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INTEGRATION OF ICT IN INSTRUCTIONAL SUPERVISION IN PUBLIC SECONDARY SCHOOLS

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ABSTRACT

The use of Information and Communication Technology (ICT) in instructional supervision is increasingly seen as an important way of improving how teaching and learning are managed. Yet, in Kenyan public secondary schools, uptake has been relatively slow, a concern frequently raised by education stakeholders. This study set out to examine how ICT utilization influences instructional supervision in public secondary schools in Sotik Sub-County, Kenya. Framed by the Technology Acceptance Model (TAM) and Open Systems Theory, the research focused on three elements in particular: the availability of ICT resources, the perceptions of supervisors, and the competence of principals in using ICT. In conclusion, the study argues that strengthening ICT infrastructure, fostering positive attitudes among users, and ensuring school leaders have the necessary digital skills are all vital to improving supervisory practices. It recommends greater investment in ICT facilities, targeted capacity-building for principals, and policy support to embed ICT use into supervisory processes. These findings not only feed into ongoing debates on educational reform in Kenya but also resonate with the global push toward achieving Sustainable Development Goal 4 by 2030.

Keywords: Instructional supervision, Acceptance model, sustainable development goal

1. INTRODUCTION

The 21st century has witnessed a rapid transformation in educational practices, driven by the increasing integration of Information and Communication Technology (ICT). In particular, ICT has emerged as a vital tool for improving instructional supervision, a core function of educational leadership that ensures teaching and learning processes remain effective, efficient, and accountable. ICT-supported supervision offers opportunities for real-time feedback, data-driven decision-making, enhanced teacher collaboration, and greater transparency in school management. Globally, countries are embracing ICT as a catalyst for educational quality improvement, yet disparities persist between developed and developing regions in terms of access, perceptions, and leadership capacities.

In many contexts, the adoption of ICT in supervision remains constrained by infrastructural gaps, inadequate professional training, and resistance to change. While international organizations such as UNESCO and the World Bank emphasize digital learning as a cornerstone of 21st-century education, evidence suggests that many schools, particularly in sub-Saharan Africa, are yet to fully embrace these innovations. This study, guided by the Technology Acceptance Model (TAM) and Open Systems Theory, examines the influence of ICT availability, supervisors' perceptions, and principals' ICT competence on instructional supervision. In doing so, it contributes to the broader debate on the extent to which ICT can act as a lever for improved educational management and teaching quality.

1.2 Significance of the study

The significance of exploring ICT in instructional supervision is multifaceted. At the institutional level, ICT equips principals and heads of departments with tools for more efficient monitoring of lesson plans, teacher punctuality, and syllabus coverage. Unlike traditional methods that rely on manual recordkeeping, ICT enables accurate data storage and quick retrieval, supporting evidence-based leadership. At the systemic level, ministries of education can utilize ICT-driven supervision data to inform policy interventions, allocate resources effectively, and foster accountability among teachers.

For teachers, ICT integration in supervision shifts the process from being largely fault-finding to a developmental, collaborative exercise. Digital platforms allow supervisors to share feedback promptly, monitor lesson delivery remotely, and provide continuous professional development support. This democratizes supervision, making it less hierarchical and more collegial.

From a scholarly perspective, this study adds to the growing body of research on ICT in education by focusing on its role in instructional supervision—a relatively underexplored dimension compared to teaching, learning, or assessment. Most importantly, the findings hold practical value for policymakers in Kenya and other countries grappling with how to align ICT initiatives with sustainable education quality improvement.

1.3 Limitation of the study

Like many empirical studies in education, this investigation encountered certain limitations that must be acknowledged. First, some respondents expressed hesitancy in disclosing sensitive information about supervision practices, particularly where such practices were perceived as inadequate. Although this was mitigated through assurances of confidentiality and authorization letters from relevant authorities, it is possible that self-reporting biases influenced some responses.

Second, the study was conducted within a specific sub-county context, limiting the generalizability of findings to other regions. ICT adoption in schools often reflects contextual factors such as regional infrastructure, socio-economic disparities, and cultural attitudes toward technology. Hence, while the findings provide critical insights, further comparative studies across different counties and nations are necessary for broader application.

Lastly, the study was confined to examining three specific independent variables—ICT availability, supervisors' perceptions, and principals' competence. Future research could broaden the scope to include variables such as government funding mechanisms, ICT policy implementation fidelity, or community involvement in promoting digital literacy

2. LITERATURE REVIEW

2.1 ICT Availability and Infrastructure

ICT availability forms the bedrock upon which digital supervision is built. Adequate infrastructure, including computers, internet access, projectors, mobile devices, and reliable electricity, is indispensable for meaningful adoption. However, studies across multiple contexts reveal significant deficits.

In Malaysia, Hasin and Nasir (2021) observed that schools in rural areas struggled with inadequate infrastructure, limiting their capacity to implement ICT in supervision. Similarly, Pujari et al. (2020) reported that Indian schools faced financial constraints in procuring devices and sustaining internet services. In Africa, the challenges are even more pronounced. Ategwu et al. (2022) found that Nigerian schools lacked adequate ICT facilities during the COVID-19 pandemic, hindering remote supervision. In Kenya, Manyasa (2022) emphasized the urgent need for investment in infrastructure and teacher digital literacy.

At the same time, examples from developed countries illustrate how robust ICT infrastructure enables more innovative supervisory practices. In Finland, for example, digital platforms support real-time data analysis on student learning outcomes, which supervisors use to guide teacher professional development. These contrasts highlight the infrastructural divide that shapes ICT adoption globally.

2.2 Supervisors' Perceptions and Attitudes

While infrastructure is crucial, the perceptions and attitudes of supervisors play an equally important role in ICT adoption. Positive perceptions foster enthusiasm, experimentation, and sustained usage, whereas negative attitudes create resistance and underutilization.

Research demonstrates that favorable attitudes among supervisors are linked to increased ICT adoption. In Ghana, Mensah et al. (2023) found that supervisors who valued ICT were more likely to integrate it into monitoring, leading to improved teacher collaboration and student outcomes. In Malaysia, Hasin and Nasir (2021) reported that teachers in rural schools viewed ICT as a tool for enhancing independence and learner-centered pedagogy. In Saudi Arabia, Alkinani (2021) observed that ICT adoption was positively correlated with perceptions of improved student engagement and motivation.
Conversely, skepticism persists among some supervisors, particularly where digital tools are perceived as disruptive to established routines. In Kenya, Mukenya et al. (2020) noted that while supervisors acknowledged ICT as time-saving and performance-enhancing, gaps in professional training and fear of technology hindered full integration.

2.3 Principals' ICT Competence

The competence of school leaders, especially principals, is pivotal in determining the success of ICT adoption in supervision. Principals are not only administrative heads but also instructional leaders whose attitudes and competencies shape school culture. According to Karim et al. (2021), principals with strong ICT skills are better positioned to model digital practices, troubleshoot challenges, and inspire confidence among teachers.

Competence involves not just technical proficiency but also the ability to integrate ICT strategically into supervisory functions. For example, digitally competent principals can leverage data management systems to monitor student performance, use video conferencing for remote supervision, and harness learning management systems to track teacher progress. International evidence suggests that schools led by digitally literate principals are more likely to achieve meaningful ICT integration compared to those where leadership is less technologically oriented.

2.4 Theoretical Framework

2.4.1 Technology Acceptance Model (TAM)

The Technology Acceptance Model (Davis, 1989) posits that the adoption of technology is shaped by two critical perceptions: ease of use and usefulness. Applied to instructional supervision, TAM helps explain why some principals embrace ICT tools while others remain reluctant. If supervisors perceive ICT as useful in saving time, improving accuracy, and enhancing feedback, adoption rates are likely to rise. Conversely, perceptions of complexity or irrelevance hinder utilization.

TAM has been widely applied in educational research. Kamal et al. (2020) highlight its effectiveness in predicting technology adoption behaviors among teachers and principals. However, critics argue that TAM underemphasizes contextual factors such as institutional culture or leadership support, suggesting the need to integrate it with broader organizational theories.

2.4.2 Open Systems Theory

Open Systems Theory (von Bertalanffy, 1956) conceptualizes organizations as dynamic entities interacting continuously with their environments. Schools, viewed as open systems, must adapt to technological changes, policy demands, and societal expectations. ICT adoption in supervision can thus be seen as an adaptive response to global and national pressures for quality education.

Valentinov et al. (2019) emphasize that open systems thrive when they effectively integrate external resources—such as technology—into their internal processes. By applying this theory, the study situates ICT adoption not merely as an individual choice but as a systemic necessity for schools to remain relevant and competitive in the knowledge economy.

2.4.3 Conceptual Framework

The conceptual framework guiding this study posits that instructional supervision is influenced by three interrelated independent variables: ICT availability, supervisors' perceptions, and principals' ICT competence. Instructional supervision, as the dependent variable, is measured through indicators such as syllabus coverage, learner outcomes, teacher attendance, and punctuality. The framework assumes that when infrastructure is adequate, perceptions are favorable, and leadership is competent, ICT integration in supervision will yield improved educational outcomes.

3. METHODOLOGY

This study employed a **correlation research design** to examine the influence of Information and Communication Technology (ICT) tools on instructional supervision in public secondary schools. The design was considered appropriate as it enabled the researcher to describe existing conditions and assess the strength and direction of relationships among variables in a non-intrusive and cost-effective manner.

The research was conducted in **Sotik Sub-County, Bomet County, Kenya**, an area purposively selected due to its strong academic performance, diversity of public secondary schools, and contextual similarities with other rural regions where ICT integration in instructional supervision remains limited. Sotik hosts 62 public secondary schools, encompassing national, extra-county, county, and sub-county institutions.

The **target population** comprised **62 principals, 62 Directors of Studies, and 248 Heads of Departments (HoDs)**, totaling 372 respondents. Using **Yamane's (1967) formula** at a 95% confidence level and 5% margin of error, a sample size of **175 participants** was obtained. To ensure representativeness, stratified sampling was applied based on school categories, followed by simple random sampling within each stratum. This approach minimized bias and ensured proportional inclusion of principals, DoS, and HoDs across school types.

4. FINDINGS

This study examined the effect of Information and Communication Technology (ICT) on instructional supervision in public secondary schools in Sotik Sub-County, focusing on ICT availability, supervisors' perceptions, and principals' competence. The findings demonstrate that ICT plays a significant role in shaping the quality and effectiveness of supervision.

First, the availability of ICT infrastructure including stable internet, projectors, software for exam analysis, and reliable power supply was found to have a statistically significant effect on instructional supervision. Schools with such tools reported improved monitoring of syllabus coverage, lesson attendance, and teaching quality. Both survey and interview data confirmed that access to ICT resources positively contributes to supervision practices.

Second, supervisors' perceptions emerged as an important determinant of ICT use. Most supervisors viewed ICT as enhancing efficiency, timeliness, collaboration, and transparency in the supervision process. Those with positive attitudes were more likely to integrate digital tools into their activities, leading to improved feedback, lesson monitoring, and communication. The statistical analysis further confirmed a strong link between positive perceptions and effective supervision outcomes.

Finally, principals' ICT competence significantly influenced instructional supervision. Respondents agreed that principals with higher digital proficiency not only applied ICT tools effectively but also encouraged staff to adopt them. Competent principals were associated with stronger supervision practices, using digital platforms such as electronic observation templates, performance dashboards, and online communication systems. These practices fostered accountability, innovation, and continuous improvement in teaching and learning.

Overall, the study underscores that ICT availability, favorable perceptions, and leadership competence collectively enhance instructional supervision, making schools more effective in promoting quality education.

4.1 Recommendations

The findings of this study highlight both the promise of ICT in strengthening instructional supervision and the challenges that limit its effective integration. To address these issues and promote more equitable, efficient, and sustainable supervision practices in public secondary schools, several recommendations are proposed.

First, while many schools already possess essential ICT infrastructure such as hardware, internet connectivity, and basic software systems, disparities in adequacy, functionality, and consistency remain evident across institutions. To reduce these gaps, the Ministry of Education, working in collaboration with the Teachers Service Commission (TSC) and county education offices, should establish a national framework that sets and enforces minimum ICT standards for all public secondary schools. Such a framework should guarantee equitable provision of hardware (computers, tablets, servers), supervision and communication software, and reliable internet services, while also embedding strategies for regular maintenance and upgrading of infrastructure. At the institutional level, Boards of Management (BoMs) should be encouraged to allocate specific budgets for ICT investment and to implement school-based support systems. Partnerships with private technology providers and development agencies could also supplement government efforts, while the establishment of ICT technical support units at sub-county level would enhance sustainability by offering continuous assistance and capacity-building to school personnel.

Second, the study underscores the importance of supervisors' perceptions in determining ICT use. To strengthen positive attitudes, the Ministry of Education should spearhead a national attitudinal change campaign targeting teachers, principals, and other education leaders. This should be embedded in Continuous Professional Development (CPD) programs with a focus on the practical benefits of ICT for supervision efficiency, transparency, and accountability. Principals and education directors should be trained as digital champions who foster a pro-ICT culture within schools. In addition, internal sensitization workshops, peer-learning forums, and recognition schemes for teachers or departments that demonstrate innovation in ICT-supported supervision can further embed positive attitudes into school culture.

Third, principals' competence in using ICT emerged as a critical factor in effective supervision. To strengthen leadership capacity, the TSC and the Kenya Education Management Institute (KEMI) should institutionalize mandatory ICT proficiency certification as part of leadership training and promotion criteria. School leaders should undergo periodic training in digital supervision tools, data analytics, virtual reporting, and instructional planning platforms. County Directors of Education, in partnership with ICT experts, should coordinate in-service training programs and provide school leaders with digital manuals and toolkits. Moreover, mentorship programs where ICT-competent principals guide their peers can foster knowledge sharing and collective growth. By investing in sustained professional development, school heads will be better equipped to lead ICT integration, transforming instructional supervision into a more effective, data-driven, and innovative process.

Finally, the study points to several areas that warrant further research. Since this investigation was limited to public secondary schools in Sotik Sub-County, future studies should be conducted across other sub-counties and counties to allow for broader generalization and comparative analysis. Additionally, as the correlation research design employed limits causal interpretations, experimental and longitudinal designs could be adopted to establish stronger causal links between ICT adoption and supervision outcomes. Further research is also needed to examine principals' actual readiness, attitudes, and usage of ICT tools, given their central role in implementation. Lastly, emerging technologies such as artificial intelligence, big data analytics, and digital dashboards present new opportunities for real-time instructional supervision and decision-making, and should therefore be prioritized as areas for future scholarly inquiry.

4.2 CONCLUSION

This study established that the effectiveness of ICT-enabled instructional supervision in Sotik Sub-County is largely determined by the availability of infrastructure, supervisors' perceptions, and principals' ICT competence. Where these conditions are favorable, ICT facilitates efficient, transparent, and collaborative supervision, ultimately improving teaching and learning outcomes.

However, infrastructural gaps, uneven digital literacy, and resistance to change continue to limit ICT adoption in many schools. Addressing these challenges requires coordinated efforts through government investment, continuous professional development, and stakeholder collaboration. Overall, ICT-

supported supervision has significant potential to transform instructional leadership in Kenya and similar contexts, provided deliberate and sustained intervention are pursed

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