ARTIFICIAL INTELLIGENCE APPLICATION AS PREDICTOR OF EFFECTIVE SECONDARY EDUCATION MANAGEMENT IN RIVERS STATE, NIGERIA

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Abstract

This study examined artificial intelligence application as predictor of effective secondary education management in Rivers State, Nigeria. The study was guided by three objectives, six research questions and six null hypotheses. The study adopted a correlation survey research design, with a population of 6,153 academic staff from 320 public senior secondary schools in Rivers State. The sample size of the study was 376 drawn from the population Taro Yamane. Stratified sampling technique was the study sampling technique. Questionnaire of two set was the instrument for the study and it was titled: Artificial Intelligence Application Assessment Scale (AIAAS) and Effective Secondary Education Management Assessment Scale (ESEMAS). The instruments were validated and their reliability were tested using Cronbach alpha method and reliability coefficients of 0.81 and 0.86 for both respectively were derived. For method of data analysis, the research questions were answered using simple regression, while the hypotheses were tested with t-test associated with simple regression at 0.05 level of significance. The findings of the study revealed that artificial intelligence application in decision making, resources optimization and enhancement of security significantly predict effective secondary education management in Rivers State to a high extent. Based on this finding, it was recommended among others that school administrators should continue to ensure that school personnel do not see artificial intelligence application in school management as a silver bullet in order to minimize the bias behaviour they have towards AI and issues that has to do with poor decision-making. Also, government through the Ministry of Education management should regularly carrying out training and retraining programme for staff to ensure effective usage of Al facilities in resource optimization for effective secondary education management.

Keywords: *Artificial Intelligence, Secondary Education, Management*

Introduction

Education is the greatest instrument for economic growth and national development. It re-defines man and transmits his culture from one generation to the other. Plato notes that educated citizens are special gifts to humanity and that every State should bequeath its leadership on the shoulders of such citizens who become Philosopher-Kings by virtue of education and character. Civilizations all over the world are sustained and improved upon through education. Also to Aristotle, educated men are as much superior to uneducated men as the living are to the dead. He maintains that man is not in any proper

sense a human being until he is educated. The aim of education is the production of good men and if a person is knowledgeable but not morally good, his education is a failure (Aguba, 2021).

Aguba (2013) asserts that education is the process of transmitting worthwhile values, skills, attitudes and knowledge for the good of the recipients and the survival, development and safety of the larger society. Education is so central to man that the major difference between a wild animal and human being lies in education. No wonder that government of Nigeria regards education as key to the realization of the nation's collective aspiration of being among the top 20 developed nations of the world. It is noted that the management of secondary education resources remains a national objective for Nigeria's policymakers as this enables the achievement of sustainable national transformation.

Secondary education is the stage of education that is received after primary education and before tertiary education. Most secondary education systems in Sub-Saharan African countries like Nigeria face numerous challenges that impact on quality, such as poor management. This challenge often lead to low quality of secondary education, poor health for most learners and cements gender inequality. It is noted that most of Nigeria's secondary education systems have lower efficiency that results in backwardness in digitalization process of the system (Nyong, 2015; Tingum, 2020). Such challenges in many parts of the country as a result of poor management of the secondary education system have further given rise to weaker links between education and other national economic goals. Management secondary education remains one of the fundamental factors of development as it has the potential of enriching people's understanding of themselves and the world. It has the capacity to improve the quality of human life and leads to broad social benefits for individuals and society.

Management is defined as the art of getting things done through people. It refers to the process by which managers create, direct, maintain and operate purposive organizations through coordinated, cooperative human efforts (Aguba, 2021). Consequently, management of secondary education refers to the planning, organization, and supervision of resources and activities at the secondary school level to achieve educational goals and objectives. It involves leadership, curriculum planning, teacher management, student management, resource allocation, assessment and evaluation, parent and community engagement, staff development, discipline and conflict resolution, and innovative policy implementation such as integration of artificial intelligence in the management of school activities.

Since ancient times, the method of managing the education system is constantly evolving and undergoing numerous changes due to new technologies. We are all familiar with traditional ways of school management where education is imparted within the walls of classrooms to a group of students. With the intervention of the internet and digital technology, the online platform is trending slowly and surely taking the place of classrooms. Thus, the modern management of education system has completely eradicated the space limitation of a classroom by encouraging the participation of more students from every corner of the world. By providing knowledge through online platforms or websites, the modern education system has been able to attract a variety of students and teachers to participate in technology-based learning (Mircea, 2023).

In recent decades, Artificial Intelligence (AI) has become increasingly present in our lives, having a significant impact in various fields, including education. Al is an advanced computer controlled system with likely human Intelligence. It is being used in educational management to enhance the learning process, improve student outcomes, and streamline administrative tasks. Artificial Intelligence refers to the development of computer systems capable of performing tasks that typically require human intelligence (AFSA, 2022). 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).

Alagbe (2023) viewed AI as the ability of a computer or machine to mimic the capabilities of the human mind – learning from examples and experience, recognising objects, understanding and responding to language, making decisions, solving problems and combining these and other capabilities to perform functions a human might perform, such as greeting a hotel guest or driving a car. American technology giant International Business Machines Corporation defined Artificial Intelligence as referring to any human-like intelligence exhibited by a computer, robot, or other machines. Artificial intelligence defined as intelligence exhibited by machines, has many applications in today's society. Its application in educational management can lead to effective data analysis and decision making, effective school administrative, resource optimization, student support and intervention, streamlined communication and engagement and enhanced security and safety. However, this paper will be looking at it in the area decision making, resource optimization and enhancement of security in secondary school.

One of the major function of school administrators in the course of secondary education management is to make policies and take decision on school issues. Decision-making involves the process of choosing from alternative course of action. Many issues arising in the educational institutions demand decision-making because there is more than a single option of action. Many alternatives are generated out of which one is taken for implementation. The manager must have an adequate knowledge of alternative actions available on an issue, who should be involved in decision-making and mode of implementation of the decision (Fasasi, 2021). Right decision at appropriate time and place will enhance achievement of secondary education goals. As much as possible, subordinates should be allowed to participate in decision-making. Decision taking in the level of school management is very crucial for the development of the school. Al can be used to making effective decision in educational institutions. Al has the capacity to help school administrator makes right decisions. It helps them as well as the teachers and students use information and knowledge properly to make suitable decisions for their schools and innovations (Ahmad, 2019). School personnel are producing large volumes of data, and to make it efficient, schools are adopting and using AI and kicking humans out of using the data (Jarrahi, 2018).

Resources allocation is another fundamental functions of school administrators. There are both human, material and financial resources in the school that need to be properly managed. It is the responsibilities of schools administrators to ensure these resources are effectively and efficiently allocated to realize the schools goals and programme. AFSA (2022) asserts that AI can help administrators optimize the allocation of resources, such human and materials. By analyzing data on student enrollment, class sizes and scheduling, AI systems can suggest efficient resource allocation strategies to optimize learning environments and support student needs.

School administrators or management are saddled with the responsibilities of ensure safety of lives and properties within the school environment. School administrators can deploy Al facilities to enhance school security. AFSA (2022) maintains that AI can contribute to school security and safety measures. Teaching and learning can only take place in a peaceful, secured and conducive environment. AI-powered facial recognition systems and video analytics can help monitor school premises, detect potential security threats, and ensure the safety of students and staff. AI-powered systems can also analyze social media or online platforms to identify potential risks and proactively address them. Artificial intelligence (AI) security cameras can identify people, suspicious behaviour and guns and gather large amounts of information. The images show what people are wearing, how they walk and other physical mannerisms. If the cameras capture an image of someone who is banned from a building, the system can immediately inform school officials if the person returns. Deployment of advanced AI-based gun detection, perimeter protection, and intrusion detection systems. Embracing intelligent school security systems can help to leverage the power of AI and machine learning to detect and report anomalies. Such technologies create a security architecture capable of thwarting criminal attempts effectively. AI-powered cameras don't just record threats but analyze the video streams as soon as the

footage is captured. If an anomaly is detected, it tracks and reports that in real-time by sending notifications and alerts. Unlike humans, these technologies do not have limitations such as short attention spans, fatigue, and confusion (Ogunode & Gregory, 2023).

Education such as the secondary education has undergone a series of changes and under the impact of artificial intelligence that brings with it the opportunity to transform the management of secondary education. There is a need to research the impact that artificial intelligence is having on education as we know it, and how we can use this discovery to improve the experiences of students and teachers in the school. Hence, it is on this premise that this paper sought to examine the topic 'artificial intelligence application as predictor of effective secondary education management in Rivers State.

Statement of Problem

Secondary school education has become more complex due to the increase in the number of students' enrolment and knowledge in the use of technology as well as the number of programmes being offered. Consequently, its management demands more from the managers to achieve the set goals. Due to this complexity, school administrators are sometimes faced with the challenge of managing schools in a meaningful and productive way. Some of the problems faced include poor decision making, inefficient resources management, insecurity and many others. These challenges affects both staff and students and even external governing bodies of the school and sometimes effective planning because most of the processes are still carried out manually without leveraging technologies like artificial intelligence. Hence, this paper looks at artificial intelligence application as predictor of effective secondary education management in Rivers State.

Aim and Objectives of the Study

The aim of this study was to examine the extent artificial intelligence predict effective secondary education management in Rivers State. Specifically, the study focused on achieving the following objectives;

1. determine the extent artificial intelligence application in decision making predicts effective secondary education management in Rivers State.
2. investigate the extent artificial intelligence application in resource optimization predicts effective secondary education management in Rivers State.
3. ascertain the extent artificial intelligence application in enhancing security predicts effective secondary education management in Rivers State.

Research Questions

The following research questions guided the study:

1. To what extent does artificial intelligence application in decision making predicts effective secondary education management in Rivers State?
2. To what extent does artificial intelligence application in resource optimization predicts effective secondary education management in Rivers State?
3. To what extent does artificial intelligence application in enhancing security predicts effective secondary education management in Rivers State?

Research Hypotheses

The following hypotheses were tested at 0.05 level of significance:

1. Artificial intelligence application in decision making does not significantly predicts effective secondary education management in Rivers State.
2. Artificial intelligence application in resource optimization does not significantly predicts effective secondary education management in Rivers State.

3. Artificial intelligence application in enhancing security does not significantly predicts effective secondary education management in Rivers State.

Methodology

This study adopted a correlation design to ascertain if the independent variable (artificial intelligence application) predict the dependent variable (effective secondary education management). The population of this study the consisted of the 6,153 academic staff (i.e. 320 principals and 5833 teachers) in all the three hundred and twenty (320) public senior secondary schools spread across the three (3) senatorial zones in 23 Local Government Areas of Rivers State, Nigeria. Source: Department of Planning Research and Statistics Secondary Education Management Board (SEMB), Rivers State, January 2024. The sample size of the study comprised of 376 academic staff derived using Taro Yamane formula. Stratified sampling technique was adopted as the sampling technique. The research instrument for the study was a two set questionnaire titled: Artificial Intelligence Application Assessment Scale (AIAAS) and Effective Secondary Education Management Assessment Scale (ESEMAS). The instruments have sections A, B and C. The section A consisted of the demographic information of the respondents, while section B dealt with questionnaire items on AIAAS which are made up of three parts. Each has 5-items with a total number of 15 items. The second instrument ESEMAS was section C, it consisted of 20 items. Both AIAAS and ESEMAS were structured after the 4-point Likert rating scale of Very High Extent (VHE) = 4 points, High Extent (HE) = 3 points, Low Extent (LE) = 2 points and Very Low Extent (VLE) = 1 point. Cronbach alpha reliability statistics was used to test the reliability of the two instruments. The reliability coefficients of both instrument are 0.81 and 0.86, while the reliability coefficients for the subscales: decision making, resources optimization and enhancement of security are 0.87, 0.88 and 0.84 respectively. For the data that were analyzed, research question one to three were answered using simple linear regression, while hypotheses one to three were tested using t-test associated with simple linear regression at 0.05 level of significance.

Results and Discussion

Research Question 1: To what extent does artificial intelligence application in decision making predicts effective secondary education management in Rivers State?

Table 1: Simple Linear Regression on the Extent Artificial Intelligence Application in Decision Making Predicts Effective Secondary Education Management in Rivers State

Model	R	R Square	Adjusted R Square	Extent of Prediction	Decision
1	.815[a]	.622	.621	62.1%	High Extent

Decision Rule: 100%- 75% (Very High Extent), 74% - 50% (High Extent), 49%-25% (Low Extent) and 0% - 24% (Very Low Extent)

Table 1 revealed that the regression (R) and regression square (R^2) coefficients are .815 and .622 respectively, while the adjusted R square is .621. The extent of prediction (coefficient of determinism) was calculated to be 62.2% (.622×100). The result shows that artificial intelligence application in decision making predicts effective secondary education management in Rivers State to a high extent by 62%.

Research Question 2: To what extent does artificial intelligence application in resource optimization predicts effective secondary education management in Rivers State?

Table 2: Simple Linear Regression on the Extent Artificial Intelligence Application in Resource Optimization Predicts Effective Secondary Education Management in Rivers State

Model	R	R Square	Adjusted R Square	Extent of Prediction	Decision
1	.941[a]	.741	.739	74.1%	High Extent

Decision Rule: 100%- 75% (Very High Extent), 74% - 50% (High Extent), 49%-25% (Low Extent) and 0% - 24% (Very Low Extent)

Table 2 revealed that the regression (R) and regression square (R^2) coefficients are .941 and .741 respectively, while the adjusted R square is .739. The extent of prediction (coefficient of determinism) was calculated to be 74.1% (.741×100). The result shows that artificial intelligence application in resource optimization predicts effective secondary education management in Rivers State to a high extent by 74%

Research Question 3: To what extent does artificial intelligence application in enhancing security predicts effective secondary education management in Rivers State?

Table 3: Simple Linear Regression on the Extent Artificial Intelligence Application in Enhancing Security Predicts Effective Secondary Education Management in Rivers State

Model	R	R Square	Adjusted R Square	Extent of Prediction	Decision
1	.813[a]	.614	.613	61.4%	High Extent

Decision Rule: 100%- 75% (Very High Extent), 74% - 50% (High Extent), 49%-25% (Low Extent) and 0% - 24% (Very Low Extent)

Table 3 revealed that the regression (R) and regression square (R^2) coefficients are .813 and .614 respectively, while the adjusted R square is .613. The extent of prediction (coefficient of determinism) was calculated to be 61.4% (.614×100). The result shows that artificial intelligence application in enhancing security predicts effective secondary education management in Rivers State to a high extent by 61%.

Test of Hypotheses

Hypothesis 1: Artificial intelligence application in decision making does not significantly predicts effective secondary education management in Rivers State.

Table 4: t-test Associated with Simple Regression on the Extent Artificial Intelligence Application in Decision Making Significantly Predicts Effective Secondary Education Management in Rivers State

Model		Unstandardized Coefficients		Standardized Coefficients	t	p-value	Alpha level	Decision
		B	Std. Error	Beta				
1	(Constant)	2.782	.067		38.347	.000	0.05	Hypothesis is rejected
	Decision Making	.131	.032	.112	3.611	.000		

a. Dependent Variable: Effective Secondary Education Management

Table 4 revealed that standard beta value and t-test are .112 and 3.611. The p-value of 0.000 is less than the level of significance of 0.05. Therefore, the null hypothesis is rejected. By implication, artificial intelligence application in decision making significantly predicts effective secondary education management in Rivers State.

Hypothesis 2: Artificial intelligence application in resource optimization does not significantly predicts effective secondary education management in Rivers State.

Table 5: t-test Associated with Simple Regression on the Extent Artificial Intelligence Application in Resource Optimization Significantly Predicts Effective Secondary Education Management in Rivers State

Model		Unstandardized Coefficients		Standardized Coefficients	t	p-value	Alpha level	Decision
		B	Std. Error	Beta				
1	(Constant)	2.351	.073		31.403	.000	0.05	Hypothesis is rejected
	Resources Optimization	.072	.034	.073	2.075	.000		

a. Dependent Variable: Effective Secondary Education Management

Table 4 revealed that standard beta value and t-test are .073 and 2.075. The p-value of 0.000 is less than the level of significance of 0.05. Therefore, the null hypothesis is accepted. By implication, artificial intelligence application in resource optimization significantly predicts effective secondary education management in Rivers State.

Hypothesis 3: Artificial intelligence application in enhancing security does not significantly predicts effective secondary education management in Rivers State.

Table 6: t-test Associated with Simple Regression on the Extent Artificial Intelligence Application in Enhancing Security Significantly Predicts Effective Secondary Education Management in Rivers State

Model		Unstandardized Coefficients		Standardized Coefficients	t	p-value	Alpha level	Decision
		B	Std. Error	Beta				
1	(Constant)	2.662	.075		26.943	.000		

Enhancement of Security	.182	.034	.161	4.355	.010	0.05	Hypothesis is rejected

a. Dependent Variable: Effective Secondary Education Management

Table 6 revealed that standard beta value and t-test are .161 and 4.355. The p-value of 0.010 is less than the level of significance of 0.05. Therefore, the null hypothesis is rejected. By implication, artificial intelligence application in enhancing security significantly predicts effective secondary education management in Rivers State.

Discussion of Findings

The first finding of this study revealed that artificial intelligence application in decision making predicts effective secondary education management in Rivers State to a high extent by 62%. Also, a corresponding hypothesis tested establishes that artificial intelligence application in decision making significantly predicts effective secondary education management in Rivers State. These findings, are in tandem with Ahmad (2019) whose empirical work showed that Artificial Intelligence (AI) has the capacity to help school administrator makes right decisions. Jarrahi (2018) asserted that AI helps school management as well as the teachers and students use information and knowledge properly to make suitable decisions for their schools and innovations. Similarly, Meissner and Keding (2021) noted that organizations like the school use AI to analyze data and make complex decisions effectively to obtain a competitive advantage. According to the scholars, although AI is helping the decision-making process in various sectors, humans still have the last say in making any decision. It highlights the importance of humans' role in the process and the need to ensure that AI technology and humans work side by side. The role of AI in decision-making in educational management is spreading daily both in academic and administrative activities.

The second finding of the study revealed that artificial intelligence application in resource optimization predicts effective secondary education management in Rivers State to a high extent by 74%. Also, a corresponding hypothesis tested establishes that artificial intelligence application in resource optimization significantly predicts effective secondary education management in Rivers State. These findings corroborate AFSA as cited in Ogunode and Gregory (2023) who in their studies asserted that there is a significant relationship between artificial intelligence application in resource optimisation and management of secondary education. To the scholars, AI helps administrators optimize the allocation of resources, such as staff, classrooms and materials. By analyzing data on student enrollment, class sizes and scheduling, AI systems can suggest efficient resource allocation strategies to optimize learning environments and support student needs.

The third finding revealed that artificial intelligence application in enhancing security predicts effective secondary education management in Rivers State to a high extent by 61%. Similarly, a corresponding hypothesis tested establishes that artificial intelligence application in enhancing security significantly predicts effective secondary education management in Rivers State. These findings are in consonance with Nawaz et al. (2020) and Ahmed and Nashat (2020) whose empirical works agree that AI significantly contributes towards enhancing security in school. Their claim is that no one can deny that AI systems and applications are becoming a part of school strategy in enhancing security through gadgets and tools that are AI-empowered (Sayantani, 2021). Each tool works according to its way, and the shool use it accordingly. It promote an immersive conducive learning environment devoid of threats and attack (Gocen & Aydemir, 2020). In addition, AFSA (2022) asserted that AI facial recognition systems and video analytics aid to monitor school premises, detect potential security threats, and ensure the safety of students and staff. AI-powered systems can also analyze social media or online platforms to identify potential risks and proactively address them.

Conclusion

Based on the findings of this study it was deduced that artificial intelligence application in decision making, resources optimization and enhancement of security significantly predict effective secondary education management in Rivers State to a high extent.

Recommendations

The following recommendations were proffered based on the findings and conclusion of this study:

1. School administrators should continue to ensure that school personnel do not see artificial intelligence application in school management as a silver bullet in order to minimize the bias behaviour they have towards AI and issues that has to do with poor decision-making.
2. Government through the Ministry of Education management should regularly carrying out training and retraining programme for staff to ensure effective usage of Al facilities in resource optimization for effective secondary education management.
3. Government should remove tax levied on AI security facilities as a way to subsidize their high cost and on the hand empower schools to afford them to enhance security of life and properties within the school environment.

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