



Effects of ICT Infrastructure Availability on the Teaching-Learning of Social Studies in Public Primary Schools in Belgut Sub-County, Kericho County, Kenya

Kipkemoi Reuben

Department of Curriculum, Instruction, and Educational Media

University of Kabianga

Email: kipkemoi098@gmail.com

Abstract: This study evaluated the effects of ICT infrastructure availability on the teaching-learning of Social Studies in public primary schools in Belgut Sub-County, Kericho County, Kenya. A mixed-methods design was employed, targeting 82 headteachers, 160 Grade Six Social Studies teachers, and 3,259 learners. Data were collected from 22 headteachers, 44 teachers, and 302 learners through questionnaires, interviews, and observation checklists. Findings revealed a stark contrast between hardware availability and supporting infrastructure. Hardware received the highest rating ($M=3.36$), with 63.6% of teachers reporting moderate to abundant availability of tablets, laptops, and computers. However, software availability was significantly lower ($M=2.86$), with 40.9% indicating not available or sparingly available. Internet connectivity received a low rating ($M=2.48$), with 54.5% indicating not available or sparingly available. Power backup infrastructure received the lowest rating ($M=2.23$), with 61.4% indicating not available or sparingly available. Observation results confirmed these findings: while 88% of schools had tablets, only 60-80% were operational. Wi-Fi was available in only 25% of schools, and fiber optics were absent in all schools. Qualitative data revealed that inadequate internet connectivity, unreliable power supply, and lack of maintenance severely constrained ICT integration. The study concludes that while the Digital Learning Programme succeeded in providing hardware, critical supporting infrastructure remains severely inadequate, significantly limiting ICT integration in Social Studies instruction. Recommendations include prioritizing investment in reliable internet connectivity and power backup, establishing maintenance schedules, deploying technical support personnel, and developing public-private partnerships to bridge the infrastructure gap.

Keywords: ICT Infrastructure, Hardware Availability, Internet Connectivity, Power Backup, Social Studies, Digital Learning Programme, Primary Education.

How to cite this work (APA):

Kipkemoi, R. (2026). Effects of ICT Infrastructure Availability on the Teaching-Learning of Social Studies in Public Primary Schools in Belgut Sub-County, Kericho County, Kenya. *Journal of Research Innovation and Implications in Education*, 10(4), 893 – 903. <https://doi.org/10.59765/ivy3s8k>

1. Introduction

Information and Communication Technology (ICT) infrastructure constitutes the foundational framework upon which technology-enhanced teaching and learning is built.

Zewdu (2025) defined ICT infrastructure as encompassing computer hardware, peripherals like digischool tablets, computers, scanners, smartphones, printers, projectors, and broadcast technology such as radio and television, along with important software for improved education. The

availability and quality of ICT infrastructure directly influence the extent to which teachers can integrate technology into their instructional practices and learners can benefit from technology-enhanced learning experiences.

In Kenya, the Competency-Based Curriculum (CBC) has integrated ICT literacy as a core competency, necessitating the provision of adequate ICT infrastructure in all public primary schools. The government's Digital Learning Programme (DLP) has been instrumental in distributing digischool tablets to schools across the country, with Kericho County reporting 99.01% coverage. However, the mere presence of hardware does not guarantee effective integration; supporting infrastructure such as reliable internet connectivity, power backup, and appropriate software is equally critical for meaningful technology-enhanced learning (Gachuiga, 2025).

Social Studies, as a comprehensive study of social science fields including History, Geography, Civic Education, and Sociology, requires pragmatic, demonstrative, and illustrative approaches to optimize learner comprehension and engagement (KICD, 2021). The subject's nature makes it particularly amenable to ICT integration, as digital tools can bring abstract concepts to life through visual representations, video demonstrations, and interactive learning experiences. Koçoglu and Avcu (2024) asserted that digital visual aids spark learners' imaginations and enable them to expand their Social Studies knowledge by integrating modern technologies into their activities. However, the effectiveness of such integration depends substantially on the availability of appropriate ICT infrastructure.

Despite the recognized importance of ICT infrastructure, studies have revealed significant gaps in its availability and functionality in Kenyan primary schools. John, Maurice, and Michael (2025) found that insufficient ICT infrastructure and tools hindered the implementation of ICT in primary schools in Kenya, with 94% of the 40 primary schools in their study lacking adequate ICT equipment. Similarly, Gachuiga (2025) identified infrastructure as a key challenge, noting that despite the presence of digital equipment in some schools, integration remains minimal due to various challenges including lack of internet connectivity, unreliable power supply, and inadequate maintenance.

In Belgut Sub-County, Kericho County, the situation mirrors these national challenges. According to the Kericho County Census Report (2020), many primary schools in the sub-county are situated in rural areas characterized by limited access to digital resources and infrastructure (Koech, 2024). Despite the presence of digital equipment in some schools, the integration of technology into teaching practices remains minimal. This study, therefore, sought to evaluate the effects of availability of ICT infrastructure on the teaching-learning experience of Social Studies in public primary schools in Belgut Sub-County, Kericho County, Kenya.

2. Literature Review

2.1 Conceptualizing ICT Infrastructure

ICT infrastructure encompasses the physical and technological framework that enables the integration of ICT in educational settings. According to Zewdu (2025), ICT infrastructure includes computer hardware, peripherals like digischool tablets, computers, scanners, smartphones, printers, projectors, and broadcast technology, along with important software for improved education. Adade (2022) noted that 21st-century education could be significantly enhanced through the adoption of advanced ICT infrastructure, while Gachuiga (2025) emphasized that updating ICT infrastructure and teachers' digital skills were essential prerequisites for effective ICT implementation in schools.

The components of ICT infrastructure can be categorized into hardware, software, connectivity, and support systems. Hardware includes physical devices such as computers, tablets, projectors, and peripherals. Software encompasses operating systems, educational applications, and content management systems. Connectivity refers to internet access and network infrastructure. Support systems include power supply, technical support, and maintenance schedules. Each component is essential for effective ICT integration, and the absence of any single component can undermine the entire ICT integration effort.

2.2 ICT Infrastructure and Teaching-Learning Outcomes

Research has consistently demonstrated a positive relationship between ICT infrastructure availability and teaching-learning outcomes. Globally, the Global Information Technology Report (GITR, 2022) highlighted a significant link between the incorporation of ICT in educational institutions and enhanced academic outcomes. Grigg and Keane (2022) noted that more than half of educational institutions in the UK had fully adopted ICT infrastructure integration to support talented and well-educated learners, with public primary schools showing enhanced numeracy standards due to ICT infrastructure incorporation.

At the regional level, studies in Ghana have revealed that outdated equipment limits the incorporation of digital appliances in teaching (Toh, 2022). Teachers in Ghana were unable to integrate ICT into their teaching as a result of outdated equipment, while limited software was identified as a hindrance to the use of computers as educational tools. Similarly, studies in Tanzania have acknowledged the importance of integrating ICT into the educational system, with the country's basic education ICT policy revised to comprehensively incorporate ICT across pre-primary, primary, secondary, and teacher education levels (Mkilamwe, 2023).

In the Kenyan context, John et al. (2025) found that insufficient ICT infrastructure and tools hindered the implementation of ICT in primary schools in Kenya. Gachuiga (2025) contended that access to ICT infrastructure in schools represents a crucial initial step towards effectively incorporating ICT into educational instruction. However, studies have revealed that even where infrastructure exists, its quality and functionality often constrain effective integration. The high rate of non-functionality of ICT devices in Kenyan schools has been identified as a significant barrier to effective ICT integration.

2.3 Internet Connectivity and Digital Learning

Internet connectivity is a critical component of ICT infrastructure that enables access to online resources, digital content, and interactive learning platforms. Zewdu (2025) emphasized that without reliable internet, the full potential of ICT cannot be realized in educational settings. Internet connectivity enables teachers to access educational videos, online research materials, current affairs information, and interactive learning resources that can bring Social Studies concepts to life.

In developing countries, including Kenya, internet connectivity remains a significant challenge, particularly in rural areas. John et al. (2025) noted that despite the presence of digital equipment in some schools, integration remains minimal due to lack of internet connectivity. Gachuiga (2025) identified internet connectivity as a persistent challenge in Kenyan schools, noting that even where devices are available, teachers remain hesitant to use them for instruction due to insufficient internet access.

The economic dimension of the connectivity challenge is particularly significant for public primary schools operating on limited budgets. Schools that cannot afford regular internet access fall further behind, while learners miss out on the digital literacy skills that are increasingly essential for their future academic and professional success. This economic barrier reinforces educational inequality, creating a digital divide between schools with internet access and those without.

2.4 Power Supply and ICT Integration

Reliable power supply is an essential prerequisite for ICT integration in schools. Without electricity, ICT devices cannot function, and without power backup systems, schools are vulnerable to disruptions caused by power outages. Gachuiga (2025) noted that power outages disrupt ICT-integrated lessons, discouraging teachers from planning ICT-integrated activities.

In rural areas of Kenya, power supply is often unreliable, with frequent outages disrupting teaching and learning activities. The lack of Uninterruptable Power Supply (UPS)

or standby generators in many schools means that power interruptions can result in data loss, device damage, and disrupted lessons. This unreliability undermines teachers' confidence in using ICT devices and limits the viability of ICT integration in schools with unreliable electricity.

The importance of power backup infrastructure is underscored by the high cost of ICT devices and the potential for damage caused by power surges and interruptions. Without adequate power protection, schools risk losing their investment in ICT infrastructure, and teachers may avoid using ICT devices when they fear power interruptions.

2.5 Theoretical Framework

This study was anchored on the Technology Acceptance Model (TAM) developed by Davis (1989) and constructivist learning theory. TAM posits that an individual's adoption of technology is influenced by perceived usefulness and perceived ease of use. Applied to ICT infrastructure, TAM suggests that teachers who perceive ICT as useful for enhancing teaching and learning, and who find it easy to use, are more likely to integrate it into their instructional practices. Infrastructure availability directly influences both perceived ease of use and perceived usefulness, as teachers with adequate infrastructure are more likely to find technology accessible and beneficial.

Constructivist learning theory emphasizes that learners construct knowledge through active engagement with their environment. From a constructivist perspective, ICT infrastructure enables teachers to create learner-centered, collaborative, and hands-on learning experiences (Kritt & Budwig, 2022). Without adequate infrastructure, teachers cannot create the rich, interactive, ICT-enhanced learning environments that constructivism advocates. The availability of ICT infrastructure, therefore, is a critical enabler of constructivist pedagogy in the digital age.

3. Methodology

3.1 Research Design

A mixed-methods research design was employed, combining quantitative and qualitative approaches to enable comprehensive exploration of the effects of ICT infrastructure availability on the teaching-learning experience of Social Studies. Quantitative methods, including surveys and structured questionnaires, were used to gather measurable data on ICT infrastructure availability. Qualitative approaches, including interviews and observations, were utilized to gain in-depth insights into the nature and effects of infrastructure availability.

3.2 Location of Study

The study was conducted in Belgut Sub-County, Kericho County, Kenya. This location was chosen because most primary schools in the sub-county are situated in rural areas characterized by high learner numbers and limited access to digital resources (Kericho County Census Report, 2020). According to John et al. (2025), teachers in the area have been slowly embracing the Competency-Based Curriculum, presenting an opportunity to explore the factors affecting ICT integration in this context.

3.3 Target Population and Sample

The target population comprised 82 headteachers, 160 Social Studies teachers, and 3,259 Grade Six learners from 82 public primary schools in Belgut Sub-County. Using stratified random sampling, 25 schools (30%) were selected, comprising 25 headteachers, 48 teachers (30%), and 326 learners (10%). The study achieved an overall response rate of 92.2% (368 out of 399 targeted respondents), surpassing the 70% threshold recommended for social science research (Kothari, 2022).

3.4 Data Collection Instruments

Data were collected using teachers' questionnaires, learners' questionnaires, headteachers' interview schedules, and observation checklists. The teacher questionnaire included items on a Likert rating scale measuring the availability of hardware, software, internet connectivity, and power backup infrastructure. The observation checklist was used to assess the availability and condition of ICT resources in schools. Qualitative data were gathered through headteachers' interviews, providing rich insights into the nature and effects of infrastructure availability.

3.5 Validity and Reliability

Content and construct validity were ensured through expert review by university supervisors and pilot testing. The test-

retest technique was employed to measure reliability, with a coefficient of 0.7 or greater considered sufficient for social science research instruments (Kothari, 2022). A pilot study was conducted in three schools in Soin-Sigowet Sub-County, adjacent to Belgut Sub-County, to refine the research instruments before full-scale data collection.

3.6 Data Analysis

Quantitative data were analyzed using descriptive statistics, including frequencies, percentages, means, and standard deviations, with the aid of SPSS version 26. Qualitative data from interviews and open-ended responses were analyzed thematically, with responses coded and categorized into themes aligned with the study objectives.

3.7 Ethical Considerations

Ethical clearance was obtained from the University of Kabianga Ethics Review Committee and the National Commission for Science, Technology and Innovation (NACOSTI). Permission was also sought from the Kericho County Director of Education and the headteachers of the participating schools. Informed consent was obtained from all participants, and confidentiality and anonymity were maintained throughout the study.

4. Results and Discussion

4.1 Response Rate

The overall response rate of 92.2% indicates a high level of participation, surpassing the 70% threshold recommended for social science research (Kothari, 2022).

4.2 Learners' Responses on ICT Availability and Use

Table 1: Learners' Responses on ICT Availability and Use

Item	Response	Frequency (n=302)	Percentage (%)
Is there a digischool tablet in your school?	Yes	272	90.1
	No	30	9.9
Have you ever used a computer or digischool tablet in your school?	Yes	266	88.1
	No	36	11.9
Have you ever learned Social Studies using a computer or digischool tablet?	Yes	172	57.0
	No	130	43.0
Do you know there are video clip links in your Social Studies text accessible by digischool tablets?	Yes	109	36.1
	No	193	63.9
Do you enjoy using digischool tablet/computer for Social Studies lessons?	Yes	223	73.8
	No	79	26.2

The findings reveal that while 90.1% of learners confirmed the presence of digischool tablets in their schools, only 57.0% had used these devices specifically for learning Social Studies. Only 36.1% of learners were aware of video clip links embedded in their Social Studies textbooks, suggesting limited utilization of available digital resources.

However, 73.8% of learners reported enjoying using ICT for Social Studies lessons.

4.3 Teachers' Responses on Availability of ICT Infrastructure

Table 2: Teachers' Responses to Availability of ICT Infrastructure

Item	Mean	Std. Dev
The school has the necessary hardware at its disposal for use, encompassing but not limited to digischool tablets, laptops, and desktop computers.	3.36	1.56
The school has the latest relevant software available for use, including computers that have the most recent antivirus programmes installed for data protection purposes.	2.86	1.49
The educational institution has a quick and trustworthy internet connection.	2.48	1.63
The school has an Uninterruptable Power Supply (UPS) or a standby power supply to prevent data loss in the event of a power cut.	2.23	1.59

Hardware availability received the highest rating (M=3.36), with 34.1% of teachers indicating abundant availability and 29.5% indicating moderate availability. The combined moderate-to-abundant availability rate of 63.6% indicates that most schools have received ICT devices. However, 25.0% of teachers rated hardware as not available or sparingly available, highlighting persistent disparities in resource distribution.

Software availability received a significantly lower rating (M=2.86), with 40.9% indicating not available or sparingly available, 20.5% unsure, and only 38.7% indicating moderate to abundant availability. This reveals a critical gap between hardware provision and software support.

Internet connectivity received a low rating (M=2.48), with 54.5% of teachers indicating not available or sparingly available, and only 29.5% indicating moderate to abundant availability. This represents a significant barrier to ICT integration, as reliable internet is essential for accessing online resources and engaging in digital learning activities.

Power backup infrastructure received the lowest rating (M=2.23), with 61.4% indicating not available or sparingly available, and only 25.0% indicating moderate to abundant availability. This is particularly concerning given the frequent power outages in rural areas of Kericho County.

4.4 Observation Checklist Results

Table 3: Observation Checklist Results

ICT Resource	Availability (%)	Number Operational	Condition
Electricity	100%	-	Good
Digischool Tablet	88%	60-80%	Fair-Poor
Software	65%	65%	Fair
Laptops	45%	70%	Fair
Computers	35%	60%	Poor
Firewalls	15%	50%	Poor
Whiteboards	100%	100%	Good

ICT Resource	Availability (%)	Number Operational	Condition
Printers	30%	60%	Poor
Wi-Fi	25%	40%	Poor
Modems	30%	50%	Poor
Fiber Optics	0%	0%	N/A
Projectors	30%	60%	Poor

All schools had electricity (100%) and whiteboards (100%). Digischool tablets were available in 88% of schools, but only 60-80% were operational with fair to poor condition. Laptops (45%) and computers (35%) had fair to poor condition with many outdated or non-operational.

Internet connectivity through Wi-Fi (25%) and modems (30%) was poor and unreliable. Software (65%) was fair but often outdated. Other peripherals had limited availability: printers (30%), scanners (20%), USB devices (45%), and projectors (30%). Fiber optics were not available in any school.

4.5 Headteachers' Interview Analysis

4.5.1 Availability of Digischool Tablets

Headteachers' responses revealed a consistent pattern regarding the availability of digischool tablets. While all headteachers acknowledged receiving tablets through the government's Digital Learning Programme, a critical gap emerged between provision and sufficiency. Multiple headteachers explicitly stated that the tablets were insufficient to meet the needs of all learners, with one noting, "we have tablets but not enough for all learners" (HT 1), and another echoing, "we have tablets, but the issue is we don't have enough for each learner" (HT 3).

Beyond quantitative insufficiency, headteachers identified critical qualitative challenges. One headteacher lamented, "we have tablets, but they are not all functional. Some are broken and we lack capacity to repair them" (HT 2), while another observed, "we received tablets two years ago, but they are not all in good condition. We lack a way to charge them all at once" (HT 5).

The most profound challenge identified by headteachers extended beyond infrastructure to human capacity. One headteacher insightfully observed, "the challenge is teachers are not competent enough to use them effectively" (HT 4).

4.5.2 Internet Connectivity

Headteachers' responses on internet connectivity revealed a pervasive crisis. One headteacher noted, "we have a modem, but the internet is very slow" (HT 1), while another confirmed, "internet is available but not reliable. It works occasionally" (HT 3).

Beyond technical limitations, headteachers identified significant economic barriers. One headteacher candidly explained, "internet connectivity through a mobile modem is too expensive to use regularly" (HT 3).

The most extreme manifestation was found in schools with no internet access whatsoever. One headteacher reported, "we don't have internet connectivity at all. We rely on pre-loaded content" (HT 4). Another noted, "our school has Wi-Fi in the computer lab, but it doesn't reach the classrooms" (HT 5).

4.5.3 ICT Facilities and Adequacy

Headteachers' responses regarding ICT facilities revealed a systematic pattern of insufficiency. One headteacher bluntly stated, "Our facilities are not adequate. We don't have a computer lab" (HT 3), while another confirmed, "We have a computer lab with 15 computers, but they are outdated" (HT 2).

A more nuanced finding was the distinction between hardware adequacy and supporting infrastructure adequacy. One headteacher explained, "We have enough tablets but lack internet connectivity and power backup" (HT 4), while another observed, "Facilities are adequate in terms of hardware but inadequate in supporting infrastructure" (HT 5).

4.6 Qualitative Responses from Teachers

Qualitative responses from teachers provided rich contextual insights into infrastructure challenges. One

teacher stated: "We have enough digischool tablets for each learner, but we don't have reliable internet" (KCO Teacher, 2025). Other responses further illuminated infrastructure challenges: "Our school has a computer lab with 10 computers, but many are not working; we have tablets but no stable internet connection and we also need more training; we lack enough ICT hardware and the few available are outdated; and although we have a good network of computers, they are not used effectively due to lack of technical support."

4.7 Discussion of Findings

4.7.1 Hardware Availability and Functionality

The findings reveal that while the government's Digital Learning Programme has been largely successful in providing digischool tablets to public primary schools in Belgut Sub-County (90.1% of learners confirmed presence), significant challenges exist regarding sufficiency and functionality. The moderate-to-abundant hardware availability rate of 63.6% indicates progress, but the 25.0% of schools still lacking adequate hardware highlights persistent disparities. This finding is consistent with Gachuiga (2025), who noted that non-functionality limits integration, and with John et al. (2025), who found that 94% of schools lacked adequate ICT equipment.

The functionality challenge is particularly concerning. Observation results revealed that only 60-80% of available tablets were operational, meaning a substantial proportion of the devices provided through the Digital Learning Programme are non-functional due to lack of maintenance, repair capacity, and adequate charging infrastructure. This finding aligns with Toh (2022), who observed that outdated and non-functional equipment limits the incorporation of digital appliances in teaching, and with Mkilamwe (2023), who noted that even where ICT infrastructure exists, functionality and maintenance remain critical barriers to effective integration.

The insufficiency of tablets to meet the needs of all learners, as reported by headteachers, creates significant pedagogical challenges. Teachers cannot effectively integrate ICT into Social Studies instruction when only a fraction of learners can access the devices simultaneously. This undermines the potential for learner-centered, interactive, and individualized ICT-enhanced learning experiences that the Competency-Based Curriculum envisions. As Kritt and Budwig (2022) argued from a constructivist perspective, meaningful learning requires active engagement with learning tools, and insufficient devices limit the opportunities for such engagement.

4.7.2 Internet Connectivity Challenges

Internet connectivity emerged as a major barrier to ICT integration, with only 29.5% of teachers indicating moderate to abundant availability, and 54.5% indicating not

available or sparingly available. Observation results confirmed this, revealing that Wi-Fi was available in only 25% of schools, and fiber optics were not available in any school.

The poor quality and reliability of available internet connections, as described by headteachers, renders internet connectivity largely ineffective for meaningful pedagogical purposes. Slow and intermittent connections make it impractical to stream educational videos, access online resources, and engage in digital research activities. This finding aligns with Zewdu (2025), who noted that without reliable internet, full ICT potential cannot be realized, and with Gachuiga (2025), who identified internet connectivity as a persistent challenge in Kenyan schools.

The economic barriers to internet access identified by headteachers are particularly significant for public primary schools operating on limited budgets. Schools that cannot afford regular internet access fall further behind, while learners miss out on the digital literacy skills essential for their future success. This finding is consistent with the Global Information Technology Report (GITR, 2022), which highlighted the significant link between ICT incorporation and enhanced academic outcomes, and with UNESCO (2022), which emphasized that connectivity is a fundamental requirement for equitable access to digital learning. This underscores the need for systemic policy interventions that recognize internet access as a fundamental infrastructure requirement for 21st-century education, necessitating government investment in subsidized or free internet connectivity for public schools.

4.7.3 Power Supply and Backup Infrastructure

Power backup infrastructure received the lowest rating ($M=2.23$), with 61.4% of teachers indicating not available or sparingly available. This is particularly concerning given the frequent power outages in rural areas of Kericho County. Without Uninterruptable Power Supply (UPS) or standby generators, schools risk data loss, device damage, and disrupted lessons whenever power cuts occur. This finding aligns with Gachuiga (2025), who noted that power outages disrupt ICT-integrated lessons and discourage teachers from planning ICT-integrated activities.

The lack of power backup limits the viability of ICT integration in schools with unreliable electricity. Teachers may avoid using ICT devices when they fear power interruptions, and lessons that incorporate ICT may be disrupted by sudden power outages. As Zenda and Dlamini (2023) observed in their study of rural secondary schools, perceived ease of use—which is directly affected by infrastructure reliability—significantly influences teachers' decisions to adopt ICT. The cascading effect of infrastructure inadequacy is evident: hardware is relatively available, but software, internet, and power support progressively decline. This creates a situation where ICT devices exist but cannot be effectively used. Without software, devices are limited to basic functions. Without

internet, access to digital content is restricted. Without power backup, lessons are vulnerable to disruptions. This cascading failure explains why only 57.0% of learners had used ICT for Social Studies learning despite 90.1% having digischool tablets in their schools.

4.7.4 Implications for Social Studies Teaching-Learning

The infrastructure inadequacies identified in this study have profound implications for Social Studies teaching-learning. Social Studies, as a subject requiring pragmatic, demonstrative, and illustrative approaches, stands to benefit significantly from effective ICT integration. However, the infrastructure constraints limit teachers' ability to leverage ICT for enhancing Social Studies instruction. This is consistent with Koçoglu and Avcu (2024), who argued that digital visual aids are particularly valuable for Social Studies because they bring abstract concepts to life, but only when the necessary infrastructure is in place.

The low learner awareness of video clip links in Social Studies textbooks (only 36.1%) suggests that teachers may not be adequately utilizing the digital resources embedded in the curriculum materials. This represents a significant missed opportunity for enhancing learning through multimedia content. The disparity between the availability of digital resources and their actual utilization points to a gap between policy intentions and classroom practice, which may be attributed to inadequate infrastructure and insufficient teacher training. As KICD (2021) noted, the Social Studies curriculum design assumes access to digital resources, but this assumption is not matched by the reality in many schools.

Teachers' positive perceptions of ICT's impact on Social Studies instruction, as revealed in the study, indicate recognition of ICT's pedagogical value. However, these positive attitudes cannot be translated into practice without adequate infrastructure. This finding is consistent with the Technology Acceptance Model (TAM), which suggests that perceived usefulness and perceived ease of use are influenced by infrastructure availability (Davis, 1989; Zenda & Dlamini, 2023).

4.7.5 Interconnection with Other Factors

The findings reveal that ICT infrastructure availability is interconnected with teacher ICT competency and ICT technical support. Inadequate infrastructure limits teachers' opportunities to develop ICT competency, as they cannot practice using ICT devices and integrating them into their teaching. Similarly, the absence of technical support means that infrastructure problems go unresolved, further limiting infrastructure functionality. This finding aligns with UNESCO (2022), which emphasized that effective ICT integration requires a holistic approach encompassing infrastructure, teacher competency, and technical support.

This interconnection underscores the need for a holistic approach to ICT integration that addresses all factors simultaneously. Addressing infrastructure challenges in isolation, such as providing more tablets, would be insufficient without simultaneously addressing teacher competency and technical support. Sustainable ICT integration requires a comprehensive approach that addresses the entire ecosystem of factors affecting ICT use. As Adade (2022) noted, the provision of ICT infrastructure must be accompanied by capacity building and ongoing support to ensure that the investment translates into improved teaching and learning outcomes.

5. Conclusion and Recommendations

5.1 Conclusion

This study evaluated the effects of ICT infrastructure availability on the teaching-learning experience of Social Studies in public primary schools in Belgut Sub-County, Kericho County, Kenya. The findings reveal a stark contrast between hardware availability and supporting infrastructure, with significant implications for the quality and consistency of ICT integration in Social Studies instruction.

The study concludes that:

- i. **Hardware availability is moderate but insufficient:** While the Digital Learning Programme has been successful in providing digischool tablets to most schools, the quantity of devices is insufficient to meet the needs of all learners, and a substantial proportion of available devices are non-functional due to lack of maintenance and repair capacity.
- ii. **Supporting infrastructure is severely inadequate:** Software availability is limited, internet connectivity is unreliable or non-existent in most schools, and power backup infrastructure is almost entirely absent. These supporting infrastructure deficits significantly constrain the effectiveness of ICT integration.
- iii. **Infrastructure inadequacy limits Social Studies instruction:** The infrastructure constraints limit teachers' ability to leverage ICT for enhancing Social Studies instruction, resulting in limited utilization of available digital resources and missed opportunities for enhancing learning through multimedia content.
- iv. **Infrastructure challenges are interconnected:** ICT infrastructure availability is interconnected with teacher ICT competency and ICT technical support, underscoring the need for a holistic approach to ICT integration.

The findings support the theoretical frameworks adopted in this study—constructivism and the Technology Acceptance Model (TAM). From a constructivist perspective, inadequate ICT infrastructure constrains teachers' ability to create learner-centered, collaborative, and hands-on

learning experiences (Kritt & Budwig, 2022). From a TAM perspective, teachers' perceived usefulness and perceived ease of use of ICT are negatively influenced by infrastructure inadequacies, reducing their willingness to integrate ICT into their teaching (Davis, 1989; Zenda & Dlamini, 2023).

5.2 Recommendations

Based on the findings of this study, the following recommendations are made:

1. Invest in Reliable Internet Connectivity

The government should prioritize the installation of fiber optics and reliable Wi-Fi in schools to enable access to online resources. This should include subsidized or free internet connectivity for public schools, particularly those in rural areas. Partnerships with telecommunication companies could help bridge the connectivity gap.

2. Provide Power Backup Systems

Schools should be equipped with Uninterruptable Power Supply (UPS) systems and standby generators to prevent data loss and lesson disruption during power outages. The government should allocate funding for power backup infrastructure in all public primary schools, particularly those in areas with unreliable electricity supply.

3. Enhance Hardware Sufficiency and Functionality

The government should ensure adequate numbers of functional ICT devices to meet the needs of all learners, moving towards the One Laptop Per Child Policy (OLPCP) target. This should include regular maintenance and repair schedules to ensure that devices remain functional.

4. Establish Maintenance and Repair Mechanisms

Schools should establish regular maintenance schedules to ensure that ICT equipment remains functional. The Teachers Service Commission (TSC) should consider deploying ICT-trained technical support personnel to schools to provide maintenance and repair services. Schools should allocate budgets for ICT maintenance and repair.

5. Develop a Comprehensive ICT Policy

The Ministry of Education should develop a comprehensive ICT policy for primary education that addresses infrastructure, technical support, and teacher competency. This policy should guide ICT integration at all levels and ensure consistency across schools, with clear guidelines on infrastructure provision, maintenance, and support.

6. Involve Stakeholders in Infrastructure Provision

Parents, communities, NGOs, and the private sector should be involved in supporting ICT infrastructure in schools. Partnerships with private sector organizations could help bridge the infrastructure gap, and community contributions could support maintenance and repair efforts.

7. Conduct Further Research

Further research should be conducted to explore the impact of ICT infrastructure on learner outcomes in Social Studies, to compare infrastructure availability between rural and urban schools, and to evaluate the effectiveness of different infrastructure provision models.

References

- Adade, R. (2022). *The status of ICT infrastructure towards the inclusion of ICT in the new curriculum in the Hohoe Municipality, Ghana*. [Master's thesis, University of Ghana].
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319-340.
- Gachuiga, R. W. (2025). *Factors influencing integration of information communication technology in teaching and learning in public primary schools in Kieni East Sub-County, Nyeri County, Kenya*. [Master's thesis, University of Nairobi].
- Global Information Technology Report (GITR). (2022). *The Global Information Technology Report 2022*. World Economic Forum.
- Grigg, R., & Keane, A. (2022). Inspection in Wales and internationally: Some comparisons. In *Watchdogs or Visionaries?: Perspectives on the History of the Education Inspectorate in Wales* (p. 205). University of Wales Press.
- John, N. M., Maurice, K., & Michael, G. W. (2025). Influence of technology infrastructure on quality of learning in public primary schools Nyeri County, Kenya. *African Journal of Education, Science and Technology (AJEST)*, 8(2), 25-31.
- Kenya Institute of Curriculum Development (KICD). (2021). *Competency Based Curriculum: Social Studies Curriculum Design for Grade Six*. Nairobi: KICD.
- Koçoglu, E., & Avcu, K. M. (2024). Technology integration to Social Studies: Why is it necessary? In *Social Studies Teaching III: Integrating Technology into the Social Studies* (p. 107). Pegem Akademi.

- Koech, B. C. (2024). Structure and functions of learner councils in secondary schools in Kericho County, Kenya. *Science Mundi*, 4(1), 36-51.
- Kothari, C. R. (2022). *Research methodology: Methods and techniques* (3rd ed.). New Age International Publishers.
- Kritt, D., & Budwig, N. (2022). The future of constructivist education. *Human Development*, 66(4-5), 295-309.
- Mkilamwe, P. (2023). *Assessing the role of Information Communication Technology (ICT) on secondary school learners' academic performance in Tanzania* [Doctoral dissertation, Institute of Accountancy Arusha].
- Toh, Y. (2022). Creating sustainable levers for ICT integration: A development trajectory of an ICT-enriched school. In *Diversifying Schools: Systemic Catalysts for Educational Innovations in Singapore* (pp. 3-32). Springer.
- UNESCO. (2022). *ICT competency framework for teachers: A global review*. Paris: UNESCO.
- Zenda, R., & Dlamini, R. (2023). Examining factors that influence teachers to adopt information and communication technology in rural secondary schools: An empirical study. *Education and Information Technologies*, 28(1), 815-832.
- Zewdu, E. (2025). *Practice and challenges of implementing information communication technology (ICT) in public secondary schools in Lideta Sub City, Addis Ababa*. [Master's thesis, Addis Ababa University].