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EXTENT OF ADOPTION OF ARTIFICIAL INTELLIGENCE FOR EFFECTIVE SCHOOL ADMINISTRATION BY PRINCIPALS OF SECONDARY SCHOOLS IN ENUGU STATE

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Abstract

This study examined the extent of adoption of Artificial Intelligence (AI) for effective school administration by principals of secondary schools in Enugu State. The study was guided by three research questions and three hypotheses. The researchers adopted descriptive survey research design for this study. The population for the study consisted of the two hundred and ninety-five (295) principals of public secondary schools in Enugu State. Since the population of study was manageable, the researchers adopted census sampling. The instrument for data collection was a structured questionnaire developed by the researchers and titled: "Extent of Adoption of Artificial Intelligence for Effective School Administration by Principals Questionnaire (EAAIESAPQ)." The validity of the instrument was determined using Cronbach Alpha, with a reliability index of 0.89 and 0.76, and overall reliability of 0.83, and it was face-validated by three research experts. The research questions were answered with mean and standard deviation while the hypotheses were tested with z-test at 0.05 level of significance. The findings of the study amongst others were that AI has been adopted by principals of secondary schools in Enugu State for streamlined communication to a great extent; however, the extent of adoption of AI for data analysis/decision making and resource optimization is low. It was recommended amongst others that effort should ensure training and retraining of principals on the use of AI for resource optimization and data analysis/decision making.

Key words: Artificial Intelligence, School Administration, Principals, Secondary Schools.

Introduction

Education is a strong foundation for individual and group development. It is crucial in solving problems in society. Education requires a holistic approach that incorporates the interrelated dynamics of social, economic, and environmental systems (UNESCO, 2021). In the education system, educators and educational leaders are expected to prepare students to navigate and address future difficulties. These preparations should concentrate on improving quality in important areas such as environmental stewardship, social justice, equality, peacebuilding, and health education (Nnamdi & Uwelegbewe, 2025). For these feats to be attained, effective administration of the education system and particularly the school is required.

School administration is critical to the success of any education system. Administration is the task of overseeing an organization with the optimum use of all the available resources (human and nonhuman) for achieving its goals and objectives. Administration involves processes such as; planning, organizing, directing, coordinating, controlling and evaluating performance against the stated objectives of the organization (Akinwumi, Yemisi & Alegbeleye, 2021). Ogunode and Abashi, (2020) defined administration in education as dealing with systematic organization, arrangement, integration, evaluation and co-ordination of both materials and human resources in an effective and efficient ways to realize the general educational objectives. Mohammed, Ogunode and Yahaya (2021) sees administration as the utilization of institutional resources to actualize the institutional objectives.

Administration take different forms including school administration. School administration involves the effective utilisation of school resources in order to achieve educational goals. School administration is the act and process of using resources in an effective and efficiency ways to attain the various objectives of educational institutions. School administration deals with the planning and organizing human and materials resources to realize the goals of the school institutions (Nnamdi & Uwelegbewe, 2025). Nwiyi (2018) viewed school administration as concerned with integrating the appropriate human and material resources that are made available for achieving the purposes of the programme of a school.

School administration looks at education from the specific educational institutions. The objectives of school administration include to realize the goals of the educational institutions, coordinate the

activities and programme of the schools, reduce educational wastage within the educational institution, effectively allocate the limited educational resource for the actualization of the school objective, coordinate the students' extra-curriculum programme in the school, and enhance the professional development of teachers and the non-teaching staff (Ogunode, Ahaotu & Obi-E, 2021). The major objective of school administration is to ensure that the various educational programmes are implemented as planned. School administration ensures that all teaching and non-teaching staff are well supervised to do their works effectively.

School administration covers the following; school planning, organizing, controlling, coordinating and evaluating performance, decision making, curriculum development and planning, school plant management, students activities, teachers' programme, human capacity development, school-community relationship, academic calendar planning, extra-curriculum programme, school discipline programme, school sport, school examination and school security (Nnamdi & Uwelegbewe, 2025). School administration involves practical organization and arrangement of school work schedules in effective ways using administrative structures to implement school programme and realize the school objectives whereby posts are created and assigned for the optimal performance of the school. School heads like principals carry out the task of school administration.

School administrators ensures the implementation of school programmes for the development of individuals, which is a crucial aspect of educational leadership. In recent times, technology is playing a pivotal role in facilitating this goal. Technology significantly enhances the quality of education across all levels of society, contributing to improved learning outcomes and administrative efficiency. Akinoso (2018) highlights that contemporary society is increasingly dominated by the use of technology, defined as the application of scientific knowledge to address practical problems in human environments. Similarly, Bawa and Moyijo (2015) describe technology as a systematic and integrated process that involves identifying, analysing, and solving problems through the implementation, management, control, and evaluation of solutions. One of such technologies that is shaping school administration is Artificial Intelligence (AI).

AI technologies are already changing methods of running departments in almost every organization. It is facilitating the implementing of big data analysis and decision-making, resource

optimization, streamlined communication, machine and deep learning efficiency (EY, 2020). Considering the aforementioned managerial roles, AI has much to offer to ease principals' administrative and managerial burdens (Fullan, Azorín, Harris & Jones, 2023; Umkabu, 2023). Therefore, this study, specifically, examined the adoption of AI in effective school administration in the area of streamlined communication, resource optimization and as well as data analysis/decision making.

Policy and decision-making are crucial aspects of the tasks of school administrators. 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 (Niyi & Gregory, 2025). Right decision at appropriate time and place will enhance achievement of organizational goals. As much as possible, subordinates should be allowed to participate in decision-making. Decision taking in the level of administration 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 administrators make right decisions. AFSA (2022) noted that AI can assist administrators in analyzing large volumes of data, such as student performance data, attendance records and resource allocation. AI-powered systems can identify patterns, trends and insights that can inform decision-making processes. Administrators can use this information to develop data-driven strategies for improving student outcomes, allocating resources effectively, and evaluating programs and initiatives.

Resources allocation is another essential task of school administrators. It is the responsibilities of schools administrators to ensure that both human and material resources are effectively and efficiently allocated to realise school goals and programmes. AFSA (2022) asserted that AI can help 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.

In terms of streamlined communication and engagement**,** communication in school involves passing of information from one staff to another staff or students, parents. School administrators must

ensure free flow of information among all members of his organisation. Information on school activities must be relayed at the right time, to the right people and in clear language. Communication could be verbal, written, electronic or any other means. The manager serves as a link between his educational institution and the government, the community and the international bodies (Niyi & Gregory, 2025). He should give correct and up to date information about the school. Information emanating from these bodies should be passed to all staff members immediately. The school administrators should communicate and allow free communication in order to guide against rumour, misunderstanding and misrepresentation. Al can aid effective communication in schools between school administrators, teachers, students and parents. AFSA (2022) concluded that AI-powered communication systems can streamline communication between administrators, teachers, students and parents. Chatbots and virtual assistants can handle routine inquiries, provide information and direct individuals to the appropriate resources. This can improve efficiency and accessibility in communication, freeing up administrators' time for more complex interactions and strategic decision making.

Generally, the use of AI in the education system helps in effective school administration. The use of AI in school administration in secondary schools, though not popular and prominent, has the capabilities to facilitate result-oriented school administration. AI can reduce time expended on clerical or paper work tasks, produce accurate information, ensure generation of reports when needed, and facilitate decision-making process. In spite of the perceived impact of AI in school administration, there are questions about the readiness and capabilities of principals to embrace it in their administrative tasks. Though, there is a growing literature on AI, few studies have focused precisely on its influence on school administration in secondary schools. It is against this backdrop that the researcher in this study examined the adoption of AI in school administration by principals of secondary schools in Enugu state.

Statement of Problem

The limited nature of human abilities makes it herculean to keep up with all the tasks that are necessary as it usually requires lots of dedicated time from every individual. The problem that has been identified is that there are human limitations, such as biases, preconceptions and time restraints, which can hinder effective school administration. It has been identified that adopting technology-based (AI) school administration is lacking in secondary schools in Nigeria, generally, and Enugu State in particular.

Literature is lacking in AI-based school administration in secondary schools and this needs to be fulfilled. In addition, the implications of AI for school administration in secondary schools are still unclear. Principals of secondary schools require accurate, timely, sufficient, and relevant data and information to carry out their duties. The deficiencies associated with decision making and data management in terms of storage, preservation and presentation of large volumes of information in paper form made managerial processes very cumbersome. Also, resource optimization and communicating effectively with staff and other stakeholders is imperative for proper management. This makes AI-based administration by principals a very crucial component of modern school administration in secondary schools.

Purpose of the Study

Generally, this study examines the adoption of Artificial Intelligence (AI) for effective school administration by principals of secondary schools in Enugu State.

Specifically, this study sought to:

i. ascertain the extent to which AI is adopted for data analysis/decision-making by principals of secondary schools in Enugu State.
ii. determine the extent to which AI is adopted for streamlined communication by principals of secondary schools in Enugu State.
iii. find out the extent to which AI is adopted for resource optimization by principals of secondary schools in Enugu State.

Research Questions

The following research questions guided the study:

i. What is the extent to which AI is adopted for data analysis/decision-making by principals of secondary schools in Enugu State?
ii. What is the extent to which AI is adopted for streamlined communication by principals of secondary schools in Enugu State?
iii. What is the extent to which AI is adopted for resource optimization by principals of secondary schools in Enugu State?

Hypotheses

$H_0$1 There is no significant difference in the mean scores of male and female principals on the extent to which AI is adopted for data analysis/decision-making by principals of secondary schools in Enugu State.

$H_0$2 There is no significant difference in the mean scores of male and female principals on the extent to which AI is adopted for streamlined communication by principals of secondary schools in Enugu State.

$H_0$3 There is no significant difference in the mean scores of male and female principals on the extent to which AI is adopted for resource optimization by principals of secondary schools in Enugu State.

Methodology

Descriptive survey research design was used for the study. The area of study is Enugu State. The population for the study consists of all the two hundred and ninety-five (295) principals of the government owned secondary schools in Enugu State, comprising of one hundred and eighty-six (186) male principals and one hundred and nine (109) female principals. Census sampling was used since the population is manageable; therefore, there was no sampling. The instrument for data collection is a researcher-made questionnaire titled: "Principals Adoption of Artificial Intelligence for Effective School Administration Questionnaire (PAAIESAQ)." The instrument consisted of two parts, the first part covers instructions on how to respond to the items as well as collect demographic information of the respondents, while the second part consists of 26 items divided into two clusters according to the research questions. Four-point scale made up this response options. They are VGE – Very Great Extent (4); GE – Great Extent (3); LE – Low Extent (2), and VLE – Very Low Extent (1). The instrument was face validated by three research experts. One research expert in measurement and evaluation from the Department of Mathematics and Computer Education and two research experts from Department of Educational Management all from Faculty of Education, Peaceland University, Enugu. The validity of the instrument was conducted by administering 10 copies of the questionnaire to principals in selected secondary schools in Anambra state. The reliability index was determined using Cronbach Alpha, it yielded 0.79, 0.77 and 0.81 from the two clusters respectively. The overall reliability index is 0.79 which shows that the instrument is reliable for the study. The instrument was distributed by the researcher directly to the respondents. The research

questions were answered using mean with standard deviation while the hypotheses were tested using z-test statistics. The decision for interpreting the results were based on the values of calculates means. Responses on each of the research questions were considered high and accepted when the Mean is 2.50 and above and low and rejected when less. This is derived from the mean of the weight of the response options, i.e. (4+3+2+1)/4=10/4 = 2.5. The hypotheses were tested at 0.05 level of significance. If the calculated value is equal to or greater than the table value, the null hypotheses was rejected, but if it is less than the table value, the null hypotheses was rejected.

Results

Research Question 1

What is the extent to which AI is adopted for data analysis/decision-making by principals of secondary schools in Enugu State?

Table 1: Means scores of male and female principals on the extent to which AI is adopted for data analysis/decision-making by principals of secondary schools in Enugu State

S/NO	ITEMS	Male (186)		Female (109)		Total 295		
	AI is adopted for data analysis/decision-making in the following ways:	**X**	**SD**	**X**	**SD**	**X**	**SD**	**Dec.**
1	proper keeping of attendance records	2.51	0.71	2.90	1.07	2.77	0.97	GE
2	analysing mode of decision implementation	2.20	0.63	2.45	0.51	2.37	0.56	LE
3	making right decision at appropriate time	2.26	0.79	2.35	0.75	2.31	0.75	LE
4	evaluating programmes	1.82	0.79	2.35	0.59	2.17	0.70	LE
5	enabling analyses of large volumes of data	2.40	0.92	2.10	0.72	2.25	0.79	LE
6	analysing student performance data	2.10	0.74	2.30	0.66	2.23	0.68	LE
7	identify patterns that can inform decision-making processes	2.30	0.48	2.50	0.51	2.43	0.50	LE
8	discover insights that enhance decision-making	2.43	0.63	2.00	0.65	1.93	0.64	LE

9	develop data-driven strategies for improving student outcomes	2.50	0.53	2.15	0.58	2.27	0.58	LE
	Cluster mean	**2.28**	**0.69**	**2.34**	**0.67**	**2.30**	**0.69**	**LE**

Table 1 above shows the mean scores of male and female principals on the adoption of artificial intelligence (AI) for data analysis/decision-making in secondary schools in Enugu State. The respondents' means ranged from 1.82 to 2.51 with a cluster mean of 2.28 and a standard deviation of 0.69 for male principals, while those of female principals ranged from 2.00 to 2.90 with a cluster mean of 2.34 and standard deviation of 0.67. Both groups recorded similar responses in all the items. The overall cluster mean of 2.30 and standard deviation of 0.69 indicates that there is low extent of adoption of AI for data analysis/decision-making by principals of secondary schools in Enugu State. Apart from proper keeping of attendance records, principals do not utilise AI for other data analysis/decision-making in administrative activities.

Research Question 2

What is the extent to which AI is adopted for streamlined communication by principals of secondary schools in Enugu State?

Table 2: Means scores of male and female principals on the extent to which AI is adopted for streamlined communication by principals of secondary schools in Enugu State

S/NO	ITEMS	Male (186)		Female (109)		Total 295		
	AI is adopted for streamlined communication in the following ways:	**X**	**SD**	**X**	**SD**	**X**	**SD**	**Dec.**
10	passing of information from one staff to another staff	3.15	0.57	2.97	0.95	3.06	0.83	GE
11	for ensuring free flow of information among all staff	3.02	0.82	2.80	1.01	2.91	0.94	GE
12	for relaying information on school activities at the right time	2.90	0.74	2.95	0.95	2.93	0.87	GE
13	for communicating to the right people in clear language	2.56	0.89	2.52	1.10	2.54	1.01	GE

14	giving correct up to date information about school programmes	2.50	0.85	2.59	1.19	2.55	1.08	GE
15	allowing free communication in order to guide against rumour	2.74	0.42	2.77	0.92	2.76	0.79	GE
16	countering misrepresentation	2.80	0.79	2.40	0.82	2.53	0.82	GE
17	handling routine inquiries	2.60	0.52	2.70	0.80	2.67	0.71	GE
18	provide direct information to staff on appropriate resources	2.40	0.70	2.55	0.95	2.50	0.86	GE
19	proactively delivering relevant information for improved communication effectiveness	2.51	0.82	2.60	0.94	2.56	0.88	GE
	Cluster mean	**2.72**	**0.71**	**2.69**	**0.96**	**2.70**	**0.88**	**GE**

Table 2 above shows the mean scores of male and female principals on the adoption of artificial intelligence (AI) for effective communication among human resources in secondary schools in Enugu State. The respondents' means ranged from 2.40 to 3.15 with a cluster mean of 2.72 and a standard deviation of 0.71 for male principals, while those of female principals ranged from 2.40 to 2.97 with a cluster mean of 2.69 and standard deviation of 0.96. Both groups recorded similar responses in all the items. The overall cluster mean of 2.70 and standard deviation of 0.88 indicates that there is high extent of adoption of AI for streamlined communication by principals of secondary schools in Enugu State.

Research Question 3

What is the extent to which AI is adopted for resource optimization by principals of secondary schools in Enugu State?

Table 3: Means scores of male and female principals on the extent to which AI is adopted for resource optimization by principals of secondary schools in Enugu State

S/NO	ITEMS	Male (186)		Female (109)		Total 295		
	AI is adopted for data resource optimization in the following ways:	**X**	**SD**	**X**	**SD**	**X**	**SD**	**Dec.**
20	ensure effective allocation of school resources	2.20	0.63	2.45	0.51	2.32	0.56	LE
21	ensure efficient utilisation of school resources	2.26	0.79	2.35	0.75	2.31	0.75	LE

22	proper allocation of staff	1.82	0.79	2.35	0.59	2.17	0.70	LE
23	right allocation of classrooms	2.40	0.92	2.10	0.72	2.25	0.79	LE
24	efficient resource allocation strategies to optimize learning environments	2.10	0.74	2.30	0.66	2.23	0.68	LE
25	analyzing data on student enrollment	2.30	0.48	2.41	0.51	2.36	0.50	LE
26	analyzing data on class sizes	2.43	0.63	2.00	0.65	1.93	0.64	LE
	Cluster mean	**2.22**	**0.69**	**2.28**	**0.67**	**2.25**	**0.69**	**LE**

Table 3 above shows the mean scores of male and female principals on the adoption of artificial intelligence (AI) for resource optimization in secondary schools in Enugu State. The respondents' means ranged from 1.82 to 2.43 with a cluster mean of 2.22 and a standard deviation of 0.69 for male principals, while those of female principals ranged from 2.00 to 2.45 with a cluster mean of 2.28 and standard deviation of 0.67. Both groups recorded similar responses in all the items. The overall cluster mean of 2.25 and standard deviation of 0.69 indicates that there is low extent of adoption of AI for data analysis/decision-making by principals of secondary schools in Enugu State.

Hypotheses

Hypothesis 1

$H_0 1$ There is no significant difference in the mean scores of male and female principals on the extent to which AI is adopted for data analysis/decision-making by principals of secondary schools in Enugu State.

Table 4: Test of Hypothesis 1

Group	N	X	SD	Df	z-cal	z-crit	Decision
Male	186	2.28	0.69				
				293	0.73	1.96	Do not reject $H0_1$
Female	109	2.34	0.67				

Table 4 shows the z-value for the difference in male and female principals on the extent to which AI is adopted for data analysis/decision-making by principals of secondary schools in Enugu State. The result

showed that the calculated z-value (0.73) was less than the critical value (1.96). Hence, the null hypothesis was not rejected. Therefore, there is no significant difference between the mean ratings of male and female principals on the extent to which AI is adopted for data analysis/decision-making by principals of secondary schools in Enugu State.

Hypothesis 2

$H_0$2 There is no significant difference in the mean scores of male and female principals on the extent to which AI is adopted for streamlined communication by principals of secondary schools in Enugu State.

Table 5: Test of Hypothesis 1

Group	N	X	SD	Df	z-cal	z-crit	Decision
Male	186	2.72	0.71				
				293	0.28	1.96	Do not reject $H0_2$
Female	109	2.69	0.96				

Table 5 shows the z-value for the difference in male and female principals on the extent to which AI is adopted for streamlined communication by principals of secondary schools in Enugu State. The result showed that the calculated z-value (0.28) was less than the critical value (1.96). Hence, the null hypothesis was not rejected. Therefore, there is no significant difference between the mean ratings of male and female principals on the extent to which AI is adopted for streamlined communication by principals of secondary schools in Enugu State.

Hypothesis 3

$H_0$1 There is no significant difference in the mean scores of male and female principals on the extent to which AI is adopted for resource optimization by principals of secondary schools in Enugu State.

Table 6: Test of Hypothesis 3

Group	N	X	SD	Df	z-cal	z-crit	Decision
Male	186	2.22	0.69				
				293	0.69	1.96	Do not reject $H0_1$
Female	109	2.28	0.67				

Table 6 shows the z-value for the difference in male and female principals on the extent to which AI is adopted for resource optimization by principals of secondary schools in Enugu State. The result showed that the calculated z-value (0.69) was less than the critical value (1.96). Hence, the null hypothesis was not rejected. Therefore, there is no significant difference between the mean ratings of male and female principals on the extent to which AI is adopted for resource optimization by principals of secondary schools in Enugu State.

Discussion

The finding of the study indicated that there is low extent of adoption of AI for data analysis/decision-making by principals of secondary schools in Enugu State. The respondents were of the views that apart from proper keeping of attendance records, principals do not utilise AI for other data analysis/decision-making in administrative activities. Principals of secondary schools in Enugu State are still lagging behind in the use of AI for data analysis/decision-making; meanwhile, AI is very effective in data analysis/decision-making as it makes data management related tasks very easy and accurate.

This assertion agrees with the submission of Niyi and Gregory (2025) who found that many issues arising in the educational institutions demand decision-making because there is more than a single option of action; therefore, administrators 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. It also agrees with AFSA (2022) who averred that AI assist administrators in analyzing large volumes of data, such as student performance data, attendance records and resource allocation as they identify patterns, trends and insights that can inform decision-making processes.

The findings of the study also showed that there is high extent of adoption of AI for streamlined communication by principals of secondary schools in Enugu State. The respondents submitted that AI is adopted by principals for passing information from one staff to another staff, ensuring free flow of information among all staff, relaying information on school activities at the right time, communicating to the right people in clear language, giving correct up to date information about school programmes, allowing free communication in order to guide against rumour, countering misrepresentation, handling routine inquiries, provide direct information to staff on appropriate resources, proactively delivering relevant, and information for improved communication effectiveness.

This agrees with the submission of Niyi and Gregory (2025) that Al aids effective communication in schools between school administrators, teachers, students and parents. This is corroborated by AFSA (2022) who found that AI-powered communication systems can streamline communication between administrators, teachers, students and parents. Chatbots and virtual assistants can handle routine inquiries, provide information and direct individuals to the appropriate resources.

Finally, the findings of the study also showed that there is low extent of adoption of AI for resource optimization by principals of secondary schools in Enugu State. The respondents were of the views that principals do not utilise AI for resource optimization in their administrative activities. Principals of secondary schools in Enugu State are not fully exposed and knowledgeable, yet, in the use of AI for resource optimization; meanwhile, AI is very effective in resource.

This agrees with the submission of AFSA (2022) who asserted that AI can help 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.

Conclusion

This study confirms that AI is crucial and significant in school administration for streamlined communication, data analysis/decision-making and resource optimization. The application of Al in school administration can lead to effective data analysis, effective communication, proper school administration, resource optimization, student support and intervention, streamlined communication and engagement and enhanced security and safety. The real need of implementing AI for school administration comes handy because AI software provides avenue for proficient human resources data management, productive communication, and overall improved human resource management practices.

Recommendations

Based on the findings of the study, the following recommendations were made:

i. Effort should be made to ensure training and retraining of principals on the use of AI for resource optimization in school administration.
ii. There is need to enhance the knowledge and exposure of principals on the utilisation of AI for data analysis/decision making in their administration tasks.

iii. Principals should improve on their adoption of AI for streamlined communication especially in the areas of customize communication with each staff and issuing queries.

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