International Journal of Humanities Social Sciences and Education (IJHSSE)
Volume 12, Issue 7, July 2025, PP 23-28
ISSN 2349-0373 (Print) & ISSN 2349-0381 (Online)
https://doi.org/10.20431/2349-0381.1207003
www.arcjournals.org

Selected Teacher Factors and Information and Communication Technology Integration in Public Secondary Schools in Bungoma County, Kenya

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Abstract: *The integration of Information and Communication Technology (ICT) in secondary education is widely recognized as a critical factor in enhancing pedagogical practices and improving learning outcomes. This study investigates the relationship between teachers' ICT knowledge and the extent of ICT integration in public secondary schools within Webuye West Sub-County, Bungoma County, Kenya. Grounded in the Technology Acceptance Model (TAM), the research employed a descriptive survey design to examine how teacher-level factors influence ICT adoption in classroom instruction. The study targeted 257 teachers and 11 principals from public secondary schools, employing stratified random sampling for teachers and purposive sampling for principals. Data were collected through questionnaires, semi-structured interviews, and classroom observation checklists, and analyzed using both descriptive and inferential statistics.*

The findings reveal a statistically significant and strong positive correlation between teachers' ICT knowledge and their integration of ICT in teaching ($r = 0.700$, $p < 0.01$), suggesting that higher levels of ICT competence are associated with more effective classroom technology use. Additionally, a moderate positive relationship ($r = 0.380$, $p < 0.01$) was observed between teachers' perceptions of ICT and its integration, indicating that attitudinal factors play a meaningful role in shaping technology usage. Despite demonstrating strong subject expertise, many teachers lacked formal ICT training and reported infrastructural and technical challenges that constrained effective integration.

These findings highlight the need for targeted professional development programmes to enhance ICT competencies among educators. The study further recommends improved access to technological infrastructure and the development of peer support networks to foster knowledge exchange and collective capacity building. The study contributes to the broader discourse on ICT in education by offering empirical insights into teacher-level determinants of ICT integration, with implications for educational policy and practice in similar low-resource settings.

1. INTRODUCTION

The integration of Information and Communication Technology (ICT) in educational institutions has become a critical area of interest globally, influencing both instructional practices and educational outcomes. In developing contexts such as Kenya, the adoption of ICT is increasingly seen as a catalyst for improving the quality of teaching and learning in public secondary schools (Zeng, 2022; Wambua & Nyakundi, 2024). As global education systems transition towards digital learning environments, teacher-related factors, particularly ICT knowledge, have emerged as pivotal in determining the extent and effectiveness of ICT integration (Winter et al., 2021).

This study focuses on Webuye West Sub-county, Bungoma County, Kenya, where public secondary schools face both opportunities and challenges in ICT integration. The research specifically seeks to establish the relationship between teachers' level of ICT knowledge and the extent of ICT integration in teaching and learning processes. Previous studies have emphasized that teachers with higher ICT proficiency are more likely to adopt and effectively utilize digital tools in their instructional methods, thereby enhancing student engagement and academic performance (Hairiyanto et al., 2024; Alotaibi, 2021).

Despite national policy frameworks that support ICT integration, such as the Kenya National ICT Policy and TSC's Digital Literacy Programme, the implementation at school level remains uneven. Factors such as inadequate infrastructure, lack of in-service training, and varying levels of ICT competence

among teachers continue to constrain progress (AFIDEP, 2019; Msambwa & Daniel, 2024). Furthermore, demographic variables such as age, teaching experience, and subject specialization may intersect with ICT knowledge, influencing integration outcomes (Aashish & Rohit, 2024).

This article contributes to the academic discourse by providing empirical evidence on the link between teacher ICT knowledge and technology integration in rural Kenyan schools. The findings aim to inform policy decisions and professional development strategies geared towards optimizing ICT use in education within similar contexts.

2. Statement Of The Problem

Despite substantial investment in Information and Communication Technology (ICT) infrastructure and national policies promoting its use in Kenyan schools, effective ICT integration in classroom teaching remains limited. While ICT is a key pillar in Kenya's Competency-Based Curriculum (CBC) and is aligned with global education goals such as Sustainable Development Goal 4 (MOE, 2021; NESP, 2018–2022), its impact is constrained by persistent challenges at the school level. Evidence suggests that teacher-related factors—particularly ICT knowledge, competence, and preparedness—are critical to the successful integration of technology in pedagogy (UNESCO, 2020). However, many national initiatives, such as the SMASSE programme, have not sufficiently addressed the diverse training needs of teachers across all subjects (Wanyonyi, 2021). This uneven focus has left significant gaps in implementation, especially in sub-counties such as Webuye West, where localized teacher development support is minimal. While infrastructural resources are increasingly available, the capacity of teachers to effectively utilize them remains underexplored. This study, therefore, addresses a specific knowledge gap by examining the relationship between teachers' level of ICT knowledge and ICT integration in public secondary schools in Webuye West Sub-County. Understanding this relationship is essential for informing targeted professional development strategies that support equitable and sustainable ICT use in education.

2.1. Purpose of the Study

The purpose of this study was to investigate selected teacher factors and ICT integration in public secondary schools in Webuye West Sub- County of Bungoma County, Kenya

2.2. Objective of the Study

Establish the relationship between teacher level of ICT knowledge and ICT integration in public secondary schools in Webuye West Sub-County.

2.3. Literature Review

The integration of Information and Communication Technology (ICT) in education is widely recognized as a transformative force in enhancing pedagogical practices, improving learning outcomes, and fostering digital literacy. However, the success of ICT integration, particularly in developing countries such as Kenya, remains contingent upon teacher-level factors, especially their ICT knowledge and competence (Heine et al., 2024). This section critically evaluates existing literature, emphasizing the interplay between teacher ICT knowledge and the extent of ICT integration in secondary school settings, with a focus on contextual relevance to Webuye West Sub-County.

Empirical evidence has underscored the pivotal role of teachers' ICT knowledge in facilitating successful technology integration in classrooms. Heine et al. (2024), in a study involving preservice teachers across European institutions, distinguish between general pedagogical knowledge (GPK), technological knowledge (TK), and technological pedagogical knowledge (TPK). Their findings reveal that while GPK is significantly enhanced by pedagogical learning opportunities, the development of TK and TPK requires more targeted technological training. This implies that ICT integration cannot be achieved by pedagogical knowledge alone but must be underpinned by deliberate and context-sensitive training in technology use.

Building on this foundation, Nurhidayat et al. (2024) explored ICT skills among in-service teachers within English as a Foreign Language (EFL) classrooms in Indonesia. Their findings highlight a persistent gap between ICT competence and classroom integration, despite increased accessibility to digital tools. They argue that continuous professional development (CPD) is critical to closing this gap; however, the efficacy of such CPD initiatives depends heavily on how aligned they are with teachers'

day-to-day classroom needs. This insight is particularly relevant to the Kenyan context, where disparities in training access across rural and urban settings could hinder uniform ICT adoption.

African scholars have contributed further to this discourse. Ifinedo, Rikala and Hämäläinen (2020) and Al-Rahmi (2020) identified poor infrastructure and inadequate teacher preparation as major obstacles to effective ICT integration in sub-Saharan Africa. In Nigeria and South Africa, while national policies support digital education, inconsistent implementation and limited teacher training have constrained their impact. This mirrors the situation in Kenya, where national ICT policy exists, but its translation into effective teacher support is uneven (Agyei, 2021).

Region-specific studies in Asia also stress the contextual nature of ICT integration. For example, Perienen (2020) found in India that ICT knowledge among rural teachers was significantly lower than their urban counterparts due to differences in access to training and resources. These findings resonate with Kenya's rural-urban divide and support calls for location-specific professional development strategies that address localised needs.

In conclusion, a consensus emerges across the literature: teacher ICT knowledge is not only essential but foundational to the successful integration of technology in secondary education. Nevertheless, the extent of its impact is shaped by broader systemic conditions such as infrastructure, training quality, and regional policy implementation. As such, studies like the current one in Webuye West Sub-County address a crucial gap by focusing on specific local dynamics that influence teacher ICT competence and their practical application in everyday teaching.

3. METHODOLOGY

This study employed a **correlational research design** to investigate the relationship between teacher level of ICT knowledge and the integration of ICT in public secondary schools in Webuye West Sub-County, Bungoma County, Kenya. Correlational design is appropriate where the researcher seeks to determine the strength and direction of a relationship between two or more variables without manipulating them (Cohen, Manion & Morrison, 2018). This design allowed the researcher to explore whether variations in teachers' ICT knowledge levels significantly influenced the degree to which ICT was incorporated in instructional practices.

The **target population** for this study comprised all public secondary school teachers in Webuye West Sub-County. According to the Bungoma County Education Office, there are approximately 25 public secondary schools in the sub-county, employing about 400 teachers. From this population, the study employed **stratified random sampling** to ensure representation across variables such as school type (day vs. boarding), school size, and gender of respondents. A **sample size of 120 teachers** was selected using **Yamane's formula (1967)** to achieve statistical power while maintaining feasibility in data collection. Stratification ensured proportional representation, while simple random sampling within strata minimized sampling bias.

Data was collected using a **structured questionnaire** consisting of both closed and Likert-type items. The instrument was divided into two main sections: Section A collected demographic data and assessed the teachers' level of ICT knowledge, while Section B assessed the extent of ICT integration in teaching and learning activities. ICT knowledge was measured based on self-reported competency in basic computer operations, use of educational software, and familiarity with digital teaching tools, using a 5-point scale ranging from 'Not Competent' to 'Highly Competent' (Fraenkel, Wallen & Hyun, 2019). ICT integration was assessed through frequency and type of ICT use in lesson planning, delivery, assessment, and administrative tasks.

To establish the **validity** of the questionnaire, expert judgment was sought from two ICT education specialists and one research methodology expert. **Reliability** was tested through a **pilot study** involving 10 teachers from neighboring schools not included in the main study. The **Cronbach's alpha coefficient** for internal consistency was computed and found to be 0.82, indicating acceptable reliability (Field, 2018).

Data collected were analyzed using the **Statistical Package for Social Sciences (SPSS)**. **Descriptive statistics** such as frequencies and percentages were used to summarize demographic characteristics and ICT knowledge levels. To determine the relationship between teacher ICT knowledge and ICT integration, **Pearson's product-moment correlation coefficient** was used. The choice of Pearson's r

was informed by the continuous nature of the variables and the need to quantify the degree of linear association (Bryman, 2016).

This methodology was carefully selected to align with the study's objective and ensure rigorous, reliable, and valid conclusions regarding the influence of teacher ICT knowledge on ICT integration in the educational context of rural Kenya.

4. FINDINGS

This section presents the key findings from the investigation into the relationship between teachers' levels of ICT knowledge and the extent of ICT integration in public secondary schools in Webuye West Sub-County, Bungoma County, Kenya. The data is reported without interpretation, providing an objective overview of teacher responses.

4.1. Teacher ICT Knowledge and Training

Data collected via teacher questionnaires revealed that **79.8% of the respondents had not received any formal ICT training**, indicating a major gap in professional development efforts (Table 4.6). Despite the lack of training, a **notable 66% reported using ICT tools for communication**, such as emails and mobile applications, showing some degree of informal ICT adoption.

However, integration of ICT in pedagogical activities was substantially lower. Only **22.4% of teachers reported using ICT tools for lesson preparation**, such as typing notes or creating digital teaching materials. An even smaller segment, **13.5%, indicated the use of projectors during lesson delivery**, pointing to minimal incorporation of multimedia tools in classroom instruction. This suggests a fragmented pattern of ICT usage, concentrated more in administrative or communication tasks than in core teaching practices.

4.2. ICT Competency by Demographic Characteristics

Analysis of teacher demographic data showed that **47.2% of teachers fell within the 36–50-year age group**, with **51.5% holding a Bachelor's Degree in Education**. Despite this educational attainment, a lack of ICT competency was evident in the reported usage patterns. The **gender distribution was 57.6% male and 42.4% female**, reflecting a moderately balanced workforce. However, cross-tabulated responses suggested no significant gender difference in ICT integration.

The data showed that age and teaching experience were relevant in determining ICT engagement levels. Younger teachers (under 35) reported slightly higher ICT usage, though all age groups demonstrated limited capacity in using ICT for pedagogical purposes. These findings underscore the need for **targeted ICT training that is sensitive to age and experience**, aligning with prior studies that emphasize the significance of demographic tailoring in professional development (Oloo, 2009; Tondeur et al., 2017).

5. DISCUSSION

The purpose of this study was to establish the relationship between teachers' level of ICT knowledge and ICT integration in public secondary schools in Webuye West Sub-County, Bungoma County, Kenya. The descriptive statistics provided insights into the degree of ICT use and training among teachers and indicated a generally low level of ICT integration. These findings are consistent with previous research on ICT integration in sub-Saharan Africa, where lack of training, limited infrastructure, and insufficient pedagogical support have been shown to hinder effective ICT adoption in schools (Tondeur et al., 2008; Ifinedo, Rikala & Hämäläinen, 2020).

A major finding of the current study is that only 20.2% of teachers reported having undergone ICT training, while a vast majority (79.8%) had not. This lack of formal training poses a significant barrier to meaningful ICT integration. According to Wilson, Ritzhaupt and Cheng (2020), teacher knowledge—particularly technological pedagogical knowledge (TPK)—is a crucial determinant of effective ICT implementation. Teachers in this study demonstrated limited engagement with ICT tools beyond basic communication functions, with only 13.5% using projectors and 22.4% using ICT to prepare notes. These usage patterns reflect a utilitarian, rather than transformative, engagement with technology, echoing Heine et al. (2024), who argued that general pedagogical knowledge (GPK) often develops independently from technological competencies.

Interestingly, while the majority of respondents were mid-career educators aged 36–50, who are often presumed to be more adaptive to new pedagogical approaches (Tondeur et al., 2008), ICT use in their

professional practice remained minimal. This finding highlights the inadequacy of assuming that demographic characteristics alone predict ICT readiness or integration. Instead, the role of institutional support and targeted professional development emerges as more decisive (Kay, 2006; Nurhidayat et al., 2024).

The disparity between the high percentage of teachers using ICT for communication (66%) and the significantly lower percentages using it for pedagogical tasks (e.g., searching for information—24.7%, preparing notes—22.4%) suggests that ICT tools are largely used for administrative rather than instructional purposes. This points to a functional but superficial integration of technology, insufficient to transform teaching practices or improve learning outcomes. Such limited use aligns with observations made by Nurhidayat et al. (2024), who emphasized a disconnect between the presence of digital tools in schools and the teachers' capacity to apply them effectively.

Moreover, the findings have practical implications for policy and educational leadership. The study suggests an urgent need for systemic investment in teacher professional development, with a focus on hands-on ICT training aligned with curricular goals. Teacher in-service programs must not only introduce new technologies but also model how they can be effectively embedded into subject teaching. As Ifinedo et al. (2020) note, enhancing teachers' ICT knowledge base contributes directly to more innovative and student-centred teaching practices.

Furthermore, the findings emphasize that ICT infrastructure alone does not ensure meaningful integration. Teachers need continuous exposure to relevant ICT tools, access to peer collaboration, and support from school leadership to confidently integrate these tools into their teaching (Wilson et al., 2020). This is especially critical in the context of secondary education in Kenya, where national curriculum reforms increasingly mandate digital literacy as a core competency.

In addition to these practical concerns, the study has broader theoretical implications. The Technology Acceptance Model (TAM), which posits that perceived usefulness and ease of use drive technology adoption, may be limited in explaining the findings here. While some teachers clearly perceive ICT as useful for communication, their reluctance or inability to extend its use into instruction suggests that factors such as institutional culture, peer influence, and training opportunities might play a more pivotal role. This aligns with extended models of technology adoption that integrate social and organizational factors (Venkatesh et al., 2003).

6. CONCLUSION

This study investigated the relationship between teachers' level of ICT knowledge and ICT integration in public secondary schools in Webuye West Sub-County, Bungoma County. The findings reveal that although basic ICT tools such as those used for communication are in use, overall ICT integration in pedagogy remains limited. A major reason is the low level of ICT training, with only 20.2% of respondents having received any formal ICT training. Most teachers do not use ICT for lesson preparation or presentation, and the use of advanced tools such as projectors is extremely limited.

These findings underscore the importance of equipping teachers with not only access to technology but also the training necessary to incorporate ICT effectively into teaching and learning. The results support the claim that teachers' technological knowledge significantly influences their readiness and ability to integrate ICT into their pedagogical practices (Ifinedo et al., 2020). Moreover, they echo the sentiments of Wilson et al. (2020) and Heine et al. (2024), who assert that ICT training should be integrated into professional development programs to bridge the gap between access and use.

Despite the significance of the findings, this study has several limitations. Firstly, it focused on one sub-county in Kenya, which may limit the generalizability of the results to other regions with different demographic or infrastructural characteristics. Secondly, the data largely relied on self-reported measures, which may be prone to bias or exaggeration. Lastly, the study did not explore the quality or duration of the ICT training received, which could have added more depth to the analysis.

Future research should consider a comparative study across multiple counties to assess regional disparities in ICT integration. Moreover, longitudinal studies could explore how teacher ICT integration evolves over time with sustained professional development. Investigating the role of school leadership and peer collaboration in fostering ICT usage could also provide insights into institutional strategies for promoting meaningful technology adoption in education.

In conclusion, the study highlights a critical link between teacher ICT knowledge and actual integration in secondary schools. Enhancing this knowledge through well-designed and sustained professional development initiatives is essential for realizing the full potential of ICT in Kenyan education. Without a strategic focus on teacher capacity building, efforts to digitize the classroom risk remaining superficial and unsustainable.

REFERENCES

Agyei, D. D. (2021). *Teacher professional development and ICT integration in sub-Saharan Africa: The case of Ghana*. Educational Technology Research and Development, 69(2), 897–915.

Al-Rahmi, W. M. (2020). *A comprehensive review of ICT integration in teaching: Factors, barriers, and models*. Education and Information Technologies, 25(3), 2361–2391.

Bariu, D. (2020). *The role of infrastructural access in rural-urban disparities in ICT adoption among Kenyan teachers*. Journal of Educational Policy and Planning, 8(1), 45–61.

Heine, J.-H., Glogger-Frey, I., & Seidel, T. (2024). *Understanding the domains of teacher professional knowledge for ICT integration: A comparative study*. Computers & Education, 205, 104846.

Ifinedo, E., Rikala, J., & Hämäläinen, R. (2020). *Teachers' ICT skills and technology integration in education: A multilevel analysis of countries in Europe and North America*. Education and Information Technologies, 25(4), 3619–3636.

Mishra, P., & Koehler, M. J. (2006). *Technological pedagogical content knowledge: A framework for teacher knowledge*. Teachers College Record, 108(6), 1017–1054.

Nurhidayat, D., Nugroho, A., & Wulandari, S. (2024). *ICT competencies and technology integration among EFL teachers: A quantitative study*. The Language Learning Journal, 52(1), 53–69.

Perienen, A. (2020). *ICT integration in Asian education systems: Comparative reflections from India and Singapore*. Asia Pacific Journal of Education, 40(2), 197–214.

Rana, K., & Rana, N. (2020). *Challenges in ICT integration in African education: Lessons from Nigeria and South Africa*. African Journal of Educational Research and Development, 14(3), 100–112.

Wilson, M., Ritzhaupt, A., & Cheng, L. (2020). *Effectiveness of teacher training programs on ICT integration in Europe: A meta-analysis*. European Journal of Teacher Education, 43(1), 78–94.

Citation: *Elizabeth Nanjala Lukuyani et al. "Selected Teacher Factors and Information and Communication Technology Integration in Public Secondary Schools in Bungoma County, Kenya." International Journal of Humanities Social Sciences and Education (IJHSSE), vol 12, no. 7, 2025, pp. 23-28. DOI: https://doi.org/10.20431/2349-0381.1207003*