



# Bridging the Digital Divide: Assessing the Availability and Educational Impact of Instant Network School (INS) Resources in Kakuma Refugee Camp Secondary Schools

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*Abstract: Preliminary reports on the Instant Network Schools (INS) initiative funded by Vodafone Foundation acknowledged high levels of engagement with digital resources. However, despite the integration of INS in Kakuma secondary schools, its utilization remains inconsistent, and its contribution to improving teaching and learning practices is insufficiently evidenced within the refugee context. The purpose of this study was to examine the availability of INS resources and their contribution to the teaching and learning practices in secondary schools within Kakuma Refugee Camp. A descriptive survey design was adopted, targeting 3,897 students and 94 teachers from three INS-implementing schools. A sample of 390 students and 24 teachers was obtained through stratified purposive sampling. Data were collected using questionnaires and interviews, then analyzed with the Statistical Package for Social Sciences (SPSS). The results revealed that the services offered by the INS were not fully utilized despite the availability of resources due to problems with poor internet connectivity, insufficient infrastructure, access to internet was not always available beyond the INS laboratories as well as limited training. It was concluded that although the utilization of INS is a contributing factor to the students' learning practices, its overall practical value is insignificant and limited. To mitigate this, Vodafone Foundation should improve INS infrastructure, continue teacher and student training, and ensure the coherence of all actors in order to guarantee appropriate monitoring and assessment for the long-term effectiveness of the INS program in teaching and learning practices.*

**Keywords:** Instant Network Schools, Resource Availability, Refugee Education, Secondary Schools, and Educational Technology

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## 1. Introduction

The Instant Network Schools (INS) programme, a partnership between the Vodafone Foundation and UNHCR, represents a significant innovation in refugee education by providing a “school-in-a-box” kit designed for challenging environments like Kakuma Refugee Camp. This integrated system includes solar-powered laptops,

tablets pre-loaded with educational content, projectors, wireless speakers, and internet connectivity, transforming traditional classrooms into multimedia learning hubs (Vodafone Foundation, 2022; UNHCR, 2021). In Kakuma Refugee Camp, where access to quality education is severely constrained by limited infrastructure and resources, the INS initiative aims to bridge the digital divide and enable 21st-century learning experiences for displaced secondary school learners.

Despite the promising deployment of INS resources, their actual availability in secondary schools within Kakuma Refugee Camp remains uneven. Teachers reported high availability of core hardware such as tablets (83.3%) and projectors (79.2%), but low access to laptops/computers (16.7%), reliable classroom internet (12.5%), and curriculum-aligned digital content such as E-KICD textbooks (12.5%) (Naylor & Gorgen, 2020). These disparities highlight systemic challenges in resource distribution and infrastructure maintenance in protracted refugee settings, limiting the full realization of INS potential (UNHCR, 2023).

The availability of INS resources has contributed positively to certain aspects of teaching practices by enabling multimedia content delivery and interactive lesson planning. Teachers utilized projectors and tablets to enhance classroom engagement and deliver visual aids, moving away from traditional chalk-and-talk methods toward more student-centered approaches (Vodafone Foundation, 2022). However, inadequate training and technical support have constrained deeper integration, with many educators relying primarily on basic functions rather than advanced features such as virtual laboratories or adaptive learning tools (Tondeur et al., 2017).

On the learners' side, INS resources have improved access to revision materials, teacher-prepared notes, and online information searching, with over 90% of students reporting regular use of these features for homework and self-study. This has enhanced knowledge retention and flexible learning opportunities in a context where conventional textbooks and learning materials are often scarce (UNESCO, 2023). Nevertheless, low utilization of pre-recorded videos (99% rarely used) and E-KICD digital textbooks indicates that the contribution to deeper learning practices remains limited.

While the INS programme has introduced valuable digital infrastructure to secondary schools in Kakuma Refugee Camp, gaps in resource adequacy, connectivity, and teacher capacity continue to hinder its optimal contribution to teaching and learning practices. This study, therefore, examines the availability of INS resources and their actual influence on teaching and learning in this unique refugee context, providing empirical evidence to inform targeted improvements in digital education interventions for displaced populations.

Despite the deployment of the Instant Network Schools (INS) programme in secondary schools within Kakuma Refugee Camp, the availability of key digital resources remains uneven, with significant gaps in reliable internet connectivity, adequate devices, and curriculum-aligned content, resulting in inconsistent utilization and limited contribution to teaching and learning practices. Although INS aims to bridge the digital divide in refugee education,

empirical evidence on the actual availability and educational impact of these resources in this challenging context is insufficient. The aim of this study was therefore to examine the availability of INS resources and their contribution to teaching and learning practices in secondary schools within Kakuma Refugee Camp, Kenya.

## 2. Literature Review

### 2.1 Theoretical Review

The Diffusion of Innovations (DOI) theory developed by Rogers (1995) provides a robust theoretical lens for understanding the availability and adoption of technology resources such as the Instant Network Schools (INS) programme in resource-constrained environments. According to DOI, the rate and success of innovation adoption depend on five key attributes: relative advantage, compatibility with existing practices, complexity (ease of use), trialability, and observability. In the context of Kakuma Refugee Camp, the availability of INS resources, including solar-powered devices, tablets, projectors, and internet connectivity, represents an innovation intended to enhance teaching and learning. However, limited compatibility with existing infrastructural challenges (such as unreliable power and internet) and high perceived complexity due to inadequate teacher training often hinder full adoption and effective utilization (Rogers, 1995; Tondeur et al., 2017). This theoretical perspective highlights that mere physical availability of digital resources is insufficient without addressing compatibility and ease-of-use factors to realize meaningful contributions to pedagogical practices.

Furthermore, DOI theory emphasizes the implementation and confirmation stages, where users move from initial adoption to sustained integration of the innovation into daily routines. In refugee education settings, the availability of INS resources can contribute to teaching and learning only when teachers and students progress beyond awareness to active implementation, influenced by communication channels, social networks, and institutional support (Rogers, 1995). Empirical studies grounded in DOI indicate that innovations with strong observability, visible positive outcomes in student engagement and content delivery, are more likely to be integrated effectively (Straub, 2009; Mishra & Koehler, 2006). In Kakuma, gaps in these stages, particularly due to insufficient training and technical support, limit the transformative potential of INS resources, underscoring the need for targeted interventions to enhance their contribution to teaching and learning practices.

## 2.2 Empirical Review

Empirical studies globally have consistently shown that the availability of digital resources significantly influences teaching and learning practices when adequately supported. In the United States, schools with high availability of ICT tools such as tablets, projectors, and reliable internet reported improved student engagement and interactive lesson delivery (Graham et al., 2022). Similarly, in the United Kingdom, longitudinal research found that regular access to digital resources correlated with enhanced digital literacy and critical thinking skills among secondary students (Johnson & Adams, 2023). These findings underscore that resource availability contributes to shifting from teacher-centered to student-centered pedagogies, although success depends on complementary factors such as training and infrastructure.

In developing countries, empirical evidence reveals mixed outcomes regarding the contribution of available digital resources. A study in India showed that despite government investment in ICT infrastructure, inconsistent internet connectivity and limited device adequacy hindered effective utilization in secondary schools (Sharma et al., 2022). In South Africa, research indicated that schools with better availability of computers and projectors experienced improved content delivery and student participation, yet infrastructural gaps in rural areas limited broader impact (Meyer & Gent, 2018). These studies highlight that while resource availability is necessary, contextual challenges often moderate its contribution to teaching and learning.

Locally in Kenya, empirical investigations on ICT integration in secondary schools demonstrate that the availability of digital resources remains a critical but insufficient factor. Mwangi and Otieno (2021) found that while many schools had basic ICT equipment, unreliable electricity and internet connectivity severely restricted their contribution to instructional practices. In refugee contexts, similar patterns emerge. The current study in Kakuma Refugee Camp revealed high availability of tablets (83.3%) and projectors (79.2%) among teachers, yet low classroom internet access (12.5%) and limited curriculum-aligned content such as E-KICD textbooks (12.5%), resulting in restricted contribution to deeper learning activities.

Further empirical evidence from Kakuma shows that INS resources contribute positively to basic academic tasks but fall short in advanced applications. Over 90% of students reported using INS for accessing teacher notes, revision materials, and online information searching, enhancing homework completion and self-study (Field data, 2025). However, utilization of pre-recorded videos was minimal (99% rarely used), and virtual lab simulations were largely unavailable, limiting the resources' contribution to interactive and practical learning experiences. These

findings align with broader refugee education research, indicating that resource availability alone does not translate into transformative teaching and learning without adequate support systems (Naylor & Gorgen, 2020; UNHCR, 2023).

Comparative empirical studies in East African refugee settings reinforce that the contribution of digital resources is highly context-dependent. In similar protracted displacement environments, the availability of solar-powered kits improved access to educational content but was undermined by technical issues, insufficient training, and scheduling inequities (Tiba & Condy, 2022; Piper et al., 2023). In Kakuma, despite notable hardware availability, these barriers constrained the overall educational impact of the INS programme, highlighting the need for holistic interventions beyond mere resource provision.

## 3. Methodology

The study adopted a descriptive survey research design with a concurrent triangulation approach to examine the availability of Instant Network Schools (INS) resources and their contribution to teaching and learning practices. The study was conducted in three secondary schools implementing the INS programme in Kakuma Refugee Camp, Turkana County, Kenya. The target population comprised 94 teachers and 3,894 students. A sample of 24 teachers and 390 students was selected using convenience sampling for the schools and stratified purposive sampling for participants to ensure representation across gender, class level, and involvement with INS resources. Data were collected using structured questionnaires for teachers and students, supplemented by an interview guide for school principals.

The research instruments were piloted in Kalobeyei Secondary School to establish validity and reliability. Content validity was ensured through expert review by supervisors of this work from Masinde Muliro University of science and Technology, while reliability was confirmed using Cronbach's alpha coefficients of 0.780 for INS utilization and 0.726 for aspects of teaching and learning. Quantitative data were analyzed using descriptive statistics (frequencies, percentages, means), while qualitative data from principals underwent thematic analysis. Ethical considerations were upheld through approvals from Masinde Muliro University, NACOSTI, the Department of Refugee Services, and relevant education offices. Informed consent, voluntary participation, anonymity, and confidentiality were strictly observed throughout the study.

## 4. Results and Discussion

### 4.1 Descriptive Statistics

An assessment was conducted to establish the availability of ICT resources in the INS schools. The results are as presented in Table 1.

Table 1: ICT availability in INS

	INS Internet access from the INS lab	Simulation s (virtual labs) software	Free subscrip tio n to online resources for students	INS Internet access from the classroom	Projector	Tablets	Laptops/co mputers	E - KICD textbooks
Available	70.8%	8.3%	33.3%	12.5%	79.2%	83.3%	16.7%	12.5%
Not available	20.8%	54.2%	33.3%	41.7%	12.5%	8.3%	20.8%	41.7%
Not sure	8.3%	37.5%	33.3%	45.8%	8.3%	8.3%	62.5%	45.8%

Table 1 presents teachers' perceptions of the availability of various ICT resources in the Instant Network Schools (INS). The majority of teachers (70.8%) reported that internet access was available in the INS laboratory, while only 12.5% indicated availability in classrooms, with 45.8% unsure. Availability of specialized resources was notably low, with only 8.3% of teachers reporting access to simulation or virtual laboratory software. Similarly, free online subscription resources for students were reported as available by 33.3% of teachers, unavailable by 33.3%, and

uncertain by another 33.3%. In contrast, basic hardware showed relatively high availability, with projectors at 79.2% and tablets at 83.3%. However, laptops or computers were available to only 16.7% of respondents, while 62.5% were unsure. Access to E-KICD digital textbooks remained very limited, with only 12.5% of teachers reporting availability, 41.7% indicating they were unavailable, and 45.8% uncertain. This is also represented graphically as shown in figure 1.

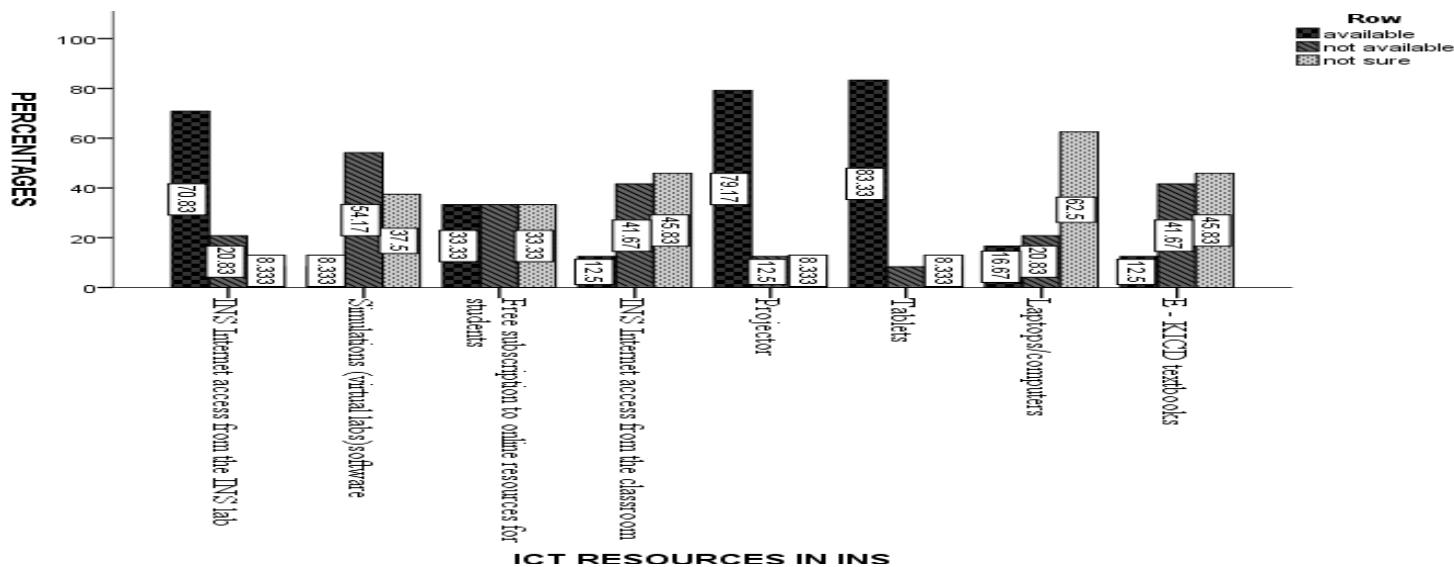


Figure 1: ICT availability in INS

The study also went ahead to assess the adequacy of the ICT Resources in the Instant Network School as

perceived by Teachers. The results are as presented in Table 2.

**Table 2: ICT Adequacy in INS**

Perception	Response	Percentages
Do you think the number of computers is enough in INS	Yes	.0%
	No	100.0%
Do you think tablets are enough in the INS	Yes	45.8%
	No	54.2%
How is the level of the internet in the school	Available and strong	25.0%
	Available but weak	54.2%
	Not available	20.8%
Do you think projectors are enough in the INS lab	Yes	20.8%
	No	79.2%
Does the school have enough ICT assistance to support teachers and students during teaching	Yes	66.7%
	No	33.3%
Does the school have an INS laboratory	Available and enough	45.8%
	Available but not enough	54.2%
	Not available	.0%

Teachers expressed varied levels of satisfaction with the adequacy of INS resources. All teachers (100%) indicated that the number of computers in the INS laboratories was insufficient. Regarding tablets, 45.8% reported that they were adequate, while 54.2% considered them inadequate. Internet connectivity was perceived as available but weak by 54.2% of teachers, available and strong by 25.0%, and not available by 20.8%. Only 20.8% of teachers felt that the number of projectors in the INS laboratory was sufficient, while 79.2% viewed them as inadequate. A majority (66.7%) reported that the school had sufficient ICT support to facilitate teaching and learning, whereas 33.3% indicated that such support was insufficient. About the INS laboratory itself, 12.5% of teachers stated it was available and sufficient, 83.3% said it was available but not sufficient, and 4.2% reported it was not available.

## 4.2 Qualitative Insights on INS Resource Availability and Utilization

In addition to the quantitative findings, qualitative data from school principals provided deeper insights into the actual availability and contribution of Instant Network Schools (INS) resources to teaching and learning practices in Kakuma Refugee Camp. The thematic analysis of principals’ responses revealed two major themes that help

explain the gap between resource presence and effective pedagogical integration.

### ***Theme 1: Insufficient Capacity Building and Training***

Principals reported that the initial training provided on the INS system was too brief and lacked follow-up support, leaving teachers to navigate the resources largely on their own.

*“The training in the INS system was too short and lacked enough capacity building, so that they had to learn independently after the initial training.....”*

### **Theme 2: Weak Monitoring, Technical Support, and Integration Challenges**

Principals highlighted frequent technical breakdowns, poor follow-up by monitoring teams, and the perception of INS as an additional burden rather than a core teaching tool.

*“Technical problems often, including delays on server update, up to two months at a time... There was no follow-up on the first system implementation... we are in the darkness.”*

These qualitative findings corroborate the quantitative data by illustrating that while certain hardware resources (such as tablets and projectors) were physically available, systemic challenges in training, technical reliability, and institutional support significantly limited their contribution to effective teaching and learning practices.

### 4.3 Discussion

The findings on resource adequacy reveal critical infrastructural gaps that significantly constrain the contribution of Instant Network Schools (INS) resources to teaching and learning practices in Kakuma Refugee Camp. The unanimous perception among teachers (100%) that computers in the INS laboratories were insufficient represents a major bottleneck. Computers serve as the foundation for content preparation, platform access, and student interaction with digital materials. Their inadequacy directly limits teachers' ability to fully utilize INS resources such as Kolibri, educational videos, and offline digital textbooks (Vodafone Foundation, 2022). This shortage is further compounded by moderate satisfaction with tablets (only 45.8% adequate), restricting the mobility and interactivity essential for learner-centered instruction in the INS model (UNESCO, 2023).

Internet connectivity emerged as another serious concern, with 75% of teachers describing it as weak or unavailable outside the laboratory. Only 12.5% reported reliable classroom access, compared to even lower figures among students. This poor extra lab connectivity severely undermines the integration of ICT into daily teaching, limiting opportunities for spontaneous, blended, or real-time learning activities (UNHCR, 2023). The situation is particularly challenging for students who depend on scheduled lab sessions, thereby reducing independent research and continuous engagement with digital resources.

Projectors, a core component for multimedia delivery, were also deemed inadequate by the vast majority of teachers (79.2%). This scarcity hampers the use of visual aids, interactive slides, animations, and educational videos, features central to the INS vision of transforming passive learning into dynamic, engaging experiences (Gaible & Burns, 2005; Vodafone Foundation, 2022). Similarly, the low adequacy of the INS laboratory itself (only 12.5% sufficient) and mixed perceptions of ICT support (33.3% insufficient) point to broader capacity challenges, including maintenance, technical assistance, and teacher-to-equipment ratios. These constraints collectively restrict time-on-task and pedagogical flexibility.

Despite these limitations, the relative availability of tablets (83.3%) and projectors (79.2%) among teachers represents a positive foundation. However, the overall pattern of

inadequacy in higher-capacity devices (laptops/computers), specialized software, and curriculum-aligned content (such as E-KICD textbooks) indicates that current resources fall short of enabling transformative teaching and learning. These findings align with broader empirical evidence from refugee and low-resource contexts, which consistently show that hardware availability alone is insufficient without reliable connectivity, sufficient quantities, and strong technical-pedagogical support (Naylor & Gorgen, 2020; Tondeur et al., 2017). Addressing these adequacy gaps is therefore essential for maximizing the educational impact of the INS programme in Kakuma Refugee Camp.

## 5. Conclusions and Recommendations

### 5.1 Conclusions

The study concluded that while certain core INS resources, such as tablets (83.3%) and projectors (79.2%) were relatively available in the secondary schools within Kakuma Refugee Camp, critical gaps existed in other essential resources. Internet connectivity was largely limited to the INS laboratories (70.8%), with very low classroom access (12.5%), and specialized resources, including simulation software, E-KICD digital textbooks, and laptops/computers, remained scarce. These inadequacies, combined with insufficient technical support and unreliable connectivity, significantly constrained the overall contribution of INS resources to teaching and learning practices. Although the resources enabled basic tasks such as accessing notes and online searching, their impact on interactive, multimedia, and curriculum-aligned learning remained limited.

### 5.2 Recommendations

1. To enhance the availability and contribution of INS resources, the Vodafone Foundation and implementing partners should prioritize increasing the quantity and distribution of core hardware (computers, tablets, and projectors) to ensure adequate teacher-to-student ratios in laboratories and classrooms.
2. There is also an urgent need to improve reliable internet connectivity beyond the laboratories and provide consistent technical maintenance to reduce downtime.
3. Additionally, schools should be supported with sufficient curriculum-aligned digital content, including updated E-KICD textbooks and simulation software, alongside strengthened ICT support systems. These measures will be critical in maximizing the educational contribution of the INS programme in Kakuma Refugee Camp.

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