

ENHANCING ACADEMIC PERFORMANCE THROUGH AI-DRIVEN EDUCATIONAL ADMINISTRATION IN PUBLIC UNIVERSITIES IN RIVERS STATE

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ABSTRACT: The integration of Artificial Intelligence (AI) in educational administration in public universities in Rivers State has the potential to transform decision-making processes in these schools. However, the increasing reliance on AI-driven decision-making also raises critical questions about accountability, transparency, and bias. This position paper explored the impact of artificial intelligence in educational administration in public universities in Rivers State, with a specific focus on AI-driven decision-making. Through a review of existing literature and a critical examination of current practices, this paper argued that AI-driven decision-making in schools must be carefully considered and critically evaluated to ensure that it serves the best interests of students, teachers, and the broader educational community. The paper concluded by proposing a framework for responsible AI-driven decision-making in schools, emphasizing the need for transparency, accountability, and human oversight.

Keywords: Artificial Intelligence, AI Driven Decision-Making, Academic Achievement.

Reference to this paper should be made as follows:

Nwachukwu, I. P., & Onunka, I. C. (2025). Enhancing academic performance through AI-driven educational administration in public universities in Rivers State. *International Journal of Strategic Leadership, Education and Social Sciences*, 1(2), 216-229.

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INTRODUCTION

The integration of Artificial Intelligence (AI) in educational administration has the potential to revolutionize decision-making processes in schools (Baker, 2019; Siemens, 2013). AI-driven systems can analyze vast amounts of data, identify patterns, and make predictions, enabling educators to make more informed decisions about student learning, teacher support, and resource allocation (Koedinger et al., 2013; Lundberg, 2020). However, as AI becomes increasingly embedded in educational administration, critical questions arise about the implications of relying on AI-driven decision-making in schools (Williamson, 2016).

While AI has the potential to enhance efficiency, accuracy, and scalability in educational decision-making, it also raises concerns about accountability, transparency, and bias (Eubanks, 2018; O'Neil, 2016). For instance, AI systems can perpetuate existing biases and inequalities if they are trained on biased data or designed with a narrow perspective (Angwin et al., 2016; Buolamwini, 2016). Moreover, the increasing reliance on AI-driven decision-making can lead to

a lack of transparency and accountability, as decisions are made by complex algorithms that may be difficult to understand or interpret (Pasquale, 2015).

As educators, policymakers, and researchers, it is essential to critically examine the impact of AI on educational administration and consider the implications of AI-driven decision-making in schools (Liu et al., 2020). This position paper explored the impact of AI on educational administration in public universities in Rivers State, with a specific focus on AI-driven decision-making. Through a review of existing literature and a critical examination of current practices, this paper argues that AI-driven decision-making in schools must be carefully considered and critically evaluated to ensure that it serves the best interests of students, teachers, and the broader educational community.

CONCEPTUAL REVIEW

Artificial Intelligence (AI)

AI is a rapidly evolving field that has captivated researchers, scientists, and engineers for decades. As AI continues to transform industries and revolutionize the way we live and work, it is essential to understand its definition and perspective. Some researchers and experts have defined Artificial Intelligence showcasing the diversity of thought and the evolution of AI research over the years. LeCun et al. (2015) defined Artificial Intelligence as a set of techniques that enable machines to perform tasks that would typically require human intelligence, such as learning, reasoning, and perception.

AI can also be referred to, as the development of computer systems that can perform tasks that typically require human intelligence, such as learning, problem-solving, decision-making, and perception. AI systems use algorithms and data to make decisions and take actions, often in real-time.

The concept of AI dates back to the 1950s, when computer scientists like Alan Turing, Marvin Minsky, and John McCarthy began exploring the idea of creating machines that could think and learn like humans. Since then, AI has undergone significant developments, with major advancements in the fields of machine learning, natural language processing, and computer vision.

There are several types of AI. They include Narrow or Weak AI, General or Strong AI and Super intelligent AI. The Narrow or Weak AI known as Thin AI refers to artificial intelligence systems designed to perform a specific task or set of tasks (Haenlein & Kaplan, 2019). These systems are trained on a particular dataset and optimized to excel in a narrow domain or function (Davenport & Dyché, 2013).

CHARACTERISTICS OF NARROW OR WEAK AI

Task-Specific

Narrow or Weak AI is designed and trained to perform a single task or a set of closely related tasks (Huang & Langlotz, 2018). This type of AI is optimized to excel in a specific domain or function, making it incredibly efficient and precise. It has a single-task focus, performing a single task such as image recognition, language translation, or playing chess (Silver et al., 2016). Some Narrow or Weak AI systems can perform a set of closely related tasks, such as virtual

assistants that can answer questions, set reminders, and control smart home devices (Sutton & Barto, 2018). These systems possess domain-specific knowledge and expertise, allowing them to make accurate decisions and take precise actions (Haenlein & Kaplan, 2019). Task-specific narrow or weak AI are easy to develop, and they are cost effective. However, they are not flexible and cannot adapt to new tasks or domains (Davenport & Dyché, 2013). Despite this limitation, Narrow or Weak AI systems can achieve high performance and accuracy in their specific domain or task.

Examples of task-specific Narrow or Weak AI systems include image recognition systems such as Facebook's facial recognition system and Google's image recognition algorithm (Silver, et al., 2016). Virtual assistants like Siri, Alexa, and Google Assistant are also examples of task-specific Narrow or Weak AI systems that can perform tasks such as answering questions, setting reminders, and controlling smart home devices (Sutton & Barto, 2018). Language translation software like Google Translate and Microsoft Translator are also examples of task-specific Narrow or Weak AI systems that can translate text from one language to another (Huang & Langlotz, 2018). Additionally, game-playing AI like AlphaGo, a computer program that plays Go, is an example of a task-specific Narrow or Weak AI system that can play a specific game at a high level (Silver et al., 2016).

Lack of General Intelligence

Task-specific narrow or weak AI systems are designed to perform a specific task or set of tasks. While they can excel in their designated domain, they lack general intelligence, which is the ability to reason, learn, and apply knowledge across a wide range of tasks (Lake et al., 2017). This limitation is significant, as it restricts the ability of narrow AI systems to adapt to new situations or tasks and to learn from experience.

IMPLICATIONS OF THE LACK OF GENERAL INTELLIGENCE

The lack of general intelligence in Narrow AI systems has significant implications for their autonomy, decision-making, and adaptability. They include:

Limited Autonomy

Narrow AI systems are not able to operate autonomously in complex or unexpected situations, which limit their ability to make decisions and take actions (Haenlein & Kaplan, 2019). This limitation is significant, as it restricts the ability of Narrow AI systems to adapt to changing circumstances.

Dependence on Human Input

Narrow AI systems require human input and oversight to function effectively, which limits their ability to operate independently (Davenport & Dyché, 2013). This limitation is significant, as it restricts the ability of Narrow AI systems to make decisions and take actions without human intervention.

Vulnerability to Bias

Narrow AI systems can be vulnerable to bias and errors, which can have significant consequences in certain contexts (Varsha, 2023). This limitation is significant, as it restricts the ability of Narrow AI systems to make accurate decisions and take effective actions.

Dependence on Data

Narrow AI systems rely heavily on the data they are trained on to learn and make decisions (Lake et al., 2017). This dependence on data creates several challenges, including overfitting, underfitting, data quality issues, and lack of generalizability.

Why Narrow AI Systems Rely on Data

Narrow AI systems use machine learning algorithms, such as neural networks, decision trees, and support vector machines, which rely on data to learn and make predictions (Hastie et al., 2016). These systems are trained on large datasets, which are used to teach the system to recognize patterns, make decisions, and take actions.

Challenges of Dependence on Data

The dependence on data creates several challenges for Narrow AI systems, including overfitting, underfitting, data quality issues, and lack of generalizability (Hastie et al., 2016). Overfitting occurs when the system becomes too specialized to the training data and fails to generalize to new or unseen data. Underfitting occurs when the system is not complex enough to capture the underlying patterns in the data.

Mitigating the Dependence on Data

There are several techniques that can be used to mitigate the dependence on data, including data augmentation, transfer learning, regularization techniques, and collecting more data (Lake et al., 2017). Data augmentation techniques, such as rotating, scaling, and cropping images, can help increase the size and diversity of the training dataset.

LIMITATIONS OF NARROW AI SYSTEMS

Narrow AI systems have several limitations. They include:

Narrow AI systems are not able to transfer learning from one task to another, which limits their ability to adapt to new situations (Lake et al., 2017).

- **Limited Reasoning and Problem-Solving:** Narrow AI systems are not able to reason and solve problems in the same way that humans do, which limits their ability to handle complex or unexpected situations (Haenlein & Kaplan, 2019).

- **Narrow Knowledge Base:** Narrow AI systems have a narrow knowledge base that is specific to their designated task or domain, which limits their ability to apply knowledge in new contexts (Davenport & Dyché, 2013).
- **Lack of Common Sense and Intuition:** Narrow AI systems do not have common sense or intuition, which can lead to unexpected or undesirable behavior in certain situations (Varsha, 2023).

Examples of Narrow or Weak AI

There are several examples of Narrow or Weak AI systems, including virtual assistants, image recognition systems, language translation software, and game-playing AI (Haenlein & Kaplan, 2019). Virtual assistants, such as Siri, Alexa, and Google Assistant, can perform tasks such as answering questions, setting reminders, and controlling smart home devices

Advantages of Narrow or Weak AI

- **High Performance:** Narrow or Weak AI systems are designed to perform a specific task or set of tasks, and they can achieve high performance in their designated domain. This is because they are optimized to excel in a particular area, and they can leverage large amounts of data and computational power to achieve high accuracy and precision.

Factors Contributing to High Performance

Some of the factors contributing to high performance in Narrow or weak AI systems are:

Specialization

Narrow or Weak AI systems are specialized to perform a specific task, which allows them to focus their resources and optimize their performance.

Large datasets

Narrow or Weak AI systems can be trained on large datasets, which enables them to learn and improve their performance over time.

Computational power

Narrow or Weak AI systems can leverage significant computational power, which allows them to process and analyze large amounts of data quickly and efficiently.

Algorithmic advancements

Narrow or Weak AI systems can benefit from advancements in machine learning algorithms, which enable them to learn and improve their performance more effectively.

Examples of High-Performing Narrow or Weak AI Systems are:

- Image recognition systems: image recognition systems such as those used in self-driving cars, can achieve high performance in recognizing and classifying objects.
- Language translation software: Language translation software, such as Google Translate, can achieve high performance in translating text from one language to another.
- Game-playing AI: Game-playing AI systems, such as AlphaGo, can achieve high performance in playing complex games like Go.
- Recommendation systems: Recommendation systems, such as those used in online shopping, can achieve high performance in recommending products to users.

Benefits of High Performance

The benefits of high performance in Narrow or weak AI systems according to Bostrom and Yudkowsky (2014) include:

- Improved Accuracy High-performing Narrow or Weak AI systems can achieve high accuracy in their designated domain, which can lead to improved outcomes and decision-making.
- Increased Efficiency: High-performing Narrow or Weak AI systems can process and analyze large amounts of data quickly and efficiently, which can lead to increased productivity and reduced costs.
- User Enhanced Experience: High-performing Narrow or Weak AI systems can provide users with personalized and relevant recommendations, which can lead to an enhanced user experience.
- Competitive Advantage: High-performing Narrow or Weak AI systems can provide organizations with a competitive advantage, as they can leverage advanced technologies to improve their operations and decision-making.
- Narrow AI systems can achieve high performance and accuracy in their specific domain or task.
- Efficient Use of Resources: Narrow or Weak AI systems can achieve efficient use of resources in several ways. Such resources are computational resources; processing power, memory and storage. Data resources; data storage, data processing and data transmission. Energy resources; power consumption and energy efficiency.

The ultimate goal of general or strong AI is to achieve human-level intelligence, allowing it to perform any intellectual task that a human can (Haenlein & Kaplan, 2019). Some researchers aim to create general or strong AI that surpasses human capabilities, allowing it to solve complex problems that are currently unsolvable (Lake et al., 2017). Additionally, General or Strong AI could potentially create a new form of intelligence that is different from human intelligence but still capable of solving complex problems (Gershman et al., 2015).

Challenges of General or Strong AI

Human intelligence is a complex and multifaceted phenomenon that is still not fully understood, making it challenging to replicate (Lindsay, 2019). Despite significant research, there is still much to be learned about human cognition and how it works (Marcus, 2018). Furthermore,

common sense and intuition are essential components of human intelligence, but they are difficult to replicate in machines (Lake et al., 2017). There is also a risk of unintended consequences, such as job displacement or exacerbating existing social inequalities (Brynjolfsson & McAfee, 2014).

Current State of General or Strong AI

There has been significant progress in AI research in recent years, with the development of deep learning algorithms and other techniques (LeCun et al., 2015). However, General or Strong AI is still in its infancy, and significant challenges remain to be overcome (Marcus, 2018). Researchers are actively working on developing general or strong AI, with a focus on areas such as natural language processing, computer vision, and machine learning (Haenlein & Kaplan, 2019).

Potential Applications of General or Strong AI

General or strong AI has the potential to revolutionize numerous aspects of society, transforming various industries and aspects of life. Some potential applications of General or Strong AI include:

Solving Complex Problems

General or strong AI could potentially solve complex problems that are currently unsolvable, such as:

- **Climate Change:** General or Strong AI could analyze vast amounts of environmental data, identifying patterns and predicting future climate trends, enabling the development of effective strategies for mitigating climate change (Bostrom & Yudkowsky, 2014).
- **Disease Diagnosis:** General or strong AI could analyze medical data, identify patterns, and predict disease progression, enabling early diagnosis and effective treatment (Bostrom & Yudkowsky, 2014).
- **Energy Management:** General or Strong AI could optimize energy consumption and production, reducing waste and improving efficiency (Gershman et al., 2015).

Improving Productivity and Efficiency

General or strong AI could improve productivity and efficiency in various industries, including:

- **Healthcare:** General or strong AI could analyze medical records, identify patterns and predict patient outcomes, enable personalized medicine, and improve healthcare outcomes (Brynjolfsson & McAfee, 2014).
- **Finance:** General or strong AI could analyze financial data, identify patterns, and predict market trends, enabling more effective investment strategies and risk management (Brynjolfsson & McAfee, 2014).

- Transportation: General or strong AI could optimize traffic flow, reduce congestion, and improve transportation efficiency (Kuwata et al., 2016).

Enhancing Human Capabilities

General or strong AI could enhance human capabilities, such as:

- Memory: General or strong AI could assist humans in remembering and recalling information, improving memory and cognitive function (Gershman et al., 2015).
- Attention: General or strong AI could assist humans in focusing attention, improving productivity, and reducing distractions (Gershman et al., 2015).
- Decision-Making: General or strong AI could assist humans in making decisions, providing data-driven insights, and improving decision-making outcomes (Gershman et al., 2015).

Creating New Industries and Opportunities

General or strong AI could create new industries and opportunities that we cannot imagine, such as:

- **New Forms of Entertainment:** General or Strong AI could create new forms of entertainment, such as interactive stories and immersive experiences (Davenport & Dyché, 2013).
- **New Forms of Education:** General or strong AI could create new forms of education, such as personalized learning platforms and adaptive assessments (Woolf et al., 2013).
- **New Forms of Employment:** General or Strong AI could create new forms of employment, such as AI training and development, and AI ethics and governance (Davenport & Dyché, 2013).

Superintelligent AI

Superintelligent AI refers to a hypothetical AI system that possesses intelligence beyond human capabilities, potentially leading to exponential growth in technological advancements (Bostrom, 2014). This type of AI would surpass human intelligence in all domains, including reasoning, problem-solving, and learning.

Characteristics of Superintelligent AI

The characteristics of superintelligent AI include:

- Unprecedented Intelligence: Superintelligent AI would possess intelligence that far exceeds human capabilities, potentially leading to breakthroughs in various fields (Bostrom, 2014).

- **Learning Autonomous:** Superintelligent AI would be capable of autonomous learning, allowing it to improve its intelligence and capabilities at an exponential rate (Lake et al., 2017).
- **Self-Improvement:** Superintelligent AI would be able to modify its own architecture and algorithms, leading to rapid self-improvement (Bostrom, 2014).

Risks and Challenges of Superintelligent AI

The risks and challenges of superintelligent AI include:

- **Existential Risk:** Superintelligent AI could potentially pose an existential risk to humanity, as its goals may not align with human values (Bostrom, 2014).
- **Value Alignment:** Ensuring that superintelligent AI aligns with human values and goals is a significant challenge (Soares et al., 2017).
- **Control and Safety:** Developing control and safety mechanisms for superintelligent AI is crucial to prevent potential risks (Amodei et al., 2016).

Current Research and Developments

While superintelligent AI is still a hypothetical concept, researchers are actively exploring various approaches to achieve it, including:

Artificial General Intelligence

Researchers are working on developing artificial general intelligence (AGI), which would enable AI systems to perform any intellectual task that humans can (Haenlein & Kaplan, 2019).

Cognitive Architectures

Cognitive architectures, such as State, Operator, And Result (SOAR) and Learning Intelligent Decision Agent (LIDA), are being developed to provide a framework for integrating multiple AI systems and achieving more general intelligence (Lindsay, 2019).

Key Applications of Artificial Intelligence to Education

Artificial intelligence (AI) has numerous applications across various industries, transforming the way businesses operate, and revolutionizing the delivery of services. Here are some key applications of AI in education:

- **Personalized learning:** AI-powered algorithms can analyze student data, learning styles, and preferences to provide personalized learning recommendations.
- **Adaptive assessments:** AI can help create adaptive assessments that adjust their difficulty and content based on a student's performance.
- **Intelligent tutoring systems:** AI-powered tutoring systems can provide one-on-one support to students, offering real-time feedback, and guidance.

Student Information Systems

AI-driven student information systems can manage student data, track progress, and provide insights for informed decision-making (Gao & Li, 2019). These systems can:

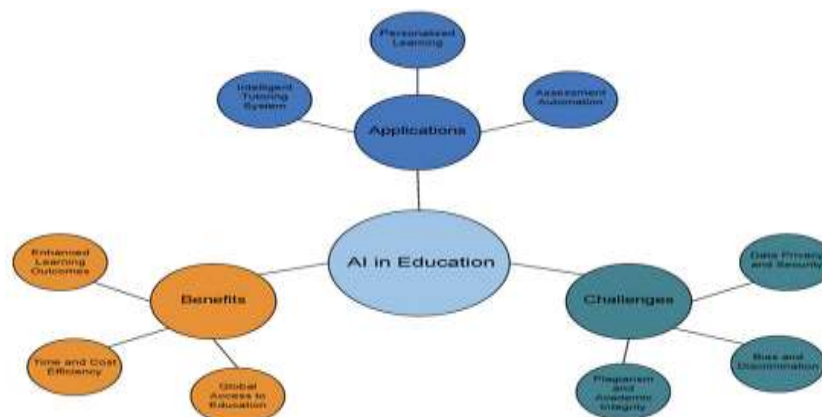
- Analyze student performance: AI can analyze student performance data, identifying trends, patterns, and areas where students need extra support.
- Predict student outcomes: AI-powered systems can predict student outcomes, such as graduation rates and post-secondary education enrollment.
- Provide personalized recommendations: AI-driven systems can provide personalized recommendations for students, including course suggestions, extracurricular activities, and career guidance.

Scheduling and Time-tabling

AI can optimize scheduling and timetabling, minimizing conflicts, and improving resource utilization (Kumar et al., 2020). AI-powered scheduling systems can:

- Analyze scheduling constraints: AI can analyze scheduling constraints, such as instructor availability, classroom capacity, and course prerequisites.
- Generate optimal schedules: AI-powered systems can generate optimal schedules, minimize conflicts and improve resource utilization.
- Provide real-time updates: AI-driven systems can provide real-time updates to students, instructors, and administrators, ensuring that everyone is informed and up-to-date.

When administrative tasks are automating using AI, AI can help educational institutions streamline their operations, reduce administrative burdens, and focus on providing high-quality education to their students.



Multifaceted impact of AI in education. Source: <https://www.mdpi.com>

AI-Driven Decision-Making in Schools

Artificial intelligence (AI) is transforming the education sector, enabling schools to make data-driven decisions that improve student outcomes. AI-driven decision-making in schools involves using machine learning algorithms to analyze large datasets, identify patterns, and provide insights that inform instructional and administrative decisions.

Applications of AI-Driven Decision-Making in Public Universities in Rivers State

- **Personalized Learning:** AI can help teachers tailor instruction to individual students' needs, abilities, and learning styles (Woolf et al., 2013).
- **Student Assessment and Feedback:** AI-powered systems can analyze student performance data, providing immediate feedback and identifying areas where students need extra support (Baker, 2019).
- **Teacher Professional Development:** AI can help identify areas where teachers need additional training or support, enabling targeted professional development (Gao & Li, 2019).
- **University Operations and Management:** AI can optimize university operations, such as scheduling, resource allocation, and facilities management (Kumar et al., 2020).

Benefits of AI-Driven Decision-Making in Universities

- **Improved Student Outcomes:** AI-driven decision-making can lead to better academic performance, increased student engagement, and improved graduation rates (Woolf et al., 2013).
- **Enhanced Teacher Productivity:** AI can automate administrative tasks, freeing up teachers to focus on instruction and student support (Baker, 2019).
- **Data-Driven Decision-Making:** AI provides universities with actionable insights, enabling data-driven decision-making and more effective resource allocation (Gao & Li, 2019).
- **Increased Efficiency:** AI can optimize university operations, reducing costs and improving resource utilization (Kumar et al., 2020).

Challenges and Limitations of AI Data-Driven Decision-Making in the Universities

- **Data Quality and Availability:** AI requires high-quality, relevant data to provide accurate insights (Baker, 2019).
- **Teacher Buy-In and Training:** Teachers need training and support to effectively integrate AI-driven decision-making into their practice (Gao & Li, 2019).
- **Equity and Bias:** AI systems can perpetuate existing biases if not designed and trained carefully (Kumar et al., 2020).
- **Regulatory and Ethical Considerations:** public universities must navigate regulatory and ethical issues related to AI, such as student data privacy and security (Woolf et al., 2013).

A Proposed Framework for Responsible AI-Driven Decision-Making in Schools

A Real-time Analytics for Data-Driven Schools (RADDS)

The following are the core principles of AI-driven decision-making processes:

- **Transparency:** AI-driven decision-making processes should be transparent, explainable, and understandable to stakeholders.
- **Accountability:** public universities in Rivers State should be accountable for AI-driven decisions, ensuring that they are fair, unbiased, and in the best interests of students.
- **Human Oversight:** AI-driven decision-making should be subject to human oversight, review, and validation to ensure that decisions are reasonable, justifiable, and aligned with educational values.

Key Components of AI-Driven Decision-Making Processes in Unniversities:

- **AI System Design:** AI systems should be designed with transparency, accountability, and human oversight in mind.
- **Data Governance:** public universities in Rivers State should establish robust data governance policies to ensure that data used in AI-driven decision-making is accurate, complete, and unbiased.
- **Decision-Making Processes:** AI-driven decision-making processes should be clearly defined, documented, and communicated to stakeholders.
- **Human Review and Validation:** AI-driven decisions should be subject to human review and validation to ensure that they are reasonable, justifiable, and aligned with educational values.
- **Monitoring and Evaluation:** public universities in Rivers State should establish processes to monitor and evaluate the effectiveness and fairness of AI-driven decision-making.
- **Stakeholder Engagement:** public universities in Rivers State should engage with stakeholders, including students, parents, teachers, and administrators, to ensure that their concerns and values are taken into account.

CONCLUSION

The integration of artificial intelligence (AI) in educational administration can transform schools, improve decision-making, and enhance student outcomes. This study highlights AI's benefits, which includes improving efficiency, enhancing decision-making, and personalizing education. It also emphasized the challenges, including bias and fairness, transparency and accountability, and equity and access. To harness AI's potential, the study suggests that schools and policymakers must prioritize responsible AI development, provide teacher training and support, and regularly evaluate and monitor AI's impact. A nuanced understanding of AI's benefits and challenges, combined with a commitment to responsible development and implementation, is crucial for successful integration.

Suggestions

Based on the analysis of AI's benefits and challenges in educational administration, the following are suggested:

- Public universities in Rivers State and policymakers must prioritize the development of responsible AI systems that are transparent, fair, and unbiased.
- Staff must be provided with training and support to effectively integrate AI into their practice and to address any challenges that may arise.
- Clear guidelines and regulations must be established to ensure the ethical use of AI in educational administration.
- Public universities and policymakers must regularly monitor and evaluate the impact of AI on educational administration to ensure that it is promoting equity, access, and improved student outcomes.
- Collaboration and communication among stakeholders, including teachers, administrators, policymakers, and industry experts, must be fostered to ensure that AI is developed and implemented in a responsible and effective manner.
- Public universities in Rivers State and policymakers must address issues of bias and fairness in AI systems to ensure that they are equitable and just.
- Public universities in Rivers State and policymakers must ensure that AI systems are transparent and accountable to ensure that decisions are explainable and justifiable.

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