SCHOOL MANAGEMENT INFORMATION SYSTEMS AND DIGITAL TRANSFORMATION IN EDUCATIONAL ADMINISTRATION: EVIDENCE FROM PUBLIC SENIOR SECONDARY SCHOOLS IN ABUJA, NIGERIA

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Abstract
This study examined the effectiveness of School Management Information Systems (SMIS) in advancing the digital transformation of educational administration in public senior secondary schools in the Federal Capital Territory (FCT), Abuja, Nigeria. An explanatory sequential mixed-methods (quantitative and qualitative) design was adopted. The study involved 87 principals; 352 teachers selected through proportionate stratified random sampling; and 24 parents who participated in focus group discussions (FGDs). Data were collected through questionnaires and analysed using mean scores and standard deviations. While data from the FGDs was analysed using thematic analysis. Findings revealed that principals demonstrated high levels of digital literacy, SMIS competence, and SMIS implementation. The findings further showed that principals effectively utilized SMIS for administrative decision-making. Similarly, teachers rated principals as effective in SMIS-based records management. However, parental access to SMIS varied across urban, semi-urban, and rural areas. The researchers concluded that SMIS enhances administrative efficiency, accountability, and parental engagement, although digital inequalities remain a challenge.

Keywords: *School Management Information Systems, digital transformation in educational administration, data-driven decision-making, parental engagement, and digital literacy.*

Introduction
The increasing adoption of digital technologies in education has significantly transformed school management globally (Kurniawanto et al., 2024). School Management Information Systems (SMIS) are now widely implemented to improve record management, administrative efficiency, accountability, communication, and evidence-based decision-making within

educational institutions (Helal et al., 2021; UNESCO, 2023). In Nigeria, particularly within the Federal Capital Territory (FCT), SMIS has been introduced in public secondary schools to enhance information management and support evidence-based administration.

Despite the increasing implementation of SMIS, concerns remain regarding its effectiveness and overall contribution to educational development. Evidence suggests that while digital technologies can enhance educational administration and learning outcomes, their success is contingent upon users' digital competence, utilisation levels, availability of supporting infrastructure, and stakeholder accessibility (OECD, 2024; World Bank, 2022). Additionally, disparities in technology access between urban and rural communities continue to restrict the equitable distribution of digital education benefits (Van Dijk, 2020). As Umah et al. (2026) observed, connectivity gaps exist, and digital inequality is increasingly reflecting disparities in skills and meaningful usage. They were emphatic that access to devices alone does not guarantee digital participation.

Previous research on SMIS has primarily addressed administrative efficiency, data management, record-keeping, and organisational performance (Helal et al., 2021; Mutua and Kilonzo, 2023). However, there has been limited exploration of how SMIS contributes to broader educational and social objectives, including cultural promotion, ethical administration, accessibility, parental engagement, and digital skill acquisition. Consequently, a gap remains concerning the extent to which digital educational management systems facilitate the preservation of cultural values, promote responsible educational data use, improve access for parents and communities, and foster digital competencies among stakeholders.

Hakimi et al. (2021) conducted a systematic qualitative analysis of 77 peer-reviewed studies exploring the ethics of using digital "big data" or trace data in learning environments. They found that issues related to data privacy, confidentiality, and the responsible use of student information have become increasingly important as schools adopt digital services more extensively. Costa and Freitas (2025) were emphatic that digital ethics is fundamental to the sustainable and responsible use of technology in education, requiring attention to issues like data privacy, algorithmic equity,

and human-centred design; achieving this depends on participatory dialogue, strong governance, and ongoing moral oversight to ensure education continues to be both technologically advanced and morally grounded. While digital ethics has received substantial scholarly attention internationally, Aina and Ibrahim (2023) research on digital governance in Nigerian secondary schools' points to a critical gap amid rapid digital adoption and inadequate cybersecurity, with schools struggling because of infrastructure deficits and low digital literacy. Findings indicate that student data is often managed without formal consent or encryption, leaving systems vulnerable and highlighting an urgent need for staff training and policy alignment with national data regulations.

Parental participation is increasingly acknowledged as a critical factor in students' academic achievement. However, Eze et al. (2022) noted that prior research in Nigeria has primarily focused on teachers and students, with limited attention to parents' access to SMIS as a tool for monitoring academic progress and enhancing home-school partnerships. The extent to which parents in the FCT's Area Councils can access and utilise SMIS remains largely undocumented.

This study examined the effectiveness of SMIS in advancing the digital transformation of educational administration in public senior secondary schools in the Federal Capital Territory (FCT), Abuja. SMIS was considered not only a technological tool for record-keeping but also a strategic platform that integrates school management, teaching and learning, and parental engagement through the generation and use of educational data.

Conceptual framework

The framework that guided the choice of methodology for the study on the adoption and utilisation of the SMIS in public secondary schools in Abuja derives from the Technology Acceptance Model (TAM) developed by Davis (1989) and the Data-Driven Decision-Making (DDM**)** Theory advanced by Mandinach and Gummer (2016).

Drawing from theories such as expectancy theory, self-efficacy, and cost-benefit analysis, TAM argues that users' acceptance of information technology is primarily influenced by two factors: perceived usefulness (the

belief that a system improves performance) and perceived ease of use (the belief that a system requires little effort to use (Davis, 1989). In the context of this study, principals' digital literacy, skills, and perceived benefits of SMIS influence the acceptance and implementation of SMIS.

Complementarily, DDM Theory emphasises the systematic use of data to inform planning, monitoring, and decision-making processes (Mandinach & Gummer, 2016). SMIS provides educational leaders with up-to-date data on student performance, attendance, and school operations, enabling evidence-based interventions. Drawing on conceptual models, it is suggested that successful digital transformation in education depends not only on technology adoption but also on the effective utilisation of the data generated by it. (Davis, 1989; Mandinach & Gummer, 2016).

Research questions:

The following research questions guided the study:

1. What is the level of principals' knowledge, digital literacy, and skills in the use of SMIS?
2. To what extent do principals use SMIS in managing administrative records?
3. How effective are principals in using SMIS data for decision-making?
4. How do teachers rate the effectiveness of principals in records management using SMIS?
5. What is the extent of parents' access to SMIS?

Methods

The study adopted an explanatory sequential mixed-methods design (Creswell and Plano-Clark, 2018), merging quantitative and qualitative approaches to examine principals' knowledge, implementation, and effectiveness in the use of the SMIS, as well as parents' access to SMIS in public senior secondary schools in the FCT, Abuja.

The study population comprised 90 principals and 4,163 teachers from the 90 public senior secondary schools under the FCT Secondary Education Board. The schools were spread across the six area councils of the FCT. All 90 principals were included in the study, of whom 87 returned valid questionnaires. A sample size of 352 teachers was selected using Bukhari's

(2020) sample size determination technique through stratified and simple random sampling procedures from all the area councils. For the qualitative phase, 24 parents were purposively selected from three area councils; Abuja Municipal Area Council (AMAC), as well as Kuje, Abaji Area Councils to participate in three Focused Group Discussions (FGDs), providing representation of both high-access and low-access SMIS contexts.

Data were collected using three instruments: the Questionnaire on Principals' Use of SMIS in Record Keeping and the Teachers' Rating of Principals' Effectiveness in Using SMIS Questionnaire. In addition, an FGD guide containing open-ended questions was used to explore parents' access, usability experiences, network challenges, and perceptions of SMIS effectiveness. Instrument validity was established through content coverage and expert review, while reliability testing using Cronbach's alpha yielded coefficients of 0.76 for the principals' questionnaire and 0.70 for the teachers' questionnaire, indicating acceptable internal consistency.

The quantitative data obtained via the questionnaires were analysed using mean scores and standard deviations, whereas qualitative data from FGDs were analysed thematically to explain patterns related to accessibility and variations in SMIS utilisation across Area Councils. The mixed-method approach enhanced the validity and comprehensiveness of the findings by combining statistical results with contextual explanations.

Results

The major findings of the study are presented below in tables according to the research questions, and the interpretation follows immediately after. Table 1 shows levels of principals' knowledge, digital literacy, and skills in using SMIS.

Table 1. Principals' Knowledge, Digital Literacy and Skills in Using SMIS
(N=87)

S/N	Principals' ratings of their level of knowledge and skills	Mean	Std. Dev.	Decision
1	Adequacy of knowledge of the use of SMIS in record management.	2.95	.974	High
2	Acquisition of adequate practical know-how required in the effective use of SMIS in managing school records.	3.05	.922	High
4	Retrieval and storage of school data via SMIS.	3.03	.920	High
5	Understanding of SMIS data security protocols and confidentiality measures			
6	Availability of basic SMIS facilities for record management in the school.	2.96	.913	High
	Overall Mean	**3.01**	**0.936**	High

Table 1 showed that the overall mean score of 3.01 exceeded the benchmark of 2.50, indicating that principals possessed a high level of knowledge, digital literacy, and technical skills necessary to operate SMIS. The standard deviation of 0.939 suggests relatively low variation among respondents' ratings. Therefore, it can be concluded that principals have knowledge, digital literacy, and skills in using SMIS in managing school records, as indicated in the results ($\overline{X} = 3.01,\ SD = 0.939$).

Table 2 indicates the results of the data analysis on the extent of principals' effectiveness in implementing SMIS in senior secondary schools in the FCT Abuja.

Table 2. Extent of Principals' Effectiveness in the Implementation of SMIS (N=87)

S/N	Items	$\overline{X}$	SD	Decision
7	Using mobile applications for access to the web-based platform associated with SMIS in records keeping.	3.02	.938	High
8	Using online communication tools linked to SMIS processes to communicate with the Secondary Education Board.	2.91	.919	High
9	Regularity of uploading students' data into SMIS.	3.04	.925	High
10	Generating an academic report (e.g., CA report exam summaries) using SMIS.	3.00	.942	High
11	Retrieving students' attendance academic records when needed.	2.93	.953	High
12	Guiding teachers experiencing difficulties in using SMIS	2.98	.952	High
13	Giving of parents access to SMIS channels to receive relevant information on students' academic performance.	2.95	.958	High
Overall rating		**2.98**	**0.938**	**High**

Source: Field research (2025)

The results in Table 2 reveal that the extent of SMIS implementation among principals across public senior secondary schools in the FCT, Abuja, is high, with an overall mean score of 2.98. The standard deviation of 0.938 indicates low variance in the extent of principals' implementation of SMIS. Details of the data suggest that SMIS has been institutionalised as the primary platform for managing school administrative records such as student enrolment, attendance, academic reports, and parent communication in public senior secondary schools in the FCT. Therefore, it can be concluded that principals use SMIS in managing administrative school records ($\overline{X} = 2.98,\ SD = 0.939$).

Table 3 shows teachers' ratings of principals' effectiveness in using SMIS data for school administration and the decision-making process in public senior secondary schools in the FCT, Abuja.

Table 3. Level of Principals' Effectiveness in Using SMIS Data for School Administration and Decision-Making Process (N=87)

S/N	Items	$\overline{X}$	SD	Decision
14	Evaluating overall school trends on the SMIS platform to make decisions on school performance	2.96	.971	Effective
15	Identifying students needing academic support through SMIS reports	2.92	.978	Effective
16	Using SMIS data for planning academic interventions to enhance teaching and learning in poor performing subjects	2.94	.945	Effective
17	Retrieving students'~~attendance~~academic records when needed	2.93	.953	Effective
18	Tracking of students' academic performance for possible intervention	2.97	.916	Effective
19	Decisions on students' academic performance are always based on the available data in SMIS.	2.97	.916	Effective
20	Supervision of teachers to ensure students' participation in lessons via SMIS data to make decisions on students' experiences.	2.92	.978	Effective
21	Giving teachers guidelines on academic activities via SMIS.	2.96	.971	Effective
Overall rating		**2.94**	**0.962**	**Effective**

Source: Field research (2025)

The findings in Table 3 reveal that principals are effective in using SMIS in school administration and decision-making with an overall mean score of

2.94. The standard deviation of 0.962 indicates low variance in principals' ratings of their effectiveness in using SMIS. Areas of principals' effectiveness included monitoring student progress, planning interventions, supervising teachers, tracking attendance, and academic monitoring. Therefore, it can be concluded that principals are effective in utilising SMIS in school administration and decision-making ($\overline{X} = 2.94$, $SD = 0.962$).

Table 4 presents the results of the data analysis of teachers' ratings of principals' effectiveness in SMIS-Based records management.

Table 4. Teachers' Ratings of Principals' Effectiveness in SMIS-Based Records Management (N=352)

S/N	Items	$\overline{X}$	SD	Decision
1	Principal promotion of consistent use of SMIS among teachers	3.4	0.53	Effective
2	Supervision of departments through SMIS reports and dashboards	3.27	0.88	Effective
3	Management of school attendance records using SMIS	3.68	0.54	Effective
4	Supervision of the uploading of academic records on SMIS by teachers	3.84	0.39	Effective
5	Monitoring of teachers' timely entry of students' results on SMIS	3.72	0.45	Effective
6	Identification of errors or inconsistencies in SMIS data entry by teachers	3.76	0.67	Effective
7	Communicating students' performance to parents through SMIS	3.66	0.96	Effective
8	Responding to issues raised through the SMIS platform	3.73	0.44	Effective
9	Overall level of effectiveness of principals in using SMIS in record management.	3.03	1.28	Effective
	Overall rating	**3.56**	**0.26**	**Effective**

Source: Field research (2025)

The results of the data analysis in Table 4 revealed that teachers rated principals as effective in records management using SMIS, with an overall mean score of 3.56. The standard deviation of 0.26 indicates very low variability around the mean score, which suggests that the results are acceptable and represent teachers' general rating. The evidence suggests that principals have effectively integrated SMIS into key record-management activities, including student attendance, examination records, teacher supervision, and school reporting. The teachers' ratings corroborate principals' self-assessments, thereby strengthening the validity of the findings. Therefore, it can be concluded that teachers rated principals as effective in the use of SMIS in record management ($\overline{X} = 3.56,\ SD = 0.26$).

Table 5 shows the extent of parental access to their children's results through SMIS.

Table 5. Parents' Access to Children's Results through SMIS Across Area Councils

(N=24)

Themes	**Qualitative Results (FGD Evidence)**	**Interpretation**
Parents' access to SMIS	Access varies by Area Council: • Abaji 3/7 have access (42.9%) • Kuje 5/7 have access (71%) • AMAC 10/10 have access (100%). Key reasons for non-access: lack of an Android phone, economic constraints, and inability to use cybercafés.	In terms of the number of participants, findings suggest that parents' access to SMIS is generally high, but qualitative evidence shows unequal access across councils, with stronger access in urban AMAC than in Abaji and Kuje.

Network availability as enabler of access	Parents identified poor/unstable network as a major challenge across councils; Parents from Abaji and Kuje reported stronger network barriers, while those of AMAC noted fluctuations.	The view expressed by the majority indicated that while SMIS is available, connectivity quality determines real use, especially outside AMAC.
Comfort/confidence in using SMIS	Parents who access SMIS reported that they are comfortable with the platform and trust it because it makes students' performance records available to them first-hand.	Generally, participants support the view that once a parent can access SMIS, they are comfortable and perceive it as reliable for monitoring.
Continuity/ acceptability of SMIS	Strong support for continuation in AMAC; and majority support in Abaji and Kuje. However, few parents were hesitant due to access barriers, not because SMIS is unwanted.	SMIS is widely accepted, but sustainability depends on reducing the digital access gap.
Key barriers	Barriers identified by in using SMIS: • Lack of android phones, • Economic hardship, • Cybercafé congestion, and • Network instability.	Although the majority have access to SMIS, a minority remains excluded due to structural constraints.

During the FGDs, parents generally supported SMIS and recognised its benefits. However, marked disparities in SMIS access existed among the area councils, as evidenced in Table 5. Parents' access to SMIS in AMAC was very high and was adjudged very good, as all 10 parents (100%) who participated in the FGD reported having access to their children's results through SMIS. AMAC is a fully urban location. In Kuje Area Council,

which is semi-urban, parents' access to SMIS was good; 5 out of 7 (71.4%) of the parents had access to SMIS. The access rates are over 50% which is considered a good development. However, in Abaji, only 3 out of 7 (42.9%) parents, could access their children's results through SMIS. Abaji is largely a rural area. The lack of accessibility was attributed by the parents to poor internet connectivity, financial limitations, and lack of access to electronic devices. Therefore, the extent of parents' access to SMIS data for tracking students' records in public senior secondary schools in the Area Councils of the FCT was not a 100% in all area councils.

Discussion

The first finding of the study, which indicates that principals in FCT public senior secondary schools are digitally competent and possess the technical capability required to operate the SMIS platform, supports the Technology Acceptance Model (Davis, 1989). The theory argues that knowledge and perceived ease of use play a major role in technology adoption. As Badawy et al (2024) explained, digital competence positively influences technology adoption among school leaders, who can track digital equity progress by using digital platforms such as student information systems to monitor access, participation, engagement, and learning outcomes across student groups, enabling them to identify gaps in teaching and learning.

The study's findings that principals have implemented SMIS to a high degree in their schools support Helal et al. (2021)'s finding that educational administrators with adequate digital skills demonstrate a greater capacity to utilise management information systems proficiently. This finding confirms the importance of information systems in supporting managerial functions.

The finding that principals effectively use SMIS data in decision-making also corroborates Mandinach and Gummer (2016), who stress that educational effectiveness improves when reliable data inform decisions. Areas of effectiveness included monitoring student progress, planning interventions, supervising teachers, tracking attendance, and academic monitoring. Principals depend on digital data to support evidence-based decision-making.

Teachers' ratings of the effectiveness of principals' use of SMIS provide evidence of the authenticity of principals' self-reported effectiveness. This

suggests that principals have effectively integrated SMIS into record management activities in their schools, such as students' attendance, examination records, school reporting systems, and teacher supervision records. This finding demonstrates that educational leaders in the FCT are effectively utilising digital technologies for administrative functions. The result supports Laudon and Laudon (2022), who found that management information systems improve organisational efficiency using systematic data management.

The study's finding on unequal parental access to SMIS suggests some degree of location-based exclusion. Abaji, which had the lowest number of parents (42.9%), is largely rural, in contrast to AMAC, which is urban, and Kuje, which is semi-urban. This finding is consistent with reports emphasising persistent digital inequalities between urban and rural communities (OECD, 2024; World Bank, 2022). The result supports the OECD (2024) report, which identified unequal access to educational technology as a major challenge affecting digital inclusion. Similarly, Van Dijk (2020) argued that accessibility differences continue to represent wider socio-economic inequalities. The finding also demonstrates that parental engagement through SMIS can strengthen home-school relationships. Joseph, Erunke, and David (2026) found that though telecommunication services have contributed to communication functionality and infrastructural development within the FCT, problems such as network instability and uneven service distribution remain persistent.

However, while principals reported effective use of SMIS data in decision-making, a gap remains regarding the extent of its influence on students' academic performance. This suggests that administrative decisions alone may not directly affect classroom-level learning outcomes. Furthermore, SMIS has untapped potential for cultural promotion. This can be achieved through documenting school events, preserving institutional records, communicating community activities, and supporting school-community relationships. SMIS can also help preserve and transmit social values. However, current implementation remains primarily administrative, with little deliberate integration of cultural content. This represents an important area for future policy and system development, which future research can address these gaps.

Conclusion

This study examined the effectiveness of School Management Information Systems (SMIS) in advancing the digital transformation of educational administration in public senior secondary schools in the FCT, Abuja. Beyond administrative effectiveness, the study highlights the broader implications of digital education. Evidence from parents indicated that SMIS promotes parental involvement by enabling closer supervision of students' attendance, performance, and school activities. Nevertheless, marked variations in access were observed across Area Councils, confirming a technological gap that continues to affect fair participation in digital education. Overall, SMIS has become a necessary tool for present-day educational administration in the FCT. Its value goes beyond record management to include improved accountability, stronger communication, stronger parental engagement, digital skills development, and opportunities for cultural conservation. However, maximising these benefits will require deliberate attempts to address accessibility challenges, strengthen ethical governance structures, bridge rural-urban digital inequalities, and integrate cultural content within digital educational systems. The future success of digital education in Nigeria will depend not simply on the availability of technological systems but on their equitable, ethical, and culturally responsive implementation. As schools grow increasingly reliant upon digital systems, safeguarding educational data becomes a central component of educational policy because of emerging ethical issues.

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