
Utilization of Artificial Intelligence in School Management and Principals' Administrative Effectiveness in Public Secondary Schools in Cross River State, Nigeria

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ABSTRACT

Specifically, the study sought to investigate the extent of utilization of artificial intelligence in school management among secondary school Principals, and to find out whether there is a relationship between the utilization of artificial intelligence in school management and principals' administrative effectiveness. Two research questions were posed with two corresponding null hypotheses to guide the study. The study adopted a correlational research design. The population of the study comprised 297 principals in public secondary schools in the three education zones in the state. A stratified random sampling technique was used to select 134 principals as the sample and respondents of the study. An instrument titled " Utilization of Artificial Intelligence in School Management and Principals' Administrative Effectiveness Questionnaires (UAISMPAEQ)" was used to collect data. The instrument was validated by two experts. Cronbach's alpha was used to determine the reliability coefficient of the instrument. Independent t-test and Pearson's product moment correlation statistics were used to analyze the data. Results revealed that utilization of artificial intelligence in managing school resources among school principals is significantly low, and that there is a significant relationship between utilization of artificial intelligence in managing school resources and principals' administrative effectiveness. Hence, it was recommended that the government and relevant agencies should provide infrastructure in schools that will enable the use of artificial intelligence in school management. Secondly, school principals should endeavor to utilize artificial intelligence in school management to enhance their administrative effectiveness.

1. Introduction

Administrative effectiveness refers to the ability or capacity of administrators in carrying out their administrative responsibilities successfully and achieving the goals and objectives of their organisation. It can also be referred to as the ability of administrators to plan, organize, control and direct day to day organisational activities in a way that ensure goals attainment. To this end, administrative effectiveness of secondary school principals can be viewed as the competence demonstrates by school principals in carrying out their day to day administrative functions of the school which ultimately results to the achievement of school goals and objectives. Onyekwelu (2024) defined

principals' administrative effectiveness as ability of principals in carrying out their administrative tasks of coordinating both human and material resources, and using them systematically for the achievement of educational objectives. On their part, Jamaica and Tagbo (2023) sees principals' administrative effectiveness as characterized by successfully implementation of policies and procedures that enhance school performance, support decision making and contribute to overall success of the school.

What makes principals effective administrators is their ability to handle administrative tasks in a manner that will lead to the achievement of the predetermined goals. According to Enyi and Enyi (2019), the success of today's educational programmes is largely dependent on the principals' effectiveness in school administration because they hold the key academic and administrative functions. Administratively, school principals plan, direct, organize, control, budget, mobilize, supervise and utilize school resources. They maintain school discipline, implement government policies, oversee curriculum, makes school decisions, manages day to day school operations and finance to ensure a smooth learning environment for intellectual growth and development of the students. It is observed that many principals manages schools manually, which makes their job very complex and almost impossible in achieving the goals and objectives of the schools. With the complexity in school administration arising from school population expansion, manual school administration is no more yielding the most desired results. As observed by Okafor and Ojo (2023), traditional method of school management often rely on manual processes which can be prone to inefficiencies, delays and inaccuracies. Manual or traditional school management slow decision making process and some time gives inaccurate data about school resources and activities, thereby creating some sort of administrative problems. In this era of digitalization, it is imperative to utilize digital tools such as artificial intelligence in school management to minimize inefficiencies in school management and enhance administrative effectiveness of principals. Artificial intelligence offers transformative solution to challenges of school management by automating processes, enhancing decision making process and promoting optimal utilization of resources (Okafor & Ojo, 2023).

Artificial intelligence has become an effective and efficient means of modern management and administration in many organizations such as schools, banks, hospitals, industries and firms. It is a technology created and designed with human intelligence to perform tasks that normally associated with human. Artificial intelligence is a new concept in the field of education, but has already impacted significantly in all area of education, especially in educational management. According to UNESCO (2025), Artificial intelligence has the potential to address some of the highest challenges in education today, innovate teaching and learning practices and accelerate progress towards SDG-4.

Artificial intelligence has emerged as a transformative tool in educational planning and management, offering innovative solutions to enhance efficiency, optimize resources and improve learning outcome. AI driven system has present opportunities for automating administrative tasks, personalizing learning experiences and facilitating data-driven decision making (Ugbenu, Ukandu, Okeke, Akpulue & Uju, 2025). Ogunode and Gregory (2025) defined artificial intelligence as program design with human like intelligence and structured in form of computer, robot or other machine to aid in provision of any kind of service or task to improve socioeconomic and political development of the society. Artificial intelligence is increasingly playing a pivotal role in enhancing school administration, improving decision making, and supporting administrators in unprecedented way. From automating routine task to providing deep, data - informed insights for strategic planning (Given, Bullet & Yurdunkulu, 2025).

AI application have been rapidly evolving, demonstrating a transformative impact on various aspects of life. This transformative had led humanity to exert significant influence over the system it has created (Yilmaz, Koc, Tekim, Altun&Aydin, 2025). According to the authors, artificial intelligence has potential to optimize administrative tasks, streamline communication, and facilitate data-driven decision making process. Artificial intelligence is a branch of computer science that aims to create systems capable of performing tasks that typically require human intelligence (Ugbuanu, Udeani & Mogboh, 2024). Effective and efficient management of resources today involves effective and efficient use of artificial intelligence. It is capable of performing all administrative tasks and optimizing resource management. Jamaica and Tagbo (2024) report that artificial intelligence tools such as machine learning, natural

language processes and automated scheduling systems significantly contribute to administrative processes such as decision making and resources management.

In financial resources management, artificial intelligence tools can streamline budgeting and expenditure tracking, which provides real time insights into financial data, helping school administrators to identify discrepancies, avoid over spending and ensure that funds are allocated to priority areas. Artificial intelligence algorithms can analyse spending patterns and recommend cost saving measures such as identifying suppliers that offer competitive prices for school materials. This enhance transparency and accountability in the management of school finances and improve administrative effectiveness (Okoro, 2023). Artificial intelligence facilitate data-driven decision making, enabling administrators to effectively manage students records, track academic progress and identify risk students, all of which enhanced administrative effectiveness. AI predictive analytics can forecast enrollment trends, helping administrators to plan more effectively and allocate resources where there are more needed. AI-driven scheduling and resources management system optimize the utilization of resources, reduce operational cost and improve overall efficiency and effectiveness (Ajowon, Animashaun & Chekezie, 2024).

Isong, Sackey and Nyong (2025) report that artificial intelligence significantly influence students personnel management, resources allocation, data handling and decision making, thereby enhancing administrative effectiveness. Ndal (2025) report that artificial intelligence has the potential to significantly enhance the effectiveness of educational management by enabling data-driven decision making, reducing operational inefficiencies, and promoting inclusivity and equity in education. Igboke, Anikeze and Ugwunwangwu (2025) findings revealed that the extent of adoption and utilization of artificial intelligence in public organizations in Enugu State, Nigeria is low; and that utilization of artificial intelligence has positive significant effect in enhancing administrative transparency in public organizations. Similarly, Chui (2025) report that there is low integration of artificial intelligence in education. Furthermore, Sari (2024) report that utilization of artificial intelligence has improved operational efficiency, acceralated administrative processed and facilitated monitoring of students and staff performance.

From the background of the study, it appears that utilization of artificial intelligence in managing school resources is significant to enhancing administrative effectiveness. Hence, this study seek to examine the extent of utilization of artificial intelligence in managing school resources among secondary schools teachers; and to find out whether utilization of artificial intelligence in managing school resources could predict principals' administrative effectiveness in Cross River State, Nigeria.

1.1 Statement of the problem

The extent to which secondary schools achieve their goals and objectives depends largely on the administrative effectiveness of the school principals. The principals hold the key to the success of their schools through their day-to-day administrative efforts. However, it has been observed over the years that administrative effectiveness have been affected by poor management of school among secondary school principals in Cross River State, hence hindering the achievement of school goals and objectives due to poor management of resources. Further observation revealed that some of these Principals still utilizes conventional way of school management instead of utilizing artificial intelligence that is globally accepted as a veritable technology for school administration. Failure to utilize artificial intelligence in the management of school may be the reason why some Principals constantly confront with the challenges of school administration. Therefore, the question of whether there is relationship between utilization of artificial intelligence in school management and principals' administrative effectiveness is the concern of this study.

Research questions

- i) What is the extent of utilization of artificial intelligence in school management ?
- ii) What is the relationship between utilization of artificial intelligence in school management and Principals' administrative effectiveness?

Research hypotheses

- i) The extent to which artificial intelligence is utilize in school management is not significantly low.
- ii) There is no significant relationship between Utilization of artificial intelligence in school management and Principals' administrative effectiveness.

2. Research method

Correlation research design was adopted in this study. The study was carried out in public secondary schools in Cross River State. The state is one of the six states in South South Geopolitical zone of Nigeria. It shares boundaries with Benue state to the North, Akwa Ibom State and Atlantic Ocean to the South, Abia and Ebonyi States to the West and Republic of Cameroon to the East. The population of the study was 297 principals of public secondary schools in the three education zones in the state (Calabar 95, Ikom 112 and Ogoja 90). Stratified random sampling technique was used to select 160 principals in the three education zones (Calabar 43, Ikom 50 and Ogoja 41) as sample and respondents of the study. The sample size constitute 40 percent of the study population.

An instrument titled " Utilization of Artificial Intelligence in School Management and Principals' Administrative Questionnaire (UAISMPAEQ)" was used to collect data. The instrument was validated by two experts in Measurement and Evaluation, and Educational Management. Cronbach's alpha was used to determined the reliability coefficient of the instrument, and the result yielded reliability coefficient of 0.74 and 0.78. Direct method of data collection was adopted by the researcher with the help of two trained research assistants. Data generated was coded accordingly and analyzed with independent t-test and Pearson's product moment correlation statistics.

3. Results

One-Sample T-Test of the level of Utilization of Artificial Intelligence for school Management

	Mean	t-value	df	p-value	Mean Difference	Lower	Upper
Utilization of AI	46.45	-2.903	133	.004	-3.55224	-5.973	-1.132

Test Value = 50, Alpha=0.05, 95% Confidence Interval of the Difference

The null hypothesis states that the utilization of AI in school management is not significantly low. However, with a p-value of 0.004, which is less than the chosen alpha level of 0.05, the null hypothesis is rejected. This indicates that there is statistically significant evidence to conclude that the utilization of artificial intelligence in school management is significantly low, relative to the hypothesized mean of 50. The negative t-statistic of -2.90288 further supports this, as it indicates that the observed sample mean (46.45) is significantly below the hypothesized mean (50). This finding implies that, based on this data, Principals are not utilizing Artificial Intelligence for school Management as much as hypothesized or desired.

Pearson Moment Correlation Coefficient Analysis between the Utilization of Artificial Intelligence in school management and Principals' Administrative Effectiveness (N=134)

Variables	ΣX	ΣX^2	ΣXY	r-value
	ΣY	ΣY^2		
Utilization of AI	2749	57665	411035	0.807962
Principals' Admin effectiveness	2739	57323		

Significant at 0.05, r-critical= 0.194, df=132

The r-value of 0.807962 indicates a positive relationship between Utilization of Artificial Intelligence in school management and Principals' Administrative effectiveness. This means that as Utilization of Artificial Intelligence in school management increases, Principals' Administrative effectiveness also increases. In addition, the significance of this correlation is determined by the r-critical value, which is 0.194 at a significance level of 0.05 and degrees of freedom (df) of 132. Therefore, since the calculated r-value (0.807962) is greater than the r-critical value (0.194), the relationship is statistically significant. Thus, the null hypothesis, which states that there is no significant relationship between the Utilization of Artificial Intelligence in school management and Principals' Administrative effectiveness, is rejected. Thus, it is alternately accepted that there is a significant relationship between the Utilization of Artificial Intelligence in school management and Principals' Administrative effectiveness.

4. Discussion

The result of hypothesis one revealed that the extent of utilization of artificial intelligence in school management by school principals is significantly low. This result may be connected to lack of infrastructures such as artificial intelligence facilities and power supply, and poor attitude of school principals towards the use of the technology. This result was in line with Chui (2025), whose findings revealed that there is a low level of utilization of artificial intelligence in education. Similarly, the result agrees with the finding of Igboke, Anikeze and Ugwunwangwu (2025) who revealed that the extent of utilization of artificial intelligence in public organizations in Enugu State is significantly low.

Furthermore, result of hypothesis two revealed that there is relationship between utilization of artificial intelligence in school management and Principals' administrative effectiveness. This implies that if school principals utilize artificial intelligence in managing school management, it will enhance their administrative effectiveness and ensure goal attainment. This result was in agreement with the finding of Isong, Sackey and Nyong (2025) who revealed that utilization of artificial intelligence significantly influence students personnel management, resources allocation, data handling and decision making, thereby enhancing administrative effectiveness.

5. Conclusion

Based on the results, it was concluded that the lack of AI infrastructures and power supply in secondary schools and Principals' lack of interest are responsible for low utilization of artificial intelligence in school management: and that utilization of artificial intelligence in managing school resources enhance Principals' administrative effectiveness.

5.1 Recommendations

The following recommendations were made based on the findings and the conclusions.

- i. There is a need for government to provide infrastructures and ensure steady power supply in secondary schools to enable the use of artificial intelligence by principals in managing school resources.
- ii. School Principal should endeavor to use artificial intelligence in school management to enhance administrative effectiveness.

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