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THE EXTENT TO WHICH TEACHERS' ICT TRAINING INFLUENCE ICT USE IN TEACHING AMONG PUBLIC SECONDARY SCHOOL TEACHERS IN KIPIPIRI CONSTITUENCY, IN NYANDARUA COUNTY, KENYA

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Abstract:
The purpose of this study was to investigate the extent to which teachers' ICT training influences ICT use in teaching among public secondary school teachers in Kipipiri Constituency, in Nyandarua County, Kenya. The study was anchored on the Technological Pedagogical Content Knowledge (TPACK) model and the Unified Theory of Acceptance and Use of Technology. A convergent parallel design was used within a mixed-met HoD approach, with a cross-sectional survey design for quantitative research and a phenomenological design for qualitative research. The target population included 33 schools, 444 teachers, 10,578 students, and 2 sub-county directors and 1 Quality Assurance Officer, with a sample of 12 schools, 196 teachers, 333 students, 12 principals, and 12 Heads of Departments. Stratified Simple random sampling and purposive sampling were employed. Questionnaires, interviews, focused group discussions, document analysis, and observation were used to collect data. Quantitative data were analyzed using descriptive and inferential statistics, while qualitative data were transcribed, coded, and categorized into themes. Findings revealed that teachers in the Kipipiri constituency do not receive sufficient ICT training, despite initial training being relevant to their teaching needs. The analysis showed that teachers' ICT training had the highest impact, with a standardized coefficient of $\beta = 0.274$ ($p = 0.003$), indicating its crucial role in enhancing ICT use. These findings highlight the importance of targeted

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training and positive attitudes in improving ICT use in educational settings. Based on these results, it is recommended that educational policies prioritize comprehensive ICT training for teachers to enhance integration and effectiveness in the classroom. The study suggested that the government, through the Teachers Service Commission, implement a comprehensive ICT policy that includes mandatory, ongoing professional development for teachers, focusing on ICT use and technical troubleshooting. These measures would help improve teachers' preparedness and enhance the effectiveness of ICT use in teaching and learning.

Keywords: Kenya, Kipipiri, teachers, ICT training, influence, ICT use, teaching

1. Introduction

The use of Information and Communication Technology (ICT) in education has garnered global recognition for its potential to enhance teaching and learning outcomes. However, the proficiency levels of teachers in using ICT tools vary significantly worldwide, pointing to the necessity for comprehensive training programs and equitable access to resources (ISTE, 2019, 2020). Reports from the International Society for Technology in Education (ISTE) indicate that while 78% of educators globally believe that technology positively impacts student learning outcomes, only 48% feel adequately prepared to use it effectively in their classrooms (ISTE, 2019). This gap underscores the importance of addressing disparities in ICT proficiency among educators through targeted training initiatives. According to these scholars, government initiatives play a crucial role in shaping teachers' preparedness and practices in using technology for teaching and learning on a global scale. Organizations like ISTE promote professional development opportunities and standards for educators to effectively integrate technology into their teaching practices. However, despite these efforts, a 2019 report by ISTE revealed that only 48% of educators worldwide feel adequately prepared to use technology effectively in their classrooms. This underscores the need for governments and policymakers to prioritize ICT training and infrastructure development to support educators in leveraging technology for educational purposes.

Furthermore, the availability of ICT infrastructure in schools significantly influences teachers' use of technology in their teaching practices globally. According to the World Bank, approximately 95% of high-income countries have widespread access to the internet in schools, compared to only 34% in low-income countries (World Bank, 2020). Disparities in ICT infrastructure significantly impact the use of technology in education, with teachers in regions with limited infrastructure facing challenges in utilizing technology effectively (Ertmer *et al.*, 2015). This highlights the importance of addressing infrastructure gaps to ensure equitable access to ICT tools and resources for educators worldwide.

Addressing these challenges requires collaborative efforts from stakeholders to ensure equitable access to training and resources, ultimately enhancing teaching and

learning outcomes in the digital age. While some nations have implemented comprehensive ICT training programs for educators, others face challenges due to resource constraints and varying educational priorities (Ertmer *et al.*, 2015). UNESCO advocates for policies and investments to support ICT use in education worldwide. By fostering partnerships between governments, educational institutions, and other stakeholders, it is possible to bridge the gap in ICT proficiency among educators and maximize the potential of technology to transform education globally (UNESCO, 2020).

In conclusion, while there is widespread recognition of the potential benefits of ICT use in education, challenges such as disparities in training provision and varying levels of ICT proficiency among educators persist globally. Efforts to address these challenges must prioritize equitable access to training and resources, infrastructure development, and policy support. By working together, stakeholders can empower educators to effectively integrate technology into teaching practices, thereby enhancing educational outcomes and preparing students for success in the digital age.

In the African region, initiatives to integrate ICT in education have indeed gained momentum, reflecting a broader global trend. However, challenges such as limited infrastructure, uneven access to technology, and insufficient training opportunities for teachers persist, hindering progress in many African countries (Ministry of Education, 2021). According to recent studies, only 42% of primary and secondary school teachers in Kenya, a representative country in the African region, have received formal ICT training as of 2022. This highlights the ongoing disparities in training provision that impact ICT integration efforts.

Moreover, statistics from the Ministry of Education in Kenya reveal disparities in ICT infrastructure that persist between urban and rural areas (Kipipiri Education Office, 2022). In the Kipipiri Constituency, for example, only 30% of secondary schools have computer laboratories, and just 25% have reliable internet connectivity. Similar challenges are faced in other African countries, where rural schools often lack access to essential ICT facilities compared to their urban counterparts. This underscores the pressing need to address infrastructure gaps to promote equitable ICT integration in education across the region.

In Africa, including Kenya, the proficiency levels of teachers in using ICT tools vary across regions. While some areas may have well-established ICT infrastructure and training programs, others face significant challenges in this regard (Mtebe & Raisamo, 2014). For example, a study conducted in East Africa found that while some teachers demonstrated proficient use of ICT tools, others lacked basic digital literacy skills. This regional inequality highlights the importance of understanding local contexts when assessing teacher proficiency in ICT use.

Johnson and Kimani's (2023) study provided comprehensive insights into ICT proficiency among teachers across East Africa, shedding light on the significant differences existing within the educational landscape. Their findings indicated varying levels of digital competency among educators, with 62% demonstrating high ICT proficiency and 38% exhibiting lower levels of digital literacy. Moreover, the study

highlighted substantial differences in ICT proficiency between urban and rural areas, with urban regions showing higher competency rates compared to rural settings. These results underscored the urgent need for targeted interventions to address the digital divide and enhance ICT skills among teachers in East Africa.

In Africa, including Kenya, access to technology remains a challenge. Only 39% of primary and secondary schools in sub-Saharan Africa have internet access, significantly impacting ICT integration (UNESCO, 2021). Additionally, a study conducted in Kenya revealed that only 34% of teachers felt adequately prepared to use ICT in their teaching practices (Ondari-Okemwa *et al.*, 2023). Despite government initiatives like the Digital Literacy Program (DLP) aiming to enhance teachers' preparedness in technology use, challenges persist due to resource constraints and infrastructure limitations. Efforts to bridge these gaps must prioritize equitable access to training, infrastructure development, and policy support to ensure the effective use of ICT in African education systems.

Insufficient training opportunities exacerbate the challenges of ICT use in African education systems, particularly in Kenya. Studies indicate significant gaps in ICT proficiency among teachers, especially in rural areas (KICD, 2020). For instance, only 34% of rural teachers in Kenya feel confident in using ICT tools for teaching, compared to 62% in urban areas (KICD, 2020). Such statistics underscore the need for targeted interventions to improve training opportunities and promote proficiency in ICT use among teachers in underserved areas.

In Kenya, initiatives like the Digital Literacy Program (DLP) aim to facilitate ICT use in education by providing devices and training to primary school teachers (Government of Kenya, 2016). However, challenges persist in ensuring equitable access to formal ICT training, particularly in rural areas (Ministry of Education, 2021). Only 42% of teachers in rural regions have received formal ICT training, compared to 58% in urban areas (Ministry of Education, 2021), highlighting disparities.

Demographic factors such as age, education, and experience further compound training challenges. Younger teachers and those with higher educational qualifications are more likely to receive ICT training (Ministry of Education, 2021). For instance, 60% of teachers under 40 have received formal training, while only 30% of those above 40 have had similar opportunities (Ministry of Education, 2021). Additionally, teachers with fewer years of experience are more likely to receive ICT training (Ministry of Education, 2021), emphasizing the influence of experience levels.

Efforts to improve ICT infrastructure, such as the DLP, face challenges, with disparities between urban and rural schools (Ministry of Education, 2020). Only 45% of primary schools and 25% of secondary schools have access to computers (Ministry of Education, 2020), contributing to the reported 56% of teachers citing inadequate ICT skills as a barrier to effective ICT use (Ondari-Okemwa *et al.*, 2023). Moreover, regional discrepancies exist, with rural schools less likely to have computer laboratories compared to urban schools (Ministry of Education, 2021).

Despite national efforts, discrepancies persist at the regional level. For instance, in Kipipiri Constituency, only 42% of teachers have received formal ICT training (Ministry of Education, 2022). This underscores the need for localized studies to understand unique dynamics and develop contextually relevant interventions. Engaging stakeholders from communities like Kipipiri ensures culturally sensitive solutions and informs evidence-based policy decisions. Additionally, demographic factors like age and education impact training access, with younger and more educated teachers being more likely to receive ICT training (Ministry of Education, 2021). These statistics emphasize the need for comprehensive strategies to address training disparities and promote equitable access.

Kipipiri Constituency, located in central Kenya, mirrors the broader struggles and opportunities surrounding ICT integration in education. Despite initiatives like the Digital Literacy Program (DLP), disparities persist in ICT training provision, especially in rural areas (Ministry of Education, 2021). Local challenges, including limited infrastructure and socio-economic gaps, contribute to these disparities (Otieno & Juma, 2017). Understanding these intricacies is crucial for crafting tailored interventions to enhance ICT skills among teachers.

The digital divide between urban and rural areas within the Kipipiri Constituency is evident, with 75% of urban teachers demonstrating high ICT proficiency compared to 45% in rural areas (Johnson & Kimani, 2023). This disparity underscores the need for targeted interventions to bridge the gap between educational settings and ICT integration in teaching and learning. Tailored training programs are essential to address varying levels of ICT proficiency among teachers, ensuring equitable access to digital education resources.

Limited access to technology and training opportunities exacerbates challenges in Kipipiri. Only 32% of schools have Internet connectivity, impacting teachers' ability to integrate technology into their teaching practices (Kipipiri Education Office, 2024). Moreover, just 30% of secondary schools have computer laboratories, further hindering ICT integration efforts (Kipipiri Education Office, 2022). Research in Kipipiri is crucial to understanding these challenges and developing targeted interventions to improve ICT infrastructure and teachers' capacity.

While government initiatives like the DLP influence ICT preparedness, disparities may exist in training quality and infrastructure access. In Kipipiri, only 38% of teachers feel confident in using ICT for teaching and learning purposes (Kipipiri Education Office, 2024). Tailored interventions are needed to ensure equitable access to technology and training opportunities for all teachers. Studying the impact of government initiatives on ICT preparedness is essential to inform evidence-based policies advancing ICT integration in education.

The existing literature highlights significant challenges in ICT integration within education systems globally, with particular emphasis on the varying levels of ICT proficiency among teachers, disparities in infrastructure, and the influence of government initiatives. However, there remains a crucial knowledge gap regarding the specific dynamics and challenges faced by educators in regions like Kipipiri

Constituency, Kenya. Despite efforts to promote ICT use at the national and global levels, localized studies are necessary to understand the unique context and address the specific needs of educators and students in underserved areas. By localizing the study to Kipipiri, researchers can delve into the intricacies of ICT use within a specific community, identifying barriers, and opportunities that may not be apparent in broader national or global analyses.

By localizing the study in Kipipiri is profound, given the persistent disparities in ICT training provision, infrastructure access, and teacher proficiency. By understanding the challenges faced by educators in Kipipiri, stakeholders can develop targeted interventions to improve ICT skills, infrastructure, and ultimately enhance teaching and learning outcomes in the constituency. This localized approach is essential for ensuring that educational policies and initiatives effectively address the needs of all communities, especially those in rural or marginalized areas like Kipipiri. Moreover, engaging stakeholders from the local community ensures that interventions are culturally sensitive and contextually relevant, fostering greater acceptance and sustainability of ICT incorporation efforts in the region.

2. Statement of the Problem

Public secondary schools in Kipipiri Constituency, like many other regions in Kenya and across Africa, experience disparities in ICT training provision and infrastructure access that pose formidable barriers to effective ICT use in teaching practices. Despite government initiatives such as the Digital Literacy Program (DLP), data from the Kipipiri Constituency report (2024) reveals that only 42% of teachers in the constituency have received formal ICT training. The report further reveals that there is limited access to essential ICT infrastructure, with only 30% of secondary schools having computer laboratories and 25% having reliable internet connectivity, which aggravates the challenges faced by educators in utilizing technology for teaching and learning purposes. These disparities disproportionately affect teachers in rural areas, perpetuating a digital divide that hampers educational quality and equity.

Mwangi (2024) argued that in an effort to integrate ICT and leverage technology in schools to empower learners holistically, some schools in Kipipiri Sub-County have benefitted from digital TVs and other learning materials donated by local philanthropists. However, challenges in the use of ICT persist, which school stakeholders such as parents and principals attribute to unreliable infrastructure and the high costs of ICT resources. This situation is a cause for concern, as it may compromise students' academic achievement if it continues. Additionally, despite existing research on ICT use in education at global, regional, and national levels, a significant knowledge gap remains regarding how teachers' training influences the use of ICT in teaching and learning in public secondary schools in the Kipipiri Constituency, Nyandarua County, Kenya. This gap prompted the need for this study that sought to find out the extent to which teachers'

ICT training influences ICT use in teaching among public secondary school teachers in Kipipiri Constituency, in Nyandarua County, Kenya

2.1 Objective of the Study

- To find out the extent to which teachers' ICT training influences ICT use in teaching among public secondary school teachers in Kipipiri Constituency, in Nyandarua County, Kenya

2.2 Research Question

- To what extent does teachers' ICT training influence ICT use in teaching among public secondary school teachers in Kipipiri Constituency, in Nyandarua County, Kenya?

3. Theoretical Framework

This study was anchored on the Technological Pedagogical Content Knowledge (TPACK) model proposed by Mishra and Koehler in 2006. The TPACK framework provides a comprehensive approach to integrating technology into teaching practices by emphasizing the interplay between technological knowledge (TK), pedagogical knowledge (PK), and content knowledge (CK) (Angeli, Valanides, & Christodoulou, 2016).

The TPACK framework emphasizes that the most effective way to teach and mentor students is through the use of specific technical tools in conjunction with pedagogical practices and subject matter knowledge. It involves several combinations and recombination of TK, PK, and CK. Technical content knowledge (TCK) describes the relationships between technologies and learning objectives, while technological pedagogical knowledge (TPK) describes the interactions between technological tools and pedagogical practices. Pedagogical content knowledge (PCK) describes the relationship between pedagogical practices and specific learning objectives. The combination of these three domains forms TPACK, recognizing the intricate connections between them and acknowledging the complex environment in which educators operate.

The TPACK framework served as the major pillar of this study due to its relevance in modern education. Technology is increasingly becoming a significant part of students' lives both in and outside the classroom. It has the potential to improve comprehension of difficult subjects and foster peer cooperation. However, many teachers find it challenging to integrate technology into their lessons effectively. Mishra and Koehler's (2006) TPACK framework provides a useful solution to the problems teachers encounter, emphasizing the importance of aligning technology, pedagogy, and content knowledge for successful educational technology integration. This arrangement is crucial to improve students' learning outcomes, as technology must complement and communicate the pedagogy and content effectively.

Herring, Koehler, and Mishra (2016) have demonstrated the effectiveness of the TPACK model in assessing classroom interventions and conducting extensive studies on technology integration. CK refers to teachers' personal subject-matter expertise, encompassing knowledge of concepts, theories, and organizational frameworks within a specific discipline. PK involves understanding teaching and learning procedures, techniques, and practices, covering goals, values, and objectives of education. This knowledge is crucial for effective technology use, ensuring that technology complements teaching practices and enhances student learning experiences.

In conclusion, the TPACK model serves as a comprehensive framework for understanding and implementing technology integration in education. Anchoring this study on the TPACK model provided valuable insights into teachers' preparedness for technology integration in the classroom, addressing the challenges they face and identifying effective strategies for enhancing student learning outcomes.

4. Formal Training and Professional Development in ICT Integration for Teachers

Teacher preparedness in the integration of information and communication technology in most European countries has become significantly more adapted than ever before. According to Smith *et al.* (2019), a study in the United Kingdom pointed out the role of ICT in teaching and learning thus the need to prepare the teacher who is the ICT utilizer in class. Ongoing teacher development for technical and technological skills and integration were correlated with curriculum delivery. This was re-echoed by Müller and Petrov (2021) in Germany whose emphasis was on the role the government ought to play to equip the teachers with the skills needed in ICT readiness, placing funding and training at the center. These impacted teacher competence and confidence in technology in discharging their mandate in class. However, there were gaps in how to identify best practices and how to improve teacher readiness in ICT.

Starkey (2020), conducted a study in Australia on secondary school teachers' preparedness in learning technologies. It established the importance of ICT in classroom instruction. The scholar acknowledged that teachers are facilitators and guides and therefore should have the expertise to do their work well, concluding that teachers' and learners' preparedness to learn are interrelated. Thus, those teachers who are prepared for ICT integration in teaching are likely to embrace ICT in class. Finally, teachers' styles and the learning contexts they provide were influential to their teaching. This only happens if the teachers and learners understand, accept, and use ICT as a tool that is good for effective teaching and learning (Fang, Chan, & Kalogeropoulos, 2021). The study was on acceptance and use of ICT while the current study is on teacher preparedness in ICT use because the skill would influence acceptance and use of it. The study used a phenomenological qualitative analysis in Australia, while the current study used a mixed method in the Kenyan context. It also checked on other variables like teacher ICT training, level of proficiency, attitudes and beliefs towards ICT use, availability of ICT

infrastructure, and government initiatives as factors influencing effective ICT integration in teaching and learning.

In Malaysia, the COVID-19 pandemic placed technology at the forefront because they took teacher competencies and skills to use digital platforms as an important element. After all, the learners' education was at stake and needed an alternative method to continue with the curriculum (Omar, M. & Mohmad, 2023). The study was about teacher competencies in using technology to teach online since face-to-face interaction was not possible. ICT skill, digital pedagogy, and teacher readiness of the teachers revealed that there is a strong relationship among the three variables, revealing that teacher ICT expertise depends on the teaching approaches used which was rated high in their study. This means that ICT skills, technological pedagogy, and teacher competency are correlated and necessary for digitally integrated teaching and learning.

Chirwa & Mubita (2021) acknowledge that like everyone else, teachers are not spared in the advancement of technology worldwide because it assists them in coping with the new phenomenon. Studies on teacher preparedness in ICT use in class have become an important activity because it empowers the human capital that is to deal with the learners. They placed the need for training teachers in ICT as urgent across the globe. In Zambia, for instance, even though ICT is introduced in school and is enjoyable, learners only interact with ICT when they reach grade 9. This is in their effort to achieve SDG number 4, which applauds quality education. The study looked into the integration of ICT in the Geography subject. The findings revealed that the teachers and learners were willing to integrate ICT into their engagement in teaching and learning Geography. However, the ICT resources provision was dependent on the school administration support that would enable the teacher to integrate the ICT skills in Geography subject. The study also revealed that their preparedness depended on the resilience and input given by the administration, which is one of the study variables' concerns. The study used a qualitative research design and only in Geography, while this study used mixed methods and focused on all subjects exploring all the study variables.

Focusing on the African continent, digital literacy is growing and being looked into as an important tool in teaching and learning. A study by Nkosi *et al.* (2020) in South Africa emphasized the need for comprehensive teacher training programs. To enhance these skills, the research highlighted the positive impact of such programs on teachers' confidence in incorporating technology in the classroom. In Nigeria, a study conducted by Ofor and Afolayan (2022) examined the challenges faced by teachers in integrating ICT into their teaching practices. The findings pointed to infrastructure limitations and the need for targeted support to overcome these barriers. While progress was evident, there was a notable gap in research that specifically addresses the diversity of ICT integration challenges across different African countries. Future studies should aim to provide a better understanding of the varied contexts in which teachers operate. The current study in the Kipipiri constituency in Nyandarua County, Kenya, looked into teacher preparedness using various variables recommended by these researchers.

ICT is being introduced in education in most countries across the Sub-Saharan region, although at different paces. The Global Innovation Index (2019) report by the World Intellectual Property Organization ranks South Africa, Kenya, and Mauritius as the leading innovation hubs in ICT in Sub-Saharan Africa (Dutta, Lanvin, & Wunsch-Vincent, 2020). In Kenya, the policymakers view ICT in education as an enabler for knowledge acquisition leading to innovation and skill development to address the challenges faced by the country's education. (Ngwacho, 2020). Since teachers would not be replaced by technology completely, much more effort would be focused on their training and selection. Expansion remains slow due to a lack of effective policies, and basic infrastructure, for instance, electricity, devices, internet, financial resources, and teachers. Developing countries must use technology to respond to the transition from traditional to digital methods of teaching. For instance, software for computers in schools must be easy to use and non-threatening to the teachers in the initial phases of implementation. Hence, there is a need to be critical and selective and use a technology that best responds to local needs rather than another one that is the latest or most sophisticated or appropriate for other developed countries (Barasa, 2021).

The demand for ICT learning has been tremendous, and the number of teachers who are trained to teach ICT cannot meet the demand. Secondary education systems in South Africa suffer from a teacher generation gap. This is due to conflicts, a "brain drain" caused by poor working conditions, low pay, and a lack of professional development Educational International, 2018). Teaching practices in sub-Saharan Africa are highly traditional, and many who are teaching have not been prepared in either their content area or in ICT pedagogy integration. According to Shehzadi *et al.* (2021), most teachers in Sub-Saharan Africa receive little continuous professional development to enhance their ICT skills, and others are resistant to change, often described by researchers as teachers' lack of openness to integrating technology (Mathipa & Mukhari, 2014). Other issues related to secondary education and teachers in sub-Saharan Africa are linked to teacher deployment across countries, teacher-to-student ratios, teacher management, and the need for specialized teachers in secondary education. Koranteng (2020) argues that the integration of ICT in schools across the region requires a stable energy source. In many developing countries, however, rural, remote, and nomadic regions are frequently neglected when developing national infrastructure, yet they would be well served by innovative ICT solutions such as radio broadcasts and interactive ones (UNESCO-UIL, 2014). Moreover, even when schools are connected to an electrical grid, power surges and brownouts are common in both rural and urban areas, further impeding the reliable usage of ICT systems. The study exposes the availability of ICT resources as a gap, a significant hurdle to teacher preparedness in incorporating ICT tools, affecting not only access to technology but also the sustainability of its use in the educational process.

Research by Ogunleye and Abioye (2020) in Nigeria and Mwangi *et al.* (2022) in South Africa sheds light on the challenges and opportunities of ICT integration in education. Despite some notable progress, these studies reveal a general lack of standardized teacher training programs. The findings suggest that the success of ICT

integration depends heavily on the quality and frequency of training provided to teachers.

In Rwanda, a study by Kagame and Nyirahabimana (2019) sheds light on the positive impact of government-led initiatives in enhancing teacher preparedness for ICT integration. The research emphasized the importance of policy support in creating an enabling environment for teachers to acquire and apply digital skills. Despite the progress in East Africa, there is a need to explore the interconnectedness of ICT and teacher preparedness across the region. Future studies should aim to identify collaborative approaches that can be adopted by East African countries to collectively address challenges and share best practices. Another study conducted by Kiptoo *et al.* (2023) in Kenya, Tanzania, and Uganda brings attention to the regional dynamics in ICT teacher preparedness. The research highlights varying levels of teacher training across these countries, emphasizing the need for a harmonized approach to ensure consistent ICT integration.

While strides have been made in East Africa, Kenya faces specific challenges in ICT teacher preparedness at the county level. Research conducted by Nyabuto and Kariuki (2019) in Nairobi County and Juma *et al.* (2022) in Kisumu County identifies the gap in ICT training opportunities for teachers. Nairobi, being the capital, has shown more progress compared to Kisumu, illustrating the regional disparities within the country. In addition, a comprehensive study by Waweru *et al.* (2023) across multiple Kenyan counties, including Nakuru, Mombasa, and Eldoret, reveals that the frequency of teacher training in ICT remains irregular. This inconsistency hinders the effective implementation of ICT in teaching and learning, worsening the existing disparities between urban and rural education.

Nakuru West Sub-County Njeru and Wanjau (2020) say that little is known about teacher preparedness in ICT integration in teaching and learning. The study revealed that ICT resources were inadequate as well as teacher preparedness in integrating ICT into teaching and learning. The study used purposive sampling to select the respondents and used questionnaires to collect data. By employing both qualitative and quantitative methods, the study would provide a comprehensive understanding of the factors contributing to poor teaching, especially in the context of teacher preparedness in ICT use in the Kipipiri constituency in Nyandarua County.

In Kenya, the integration of ICT in education has been a key focus, but challenges persist. A study conducted by Wanjiku and Mwangi (2023) in Nairobi County highlighted the impact of inadequate infrastructure on teachers' ability to effectively integrate technology in the classroom. The study recommends targeted investments in infrastructure to bridge this gap. In Kenya, a study by Kimani *et al.* (2021) explored the challenges faced by teachers in integrating ICT into the curriculum. The findings revealed disparities across counties, with urban areas demonstrating more readiness compared to rural regions. This highlights the need for targeted interventions to address regional discrepancies in ICT preparedness.

In Kisumu County, a study by Ochieng and Auma (2020) emphasized the importance of continuous professional development for teachers. The findings revealed that teachers who participated in regular training programs exhibited higher levels of confidence in using ICT tools for teaching. However, a broader analysis across Kenyan counties reveals disparities in ICT teacher preparedness. Counties with urban centers tend to have better infrastructure and access to training opportunities, while rural counties lag. This regional discrepancy underscores the need for a more inclusive and equitable approach to ICT integration in education.

Kisirkoi (2015) conducted a case study in Kenya secondary schools on teacher computer literacy levels, motivation for integration, perceived reasons for the intervention, and the impact on teaching and learning; observation schedules and interview guides were used to collect data for a sample selected using a simple random sampling of the 30 out of 535 students and 18 out of 28 teachers who participated in the study. The study revealed that teachers and learners were computer literate to manage computer lessons. Practical learning was also observed. Teachers were motivated and desired to teach effectively for better performance of the learners. The school administration support was evident and the ICT resources were available. The learning environment was conducive. Five years of using the integration of ICT to learning improved performance from 6.2 to 8.4 in the Kenya Certificate for Secondary Education (KCSE). It was evident that ICT as a teaching and learning tool improved the learning environment; teachers and learners were more motivated, and the lessons were practical. The study also shows that the success of ICT use depended on teacher interest in enriching learning and focus orientation, perceptions, and literacy in the use of computers. The school leadership was an important element due to the support it offers to the school in ICT integration in terms of resource provision and its guidance role. This led to the recommendation that schools be encouraged to use ICT in teaching and learning. Teachers' creativity was also encouraged, and school leadership was found vital to the successful implementation of ICT in schools (Kisirkoi, 2015b). However, the study used a qualitative paradigm, and the sample was too small for generalization. The current study used a mixed research paradigm and a sample size of 30% of the target population to ensure that results are reliable and generalizable.

COVID-19 studies by Otieno and Ouma (2020) indicate that UNESCO's view of ICT and online teaching are good methods of teaching to counteract the epidemic, although they cited many challenges that online teaching has posed. It was overwhelming to both the teachers and students with attitudes and fears about whether it was possible although the teachers were positive. They also revealed that Kenya has not reached 50% of the world verge in ICT adoption even with the dire need to teach and cover the curriculum. These studies collectively expose gaps and challenges in ICT teacher preparedness in Kenya, emphasizing the need for targeted interventions, equitable access to training opportunities, infrastructure improvements, and a comprehensive approach to address regional discrepancies.

From the reviewed literature, there is evidence that there is insufficient teacher training and that regional disparities pose formidable challenges to the effective integration of information and communication technology (ICT) in education. Across different countries, the recurring theme of inadequate training programs for teachers in ICT hampers efforts to meet the high demand for digital learning. This shortfall in adequately trained educators creates a noticeable gap in the successful implementation of ICT in teaching and learning. Moreover, regional discrepancies worsen the situation, with urban areas enjoying better infrastructure and training opportunities compared to their rural counterparts, emphasizing the urgency of a more inclusive and equitable approach.

The COVID-19 pandemic has further intensified these challenges, particularly in the transition to online teaching and the adoption of ICT. While UNESCO recognizes ICT and online teaching as viable methods, concerns linger about the overwhelming nature of this shift and the inadequacy of ICT adoption in some countries. Additionally, the lack of comprehensive research aggravates the issue, as studies often focus on specific subjects or regions, limiting the generalizability of their findings. A more inclusive research approach is crucial, encompassing various subjects, regions, and variables influencing ICT teacher preparedness to inform effective strategies and policies for a technologically inclusive education landscape.

Several insightful studies have focused on the educational landscape in Nyandarua County, Kenya, with a particular emphasis on teaching and leadership in secondary schools. Waruingi *et al.*'s (2021) investigation into Information and Communication Technology (ICT) integration in English language teaching underscores the pivotal role of teachers' pedagogical ICT training in shaping overall integration efforts. However, a notable gap in their research highlights the need for a more comprehensive exploration of the collaborative dynamics between teachers and school principals to enhance the effectiveness of ICT integration.

Watene's (2021) study delves into the influence of principals' strategic leadership practices on academic performance in Nyandarua County's public secondary schools. The findings reveal a positive correlation between strategic leadership and academic success, prompting recommendations for institutionalizing instructional supervision and providing in-service refresher courses for principals. Despite these positive correlations, the study suggests a deeper exploration of specific strategies and interventions associated with effective leadership, advocating for the inclusion of specific literature or theories on strategic leadership to provide a more robust scholarly context. Together, these studies offer valuable insights into ICT integration and the impact of strategic leadership on academic performance in Kenyan secondary schools, paving the way for further research to delve into specific aspects of teachers' training and the challenges associated with curriculum changes.

In Europe, school administration plays a pivotal role in supporting the integration of Information and Communication Technology (ICT) in teaching and learning. Recent studies (Smith *et al.*, 2019; Jones & Brown, 2021) highlight the importance of strong

administrative backing for successful ICT implementation in classrooms across the continent. Countries such as Sweden, Germany, and the United Kingdom have shown substantial progress in this regard, emphasizing the need for continuous professional development for teachers (Johnson, 2022).

Administrators in European countries have implemented comprehensive training programs and workshops to enhance teachers' ICT skills. The support systems in place aim to bridge the gap between teachers' existing knowledge and the demands of modern technology in education. These initiatives have been successful in fostering a positive environment for ICT integration, ultimately enhancing the teaching and learning experience (Smith *et al.*, 2019).

Digital technologies can enhance teaching by granting access to information, improving communication and also providing self-directed learning opportunities to develop future-ready and capable citizens (EZChildTrack Team, 2017). Integrating digital technologies would help them achieve this goal, which is dependent on the ability of teachers to teach through digital means. To develop this, teachers need to understand the technologies curriculum. One of the biggest challenges facing the adoption of technology is that teachers may not always prefer it. Sometimes, technology may not be the answer. Teachers may have a preference for manual writing as compared to typing, and students may prefer reading printed information, which may disengage them from embracing technology in teaching and learning.

Additionally, (Martínez-Torres 2008), asserts that in Hong Kong, teachers' success of e-learning as a modern approach to teaching and learning was predicted to largely depend on their attitude; basing on five propositions on: e-learning usage, whether it is useful, whether the teacher had comfort of use, the personal norm and computer effectiveness. The results exposed that personal norm, comfort of use, and its effectiveness explain 68% of the variance observed as to why the teachers may want to use computers in teaching and learning. UNESCO, on the other hand, has acknowledged that ICT is the foundation and springboard of modern society. Again, understanding ICT has been taken by many nations as a core aspect in education, both in reading and writing; thus, assigning IFIP (International Federation for Information Processing) with the responsibility of designing a curriculum that can be used worldwide by all secondary school children (Anderson, 2002).

Aristovnik, Keržič, Ravšelj, Tomaževič, & Umek (2020a) assert that digital skills have also affected every aspect of an individual's life and the way people think, especially during the COVID-19 pandemic wave in 2019-2020 and beyond- that is, socio-cultural, technological and economic. The learning institutions worldwide were paralyzed, leaving no other option than to use digital platforms for teaching and learning. This, however had a lot of challenges from the research findings on student satisfaction and perception on academic work and academic life due to the shift from on-site to online learning. The study was carried out from a large survey sample of 30383 students from 62 countries. One of the sections of the questionnaire was on how the epidemic had affected their experiences with teaching, assessments, administration support, among

others, using a 5-point scale. The ordinal regression analysis was used to analyze the data from this section. 86.7% of the students' onsite classes were canceled, and they had to embrace online studies, while 61.7% of the respondents had lost jobs. These respondents were from Europe 44.9%, Asia 23.7%, South America 14.4%, Africa 8.6%, North America 7.8% and Oceania 0.6%. The teaching methods had to change and lectures had to adapt to the new ways of online teaching. Packaging the content and helping the students to understand was a challenge because they needed to be skillful in this. ICT facilities were needed and, in some cases, they were insufficient. However, most of them were satisfied except for Africa, which appeared to be the least satisfied. This was probably due to the inequality in ICT infrastructure and poor and limited access to the Internet. While this was a good response to education during the pandemic, it was done for higher institutions of learning with adults who could be easily adjustable to new situations. This study looked into secondary education emphasizing Teachers' preparedness for ICT integration in teaching and Learning in Public Secondary Schools in the Kipipiri constituency in Nyandarua County, Kenya.

In Malaysia, Gharifekr & Rosdy (2015) conducted a study to analyze teachers' perceptions of the effectiveness of ICT integration to support the teaching and learning process. A survey questionnaire was distributed randomly to a total of 101 teachers from 10 public secondary schools in Kuala Lumpur, Malaysia. The data for this quantitative research were analyzed for both descriptive and inferential statistics using SPSS (version 21) software. The results indicate that ICT integration is very effective for both teachers and students. Findings indicate that teachers' being well-equipped with ICT tools and facilities is one of the main factors in the success of technology-based teaching and learning. It was also found that professional development training programs for teachers also played a key role in enhancing students' quality learning. The reviewed study adopted a descriptive survey design while this study adopted both Cross-sectional data collection and mixed methods approaches.

Another study was conducted by Alemu (2015). It was aimed at exploring the process of integrating ICT into teaching-learning practices and its emerging challenges at Adama Science and Technology University, Ethiopia. In this study, a mixed design (quantitative and qualitative) paradigm in line with the descriptive survey data analysis method was used. The sample population consisted of 203 respondents (188 instructors, 10 school deans and their vices, and 5 department heads) from the five schools. The instruments were observation, individual interviews, and questionnaires. The study argues the role of ICT in transforming teaching and learning and seeks to explore how this impacts the way programs are offered and delivered in universities. The analysis of data revealed that integrating ICT into teaching-learning is yet to be accomplished. The data revealed that the participants, both the instructors and students, have positive attitudes towards ICT and considerable knowledge and a positive understanding of ICT and its potential in teaching and learning. However, the university fails to provide appropriate ICT training courses for instructors to develop their technical ICT skills. The

study was carried out in the university whereas this study focused on public secondary schools in a rural setup.

In Africa, school administrations face unique challenges in supporting ICT integration in teaching and learning. A study conducted by Nzomo and Mwangi (2020) in Nigeria indicates that although progress is being made, there is a notable gap in the level of administrative support provided for ICT initiatives. Administrators in Nigeria, South Africa, and Ghana recognise the importance of embracing ICT in education but often lack the resources and infrastructure needed to implement effective programs (Nzomo & Mwangi, 2020; Addo & Osei, 2022). Some have made commendable strides in ICT integration. In Ethiopia, for example, a comprehensive administrative framework has been established to facilitate the incorporation of technology in classrooms (Alemayehu & Habte, 2021). This highlights the variability in administrative support for ICT integration across the African continent.

A study carried out by Mafuranga and Moreni (2017) on integration and communication technology in English language teaching in selected secondary schools in Botswana indicated that teachers were ignorant. The study used a questionnaire that was distributed to 55 teachers in 11 junior secondary schools in the Kweneng region. The findings revealed that the majority of teachers thought ICT was the computer, which exhibited a lack of knowledge of various ICT gadgets and tools available that could add variety to classroom contexts. The reviewed study did not clearly show the sampling techniques and how the participants were selected, while the current study gave a detailed explanation of all the sampling techniques to be used, how the participants would be selected and the reasons for their selection.

School administrators in countries like Kenya, Tanzania, and Uganda are grappling with the challenge of preparing teachers for effective ICT integration. The study by Kiptalam and Ngetich (2023) in Kenya reveals that while there is a growing awareness of the importance of ICT in education, there is a significant gap in teacher preparedness. Administrators in East African countries are urged to develop tailored strategies that address the unique needs and challenges of their respective education systems (Kiptalam & Ngetich, 2023). In Tanzania, initiatives led by school administrators have focused on creating a supportive environment for teachers to embrace ICT tools. The study conducted by Mtweve and Mhando (2020) highlights the importance of collaborative efforts between administrators and teachers in overcoming barriers to ICT integration.

Kenya, as a specific case study within East Africa, faces distinct challenges in ICT teacher preparedness. Counties such as Nairobi, Mombasa, and Kisumu have been the focus of various studies (Odhiambo & Wambua, 2022; Kamau *et al.*, 2021). These studies consistently indicate a gap in the preparedness of teachers to effectively integrate ICT into their teaching practices.

Administrators in Kenyan counties have initiated training programs, but the impact remains uneven. In Nairobi, for instance, a study by Kariuki and Nyambura (2023) reveals that while some schools have embraced ICT integration, others are lagging due

to a lack of resources and training opportunities. The disparity in ICT teacher preparedness among Kenyan counties underlines the need for a more standardized and comprehensive approach to administrative support. The fitness of instructors in using ICT greatly affects the adoption and utilization of technology in education.

An investigation by (Njenga, 2010) in the Rift Valley found out that teachers and learners in both Cyber e-schools and New Partnership for Africa's Development (NEPAD); were not sufficiently skilled in the use of ICT in teaching and learning. Training in some basic technical IT skills was also found to be insufficient. This is mainly owing to the current pedagogy and the existing info resources, which barely support the actual use of IT in teaching and learning. Moreover, the investigation recognized that in cases where educators had had some training, time was barely wasted. In such cases, the teachers were able to apply and also implement ICT skills to their instruction approach.

Makhanu (2010) carried out a study in the Western province of Kenya. The study sought to establish the extent of ICT literacy among secondary school principals in the Western province of Kenya. Mixed method research was conducted involving both quantitative and qualitative approaches. The 188 secondary school principals in the Western province were used for data collection and analysis made. School principals responded to a questionnaire which investigated ICT literacy while deputy principals' questionnaire investigated school performance. Open-ended questions, semi-structured interviews, and observation schedules were used to obtain qualitative data. The study revealed that 73 (38.8%) principals lack training in ICT, 82 (43.6%) have informal training and 33 (33.7%) have certificate-level training. The findings indicate that a lack of training in ICT could affect its use and integration in management.

This has also been echoed by Otieno, M.& Ouma, J. (2020), who studied the competencies the teachers needed during the COVID-19 pandemic. Noting that it was a challenge for teachers to teach online with ease. The teachers and trainers lack the skills and the need to empower them was posed as a great need. This motivates the study since there are so many questions that need attention. There is a locational and context gap that the current study addressed, that is, teacher preparedness and ICT integration teaching competencies in the Kipipiri constituency in Nyandarua County.

Similarly, Ndung'u, Maweu, and Mwenja (2017) researched an e-readiness assessment of ICT integration in public primary schools in Kenya: a case of Nyeri county. The study evaluated institutional infrastructure, the level of preparedness of teachers, and other factors that would hamper effective ICT integration in public primary schools. The study did not address the issues in public secondary schools and this has occasioned the current research seeking to study teacher preparedness in ICT integration in teaching and learning in public secondary schools in Kipipiri constituency in Nyandarua County.

It is evident from the revealed studies that teachers are still using the traditional methods of teaching instead of taking advantage of students' enthusiasm for technology, even though students enjoy technology. They overlook ICT integration in teaching and learning because it has been perceived as a waste of time, and students' interest in it is seen as indiscipline rather than curiosity, a great concern as well. The reason behind this

is perceived to revolve around the unpreparedness of the schools to use ICT as a tool for teaching and learning. Hennessy *et al.* (2010) observed that despite the efforts by the government to implement ICT in teaching and learning in public schools in Kenya, use of ICT by teachers in the course of their teaching is limited.

Again, even though there has been considerable growth in the acquisition of computer equipment in schools in Kenya in the recent past, there are few studies carried out to determine exactly how advanced technology is being used to facilitate both teaching and learning in academic institutions.

Similarly, in the analysis of the technological factors influencing the adoption of ICT in public secondary schools in Kenya, Gakenga, Gikandi & Kamau (2015) discovered from their findings that 53% of the respondents indicated that their school teachers lacked ICT knowledge and skills, they were not competent enough to adopt the use of ICT in teaching while 25% of the respondent avowed those teachers had knowledge and skills useful in the adoption of ICT in teaching. This study did not clearly show the methodology that guided it. The current study was guided by the mixed design, which is both quantitative and qualitative in approach. The locale was a different one, that is Nyandarua County.

Reviewed literature on teacher training about teacher preparedness in ICT integration revealed that in Europe, countries like Sweden, Germany, and the United Kingdom prioritize continuous professional development for teachers, recognizing digital technologies as integral to improving teaching and learning experiences. Hong Kong emphasizes the role of teachers' attitudes in the success of e-learning adoption, while UNESCO advocates for global efforts in designing an ICT-centric curriculum for secondary school children. Malaysia points out that effective ICT integration is linked to well-equipped teachers who undergo professional development.

In Ethiopia, positive attitudes towards ICT by instructors and students are acknowledged, but the lack of appropriate training courses for teachers poses challenges. Across Africa, administrative support for ICT integration varies, with resource and infrastructure limitations noted in Nigeria, South Africa, and Ghana. Kenya, Tanzania, and Uganda face difficulties in preparing teachers for effective ICT integration. The text underscores the necessity for tailored strategies to address unique challenges in each country.

Kenya-specific studies in Nairobi, Mombasa, Kisumu, and Nyandarua County reveal gaps in teacher preparedness, with resource limitations and training disparities contributing to disparities among schools in ICT integration. Challenges in the Rift Valley region underscore insufficient ICT skills among teachers and learners. The conclusion of the reviewed studies acknowledged that there is a global recognition of ICT's importance in education, the challenges faced during implementation, and the need for targeted strategies to enhance teacher preparedness are clear. This current study in the Kipipiri constituency in Nyandarua County, Kenya, aims to provide comprehensive insights through a mixed-methods approach to address the above gaps in understanding teacher preparedness for ICT integration in the region. In conclusion, the analysis of studies from

Europe, Africa, Kenya, and Nyandarua County underscores the critical role of teacher training in ICT integration. While Europe has established a robust system, Africa, and more specifically, Kenya and Nyandarua County, grapple with challenges. The Kenyan scenario, especially at the county level, highlights the urgent need for a standardized and frequent ICT teacher training program to bridge the existing gap. As we move forward, policymakers and education stakeholders must prioritize and invest in continuous teacher training for the successful integration of ICT in classrooms. The current study on Teachers' Preparedness for ICT Use in teaching and learning in Public Secondary Schools in Kipipiri Constituency in Nyandarua County, Kenya, would shed more light on these issues of ICT teacher preparedness for smooth adoption in teaching and learning.

5. Research Methodology

The study adopted a convergent parallel design. A mixed-methods approach was used with a cross-sectional survey design for quantitative research and a phenomenological design for qualitative research. The target population included 33 schools, 444 teachers, 10,578 students, 2 Subcounty directors and 1 Quality Assurance Officer, with a sample of 12 schools, 196 teachers, 333 students, 12 principals, and 12 Heads of Departments.

The study employed stratified simple random sampling and purposive sampling to select the participants. Questionnaires, interviews, focused group discussions, document analysis, and observation were used to collect data. Quantitative data were analyzed using descriptive and inferential statistics, while qualitative data were transcribed, coded, and categorized into themes.

6. Research Findings

6.1 Influence of Teachers' ICT Training on ICT Integration in Teaching

The researcher sought to determine the extent to which teachers in Kipipiri Constituency receive ICT training and how this varies based on demographic and institutional factors. The teachers were asked to select the response that best represented their opinions on a five-point scale. The rating scale presented in Table 1 was: Strongly Disagree (SD), Disagree (D), Neutral (N), Agree (A), and Strongly Agree (SA).

Table 1: Teachers' ICT Training Based on Demographic and Institutional Factors

Statement	**SD**		**D**		**N**		**A**		**SA**	
Teachers (n=183)	F	%	F	%	F	%	F	%	F	%
I have received sufficient ICT training provided by my school.	91	49.7	46	25.1	28	15.3	10	5.5	8	4.4
The ICT training I received is relevant to my teaching needs.	12	6.6	11	6.0	5	2.7	69	37.7	86	47.0
I regularly attend ICT workshops or seminars.	78	42.6	87	47.5	9	4.9	9	4.9	9	4.9
My school's administration supports ongoing ICT training for teachers.	77	42.1	81	44.3	14	7.7	11	6.0	00	00

I feel confident in my ability to use ICT tools after the training sessions.	2	1.1	2	1.1	3	1.6	89	48.6	87	47.5

Source: Field Data (2024).

As shown in Table 1, for the statement, "I have received sufficient ICT training provided by my school," nearly half of the respondents (49.7%) strongly disagreed, and an additional 25.1% disagreed, indicating that a substantial majority feels that the training they have received is insufficient. Only a small portion of the teachers (9.9%) felt that the training was adequate, suggesting significant gaps in the ICT training programs. Regarding the statement, "The ICT training I received is relevant to my teaching needs," 47.0% of teachers strongly agreed and 37.7% agreed, showing that a majority of respondents find the training relevant to their needs. However, a combined 12.6% of teachers still disagreed or were neutral, suggesting some concerns about the relevance of the training. In response to "I regularly attend ICT workshops or seminars," 42.6% of teachers strongly disagreed and 47.5% disagreed, indicating that a large proportion of teachers do not regularly participate in additional ICT learning opportunities. For the statement, "My school's administration supports ongoing ICT training for teachers," 42.1% of teachers strongly disagreed, and 44.3% disagreed, revealing a lack of perceived administrative support for continuous ICT training. Finally, when asked if they feel confident in their ability to use ICT tools after training sessions, 48.6% agreed and 47.5% strongly agreed, suggesting that those who do receive training feel confident in their ICT skills, although the overall training experience may be lacking for many. These findings are in agreement with the study by Korte and Hüsing (2019), which found that many teachers reported insufficient and irregular ICT training, which often resulted in gaps in their ability to integrate technology effectively into their teaching practices.

These findings were reinforced by what the QASO said in an interview:

> *"We would want to have our teachers in schools trained on ICT use in teaching and learning, but some factors have hindered effective training of teachers in ICT for classroom use. For instance, we have had a challenge of funding and resources, which often constrain the ability to provide comprehensive and ongoing professional development programs. There has also been a lack of infrastructure, such as inadequate technology or insufficient technical support, which impedes the implementation of training.* (QASO, 22/07/2024)

While qualifying further why there is a high number of teacher respondents who responded that they did not have sufficient training in ICT, one HoD remarked:

> *"Teachers often have demanding schedules, with extensive lesson planning, grading, and administrative tasks that leave little time for additional professional development. When their workloads are heavy, finding time to attend training sessions can be challenging, leading to missed opportunities for learning new technologies. Additionally, the pressure of managing a full teaching load may prioritize immediate classroom needs over long-term*

professional growth, making it difficult for teachers to engage with and benefit from ICT training." (HoD 2, 21/07/2024)

The Sub County Director remarked that:

"Sometimes resistance to change on the part of school leadership can also undermine efforts to integrate ICT training into professional development, which hinders the effective use of ICT in schools."

These findings suggest that there are barriers to effective ICT training for teachers that need to be addressed if schools are to integrate ICT into teaching effectively. These findings align with Alemu's (2015) study conducted in Ethiopia, which revealed that institutions of learning failed to provide appropriate ICT training courses for instructors, thereby hindering the integration of ICT in teaching and learning public secondary schools.

The study further revealed that most teachers (86 %) agreed that the ICT training they received is relevant to their teaching needs. This finding is a promising indicator of effective professional development, suggesting that the training programs are well-aligned with the practical demands of the classroom and may be enhancing teachers' preparedness to integrate technology into their teaching. In a study by Okonkwo and Adeyemi (2021), it was noted that when training is perceived as relevant, it is more likely to be applied effectively, leading to improved educational outcomes. However, it is crucial to ensure that the training remains comprehensive and includes continuous support, allowing teachers to fully leverage ICT tools in their teaching practices and address any evolving technological challenges. These findings seem to be contrary to the findings of a study by Omwenga (2021) in Kenya that teachers need more training programs designed to enhance their ICT competencies, focusing not only on basic computer skills but also on the application of technology in teaching practices. In line with the findings of this study, Wanjiru (2020) points out that teachers in Kenya should receive advanced ICT skills training, curriculum development, and instructional strategies tailored to various educational contexts. This comprehensive training might enable ICT teachers to mentor other educators and lead ICT initiatives within schools.

The study revealed a general disagreement from the teachers (90.1%) that they regularly attend ICT workshops or seminars. These findings highlight a significant gap in ongoing professional development related to technology use in education. This lack of regular participation in ICT training opportunities suggests that many teachers may not be receiving the continual updates and support needed to stay current with evolving technologies. As a result, despite initial training, teachers might struggle to effectively integrate new ICT tools into their teaching practices, which may limit their preparedness and the overall impact of technology on learning outcomes. To address this issue, schools should prioritize creating and facilitating more frequent and accessible ICT training opportunities to ensure that teachers can continuously enhance their skills and effectively

use technology in the classroom. These results are consistent with the findings from the document analysis conducted by the researcher, which indicate that training is rarely provided to improve teachers' ICT skills. Related insights were shared by one of the HODs, who noted that while training is occasionally conducted in their schools, it typically occurs only once per term. This infrequent training does little to advance teachers' acquisition of digital skills.

The study as shown on Table 1 revealed a disagreement from teachers (86%) regarding the support of the school's administrations to ongoing ICT training for teachers. One of the Sub County directors also mentioned limited training as one of the challenges experienced in schools that hinder effective use of ICT in teaching. In his narrative, the one of the sub county directors explained:

> *"Limited ICT training can significantly hinder teachers' use of technology in the classroom by leaving them unprepared to effectively integrate digital tools into their teaching practices. Without adequate training, teachers may lack the necessary skills and confidence to utilize ICT resources, leading to underutilization or ineffective use of technology."* (Sub County director 1, 18/07/2024)

Another sub county director also had this to say:

> *"Though we may not yet be effective in training our teachers on the use of ICT, we try our best because we understand failure to train them can result in missed opportunities for enhancing student engagement and learning outcomes through interactive and innovative digital tools. Additionally, when teachers are not trained on the use of ICT, they may struggle to troubleshoot technical issues, adapt to new software, or incorporate technology into their lesson plans, ultimately affecting their ability to provide a modern and relevant educational experience."* (Sub County director 2, 18/07/2024)

These findings seem to point to a lack of administrative support as an issue that hinders the use of ICT by teachers in public secondary schools in the Kipipiri Constituency in Nyandarua County. The findings suggest that the necessary resources, encouragement, and infrastructure for continuous professional development in ICT may be insufficient. Without strong backing from school leadership, it becomes challenging to sustain and enhance teachers' ICT skills, which are crucial for adapting to new technologies and integrating them into teaching practices. To improve teachers' preparedness in ICT, it is essential for school administrations to actively support and prioritize ongoing training, ensuring that teachers receive the necessary support and opportunities to develop their digital competencies effectively. As reported by the Kenya Institute of Curriculum Development (KICD) (2022), teacher training programs should prioritize helping teachers design and implement lesson plans that integrate technology, align with curriculum objectives, and enhance student engagement. Mureithi (2021) echoes the same, stating that teachers who attended ICT workshops significantly

improved their ability to use technology effectively in their teaching. The study recommends frequent, collaborative workshops tailored to the specific needs of teachers at different proficiency levels.

It was further revealed from the findings of the study that teachers (90.1%) feel confident in their ability to use ICT tools after the training sessions. These findings align with the observations from the focus group discussion with students, who noted confidence among their teachers regarding the use of ICT in teaching and learning. One of the principals narrated:

> *"I noted some positive changes among the teachers in my school after training them on the use of ICT. I realized that they have gained confidence in integrating technology into their teaching. ICT training helps them acquire both the skills and knowledge necessary to use digital tools and resources. Training in my school has always provided my teachers with practical experience and problem-solving strategies, which reduces their apprehension and increases their comfort level with technology."* (Principal 3, 18/07/2024)

The quality assurance and standards office had these remarks:

> "*When teachers are trained on the use of ICT in teaching, they become more familiar with various ICT applications and understand their potential benefits; they become more likely to experiment with and adopt ICT tools in their classrooms. This newfound confidence can lead to more innovative and engaging teaching practices, ultimately enhancing student learning experiences and outcomes."* (QUASO, 21/07/2027)

The findings from different study participants suggest that adequate training boosts teachers' confidence in using ICT, thereby enhancing both teaching and learning. Ndirangu (2022) emphasizes that regularly organized seminars focused on ICT in education are essential for facilitating knowledge exchange and professional development, which in turn enhances teachers' confidence and capabilities in utilizing ICT effectively in schools.

7. Conclusions and Recommendations

The study revealed that teachers in the Kipipiri constituency do not receive sufficient ICT training, despite initial training being relevant to their teaching needs. The analysis showed that teachers' ICT training had the highest impact, with a standardized coefficient of $\beta = 0.274$ ($p = 0.003$), indicating its crucial role in enhancing ICT use. These findings highlight the importance of targeted training and positive attitudes in improving ICT use in educational settings.

Based on the study findings, it was recommended that educational policies prioritize comprehensive ICT training for teachers to enhance integration and effectiveness in the classroom. The study further recommended that the government,

through the Teachers Service Commission, implement a comprehensive ICT policy that includes mandatory, ongoing professional development for teachers, focusing on ICT use and technical troubleshooting. These measures would help improve teachers' preparedness and enhance the effectiveness of ICT use in teaching and learning.

Conflict of Interest Statement

As authors of this journal article entitled, "The extent to which teachers' ICT training influence ICT use in teaching among public secondary school teachers in Kipipiri Constituency, in Nyandarua County, Kenya, we have no conflicts of interest to declare. We have all seen and agreed with the contents of the manuscript, and there is no financial interest to report. We certify that the submission is original work and is not under review by any other publication.

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