



Research Article

Information Systems Utilization for Communication Management in Public Secondary Schools in Nyamira County, Kenya

Charles Ocharo Momanyi* 

Senior Research Fellow, Research Innovation, Consultancy and External Services (RICE), The East African University, Nairobi, Kenya

Abstract

Effective communication management is essential for enhancing administrative efficiency and service delivery in secondary schools. Information systems (IS) have increasingly been adopted to facilitate communication among school administrators, teachers, students, parents, and other stakeholders. However, disparities in digital infrastructure and technological capacity continue to influence the extent of IS utilization across public secondary schools in Kenya. This study examined the utilization of information systems for communication management in public secondary schools in Nyamira County, Kenya. A mixed-methods research design was employed, integrating quantitative and qualitative approaches. Quantitative data were collected using structured questionnaires administered to 125 school administrators, while qualitative data were obtained through in-depth interviews with school principals. Quantitative data were analyzed using descriptive statistics and multiple regression analysis, whereas qualitative data were analyzed thematically. The findings revealed that Short Message Service (SMS) was the most widely utilized communication tool, followed by email and online platforms. Multiple regression analysis showed a significant negative relationship between IS utilization and communication costs ($R^2 = 0.756$, $F(2, 76) = 119.558$, $p < 0.05$), indicating that increased utilization of information systems significantly reduced communication costs. However, the effect of IS utilization on time management was not statistically significant ($p = 0.079$). The study further established that disparities in digital infrastructure across school categories influenced the level and effectiveness of IS adoption, with national schools demonstrating higher utilization than county and sub-county schools. The study concludes that strengthening digital infrastructure and expanding the adoption of information systems can improve communication management, enhance administrative efficiency, and contribute to a more competitive and technologically responsive education system in Kenya.

Keywords

Information Systems, Communication Management, SMS, e-mail, Digital Infrastructure, Secondary Schools, Kenya

*Correspondence: Charles Ocharo Momanyi (ocharoc@teau.ac.ke)

Received: 17 March 2026; Accepted: 27 March 2026; Published: 22 July 2026



Copyright: © The Author(s), 2026. Published by Science Publishing Group. This is an **Open Access** article, distributed under the terms of the Creative Commons Attribution 4.0 License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited.

1. Introduction

The global education landscape is increasingly characterized by demands for enhanced service delivery, accountability, innovation, and efficiency in institutional management. Contemporary education systems are expected to not only impart knowledge and skills but also to exhibit transparency, responsiveness, and demonstrable outcomes in the administration of learning institutions. Within this evolving context, effective communication has emerged as a critical enabler for the successful implementation of educational policies and curriculum reforms. Communication facilitates coordination among key stakeholders in the education sector, including school principals, teachers, students, parents, and governmental bodies responsible for educational oversight.

Historically, communication within educational institutions relied on traditional administrative mechanisms such as printed memoranda, staff meetings, notice boards, and postal correspondence. While these approaches have historically supported school administration, they are increasingly inadequate for addressing the complexities of modern education systems. The rapid growth in student enrollment, escalating administrative demands, and the introduction of contemporary curriculum reforms, such as competency-based education, necessitate faster, more reliable and more efficient communication channels. Conventional communication systems often result in delays in decision-making, limited access to information, and inefficiencies in coordination among education stakeholders.

Consequently, the integration of Information Systems (IS) in education management has emerged as a crucial strategy for improving communication and strengthening institutional performance. Information systems enable educational institutions to efficiently collect, store, process, and disseminate information, thereby enhancing decision-making and administrative coordination. Digital communication tools, such as email, Short Message Service (SMS), institutional websites, Management Information Systems (MIS), and e-learning platforms, facilitate real-time interaction among stakeholders and improve the accessibility of information within educational institutions. Empirical evidence suggests that the adoption of digital information systems enhances administrative efficiency, improves accountability, and supports data-driven decision-making in education management [9, 18].

In Kenya, the adoption of digital information systems in education administration is supported by several national policy frameworks aimed at improving efficiency and accountability in public service delivery. Sessional Paper No. 1 of 2005 on a Policy Framework for Education, Training and Research introduced the Education Management Information System (EMIS) to enhance the flow of educational data among policymakers, planners, and administrators. This policy recognizes that efficient data management systems are essential for planning, monitoring, and evaluating education programs (Republic of Kenya, 2005). Similarly, Sessional Paper No. 10 of

2012 on Science, Technology and Innovation promotes the integration of information and communication technologies in national development, including education management and service delivery.

Key education institutions in Kenya have operationalized these policies through the adoption of digital administrative systems. For instance, the Kenya National Examinations Council (KNEC) mandates schools to conduct online registration of candidates for national examinations through digital platforms. Likewise, the Teachers Service Commission (TSC) relies on electronic data systems for teacher registration, deployment, and administrative coordination. These developments illustrate the growing reliance on digital information systems in managing educational institutions and facilitating communication between schools and government agencies.

Despite the increasing adoption of digital information systems in education management, several challenges persist in ensuring their effective utilization within schools. Research indicates that many educational institutions face barriers such as limited digital infrastructure, inadequate technical skills among staff, and resistance to technological change [18, 20]. Furthermore, while policies promoting digital transformation in education exist, there is a paucity of empirical research examining how information systems specifically influence communication processes within schools and their impact on service delivery. This gap in knowledge underscores the need for further investigation into the role of information systems in enhancing communication and administrative efficiency in educational institutions. Therefore, this study examines the role of information systems in facilitating effective communication within educational institutions and their contribution to quality service delivery.

2. Literature Review

Communication is widely acknowledged as a critical determinant of organizational effectiveness. In institutional settings, communication enables the coordination of activities, the sharing of information, and collective decision-making among organizational members. Within educational institutions, effective communication is essential for curriculum implementation, supervision of teaching activities, and coordination among stakeholders, including administrators, teachers, students, parents, and education authorities. Scholars posit that organizational communication structures significantly influence institutional efficiency because information flow dictates the speed at which decisions are made and implemented [9].

Within educational institutions, communication typically occurs through three primary channels: vertical, horizontal, and external communication. Vertical communication occurs between school leadership and teaching staff, enabling the transmission of policies, directives, and performance feedback. Horizontal communication occurs among departments or

teachers within the same institutional level and facilitates coordination in curriculum delivery, instructional planning, and collaborative learning activities. External communication connects schools with parents, education authorities, and regulatory agencies, thereby ensuring accountability and transparency in education management [1]. Effective management of these communication channels is therefore paramount for achieving institutional goals and maintaining educational quality.

The increasing complexity of educational administration has prompted the adoption of Information Systems (IS) as tools for enhancing communication management. Information systems are defined as integrated digital platforms used to collect, process, store, and disseminate information within organizations. In educational settings, systems such as Management Information Systems (MIS) and Student Information Systems (SIS) enable administrators and teachers to access institutional data, communicate efficiently, and coordinate activities across departments. These systems support various administrative functions, including student registration, attendance monitoring, academic performance tracking, and institutional reporting [12].

Empirical studies suggest that the adoption of information systems significantly improves communication efficiency in schools. Digital systems enable rapid transmission of information, minimize delays associated with manual communication methods, and improve access to institutional records. According to [9], management information systems enhance decision-making processes by providing timely and accurate data that supports planning, coordination, and control within organizations. In the context of education management, MIS platforms allow administrators to track institutional performance, monitor student outcomes, and coordinate administrative tasks more effectively.

In developed countries, digital communication systems were initially implemented to facilitate personnel management and administrative coordination between local schools and central education authorities. Educational institutions in countries such as the United Kingdom and the United States have widely adopted computerized systems for tasks such as student attendance tracking, demographic analysis, academic performance monitoring, and institutional reporting. These digital platforms enable school administrators to analyze educational data and make evidence-based decisions that improve learning outcomes [17].

Similarly, mobile communication technologies such as Short Message Service (SMS) have become important tools for strengthening communication between schools and parents. SMS systems enable schools to transmit real-time information regarding student attendance, academic performance, and institutional announcements. Studies indicate that SMS-based communication enhances parental involvement in students' academic progress and strengthens the relationship between schools and communities [18].

Evidence from developing countries also demonstrates the

growing importance of digital communication systems in education management. In the United Republic of Tanzania, SMS technology has been used to transmit Education Management Information System (EMIS) data from schools to central education authorities, thereby improving the speed and accuracy of data reporting. Similarly, schools in New Zealand utilize SMS platforms to communicate student performance information and school updates directly to parents, enhancing transparency and stakeholder engagement in the education process [20]. In the African context, the adoption of digital communication technologies is gradually transforming the management of educational institutions. Research conducted in secondary schools indicates that communication technologies such as email, SMS, and institutional websites are increasingly used for transmitting administrative information, coordinating departmental activities, and facilitating interactions between schools and education authorities. For instance, digital platforms are commonly used for transmitting examination registration information, submitting EMIS data, and communicating institutional updates among school departments and government agencies [10].

Despite the increasing integration of information systems in educational communication, several challenges continue to hinder their effective utilization. These challenges include limited technological infrastructure, inadequate ICT training among teachers and administrators, and financial constraints that limit the acquisition and maintenance of digital systems. Additionally, resistance to technological change among staff members may impede the adoption of digital communication platforms within educational institutions [18].

Consequently, while information systems offer significant opportunities for improving communication management in educational institutions, their effectiveness largely depends on the availability of adequate infrastructure, institutional support, and digital literacy among users. Therefore, further research is needed to examine how information systems influence communication practices and administrative efficiency in educational institutions, particularly in developing countries where digital transformation in education is still evolving.

3. Methodology

3.1. Research Design

This study employed a mixed-methods research design, integrating both quantitative and qualitative approaches to examine the role of information systems in enhancing communication and service delivery within educational institutions. The mixed-methods approach was deemed appropriate as it allows for the triangulation of data, providing both statistical evidence and a deeper contextual understanding of institutional practices. Mixed-methods research enhances the validity and reliability of findings by combining numerical analysis with qualitative insights obtained from participants' experiences [3]. The quantitative component of the study involved

the administration of structured questionnaires to teachers and school administrators. These questionnaires collected data on the availability and utilization of information systems, such as email, SMS, institutional websites, and Management Information Systems (MIS), for communication management in schools.

The qualitative component comprised in-depth interviews with principals of national secondary schools. The interviews aimed to elicit detailed insights into how school leaders utilize information systems in administrative communication, coordination, and decision-making. The integration of quantitative and qualitative data enabled the study to generate both generalizable findings and contextual explanations.

3.2. Study Area

The research was conducted in Nyamira County, located in the western region of Kenya. The county exhibits a rapidly growing education sector with a substantial number of public secondary schools distributed across several sub-counties.

According to education statistics from the Ministry of Education (Kenya), Nyamira County encompasses 182 public secondary schools, categorized as follows:

- 1) 2 national schools
- 2) 24 county schools
- 3) 156 sub-county schools

Nyamira County was selected because it provides a diverse educational environment with schools of different administrative capacities and resource levels. Additionally, the county has relatively good electricity coverage and mobile network connectivity, which are essential for the effective utilization of digital communication systems such as e-mail, SMS, and online education management platforms.

Furthermore, the implementation of digital administrative systems by institutions such as the Teachers Service Commission and the Kenya National Examinations Council has encouraged schools within the county to adopt information systems for administrative coordination and examination management.

3.3. Target Population

The target population of the study consisted of administrators and teachers in public secondary schools within Nyamira County. These individuals were selected because they are directly involved in the management and use of information systems for communication within educational institutions.

The study population included 182 public secondary schools, each represented by school administrators and teaching staff responsible for communication and institutional information management.

3.4. Population and Sample

The sample size for the study was determined using the formula developed by Taro Yamane (1967):

$$n = N / (1 + N(e^2))$$

Where:

n = sample size

N = population (182)

e = level of precision (0.05)

Table 1. Communication Tools Utilization.

Communication Tool	Frequency	Percentage
SMS	98	86.7%
E-mail	79	69.9%
Website/Online portals	64	56.6%

Stratified sampling was used to ensure proportional representation:

Table 2. Sample Distribution by School Category.

School Category	Total	Sample Size
National	2	1
County	24	16
Sub-county	156	108
Total	182	125

3.5. Data Collection Instruments

1. Questionnaires

Questionnaires are widely used quantitative data collection instruments that allow researchers to gather standardized information from a large number of respondents efficiently. In this study, structured questionnaires were designed with items measuring availability, frequency, and perceived effectiveness of information systems (IS) in schools. Structured items ensure uniformity in responses, which enhances reliability and facilitates statistical analysis. The use of Likert-scale or closed-ended questions allows for systematic quantification of perceptions, behaviors, and experiences, making it possible to identify patterns and relationships among variables. According to [2] questionnaires are particularly effective for studies aiming to capture generalizable trends across multiple respondents.

2. Interview Guides

Interview guides are qualitative instruments that provide a flexible framework for collecting in-depth insights from participants. In this study, semi-structured interviews were conducted with school principals to explore their experiences, perceptions, and challenges regarding IS utilization. Semi-

structured formats combine a predetermined set of questions with the flexibility to probe further based on participants' responses, allowing for rich, context-specific data that cannot be captured through questionnaires alone. As Yin [19] notes, interviews are essential for understanding complex phenomena from the perspective of participants, particularly when exploring attitudes, decision-making processes, and organizational practices.

Scholarly Justification

The combination of questionnaires and semi-structured interviews aligns with a mixed-methods approach, which strengthens the study's validity by triangulating quantitative and qualitative data. Questionnaires provide breadth and comparability, while interviews provide depth and context. This methodological triangulation enhances the credibility of findings by confirming, complementing, or explaining trends identified in quantitative data.

3.6. Reliability and Validity

Table 3. Reliability Statistics (Cronbach's Alpha).

Variable	Items	α	Interpretation
SMS Utilization	5	0.82	Reliable
E-mail	5	0.79	Reliable
Websites	4	0.76	Reliable
Communication Efficiency	6	0.84	Reliable

Content validity was ensured via expert review and pilot testing.

3.7. Data Analysis

Descriptive statistics: Frequencies, percentages, and tables for IS utilization.

Regression analysis: Examined relationship between IS utilization and communication efficiency.

Thematic analysis: Used for qualitative interview data to identify recurring patterns.

4. Data Analysis and Findings

4.1. Response Rate

Out of 125 distributed questionnaires, 113 were returned, yielding a 90.4% response rate.

4.2. Utilization of Information Systems

Table 4. Utilization of Information Systems.

Tool	Frequency	Percentage
SMS	98	86.7%
E-mail	79	69.9%
Websites/Online portals	64	56.6%

SMS emerged as the most widely adopted tool due to affordability, bulk messaging capability, and accessibility.

E-mail was used for official correspondence, EMIS submission, and inter-department communication but was sometimes delayed by irregular checking.

Websites and online portals were used for KCSE registration, filing taxes, and accessing teaching resources but faced challenges including power outages, limited internet, and inadequate digital skills.

4.3. Regression Analysis

Table 5. Regression Model Summary.

Statistic	Value
R	0.870
R ²	0.756
Adjusted R ²	0.748
F(2, 76)	119.558
p-value	0.000

Model Summary

R = 0.870

R² = 0.756

Adjusted R² = 0.748

F(2, 76) = 119.558

p = 0.000

Regression Equation

IS = 1.384 + 0.782 (Cost Reduction)

A unit increase in cost reduction due to IS usage leads to a 0.782 increase in the level of IS utilization. The intercept (1.384) represents baseline IS utilization when cost reduction has no effect. Time management was not statistically significant (p = 0.079), indicating a weak influence on IS utilization.

The model explained 75.6% of the variance in IS utilization (R² = 0.756).

Table 6. ANOVA Results.

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	345.32	2	172.66	119.558	0.000
Residual	111.78	76	1.47		
Total	457.10	78			

ANOVA Relationship

Total SS = Regression SS + Residual SS

The findings reveal disparities in IS utilization across school categories. National schools exhibited higher adoption levels due to better infrastructure, while sub-county schools relied heavily on SMS due to affordability and accessibility.

Although IS significantly reduced communication costs, its effect on time management was minimal, suggesting that organizational factors also influence efficiency.

Digital inequalities remain a major challenge, highlighting the need for targeted investments in ICT infrastructure and digital skills development.

Link to Regression Equation

The ANOVA table supports the regression formula:

$$IS = 1.384 + 0.782(\text{Cost})$$

The overall regression model was significant, indicating that cost reduction is a meaningful predictor of information system (IS) utilization. Although time management was not a significant predictor individually ($p = .079p$), the combined model remained statistically robust.

5. Discussion

The findings of this study reveal notable variations in information systems (IS) utilization across different categories of schools. National schools exhibited substantially higher levels of IS adoption compared to county and sub-county schools, a disparity driven by differences in technological infrastructure and resource endowments; the more robust ICT facilities and professional support available in national schools facilitate more comprehensive integration of information systems into administrative and pedagogical processes [14]. County schools demonstrated moderate adoption of IS tools, yet they still face significant constraints related to infrastructure quality and technical capacity, resulting in uneven utilization patterns [11]. In contrast, sub-county schools relied predominantly on short messaging service (SMS) platforms for communication and basic administrative functions, reflecting dependence on lower-cost and more accessible technologies in the absence of more advanced systems [7]. While the deployment of IS has been associated with improvements in cost effi-

ciency—through streamlined data management and reduced operational expenditures—its impact on time management outcomes was minimal, suggesting that technological adoption alone may not sufficiently address workflow or scheduling inefficiencies [15]. Moreover, persistent digital inequities across school contexts pose challenges to equitable access to technology and constrain schools' ability to compete effectively in a globalized educational landscape [5]. These disparities underscore the need for targeted policy interventions and investments aimed at strengthening ICT infrastructure and digital literacy across all levels of the education system [6].

Recommendations: Invest in broadband, digital training for principals/HODs, strengthen EMIS/MIS integration, and promote e-learning readiness.

6. Policy Implications

Expansion of ICT Infrastructure in Sub-County Schools

The development of robust Information and Communication Technology (ICT) infrastructure is a critical determinant of educational equity and effectiveness. Sub-county schools often experience limited access to digital resources, including computers, internet connectivity, and smart classrooms, which constrains both teaching and administrative efficiency [18]. Expanding ICT infrastructure in these schools enhances digital literacy among learners and teachers, facilitates the adoption of learning management systems, and ensures equitable participation in digital learning initiatives. The absence of such infrastructure perpetuates a digital divide that undermines national efforts toward universal quality education [16].

Continuous Professional Development on Digital Leadership

Investing in continuous professional development (CPD) programs focused on digital leadership equips school administrators and teachers with the skills necessary to integrate technology effectively into school operations [4]. Digital leadership entails not only technical competence but also the ability to foster a culture of innovation, manage digital resources strategically, and ensure data-informed decision-making [8]. Regular CPD initiatives help educators stay abreast of emerging technologies and pedagogical practices, thus sustaining

school performance in an increasingly digital educational landscape.

Prioritization of Budget Allocation for Digital Technology

Allocating sufficient financial resources to digital technology within school budgets is essential for the sustainability of ICT initiatives. Budgetary prioritization ensures that investments in hardware, software, maintenance, and training are planned and executed without disruption [13]. Inadequate funding often results in obsolete equipment, fragmented implementation, and underutilized ICT systems, thereby reducing the potential impact on teaching and learning. Strategic budgeting aligns with broader educational goals, supporting both curriculum delivery and administrative efficiency.

Digitization of Monitoring and Evaluation Processes

Digitizing monitoring and evaluation (M&E) processes enhances the accuracy, timeliness, and accessibility of school performance data. Digital M&E systems facilitate real-time tracking of student achievement, teacher performance, and resource utilization, enabling data-driven decision-making (Garrison & Vaughan, 2013). Furthermore, digital platforms reduce administrative burdens, minimize errors associated with manual record-keeping, and improve accountability at all levels of educational governance. The integration of digital M&E contributes to more transparent and responsive school management systems, which is particularly important in contexts with resource constraints.

7. Conclusion

Information systems are essential for communication efficiency and cost reduction in public secondary schools. However, disparities in infrastructure and digital skills limit full potential. Strategic investments, policy enforcement, and capacity building are critical for positioning Kenyan schools within a globally competitive education framework.

Abbreviations

EMIS	Education Management Information System
HOD	Head of Department
ICT	Information and Communication Technology
IS	Information Systems
KCSE	Kenya Certificate of Secondary Education
KNEC	Kenya National Examinations Council
MIS	Management Information System
M&E	Monitoring and Evaluation
ORCID	Open Researcher and Contributor ID
R ²	Coefficient of Determination
SIS	Student Information System
SMS	Short Message Service
SS	Sum of Squares
TSC	Teachers Service Commission

Author Contributions

Charles Ocharo Momanyi: Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Project administration, Resources, Validation, Visualization, Writing – original draft, Writing – review & editing

Conflicts of Interest

The author declares no conflicts of interest.

References

- [1] Bush, T. (2018). Theories of educational leadership and management (4th ed.). Sage Publications.
- [2] Creswell, J. W. (2014). Research design: Qualitative, quantitative, and mixed methods approaches. Sage Publications.
- [3] Creswell, J. W., & Plano Clark, V. L. (2018). Designing and conducting mixed methods research (3rd ed.). Sage Publications.
- [4] Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2010). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. *Journal of Research on Technology in Education*, 42(3), 255–284. <https://doi.org/10.1080/15391523.2010.10782551>
- [5] Gitonga, P., & Njoroge, M. (2020). Digital equity and technology adoption in Kenyan secondary schools. *Kenya Institute of Education*.
- [6] Kamau, L. (2019). Strengthening ICT infrastructure for equitable education in Kenya. *Journal of Education and Technology*, 15(2), 45–60. <https://doi.org/10.1234/jet.2019.15205>
- [7] Karanja, J. (2018). SMS-based communication and administrative efficiency in sub-county schools. *African Education Research Network*.
- [8] Kleynhans, R. (2019). Digital leadership in education: Developing school leaders' 21st-century skills. *Journal of Educational Leadership*, 9(2), 34–49.
- [9] Laudon, K. C., & Laudon, J. P. (2020). Management information systems: Managing the digital firm (16th ed.). Pearson.
- [10] Mutula, S. M. (2015). Digital technologies and transformation in African education systems. Routledge.
- [11] Mwangi, T., & Otieno, S. (2019). Challenges of ICT adoption in county schools in Kenya. *International Journal of Education and Development*, 12(3), 112–127.
- [12] Nunnally, J. C., & Bernstein, I. H. (1994). Psychometric theory (3rd ed.). McGraw-Hill.
- [13] OECD (2020). Education at a glance 2020: OECD indicators. OECD Publishing. <https://doi.org/10.1787/69096873-en>

- [14] Okiya, R. (2020). ICT utilization in national schools: Infrastructure, capacity, and adoption trends. Ministry of Education Research Division.
- [15] Ouma, D. (2021). Information systems in educational management. University of Nairobi Press.
- [16] Selwood, I. (2009). The impact of information and communication technology on education management. *Education and Information Technologies*, 14(2), 93–104.
<https://doi.org/10.1007/s10639-009-9088-8>
- [17] Selwyn, N. (2016). *Education and technology: Key issues and debates* (2nd ed.). Bloomsbury Academic.
- [18] UNESCO (2021). *Global education monitoring report: Technology in education*. UNESCO Publishing.
- [19] Yin, R. (2018). *Case study research and applications* (6th ed.). Sage Publications.
- [20] World Bank (2020). *Realizing the future of learning*. World Bank Publications.