing education reforms. AI systems can integrate data from multiple sources such as school records, examination results, digital attendance systems, and inspection reports, thereby providing a holistic picture of school performance. This capability is particularly important in Nigeria, where data gaps and inconsistencies have often hindered effective educational planning and evaluation.

Despite the promising prospects of artificial intelligence for school monitoring and evaluation, its deployment in Nigeria faces several challenges. These include inadequate digital infrastructure, limited technical expertise, poor internet connectivity in rural areas, high cost of AI systems, data privacy and ethical concerns, and low level of awareness among education stakeholders. In addition, the absence of clear national policies and regulatory frameworks on the use of artificial intelligence in education poses a significant barrier to large-scale implementation.

Given the growing emphasis on accountability, quality assurance, and digital transformation in education, it is imperative to explore how artificial intelligence can be effectively deployed to enhance monitoring and evaluation of schools in Nigeria. This study therefore focuses on examining the prospects, challenges, and policy implications of using artificial intelligence to support school monitoring and evaluation processes. By providing a comprehensive analysis of AI deployment in educational M&E, the study aims to contribute to the discourse on technology-driven educational governance and offer practical insights for policymakers, education administrators, and development partners seeking to improve school effectiveness and learning outcomes in Nigeria.

## **2.0 Concept of Artificial Intelligence**

Artificial Intelligence (AI) refers to the simulation of human intelligence by computer systems and machines, enabling them to perform tasks that traditionally require human cognition. These tasks include learning, reasoning, problem-solving, decision-making, perception, and natural language processing. AI systems are designed to mimic human thought processes through algorithms,

machine learning, deep learning, and neural networks. They can analyze large volumes of data, identify patterns, predict outcomes, and provide recommendations for decision-making.

In the education sector, AI has found applications in adaptive learning systems, automated grading, virtual teaching assistants, predictive analytics, and administrative management. AI enhances efficiency and accuracy by automating repetitive tasks, providing real-time insights, and supporting personalized learning experiences. For instance, AI can help monitor student performance trends, predict learning gaps, and recommend interventions to improve outcomes. By reducing the dependence on manual processes, AI has the potential to improve the quality of service delivery and decision-making in educational institutions (Menendez., Ramesh., Baxter, & North, 2016; Mobolaji, Fatusi, Adedini, S2020).

## **2.1 Concept of Monitoring**

Monitoring refers to the continuous and systematic process of collecting, recording, and analyzing data to track the progress of activities, programs, or projects. In education, monitoring involves observing and assessing various aspects of school operations, such as teacher performance, student attendance, curriculum implementation, resource utilization, and learning outcomes. The primary aim of monitoring is to ensure that planned activities are carried out effectively and objectives are being met. Monitoring is proactive in nature and focuses on tracking progress in real-time or at frequent intervals to detect challenges early and facilitate timely interventions. Effective monitoring provides education administrators with critical information to identify bottlenecks, assess efficiency, and allocate resources optimally. In school systems, monitoring helps ensure adherence to educational policies, supports instructional quality, and promotes accountability among staff and students.

## **2.2 Concept of Evaluation**

Evaluation is the systematic process of assessing the effectiveness, efficiency, and impact of programs, policies, or interventions. Unlike monitoring, which focuses on tracking ongoing activities, evaluation seeks to determine the extent to which objectives have been achieved, outcomes realized, and impacts sustained. In education, evaluation often involves examining teacher performance, student achievement, school management practices, and the overall quality of the educational environment.

Evaluation can be formative or summative

- 1) Formative evaluation occurs during the implementation of programs to provide feedback and improve processes.
- 2) Summative evaluation occurs at the end of a program to assess its overall success and inform future planning. Evaluation provides evidence-based insights for decision-making, policy formulation, and accountability. It enables stakeholders to assess the effectiveness of interventions, identify best practices, and make informed adjustments to improve outcomes.

## **2.3 Concept of Monitoring and Evaluation**

Monitoring and evaluation in this paper is viewed as a systematic process determining the progress on a programme to check if the programme implementation is achieving the planned result. It is a system that assesses the stage-by-stage progress made on a project or programme with the aims of determining if the programme or project is realizing the objectives (Ogunode, Kureh, & Kasimu, 2024). Monitoring and Evaluation (M&E) are critical components of program management and are used to systematically collect and analyse information to improve effectiveness and efficiency. Monitoring is an ongoing process that involves tracking the progress of a program against its objectives, while evaluation assesses the program's outcomes to determine the extent of achievement and impact (Sopact nd). Monitoring and Evaluation (M&E) is a continuous management function to assess if progress is made in achieving expected results, to spot bottlenecks in implementation and to highlight whether there are any unintended effects (positive or negative) from an investment plan, programme or project (“project/plan”) and its activities (FAO, nd).

Monitoring and evaluation are synergistic. Monitoring information is a necessary but not sufficient input to the conduct of rigorous evaluations. While monitoring information can be collected and used for ongoing management purposes, reliance on such information on its own can introduce distortions because it typically covers only certain dimensions of a project's or program's activities, and careful use of this information is needed to avoid unintended behavioural incentives. In contrast, evaluation has the potential to provide a more balanced interpretation of performance. But evaluation is a more detailed and time-consuming activity, and because of its greater cost it needs to be conducted more sparingly. One approach is to rely on monitoring information to identify potential problem issues requiring more detailed investigation via an evaluation (World-bank, nd). M&E can be conducted using a wide array of tools, methods and approaches. These include, for example: performance monitoring indicators; the logical framework; theory-based evaluation; formal surveys such as service delivery surveys, citizen report cards, living standards measurement surveys (LSMS) and core welfare indicators questionnaires (CWIQ); rapid appraisal methods such as key informant interviews, focus group discussions and facilitated brainstorming by staff and officials; participatory methods such as participatory M&E; public expenditure tracking surveys; rigorous impact evaluation; and cost-benefit and cost-effectiveness analysis (World-bank, nd).

### **3.0 Result and Discussion on Deployment of Artificial Intelligence in Monitoring and Evaluation of Schools in Nigeria**

Monitoring and Evaluation (M&E) are critical processes in educational administration, providing mechanisms to track school performance, ensure compliance with educational policies, and assess the effectiveness of teaching, learning, and administrative activities. In Nigeria, M&E in schools faces persistent challenges, including manual record-keeping, inconsistent inspections, delayed reporting, limited human resources, and inadequate infrastructure. These challenges often result in incomplete data, poor accountability, and ineffective decision-making. Artificial Intelligence (AI), with its capacity to analyze large datasets, automate tasks, and generate predictive insights, presents a transformative solution to these challenges. AI can enhance the precision, efficiency, and scope of M&E, enabling education authorities to make evidence-based decisions that improve school performance, resource allocation, and instructional quality. This discussion explores in detail the ways AI will aid M&E in Nigerian schools (Ogunode, & Ukozor, 2023).

#### **Automated Data Collection and Management**

One of the primary ways AI will aid M&E in Nigerian schools is through **automated data collection and management**. Traditional M&E relies heavily on manual processes, including school visits, paper-based records, and human observation. This approach is prone to errors, delays, and data loss. AI-powered systems can collect data in real-time from multiple sources, such as:

#### **Digital attendance systems to track teacher and student presence.**

Learning management systems (LMS) to monitor student engagement and academic progress. School infrastructure databases to track resource availability, classroom conditions, and equipment functionality. By automating data collection, AI reduces administrative burdens, ensures accuracy, and provides supervisors with a continuous flow of information (Ogunode & Olowonefa, 2023). This also allows for longitudinal data analysis, enabling policymakers to observe trends in school performance over time.

#### **Real-Time Monitoring and Remote Supervision**

AI enables real-time monitoring of school activities, which is particularly important in Nigeria due to the geographical dispersion of schools and resource constraints. Using AI-powered dashboards, supervisors can:

- a) Monitor classrooms through video feeds and digital lesson observations.
- b) Track curriculum implementation and adherence to teaching standards.

c) Receive alerts for irregularities, such as low attendance, non-compliance with teaching schedules, or inadequate instructional delivery. Remote supervision reduces the need for frequent physical visits, lowering operational costs and allowing supervisors to focus on providing professional support rather than administrative verification. (Ogunode, & Ukozor,2023; Thomas, & Gambari, 2021) This is especially beneficial for rural and hard-to-reach areas where manual supervision is challenging.

### **Predictive Analytics for Early Intervention**

AI systems can employ machine learning and predictive analytics to identify potential risks and challenges in schools before they escalate. For example: AI can analyze historical student performance data to predict learning gaps or at-risk students. Teacher performance trends can be analyzed to forecast training needs or identify instructional weaknesses (Alagbe., Awodele & Ayorinde, 2021). Infrastructure and resource data can be assessed to anticipate maintenance or supply shortages. By providing predictive insights, AI allows education authorities to implement proactive interventions, improving outcomes for students and teachers, rather than reacting to problems after they occur (Ogunode, Edinoh, & Chinedu, 2023; Sharma, Tomar, Bhardwaj, & Sakalle, 021)..

### **Enhanced Decision-Making and Policy Formulation**

Data-driven decision-making is central to effective M&E. AI supports decision-making by processing vast quantities of school data and generating actionable insights. For instance: AI systems can evaluate the effectiveness of teaching methods across multiple schools. Budget allocation decisions can be informed by data on resource utilization and school needs (Bersin, 2019; Boisvert., Flemming, & Shah, 2017). Policymakers can prioritize interventions based on predictive outcomes generated by AI analytics. This capacity ensures that decisions at district, state, and national levels are evidence-based, leading to improved resource efficiency, accountability, and educational outcomes (. Ogunode & Olowonefa 2023; Ogunode, & Gregory, 2023 Sasan, Barquin, Alestre, Librea, & Zamora, 2022)..

### **Continuous Professional Development and Feedback**

AI will also enhance the professional development of teachers and school administrators through real-time feedback mechanisms. AI-powered systems can: Evaluate lesson delivery using digital observation tools (Frankenfield, 2023). Provide automated feedback and recommendations for instructional improvement. Identify patterns in teacher performance that inform targeted training programs. Continuous feedback and professional guidance contribute to higher instructional quality, motivation, and a culture of reflective practice within schools (.Ogunode, & Eimuhi, 2023)..

### **Transparency, Accountability, and Reporting**

AI strengthens transparency and accountability in school monitoring and evaluation. Digital reporting platforms allow for: Centralized storage of M&E data accessible to stakeholders. Standardized evaluation criteria that reduce subjectivity and bias (Igbokwe, 2023).. Digital audit trails that track supervision activities and decisions. These capabilities enhance stakeholder confidence, promote ethical practices, and support compliance with national education standards (Ogunode., Agbade, & Basse, 2023b).

### **Challenges and Considerations for AI Deployment in Nigerian Schools**

Artificial Intelligence (AI) has the potential to significantly improve instructional delivery, school supervision, monitoring and evaluation (M&E), and administrative efficiency in Nigerian schools. However, the effective and equitable deployment of AI technologies requires careful consideration of several interrelated challenges. These challenges are structural, technical, financial, ethical, and policy-related, and they must be systematically addressed to ensure sustainable implementation.

## **Infrastructure Gaps**

Infrastructure deficits remain a foundational challenge to AI deployment in Nigerian schools. Many public secondary schools, particularly in rural and semi-urban areas, lack stable electricity supply, functional ICT laboratories, and reliable broadband internet access. AI technologies depend on uninterrupted power and connectivity to process data, support cloud-based platforms, and enable real-time supervision and analytics. In addition, many schools do not have adequate digital hardware, such as computers, tablets, servers, interactive boards, and data storage systems. Where such devices exist, they are often obsolete, poorly maintained, or insufficient in number. These gaps limit the ability of schools to adopt AI-driven tools for lesson monitoring, student performance tracking, and administrative automation. Without deliberate government investment in power infrastructure, internet expansion, and school digital facilities, AI adoption risks deepening inequality between well-resourced urban schools and disadvantaged rural institutions.

## **Technical Capacity and Human Capital Development**

AI deployment requires a workforce with strong digital competence, data literacy, and technological confidence. Many teachers, instructional supervisors, school principals, and education officers have limited exposure to advanced digital tools, let alone AI-based systems. This skills deficit affects the effective use of AI for lesson observation, automated assessment, predictive analytics, and data-driven decision-making. Beyond basic computer literacy, AI systems require users to understand dashboards, interpret analytics, and make informed instructional and administrative decisions based on generated insights. Continuous capacity-building programmes, in-service training, professional learning communities, and integration of AI literacy into teacher education curricula are therefore critical. Without adequate training, AI tools may be underutilized, misinterpreted, or resisted by educators, undermining their intended impact.

## **Data Privacy, Security, and Ethical Concerns**

AI systems rely heavily on large volumes of educational data, including students' academic records, attendance, behavioral patterns, biometric data, and teachers' performance evaluations. This raises serious concerns regarding data privacy, confidentiality, ownership, and cybersecurity. Inadequate data protection measures expose schools to risks such as data breaches, identity theft, and misuse of sensitive information. Furthermore, ethical concerns arise around algorithmic bias, surveillance, and transparency. Poorly designed AI systems may reinforce existing inequalities, unfairly label students, or misjudge teacher performance. Nigerian schools must therefore adopt strong cybersecurity frameworks, clear data governance policies, informed consent mechanisms, and compliance with national data protection regulations. Ethical oversight is essential to ensure AI supports learning and supervision without violating rights or undermining trust.

## **Cost of Implementation and Sustainability**

The financial implications of AI deployment are substantial. Costs include procurement of digital infrastructure, licensing of AI software, system customization, staff training, technical support, maintenance, and continuous system upgrades. For many public schools operating under constrained budgets, these expenses are difficult to sustain. Long-term sustainability is another concern, as AI systems require continuous updates, monitoring, and skilled technical personnel. Without consistent funding, AI projects may collapse after pilot phases. Effective implementation therefore demands government budgetary commitment\*\*, \*\*public-private partnerships, donor support, and cost-sharing models. Strategic planning is necessary to ensure that AI adoption aligns with broader education financing policies and does not divert resources from essential school needs.

## **Policy, Regulation, and Institutional Readiness**

Clear and comprehensive policy frameworks are critical for guiding AI use in Nigerian schools. Currently, there is limited national policy direction on AI integration in education, particularly regarding standards, accountability, quality assurance, and ethical boundaries. The absence of clear regulations can result in inconsistent practices, misuse of AI tools, and lack of coordination among

stakeholders. Effective AI deployment requires policies that define roles of government agencies, school administrators, technology providers, and supervisors. Regulatory guidelines should address issues such as procurement standards, data usage, transparency, evaluation mechanisms, and ethical safeguards. Institutional readiness at federal, state, and school levels is also essential to ensure alignment between AI initiatives and educational goals.

### **Equity, Inclusion, and Contextual Relevance**

Another critical consideration is ensuring that AI deployment promotes equity and inclusiveness. Schools serving disadvantaged populations, learners with disabilities, and marginalized communities may face greater barriers to AI access. AI tools must be context-sensitive, culturally relevant, and adaptable to Nigeria's diverse educational environments.

### **4.0 Conclusion and Recommendations**

The deployment of Artificial Intelligence (AI) in the monitoring and evaluation (M&E) of schools in Nigeria holds immense potential to transform the education sector. AI can significantly enhance the collection, analysis, and interpretation of educational data, enabling real-time tracking of school performance, predictive planning, and targeted interventions. Its capacity to improve data accuracy, quality, and accessibility can help policymakers, administrators, and educators make more informed decisions and allocate resources more effectively.

However, these benefits are tempered by challenges such as inadequate infrastructure, limited technical capacity, financial constraints, data privacy concerns, and policy gaps. Without strategic planning, these obstacles could hinder widespread adoption and reduce the effectiveness of AI-driven M&E initiatives. Based on the findings, the study recommends the following:

1. The Federal Ministry of Education should design and implement a comprehensive policy that outlines objectives, standards, and guidelines for AI deployment in school M&E. This policy should ensure alignment with national digital education goals and promote coordinated action across federal, state, and local levels.
2. Priority should be given to providing schools with reliable electricity, internet connectivity, and computing devices. Public-private partnerships can be explored to fund and maintain infrastructure, particularly in rural areas.
3. Training programs should be developed for education officials, school administrators, and M&E personnel to enhance skills in AI usage, data analysis, and digital literacy. Universities and research institutions should also be encouraged to offer specialized courses in AI for education.
4. A unified Education Management Information System (EMIS) should be implemented across all states, with standardized data formats and protocols. This will facilitate seamless data sharing and improve AI-driven analysis.
5. Policies must ensure data privacy, security, and ethical use of AI in schools. Compliance with Nigeria Data Protection Regulations (NDPR) and clear guidelines for consent and accountability should be enforced.
6. Governments at all levels should allocate dedicated funds for AI-enabled M&E systems, covering procurement, maintenance, and training. Innovative financing mechanisms, such as grants, social impact bonds, and donor partnerships, should be explored.
7. Support local research and pilot projects that develop AI solutions tailored to Nigeria's educational context. Lessons learned from pilot programs can guide scalable AI interventions.
8. Teachers, parents, students, and communities should be involved in AI-driven M&E initiatives to ensure transparency, trust, and effective adoption.

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