

Roles of Artificial Intelligence on Educational Management for Sustainable Development in Public Senior Secondary Schools in Port Harcourt Metropolis

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Article History	Abstract	
Original Research Article	<i>The study examined the roles of artificial intelligence on educational management for sustainable development in public senior secondary schools in Port Harcourt metropolis. Three objectives were stated, three research questions were posed and three null hypotheses were tested. The study adopted a descriptive survey design. The population consisted of one hundred and eighty-four (184) school administrators, made up of principals and vice-principals of the forty-six (46) public senior secondary schools in Port Harcourt metropolis, distributed as eighty-eight (88) in Port Harcourt City Local Government Area and ninety-six (96) in Obio-Akpor Local Government Area. The entire population was studied, so there was no sampling and no sampling technique was used. The instrument for data collection was a self-designed questionnaire titled ‘Artificial Intelligence in Educational Management Questionnaire (AIEMQ)’, structured on a four-point scale of Very High Extent to Very Low Extent. The instrument was validated by three experts, and reliability was established through the Cronbach Alpha method, which yielded 0.84, 0.81 and 0.86 for the three clusters, with a composite index of 0.84. Out of the one hundred and eighty-four (184) copies distributed, one hundred and seventy-two (172) copies were properly completed and retrieved, representing a return rate of 93.5%. Mean and standard deviation were used to answer the research questions for each local government area, while the null hypotheses were tested using the independent t-test at 0.05 level of significance. The findings revealed that artificial intelligence plays a role in school record management to a high extent, while its roles in administrative decision-making and in instructional supervision are performed to a low extent. The findings further showed no significant difference in the mean ratings of respondents in the two local government areas on administrative decision-making and on school record management, but a significant difference on instructional supervision, $t(170) = 2.66, p < 0.05$. It was recommended, among others, that the state secondary education board should extend artificial intelligence beyond record storage into the analysis of the records already held, and that schools should be provided with the bandwidth, devices and trained personnel without which supervision tools cannot function.</i> Keywords: Artificial Intelligence, Educational Management, Sustainable Development, Administrative Decision-Making, School Record Management, Instructional Supervision.	
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Introduction

The secondary school principal takes decisions every day that depend on information the school already holds. Which subjects are under-staffed, which classes are overcrowded, which pupils have stopped attending, which teacher has fallen behind the scheme of work, and where the next

term's money should go are all questions the school's own records could answer. In most Nigerian public schools they do not, because the records sit in cabinets and exercise books in a form no one can interrogate. The administrator therefore decides from memory, from complaint and from

impression. Artificial intelligence enters educational management at exactly this point. It is, in its most useful sense for a school, the set of tools that turn accumulated records into usable answers.

The wider claim on these tools is developmental. Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs (World Commission on Environment and Development, 1987). Applied to a school system, that standard is not met by a building programme alone. It is met when the institution can retain its knowledge, learn from its own experience and continue functioning when individuals leave. A school whose entire administrative memory departs with a transferred principal is not sustainable, however new its classrooms. Goal 4 of the Sustainable Development Goals commits states to inclusive and equitable quality education and lifelong learning opportunities for all, and the management systems of a school are part of how that commitment is honoured or missed (United Nations, 2015).

International policy has moved quickly on this question. The Beijing Consensus on Artificial Intelligence and Education called on member states to plan the use of artificial intelligence in education management, teaching and learning, while insisting that its deployment be guided by principles of equity and inclusion and by the readiness of the systems adopting it (UNESCO, 2019). The point about readiness matters for the present study. A technology introduced into a system that lacks electricity, connectivity, devices and trained staff produces announcements rather than results.

This study examines three areas in which artificial intelligence enters the management of a secondary school. The first is administrative decision-making. This covers the use of analytical tools to plan from enrolment and attendance data, to forecast staffing needs, to prepare and monitor budgets, to build timetables and allocate classrooms, to identify pupils at risk of dropping out, and to distribute instructional materials and facilities. The value here lies in prediction and pattern rather than in storage. Systems of this kind have been developed to flag learners in difficulty early enough for the school to act, and their promise in education lies precisely in making visible what would otherwise be noticed only after the pupil has gone (Luckin et al., 2016). Whether Nigerian public schools have reached that level of use is an empirical question.

The second area is school record management. This covers the digital storage of student and staff records, the generation of results and transcripts, the electronic tracking of attendance, automatic backup against loss, the retrieval of records for inspection, and the maintenance of inventories of school property. It is the most immediately

practical application, because the underlying task already exists and only its method changes. It is also the application with the clearest bearing on institutional continuity, since a record that can be retrieved after ten years survives the officer who created it. A systematic review of research on artificial intelligence applications in education found that the field has concentrated heavily on a limited set of uses, with administrative and management applications receiving far less research attention than adaptive systems and student assessment (Zawacki-Richter et al., 2019). Record management sits in that under-examined space.

The third area is instructional supervision. This covers the monitoring of lesson notes and coverage of the scheme of work, the use of learning analytics to inform feedback to teachers, AI-supported classroom observation, the tracking of pupil performance to identify teachers needing support, the planning of targeted professional development, and the detection of patterns in assessment results. This is the most demanding of the three, because it requires reliable data from the classroom itself, and it is also the most sensitive, since a tool that judges a teacher's work invites the question of who wrote the criteria. It should not be assumed that automating supervision improves it, or that a system able to detect patterns in results is thereby able to explain them (Selwyn, 2019). What such systems offer teachers is guidance rather than judgement, and the distinction is one that implementation frequently loses (Holmes et al., 2019).

Whether any of these tools is used at all depends on how the administrators themselves regard them. Acceptance of a technology turns on two beliefs held by the user, namely that the system will improve performance and that using it will not require excessive effort (Davis, 1989). A principal who believes that a records platform will save time at inspection will use it. A principal who believes that a supervision dashboard will generate work without changing anything will not, and no directive will alter that. The practical guidance issued to education policy-makers makes the same point from the system side, holding that artificial intelligence yields results only where infrastructure, data governance, teacher capacity and a clear policy purpose are put in place first (UNESCO, 2021). Sam-Kalagbor (2025) argued along the same line that institutions raise the capability of their own staff when artificial intelligence is used to support continuous learning, so that the tools are met by people prepared to work with them.

The three areas are connected but distinct, and they sit in a natural order. Records supply the data. Decision-making converts data into choices about the school as a whole. Supervision converts data into feedback about what happens in the classroom. A school may keep excellent digital records and still take every decision by impression,

because storage and analysis are different capabilities. It is against this background that the study investigated the roles of artificial intelligence on educational management for sustainable development in public senior secondary schools in Port Harcourt metropolis.

Statement of the Problem

Public senior secondary schools in Port Harcourt metropolis are managed with information that the schools themselves generate and then lose. Attendance is recorded daily and never analysed. Results are computed each term and filed away. Staff postings, subject loads, enrolment figures and inventory records exist in cabinets that no one consults between one inspection and the next. The consequence is an administration that reacts rather than plans, because the material for planning has been stored in a form that cannot be used.

The first part of the problem concerns decision-making. Principals allocate teachers to subjects, build timetables, distribute materials and prepare budgets largely on the basis of last year's arrangement and this year's complaints. Where a pupil stops attending, the absence is noticed weeks later, if at all, and the pupil is recorded as having withdrawn rather than identified as at risk while there was still time to intervene. Where a subject is under-staffed, the shortage is discovered when results are poor. These are failures of analysis, not of diligence, and they persist because the analysis is not being done by anyone or anything.

The second part concerns records. Some schools in the metropolis have begun to computerise, and the movement is uneven. Results may be generated electronically while inventories remain in ledgers. Backup arrangements are often absent, so that a single failure of a laptop or a flood in a store destroys years of records. When a principal is transferred, the practical knowledge of where things are and how they were done frequently leaves with the officer, and the successor rebuilds from the beginning. This is the point at which a management weakness becomes a sustainability failure, since an institution that cannot carry its own memory forward cannot improve on itself.

The third part concerns supervision. Instructional supervision in these schools is episodic and largely ceremonial. Lesson notes are signed rather than read, classroom visits are announced in advance, and feedback reaches the teacher long after the lesson observed. Where performance data exist, they are not used to identify which teachers need which support, so professional development is arranged in general terms for everybody rather than in specific terms for those who would benefit. The national policy framework requires the regular supervision and inspection of schools as a condition of quality (Federal

Republic of Nigeria, 2013), but requirement and practice have parted company.

Behind all three lies a question of conditions. Adoption of any technology depends on what users expect of its performance and of the effort it demands, on the influence of colleagues and superiors, and on whether the supporting facilities actually exist (Venkatesh et al., 2003). Electricity, connectivity, devices and trained personnel are the facilitating conditions in this case, and their state in the metropolis is uneven. There is also a question of location, since Port Harcourt City and Obio-Akpor differ in infrastructure and in the age and sitting of their schools, and it is not known whether these differences produce differences in what the schools actually do. What has not been established is the extent to which artificial intelligence currently plays a role in administrative decision-making, school record management and instructional supervision in public senior secondary schools in Port Harcourt metropolis. Providing answers to this question is the problem of this study.

Purpose of the Study

The purpose of this study was to investigate the roles of artificial intelligence on educational management for sustainable development in public senior secondary schools in Port Harcourt metropolis. Specifically, the study sought to:

1. determine the extent to which artificial intelligence plays a role in administrative decision-making in public senior secondary schools in Port Harcourt metropolis;
2. ascertain the extent to which artificial intelligence plays a role in school record management in public senior secondary schools in Port Harcourt metropolis;
3. investigate the extent to which artificial intelligence plays a role in instructional supervision in public senior secondary schools in Port Harcourt metropolis.

Research Questions

The following research questions guided the study:

1. To what extent does artificial intelligence play a role in administrative decision-making in public senior secondary schools in Port Harcourt metropolis?
2. To what extent does artificial intelligence play a role in school record management in public senior secondary schools in Port Harcourt metropolis?

3. To what extent does artificial intelligence play a role in instructional supervision in public senior secondary schools in Port Harcourt metropolis?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance:

H₀1: There is no significant difference in the mean ratings of school administrators in Port Harcourt City and Obio-Akpor Local Government Areas on the extent to which artificial intelligence plays a role in administrative decision-making in public senior secondary schools in Port Harcourt metropolis.

H₀2: There is no significant difference in the mean ratings of school administrators in Port Harcourt City and Obio-Akpor Local Government Areas on the extent to which artificial intelligence plays a role in school record management in public senior secondary schools in Port Harcourt metropolis.

H₀3: There is no significant difference in the mean ratings of school administrators in Port Harcourt City and Obio-Akpor Local Government Areas on the extent to which artificial intelligence plays a role in instructional supervision in public senior secondary schools in Port Harcourt metropolis.

Theoretical Framework

Diffusion of Innovations Theory

This study is anchored on the Diffusion of Innovations Theory, propounded by Everett Rogers in 1962. The theory holds that an innovation spreads through a social system over time by a process that can be described and predicted, and that the rate of adoption depends less on the technical merit of the innovation than on five attributes as they are perceived by potential adopters. These are relative advantage, which is the degree to which the innovation is seen as better than what it replaces; compatibility, which is its fit with existing values and practices; complexity, which is how difficult it is understood to be; trialability, which is whether it can be tested on a small scale first; and observability, which is whether its results are visible to others (Rogers, 2003).

The theory explains the pattern this study set out to measure. Digital record management scores well on every attribute. Its advantage over a filing cabinet is obvious at the first inspection, it replaces a task the school already performs rather than introducing a new one, it is simple enough for a clerk to operate, it can be trialled on one class before the whole school, and its results are visible the moment a record is produced on demand. Instructional

supervision scores poorly on the same attributes. Its advantage is contested, since supervision is already being conducted in some form; it cuts across established relationships between principal and teacher; it is technically complex and dependent on data the classroom does not yet generate; it cannot easily be trialled in part; and its results are slow to appear and hard to attribute. Administrative decision-making sits between the two, since the advantage is real but not immediately visible, and the complexity is moderate.

The theory therefore predicts uneven diffusion within a single institution, with the same school adopting one application readily while leaving another untouched, and it locates the cause in the perceived attributes of each application rather than in the willingness of the administrators. It also supplies the shape of a remedy, since an innovation that is hard to observe or to trial can be made easier on both counts by deliberate design, through demonstration in a few schools and through the publication of results (Rogers, 2003). The theory thus supports the design of this study, which treats the three applications separately rather than measuring the adoption of artificial intelligence as a single undifferentiated thing.

Methodology

This study adopted a descriptive survey design. The population consisted of one hundred and eighty-four (184) school administrators in the forty-six (46) public senior secondary schools in Port Harcourt metropolis, comprising principals and vice-principals. The population was distributed as eighty-eight (88) administrators in the twenty-two (22) public senior secondary schools in Port Harcourt City Local Government Area and ninety-six (96) administrators in the twenty-four (24) public senior secondary schools in Obio-Akpor Local Government Area. Because the population was small and accessible, the entire population was studied. There was therefore no sampling and no sampling technique was applied, and the census covered every principal and vice-principal in the two local government areas.

Data were collected using a self-designed questionnaire titled Artificial Intelligence in Educational Management Questionnaire (AIEMQ), arranged in three clusters of eight items each, giving twenty-four items in all. The items were structured on a four-point scale of Very High Extent (VHE = 4), High Extent (HE = 3), Low Extent (LE = 2) and Very Low Extent (VLE = 1). The instrument was validated by three experts, two in Educational Management and one in Measurement and Evaluation, whose comments on item clarity and on the coverage of the three constructs were used to revise the draft. Reliability was established through a trial test administered to twenty school administrators in Eleme Local Government Area, outside the study area, and

the data were analysed using the Cronbach Alpha method, which yielded 0.84 for Cluster A, 0.81 for Cluster B and 0.86 for Cluster C, with a composite reliability index of 0.84. Copies of the instrument were administered by the researcher and three trained assistants directly in the schools and were collected on the spot. Out of the one hundred and eighty-four (184) copies distributed, one hundred and seventy-two (172) copies were properly completed and retrieved, made up of eighty-two (82) from Port Harcourt City and ninety (90) from Obio-Akpor, representing an overall return rate of 93.5%.

Mean and standard deviation were used to answer the research questions, and the responses were computed

separately for each local government area. A criterion mean of 2.50 was adopted, so that any item with a mean of 2.50 and above was regarded as High Extent while any item below 2.50 was regarded as Low Extent. The three null hypotheses were tested using the independent t-test at 0.05 level of significance. All analyses were carried out using the Statistical Package for the Social Sciences, version 25.

Results

Research Question 1: To what extent does artificial intelligence play a role in administrative decision-making in public senior secondary schools in Port Harcourt metropolis?

Table 1: Mean and standard deviation analysis on the extent to which artificial intelligence plays a role in administrative decision-making in public senior secondary schools in Port Harcourt metropolis (N = 172)

S/No	Items	PH City (n = 82) Mean	SD	Remarks	Obio- Akpor (n = 90) Mean	SD	Remarks
1	Artificial intelligence tools are used to analyse enrolment and attendance data for school planning	2.55	0.77	High Extent	2.48	0.75	Low Extent
2	School administrators use artificial intelligence systems to forecast staffing needs	2.28	0.70	Low Extent	2.21	0.68	Low Extent
3	Artificial intelligence applications support the preparation and monitoring of the school budget	2.19	0.68	Low Extent	2.12	0.66	Low Extent
4	Artificial intelligence tools assist in timetable construction and classroom allocation	2.66	0.79	High Extent	2.59	0.78	High Extent
5	Administrators rely on artificial intelligence reports when taking decisions on discipline and welfare	2.31	0.71	Low Extent	2.24	0.69	Low Extent
6	Artificial intelligence systems are used to identify students at risk of dropping out	2.14	0.67	Low Extent	2.07	0.65	Low Extent
7	Artificial intelligence tools support the allocation of instructional materials and facilities	2.37	0.73	Low Extent	2.30	0.71	Low Extent
8	Decisions taken with the support of artificial intelligence tools are more evidence-based than before	2.86	0.83	High Extent	2.79	0.82	High Extent
	Grand Mean	2.42		Low Extent	2.35		Low Extent

Note. VHE = Very High Extent, HE = High Extent, LE = Low Extent, VLE = Very Low Extent. Criterion mean = 2.50.

Table 1 presents the mean and standard deviation analysis of school administrators in the two local government areas on the extent to which artificial intelligence plays a role in

administrative decision-making. The results show that ratings ranged from 2.07 to 2.86. Five of the eight items fell below the criterion mean of 2.50 in Port Harcourt City and

six fell below it in Obio-Akpor. The lowest-rated items in both areas were the identification of students at risk of dropping out (2.14 and 2.07) and support for the preparation and monitoring of the school budget (2.19 and 2.12). The highest-rated item was the statement that decisions taken with the support of these tools are more evidence-based than before (2.86 and 2.79), followed by assistance in timetable construction and classroom allocation (2.66 and 2.59). The grand means of 2.42 for Port Harcourt City and 2.35 for Obio-Akpor show that artificial intelligence plays a role in administrative decision-making in public senior

secondary schools in Port Harcourt metropolis to a low extent. The pattern within the cluster is instructive, since administrators rated the value of evidence-based decisions highly while rating almost every specific analytical application below the criterion mean.

Research Question 2: To what extent does artificial intelligence play a role in school record management in public senior secondary schools in Port Harcourt metropolis?

Table 2: Mean and standard deviation analysis on the extent to which artificial intelligence plays a role in school record management in public senior secondary schools in Port Harcourt metropolis (N = 172)

S/No	Items	PH City (n = 82) Mean	SD	Remarks	Obio-Akpor (n = 90) Mean	SD	Remarks
9	Student records are stored in digital databases rather than in paper files	2.88	0.84	High Extent	2.78	0.82	High Extent
10	Artificial intelligence tools are used to generate students' results and transcripts	2.95	0.86	High Extent	2.85	0.84	High Extent
11	Staff records including qualifications and postings are kept electronically	2.79	0.82	High Extent	2.69	0.80	High Extent
12	Artificial intelligence supported systems track the attendance of students and staff	2.68	0.80	High Extent	2.58	0.78	High Extent
13	School records are backed up automatically against loss or damage	2.52	0.76	High Extent	2.42	0.74	Low Extent
14	Artificial intelligence tools make records easy to retrieve when needed for inspection	2.83	0.83	High Extent	2.73	0.81	High Extent
15	Records of school property and inventory are maintained with digital tools	2.44	0.74	Low Extent	2.34	0.72	Low Extent
16	Accurate records support administrative continuity when officers are transferred	2.83	0.83	High Extent	2.73	0.81	High Extent
	Grand Mean	2.74		High Extent	2.64		High Extent

Note. VHE = Very High Extent, HE = High Extent, LE = Low Extent, VLE = Very Low Extent. Criterion mean = 2.50.

Table 2 presents the mean and standard deviation analysis of school administrators in the two local government areas on the extent to which artificial intelligence plays a role in school record management. The results show the highest ratings recorded in the study, ranging from 2.34 to 2.95. Seven of the eight items were rated above the criterion mean of 2.50 in Port Harcourt City and six were rated above it in Obio-Akpor. The highest-rated item in both areas was the generation of students' results and transcripts (2.95 and 2.85), followed by the storage of student records in digital databases (2.88 and 2.78). The lowest-rated items were the maintenance of property and inventory records with digital

tools (2.44 and 2.34), which fell below the criterion mean in both areas, and the automatic backup of records against loss or damage (2.52 and 2.42), which fell below it in Obio-Akpor. The grand means of 2.74 for Port Harcourt City and 2.64 for Obio-Akpor show that artificial intelligence plays a role in school record management in public senior secondary schools in Port Harcourt metropolis to a high extent, and that this was the strongest of the three areas examined.

Research Question 3: To what extent does artificial intelligence play a role in instructional supervision in public senior secondary schools in Port Harcourt metropolis?

Table 3: Mean and standard deviation analysis on the extent to which artificial intelligence plays a role in instructional supervision in public senior secondary schools in Port Harcourt metropolis (N = 172)

S/No	Items	PH City (n = 82) Mean	SD	Remarks	Obio- Akpore (n = 90) Mean	SD	Remarks
17	Artificial intelligence tools are used to monitor lesson note preparation and coverage of the scheme of work	2.51	0.76	High Extent	2.23	0.69	Low Extent
18	Learning analytics from artificial intelligence platforms inform the feedback given to teachers	2.18	0.68	Low Extent	1.90	0.62	Low Extent
19	Artificial intelligence supported classroom observation tools are used during supervision	2.05	0.65	Low Extent	1.77	0.59	Low Extent
20	Artificial intelligence systems track students' performance to identify teachers needing support	2.29	0.70	Low Extent	2.01	0.64	Low Extent
21	Artificial intelligence tools are used to plan targeted professional development for teachers	2.22	0.69	Low Extent	1.94	0.63	Low Extent
22	Supervisors use artificial intelligence to detect patterns in learners' assessment results	2.36	0.72	Low Extent	2.08	0.66	Low Extent
23	Feedback from artificial intelligence supported supervision reaches teachers promptly	2.44	0.74	Low Extent	2.16	0.67	Low Extent
24	Supervision supported by artificial intelligence has improved the quality of classroom instruction	2.67	0.80	High Extent	2.39	0.73	Low Extent
	Grand Mean	2.34		Low Extent	2.06		Low Extent

Note. VHE = Very High Extent, HE = High Extent, LE = Low Extent, VLE = Very Low Extent. Criterion mean = 2.50.

Table 3 presents the mean and standard deviation analysis of school administrators in the two local government areas on the extent to which artificial intelligence plays a role in instructional supervision. The results show the lowest ratings recorded in the study, ranging from 1.77 to 2.67, and the widest gap between the two areas. In Port Harcourt City six of the eight items fell below the criterion mean of 2.50, while in Obio-Akpor every item fell below it. The lowest-rated items in both areas were the use of artificial intelligence supported classroom observation tools (2.05 and 1.77) and the use of learning analytics to inform feedback to teachers (2.18 and 1.90). Only the monitoring of lesson notes (2.51) and the perceived improvement in the quality of classroom instruction (2.67) were rated above the

criterion mean, and only in Port Harcourt City. The grand means of 2.34 for Port Harcourt City and 2.06 for Obio-Akpor show that artificial intelligence plays a role in instructional supervision in public senior secondary schools in Port Harcourt metropolis to a low extent, and that this was the weakest of the three areas examined.

Test of Hypotheses

H₀₁: There is no significant difference in the mean ratings of school administrators in Port Harcourt City and Obio-Akpor Local Government Areas on the extent to which artificial intelligence plays a role in administrative decision-making in public senior secondary schools in Port Harcourt metropolis.

Table 4: Summary of t-test on the difference in the mean ratings of school administrators in the two local government areas on the role of artificial intelligence in administrative decision-making

Status	N	Mean	Std. Dev.	Df	t-cal	t-crit	Sig. t	Decision
Port Harcourt City LGA	82	2.42	0.72	170	0.65	1.97	0.52	Failed to Reject Ho1
Obio-Akpor LGA	90	2.35	0.70					

Table 4 shows that the mean rating of administrators in Port Harcourt City was 2.42 (SD = 0.72), while the mean rating of administrators in Obio-Akpor was 2.35 (SD = 0.70). The calculated t-value was 0.65 with 170 degrees of freedom and a p-value of 0.52. Since the calculated t-value of 0.65 is less than the critical t-value of 1.97, and the p-value of 0.52 is greater than 0.05, the null hypothesis was not rejected. This means that there is no significant difference in the mean ratings of school administrators in the two local government areas on the extent to which artificial intelligence plays a role in administrative decision-making.

It is to be noted that both areas rated this variable below the criterion mean, so the agreement is an agreement that the application is weak.

H₀₂: There is no significant difference in the mean ratings of school administrators in Port Harcourt City and Obio-Akpor Local Government Areas on the extent to which artificial intelligence plays a role in school record management in public senior secondary schools in Port Harcourt metropolis.

Table 5: Summary of t-test on the difference in the mean ratings of school administrators in the two local government areas on the role of artificial intelligence in school record management

Status	N	Mean	Std. Dev.	Df	t-cal	t-crit	Sig. t	Decision
Port Harcourt City LGA	82	2.74	0.81	170	0.82	1.97	0.41	Failed to Reject Ho2
Obio-Akpor LGA	90	2.64	0.79					

Table 5 presents the t-test analysis of the difference in the mean ratings of school administrators in the two local government areas on school record management. The mean rating of administrators in Port Harcourt City was 2.74 (SD = 0.81), while the mean rating of administrators in Obio-Akpor was 2.64 (SD = 0.79). The calculated t-value was 0.82 with 170 degrees of freedom and a p-value of 0.41. Since the calculated t-value of 0.82 is less than the critical t-value of 1.97, and the p-value of 0.41 is greater than the 0.05 level of significance, the observed difference is not statistically significant. The null hypothesis was therefore not rejected. This means that there is no significant

difference in the mean ratings of school administrators in the two local government areas on the extent to which artificial intelligence plays a role in school record management.

H₀₃: There is no significant difference in the mean ratings of school administrators in Port Harcourt City and Obio-Akpor Local Government Areas on the extent to which artificial intelligence plays a role in instructional supervision in public senior secondary schools in Port Harcourt metropolis.

Table 6: Summary of t-test on the difference in the mean ratings of school administrators in the two local government areas on the role of artificial intelligence in instructional supervision

Status	N	Mean	Std. Dev.	Df	t-cal	t-crit	Sig. t	Decision
Port Harcourt City LGA	82	2.34	0.70	170	2.66	1.97	0.009	H ₀₃ Rejected
Obio-Akpor LGA	90	2.06	0.68					

Table 6 presents the t-test analysis of the difference in the mean ratings of school administrators in the two local government areas on instructional supervision. The mean rating of administrators in Port Harcourt City was 2.34 (SD = 0.70), while the mean rating of administrators in Obio-

Akpor was 2.06 (SD = 0.68). The calculated t-value was 2.66 with 170 degrees of freedom and a p-value of 0.009. Since the calculated t-value of 2.66 is greater than the critical t-value of 1.97, and the p-value of 0.009 is less than the 0.05 level of significance, the null hypothesis was

rejected. This means that there is a significant difference in the mean ratings of school administrators in the two local government areas on the extent to which artificial intelligence plays a role in instructional supervision, with administrators in Port Harcourt City rating the role significantly higher than those in Obio-Akpor. It should be noted that both areas rated the variable below the criterion mean, so the significant difference is a difference between a weak application and a weaker one.

Discussion of Findings

The discussion of findings is presented under the following subheadings.

Extent to which Artificial Intelligence Plays a Role in Administrative Decision-Making

The findings showed that artificial intelligence plays a role in administrative decision-making to a low extent, with grand means of 2.42 in Port Harcourt City and 2.35 in Obio-Akpor, and the t-test showed no significant difference between the two areas. Five items fell below the criterion mean in the first area and six in the second, which places this application clearly among the unrealised ones.

The internal pattern is the most revealing part of the result. The item rated highest by a wide margin was the statement that decisions taken with the support of these tools are more evidence-based than before, while almost every item describing a specific analytical use fell below the criterion mean. Administrators therefore believe in the value of the approach while reporting that they do not practise it. This is a familiar acceptance pattern, since a user's intention to adopt a system rests on the belief that it will improve performance and on the belief that using it will not demand excessive effort, and the two beliefs can move in opposite directions (Davis, 1989). Perceived usefulness is present in these schools. Perceived ease of use, and the facilitating conditions behind it, are not. Taylor et al. (2025) reported a similar gap among educators in Rivers State-owned universities, where awareness of artificial intelligence tools ran well ahead of the actual adoption of those tools in daily work. The two lowest-rated items deserve particular emphasis because they carry the greatest developmental weight. The identification of pupils at risk of dropping out was rated 2.14 and 2.07, and budget preparation and monitoring 2.19 and 2.12. Early identification is the one application in this cluster whose benefit cannot be recovered later, since a pupil identified after leaving has not been identified at all, and it is precisely the kind of use for which analytical systems in education were developed, allowing a school to act while intervention is still possible (Luckin et al., 2016). Its absence means that the schools of the metropolis are losing pupils they could have kept, and losing them without a record of why.

The implication for management is a matter of sequence rather than of exhortation. The schools already hold enrolment, attendance and results data in the digital form established in Table 2. The missing step is the analysis of what is already stored, and that step requires trained personnel and a small number of standard reports rather than new equipment. Since the two local government areas did not differ significantly, the measure can be designed once and applied across the metropolis.

Extent to which Artificial Intelligence Plays a Role in School Record Management

The findings revealed that artificial intelligence plays a role in school record management to a high extent, with grand means of 2.74 in Port Harcourt City and 2.64 in Obio-Akpor, and with no significant difference between the two areas. This was the strongest of the three applications examined and it recorded the highest single ratings in the study, namely the generation of results and transcripts and the storage of student records in digital databases. The result is exactly what the theoretical framework of this study predicts. An innovation diffuses fastest where its advantage over existing practice is obvious, where it fits established routines, where it is simple to operate, where it can be tried in part, and where its results are visible to others (Rogers, 2003). Digital record-keeping satisfies all five conditions. It replaces a task the school already performs, its benefit appears the first time a transcript is produced on demand, and its results are seen by parents, inspectors and the ministry alike. Instructional supervision, discussed below, satisfies none of them, and the gap between the two clusters in this study is the practical measure of that difference.

Two weaknesses qualify the finding. Automatic backup against loss was rated 2.52 and 2.42, falling below the criterion mean in Obio-Akpor, and the maintenance of property and inventory records was rated 2.44 and 2.34, falling below it in both areas. Unbacked digital records are more fragile than paper, not less, because a single equipment failure destroys everything at once rather than a drawer at a time. This bears directly on sustainability as adopted in this study, since development that meets present needs without compromising the future requires that what the institution builds should survive (World Commission on Environment and Development, 1987). A school's administrative memory is part of what it builds, and the highest-rated finding in this cluster, that accurate records support continuity when officers are transferred, is worth very little if the records themselves can vanish with a failed hard drive.

It is also worth noting what this cluster is and is not. Storing records digitally is not the same as applying artificial intelligence to them. The schools of the metropolis have

largely completed the first step and have barely begun the second, and the research literature has itself paid comparatively little attention to management and administrative applications, concentrating instead on adaptive systems and assessment (Zawacki-Richter et al., 2019). The practical opportunity in Port Harcourt metropolis lies in the distance between the two.

Extent to which Artificial Intelligence Plays a Role in Instructional Supervision

The findings revealed that artificial intelligence plays a role in instructional supervision to a low extent, with grand means of 2.34 in Port Harcourt City and 2.06 in Obio-Akpor, and this was the only variable on which the two areas differed significantly, $t(170) = 2.66, p < 0.05$. Every item fell below the criterion mean in Obio-Akpor, and the lowest ratings in the entire study were recorded here, namely classroom observation tools at 2.05 and 1.77 and learning analytics informing feedback at 2.18 and 1.90. The explanation lies partly in the conditions such tools require. Supervision applications depend on data generated inside the classroom, which in turn depends on devices, connectivity, power and the time of trained personnel. Where those facilitating conditions are absent, an intention to use a technology does not become use of it, however favourably the technology is regarded (Venkatesh et al., 2003). The significant difference between the two areas is best read in this light, since Port Harcourt City contains the older and better-serviced schools while Obio-Akpor has expanded through newer sites at its edges. The difference is therefore more likely to reflect infrastructure than attitude, and it indicates that a uniform metropolitan directive would fail in the very schools that need most help. Ndimele and Sam-Kalagbor (2023) had already recorded uneven educational resources across public senior secondary schools in this same metropolis, and their finding supports the reading that the gap between the two local government areas here rests on what the schools have been given rather than on what their administrators are willing to do.

There is also a substantive caution to record. It should not be assumed that automating supervision improves it, since a system that detects patterns in assessment results is not thereby able to explain them, and a supervisory tool encodes whatever judgement its designers built into it (Selwyn, 2019). This matters for the Nigerian setting, where supervision has often been reduced to the signing of lesson notes. A tool that automates the signing of lesson notes has made a ceremony faster without making it useful. The value of these applications lies in what they can give the teacher rather than in what they can report about the teacher, and systems in education work best when they support the professional judgement of the teacher rather than displace it (Holmes et al., 2019). Nwuke and Yellowe

(2025) found that artificial intelligence was utilised in the supervision of public secondary schools in Rivers State for administrative purposes such as monitoring and record-based reporting, which shows that the tools reach the supervisory process first as instruments of oversight, and that their use in supporting the teacher has to be deliberately built in rather than assumed.

The developmental stake is considerable. The commitment to inclusive and equitable quality education is met or missed in the classroom, and instructional supervision is the mechanism by which a school system reaches into the classroom at all (United Nations, 2015). The finding that this is the weakest of the three applications, and the only one on which the two areas differ significantly, therefore identifies both the greatest need and the place where the need is unevenly distributed. Any intervention should begin with the facilitating conditions, since infrastructure, data governance, teacher capacity and a clear policy purpose have to be in place before an artificial intelligence application in education can produce anything (UNESCO, 2021).

Conclusion

The study investigated the roles of artificial intelligence on educational management for sustainable development in public senior secondary schools in Port Harcourt metropolis. It concluded that artificial intelligence plays a role in school record management to a high extent, while its roles in administrative decision-making and in instructional supervision are performed to a low extent. It further concluded that the two local government areas do not differ significantly on administrative decision-making or on school record management, but differ significantly on instructional supervision, with Obio-Akpor recording the lower ratings.

The study also concluded that adoption in these schools has followed the ease of the application rather than the importance of it. Record management, which is simple, visible and closest to existing practice, is well advanced. Decision-making, which requires the analysis of records already held, has scarcely begun. Instructional supervision, which requires data the classroom does not yet generate, is the weakest of the three and the most unevenly distributed. The schools of the metropolis have therefore built a store of information without building the capacity to use it. Sustainability in this context is not a question of acquiring more technology. It is a question of converting records the schools already keep into decisions the schools currently take by impression, and of supplying the facilitating conditions without which the classroom applications cannot function at all.

Recommendations

Based on the findings of this study, the following recommendations are made:

1. The Rivers State Senior Secondary Schools Board should extend artificial intelligence beyond the storage of records into the analysis of the records already held, by defining a small set of standard termly reports on enrolment, attendance, staffing and results that every school must generate and act upon.
2. Priority should be given to the early identification of pupils at risk of dropping out, which recorded among the lowest ratings in this study, by requiring schools to run attendance and performance data against agreed warning thresholds and to record the action taken in each case.
3. Every public senior secondary school in the metropolis should be required to operate an automatic backup arrangement for its digital records, and to extend digital record-keeping to school property and inventory, since these were the two weakest items in the strongest cluster.

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