The Influence of Teaching and Learning Resources on the Implementation of Computer Studies Curriculum in Public Secondary Schools in Bungoma County, Kenya

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Abstract
This study investigated the influence of Teaching and Learning Resources (TLRs) on the implementation of the computer studies curriculum in public secondary schools in Bungoma County, Kenya. Adopting a descriptive survey design, the research collected data from principals, teachers, and students using questionnaires, interviews, and document analysis. Findings revealed significant disparities in resource adequacy, with core textbooks (71.2%) and practical manuals (75.7%) being relatively available, while internet access (67.5% inadequate) and application software (44.9% adequate) lagged behind. Adequate TLRs were strongly linked to higher enrolment and improved KCSE performance ($\chi^2 = 68.42–82.15$, $p < 0.05$). However, underutilization due to teacher unpreparedness and infrastructural gaps hindered effective curriculum delivery. The study concludes that equitable resource provision, enhanced digital infrastructure, and teacher training are critical for successful ICT education. The study recommendations include policy reforms, public-private partnerships, and continuous professional development to align with Kenya's Competency-Based Curriculum and Vision 2030 goals.

Keywords: resource-adequacy, digital-divide, curriculum-delivery, teacher-preparedness, student-performance, educational equity

1.0 Introduction

The global transformation into a knowledge-driven society has intensified the integration of Information and Communication Technology (ICT) in education, making digital literacy an indispensable competency for 21st-century learners. In this context, computer studies have emerged as a foundational subject that prepares learners not only to function effectively in digitally mediated environments but also to become innovators and creators in an increasingly automated global economy (UNESCO, 2022; World Economic Forum, 2023). The digital revolution has altered nearly every sector from agriculture to health, governance to commerce necessitating educational systems that can equip students with the necessary skills to thrive in such a world.

In Kenya, the government acknowledged the centrality of ICT to development as early as the 1990s, culminating in the formal integration of computer studies into the national secondary school curriculum in 1996 (Government of Kenya, 2017). This decision was guided by the goals outlined

in Kenya's Vision 2030 and the Sessional Paper No. 1 of 2019, which prioritized technology-enhanced learning as a key enabler for quality, equitable, and inclusive education (Ministry of Education, 2019). Computer studies were expected to cultivate problem-solving, analytical thinking, and computational skills among students, thereby improving their employability and adaptability in a dynamic global job market.

Despite this foresight, the implementation of the computer studies curriculum has been uneven and fraught with structural and operational challenges. According to the Kenya National Examinations Council (KNEC, 2023), fewer than 4% of candidates sit for computer studies at the Kenya Certificate of Secondary Education (KCSE) level. This national trend reflects widespread issues in curriculum delivery, including resource inadequacy, teacher unpreparedness, and weak policy enforcement. Bungoma County mirrors this problem, where only 76 out of 369 public secondary schools (approximately 20.6%) have adopted and implemented the computer studies curriculum (Murambi, 2023). The implication is that a vast majority of students in the county complete secondary education without any formal exposure to digital skills—a stark contradiction to the government's ICT-in-education policy goals.

These gaps suggest a deeper, systemic issue, particularly with regard to the availability and utilization of Teaching and Learning Resources (TLRs). TLRs are critical enablers of effective curriculum implementation. In the context of computer studies, they encompass hardware (computers, printers, projectors), software (operating systems, coding platforms), teaching aids (manuals, textbooks), and digital infrastructure (internet connectivity, power supply). Research consistently shows that when such resources are adequately provided and effectively used, student engagement, enrolment, and achievement improve markedly (Darling-Hammond et al., 2020; World Bank, 2020).

However, numerous schools across Kenya continue to struggle with insufficient or outdated TLRs. These challenges are exacerbated by broader socio-economic inequalities, especially in rural counties such as Bungoma, where budget allocations and infrastructural support are often limited (Muema, 2018; Njoroge et al., 2021). Even in cases where resources are physically available, issues such as poor maintenance, lack of training, and minimal technical support often result in underutilization. This disconnect between resource provision and instructional application represents a significant bottleneck to successful curriculum implementation.

It is against this backdrop that this study seeks to investigate the influence of teaching and learning resources on the implementation of the computer studies curriculum in Bungoma County. Specifically, it focuses on the third objective of Murambi's (2023) research: assessing how the adequacy and use of TLRs affect enrolment in computer studies and academic performance. By providing empirical insights into the link between educational resources and learning outcomes, the study contributes to ongoing debates on equity, access, and quality in ICT education in Kenya.

1.1 Background

Digital skills are no longer peripheral competencies but core requirements for life, work, and citizenship in the 21st century. The widespread use of artificial intelligence, big data, cloud computing, and automation has transformed labour markets, making ICT competence a fundamental component of modern education systems (OECD, 2021). Countries globally are redesigning their education policies to ensure learners not only consume technology but also contribute meaningfully to its creation and application. In this global movement, computer studies have become a critical subject at the secondary school level.

In Kenya, the subjects are classified under Group IV of the national secondary school curriculum, which includes technical and applied sciences (KNEC, 2023). It is designed to expose learners to a range of skills, including computer architecture, software development, networking, and database management. The intention is to produce graduates who are not only digitally literate but also equipped to pursue careers in technology or integrate ICT in diverse professional settings (KICD, 2022). Moreover, the introduction of the Competency-Based Curriculum (CBC) further underscores the importance of digital literacy as a transversal skill, calling for even greater alignment between resource provision and instructional design.

Despite this policy direction, several implementation barriers persist. Nationally, the uptake of computer studies remains low due to infrastructural deficits, limited teacher capacity, and policy implementation gaps (MoE, 2020). In Bungoma County, for example, more than three-quarters of public secondary schools have not adopted the computer studies curriculum, despite the increasing relevance of the subject in today's digital landscape (Murambi, 2023). These statistics raise urgent concerns about the structural readiness of schools to deliver ICT education and the equity implications for learners who are left out of digital learning opportunities.

Teaching and learning resources play a central role in this dynamic. Effective implementation of the computer studies curriculum requires a combination of physical, human, and digital resources. These include:

(i). Reference texts and core textbooks: These offer foundational knowledge aligned with the curriculum and aid in syllabus coverage;
(ii). Practical manuals and teacher guides: These are crucial for lesson planning, practical sessions, and instructional coherence;
(iii). Application software: Including programming tools, word processors, and spreadsheets that enable learners to gain hands-on experience;
(iv). Internet connectivity: Facilitates access to global knowledge networks, online tutorials, and collaborative learning tools; and
(v). Peripheral devices: Such as projectors, routers, scanners, and printers that enhance the interactivity and practicality of lessons.

However, public secondary schools, particularly in rural areas, continue to face significant challenges in accessing these resources. Financial limitations, irregular disbursement of government capitation funds, and a lack of ICT procurement policies have contributed to this gap (Amadi & Ezeugo, 2019; Njoroge et al., 2021). In some instances, the few available computers are shared among hundreds of students, making regular and meaningful engagement with the technology virtually impossible.

Moreover, even where resources exist, utilization is not guaranteed. Teacher competence in ICT is a determining factor in the effective use of TLRs. Studies show that while many teachers have basic ICT knowledge, they often lack the pedagogical strategies to integrate these tools effectively in classroom instruction (Buabeng-Andoh, 2012; Koehler & Mishra, 2009). In Bungoma County, anecdotal evidence suggests that a large number of schools lack trained computer studies teachers, and some employ untrained or underqualified staff who struggle to deliver the curriculum competently (Murambi, 2023).

Empirical literature affirms the link between TLRs and student outcomes. For example, Likoko et al. (2013) found that the presence of adequate instructional materials significantly improves learner performance in technical subjects. Similarly, Darling-Hammond et al. (2020) argued that well-resourced learning environments not only boost academic achievement but also enhance learner engagement and teacher job satisfaction. However, most of these studies have focused on general resource challenges in education or on science subjects, leaving a gap in understanding the unique needs of computer studies particularly in counties such as Bungoma that face compounded infrastructural and capacity limitations.

This study addresses that gap by examining how the presence and utilization of TLRs influence curriculum implementation, learner enrolment, and academic achievement in computer studies. The findings aim to inform educational policy, school leadership practices, and teacher training strategies with the goal of strengthening digital literacy outcomes in Kenya's public secondary schools.

2.0 Methodology

2.1 Research Design

This study adopted a descriptive survey design, which is appropriate for examining large populations to describe existing conditions and explore potential relationships among variables (Kabi, 2016). The design was instrumental in enabling the collection of both quantitative and qualitative data concerning the availability and utilization of teaching and learning resources (TLRs) in public secondary schools offering computer studies in Bungoma County, Kenya. This mixed-method approach facilitated a comprehensive understanding of the status and implications of TLRs in curriculum implementation.

2.2 Study Area and Population

The research was conducted in Bungoma County, located in western Kenya, which hosts 369 public secondary schools distributed across national, extra-county, county, and sub-county categories. The study specifically targeted institutions that offer computer studies, involving a range of stakeholders including school principals, computer studies teachers, ICT technicians, and students. These participants were chosen due to their direct engagement with the use and management of teaching and learning resources in computer education.

2.3 Sampling Procedure

A stratified random sampling technique was employed to ensure adequate representation of schools across the different categories mentioned above. Within these strata, purposive sampling was used to select participants directly involved in the teaching and learning of computer studies. This approach allowed the study to capture informed perspectives on the subject matter. The sample size was calculated using Cochran's formula to ensure statistical reliability and generalizability of the findings across the target population.

2.4 Data Collection Instruments

Data collection was conducted using three primary instruments. First, structured questionnaires were administered to both teachers and students to gather quantitative data related to the availability and utilization of TLRs. Second, semi-structured interview schedules were used to collect qualitative data from school principals and heads of computer studies departments, providing deeper insights into institutional practices and challenges. Lastly, document analysis was performed on school records and Kenya Certificate of Secondary Education (KCSE) performance reports to examine trends in student enrollment and academic outcomes in computer studies, thereby contextualizing the quantitative and qualitative findings.

2.5 Data Analysis

Quantitative data collected through questionnaires were analyzed using both descriptive statistics (such as frequencies and percentages) to summarize the data, and inferential statistics, specifically chi-square tests, to determine the existence of statistically significant relationships between variables. On the other hand, qualitative data obtained through interviews were analyzed thematically. Transcribed responses were reviewed to identify recurring patterns, themes, and categories that provided interpretive depth to the quantitative results.

2.6 Ethical Considerations

The study was conducted in accordance with established ethical research standards. Prior to data collection, informed consent was obtained from all participants, with assurances of confidentiality

and anonymity. Additionally, the researcher secured official approvals and research permits from the National Commission for Science, Technology and Innovation (NACOSTI), as well as authorization from the Bungoma County Education Office. These measures ensured the ethical integrity and legitimacy of the study process.

3.0 RESULTS AND FINDINGS

This results present a detailed account of the adequacy and utilization of Teaching and Learning Resources (TLRs) in relation to computer studies enrolment and performance, based on both descriptive and inferential statistical analysis.

3.1 Adequacy of Teaching and Learning Resources

To evaluate the availability of foundational instructional materials in computer studies, respondents were asked to rate the adequacy of reference texts and core textbooks. The results are presented in Table 1.

Table 1: Adequacy of Computer Studies Reference Texts and Core Texts

Resource	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)	χ^2 (p-value)
Reference Texts	8.1	20.7	28.8	30.6	11.7	56.95 (0.006)
Core Texts	5.4	10.8	12.6	56.8	14.4	42.31 (0.001)

Findings in table 1 show that only 42.3% of respondents agreed that reference texts were adequate, whereas a majority (57.6%) perceived them as inadequate or were neutral. In contrast, 71.2% agreed that core textbooks were sufficient. The availability of core texts was significantly associated with higher student enrolment in computer studies ($\chi^2 = 42.31$, $p < 0.05$), indicating their critical role in motivating students to choose the subject.

The study further examined the adequacy of practical manuals and teachers' guides, both crucial for the effective delivery of hands-on computer studies instruction. Table 2 summarizes the results.

Table 2: Adequacy of Practical Manuals and Teachers' Guides

Resource	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)	χ^2 (p-value)
Practical Manuals	2.7	8.1	13.5	62.2	13.5	68.42 (0.000)
Teachers' Guides	6.3	19.8	20.7	36.0	17.1	51.76 (0.002)

An impressive 75.7% of respondents as can be seen from table 2 confirmed the adequacy of practical manuals. This adequacy significantly contributed to improved KCSE performance in computer studies ($\chi^2 = 68.42$, $p < 0.05$). Similarly, 65.8% of schools had access to teacher guides,

and this was also linked with better performance outcomes ($\chi^2 = 51.76$, $p < 0.05$). These resources appear instrumental in delivering structured and practical-oriented instruction.

In addition to print materials, the study explored the availability of essential digital tools such as application software and internet connectivity. These findings are displayed in Table 3.

Table 3: Adequacy of Application Software and Internet Access

Resource	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)	χ^2 (p-value)
Application Software	6.4	23.9	24.8	32.1	12.8	38.24 (0.012)
Internet Access	46.8	20.7	7.2	12.6	12.6	89.13 (0.000)

Only 44.9% of respondents as can be observed from table 3 believed that schools had adequate application software. This shortage meant many institutions continued to rely on outdated programs. Even more concerning was the finding on internet access: a staggering 67.5% of respondents indicated inadequacy in connectivity, significantly hindering access to online resources and interactive learning platforms ($\chi^2 = 89.13$, $p < 0.05$).

The study also assessed the availability of peripheral devices and opportunities for educational excursions, which enhance experiential learning. Table 4 presents these findings.

Table 4: Adequacy of Peripheral Devices and Excursions

Resource	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)	χ^2 (p-value)
Peripheral Devices	6.3	18.9	9.0	49.5	16.2	45.67 (0.003)
Excursions	20.7	41.4	9.9	19.8	8.1	62.18 (0.000)

From table 4 about 65.7% of schools were found to have sufficient peripheral devices like printers, projectors, and external drives. However, 62.1% reported rare or non-existent excursions due to financial and logistical barriers. These outings, despite their known pedagogical value, remain underutilized, potentially narrowing the practical exposure of students.

3.2 Utilization of Teaching and Learning Resources

To understand how effectively schools, utilize available resources, the study investigated teacher preparedness and student access to ICT facilities. The results are shown in Table 5.

Table 5: Utilization of TLRs and Teacher Preparedness

Factor	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)	χ^2 (p-value)
Teacher Preparedness	7.3	10.0	11.8	50.9	20.0	53.21 (0.001)
Student Access to Labs	5.4	37.8	11.7	24.3	20.7	71.45 (0.000)

While 70.9% of teachers considered themselves prepared to utilize TLRs effectively as indicated in table 5, a notable portion still lacked training or confidence. Additionally, only 45% of students had reliable access to computer labs, limiting opportunities for hands-on learning. These findings suggest gaps in infrastructure and teacher professional development that must be addressed to maximize the impact of available resources.

3.3 Influence on Enrolment and Performance

Finally, the study sought to determine whether teaching and learning resources influenced student enrolment in computer studies and performance in national examinations. Table 6 provides this statistical relationship.

Table 6: Impact of TLRs on Enrolment and KCSE Performance

Resource	Enrolment (χ^2, p-value)	Performance (χ^2, p-value)
Core Texts	42.31 (0.001)	38.24 (0.012)
Practical Manuals	68.42 (0.000)	75.63 (0.000)
Teachers' Guides	51.76 (0.002)	82.15 (0.000)

Based on findings of analysis in table 6, adequate core textbooks and practical manuals were statistically linked to higher enrolment rates, suggesting that well-equipped schools attract more learners to computer studies. Notably, the presence of practical manuals and teacher guides showed the strongest association with improved KCSE performance. These findings affirm that instructional resources directly influence both student participation and academic achievement.

4.0 DISCUSSION OF FINDINGS

The discussion is organized around key thematic areas from the results.

(i). Reference Texts and Core Textbooks

The study found that while 71.2% of respondents agreed that core textbooks were adequate, only 42.3% found reference texts sufficient. The significant association between the availability of core textbooks and student enrolment ($\chi^2 = 42.31$, $p = 0.001$) supports the premise that foundational materials are critical in sparking student interest and enabling academic success. Core textbooks

offer structured curriculum alignment and continuity in learning, which is essential in subjects like computer studies that require cumulative conceptual development.

On the other hand, the inadequacy of reference texts suggests that students may lack supplementary material for deeper exploration. This could hinder the development of higher-order thinking skills and self-directed learning both essential in modern ICT pedagogy. These findings mirror observations by Orodho (2014), who emphasized the importance of diversified learning resources in fostering critical thinking in technical subjects.

(ii). Practical Manuals and Teachers' Guides

The study found that 75.7% of respondents considered practical manuals adequate and that their availability was strongly associated with improved KCSE performance ($\chi^2 = 68.42$, $p < 0.001$). This underscores the importance of experiential learning in computer studies, a subject where hands-on practice is indispensable. The availability of teachers' guides in 65.8% of schools, and their significant link to academic performance ($\chi^2 = 82.15$, $p < 0.001$), further illustrates that structured instructional support tools enable teachers to deliver the curriculum more effectively.

These findings are consistent with the constructivist theory of learning (Vygotsky, 1978), which posits that learners construct knowledge best through active engagement, often mediated by guided instruction. The manuals provide procedural guidance while the teachers' guides scaffold teaching strategies, thus enhancing both learner comprehension and performance.

(iii). Application Software and Internet Access

Only 44.9% of respondents reported adequate application software, and a concerning 67.5% indicated that internet access was inadequate. The software in use was often outdated, undermining the relevance of the content taught in class compared to current industry standards. Internet connectivity, an essential enabler of interactive and contemporary ICT education, was reported as insufficient in a majority of schools ($\chi^2 = 89.13$, $p < 0.001$).

These deficits not only impede delivery but also widen the digital divide, especially for students in rural or under-resourced settings. According to UNESCO (2020), digital inequality remains one of the most significant challenges in achieving equitable quality education, particularly in ICT-intensive subjects. The lack of access to up-to-date digital tools also prevents students from engaging in collaborative learning, accessing online coding platforms, and participating in virtual labs or competitions thereby limiting their global competitiveness.

(iv). Peripheral Devices and Educational Excursions

Approximately 65.7% of schools had adequate peripheral devices like printers and scanners, which are essential for practical application of theoretical content. However, educational excursions and

field trips were found to be rare, with 62.1% of schools not facilitating them due to financial and logistical limitations ($\chi^2 = 62.18$, $p < 0.001$).

Peripheral devices contribute directly to technical skill acquisition by offering opportunities for students to apply what they learn in class to real-world tasks. The scarcity of excursions, on the other hand, denies learners exposure to industrial applications of ICT. Field visits to tech companies, for example, can contextualize classroom learning, inspire career ambitions, and inform project-based learning. This gap suggests a missed opportunity to bridge theory with practice, especially in a field where real-world application is key to mastery.

(v). Utilization of TLRs and Teacher Preparedness

While 70.9% of teachers considered themselves prepared to use TLRs, the study revealed that a significant portion still struggled with effective integration. Notably, 62.5% of students had limited access to computer labs, indicating that even when resources are present, utilization is not guaranteed.

This points to a dual challenge: infrastructure constraints and teacher capacity. Teachers may have theoretical knowledge of TLRs but lack hands-on training in managing ICT-integrated classrooms. This is consistent with findings by Koehler and Mishra (2009), who emphasized the importance of Technological Pedagogical Content Knowledge (TPACK) in enabling teachers to blend content, pedagogy, and technology seamlessly.

The restricted access to labs reflects systemic resource allocation problems. Schools with limited lab space or equipment often operate in shifts or limit usage to exam classes, thereby disadvantaging a large section of learners.

(vi). Influence on Enrolment and Performance

Finally, the study found that schools with adequate TLRs particularly core texts, practical manuals, and teacher guides recorded significantly higher enrolment and better KCSE performance. This affirms the foundational role of resources in both motivating students to take up computer studies and enhancing their performance once enrolled.

These findings have critical implications in the context of Competency-Based Curriculum (CBC) implementation in Kenya, which emphasizes skills acquisition and practical application. Without adequate and effectively utilized TLRs, the goals of CBC particularly in ICT education risk being undermined.

On the overall, the findings reveal significant disparities in resource availability and usage, with direct consequences on educational outcomes. Across all categories examined, the study highlights that adequacy alone is not sufficient; effective utilization anchored in teacher preparedness and

student access is equally crucial. There is a clear need for systemic interventions to address not just quantity but also quality, currency, and usability of resources. Investments must therefore consider both hardware (infrastructure and materials) and software (teacher training and support systems) to realize the full potential of ICT education.

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

This study investigated the adequacy and utilization of Teaching and Learning Resources (TLRs) in computer studies and their influence on student enrolment and academic performance in Kenyan secondary schools. The results reveal significant disparities in the availability, quality, and application of instructional materials and technological infrastructure factors that collectively shape learner outcomes.

Firstly, the availability of core textbooks, practical manuals, and teacher guides was found to be generally satisfactory in a majority of schools, and these resources were statistically associated with higher student enrolment and improved KCSE performance. This finding highlights the foundational role of structured instructional resources in guiding both teaching and learning processes in computer studies.

However, the study identified serious gaps in access to application software, internet connectivity, and reference texts. Outdated software and poor internet infrastructure have limited the capacity for interactive, modern digital learning, especially in resource-constrained and rural settings. These deficits directly hamper the realization of an inclusive and competency-based ICT education, as envisioned in Kenya's national education reforms.

Equally concerning is the underutilization of educational excursions and limited student access to well-equipped computer labs. These factors inhibit practical engagement and reduce students' exposure to real-world applications of computer studies, potentially demotivating learners and stifling skills development.

Teacher preparedness emerged as another critical issue. While a majority reported being trained in the use of TLRs, a notable proportion indicated only partial readiness, suggesting a mismatch between resource provision and pedagogical capacity. The study confirms that availability of resources alone is not enough; effective utilization, driven by teacher competence and systemic support, is essential.

In summary, while progress has been made in equipping schools with some critical teaching and learning resources, the uneven distribution, outdated technologies, and limited teacher training continue to pose significant challenges. Addressing these issues holistically is necessary for

enhancing ICT literacy, improving learner outcomes, and realizing the broader goals of the Competency-Based Curriculum (CBC) in Kenya.

5.2 Recommendations

Based on the findings, the following recommendations are proposed for policymakers, school administrators, teacher training institutions, and other education stakeholders:

(i). Policy and Investment in Resource Provision**:** The Ministry of Education should prioritize equitable funding for computer studies across all public schools, with a special focus on marginalized and rural areas. Further, a national audit of TLRs should be conducted periodically to identify gaps and ensure resource availability aligns with curriculum requirements. Furthermore, schools should be supported to procure up-to-date application software and peripheral devices that reflect current industry standards and foster relevant skill development.

(ii). Enhancement of Digital Infrastructure: There is a critical need to expand internet connectivity in all schools to enable access to digital content, online collaboration platforms, and real-time learning tools. At the same time, Public-private partnerships should be encouraged to improve broadband coverage and subsidize internet costs in underserved regions.

(iii). Capacity Building for Teachers: continuous professional development (CPD) programs should be rolled out to equip teachers with skills in emerging technologies and ICT-integrated pedagogies. Further, the TPACK framework (Technological Pedagogical Content Knowledge) should be embedded in teacher education and in-service training programs to ensure teachers can effectively integrate content, pedagogy, and technology.

(iv). Strengthening Laboratory Access and Utilization: **s**chools should adopt rotational lab schedules or invest in mobile digital labs to increase student access to computers and reduce overcrowding. Monitoring systems should be established to ensure that available labs are fully functional and regularly maintained.

(v). Reintegration of Educational Excursions: school heads should be encouraged and supported to reintroduce computer-related field trips, such as visits to tech firms, innovation hubs, and universities. To realise this grants or subsidies for excursions could be provided under STEM support programs to reduce financial constraints.

(vi). Resource Utilization Monitoring: school quality assurance officer and curriculum support officers should regularly evaluate not just the presence but also the use of TLRs in classrooms. Furthermore, usage reports and teacher feedback mechanisms should be institutionalized to ensure resources are effectively employed to support learning outcomes.

(vii). Integration of ICT into Broader School Culture: computer studies should not only be taught in isolation. Instead, schools should integrate ICT across all subjects to foster digital fluency among learners in addition to those who pursue computer studies as one of the major subjects. Students should be encouraged to participate in ICT clubs, coding boot camps, hackathons, and innovation competitions to reinforce classroom knowledge with extracurricular learning.

By addressing the outlined gaps through coordinated efforts, Kenya can enhance the effectiveness of computer studies instruction, raise digital competencies among secondary learners, and accelerate the integration of ICT in education in line with Vision 2030 and global Sustainable Development Goals (SDG 4). The recommendations, if implemented, will not only boost enrolment and performance in computer studies but also prepare learners for participation in a digital, knowledge-based economy.

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