

Advancing Technological Integration in Primary Schools in Kenya

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Abstract- *This paper examines the state of technology in primary schools in Kenya. It explores various aspects such as the presence of computing devices, data storage devices, cloud technology, internet connectivity, funding of internet connection, devices used to access information from the internet, types of internet applications, availability of computer rooms, computer networks, and the use of computers in schools. The findings provide valuable insights into the current technological landscape in Kenyan primary schools, highlighting areas of progress and areas that require further attention.*

Indexed Terms- *Technology Integration, Internet Connectivity, Computing Devices*

I. INTRODUCTION

In recent years, the integration of technology in education has become increasingly important, with primary schools in Kenya recognizing the need to equip students with digital literacy skills. This paper aims to shed light on the existing technological infrastructure in Kenyan primary schools and assess the extent to which technology is being effectively utilized. By examining various dimensions of technology implementation, including hardware, connectivity, and software applications, we can gain a comprehensive understanding of the current state of technology in these schools.

II. COMPUTING DEVICES IN SCHOOLS

The study examined the presence of computing devices in primary schools and categorized them as autonomous devices used in data processing. The data collected from respondents focused on the available hardware technologies in use. The summarized responses are presented in Table 1 below, showcasing the frequency and percentage of each technology:

Table 1: Hardware Technologies in Primary Schools

Technology	Frequency	Percent (%)
Desktop computer	18	5.70
Laptops	90	28.48
Tablets	86	.24
Printers	32	10.10
Projectors	88	27.85
Smartboards	2	0.63
Total		100.00

Upon analyzing the data, it is evident that laptops constitute the highest percentage of computing devices in primary schools, accounting for 28.48% of all the devices examined. Projectors closely follow, representing 27.85% of the total. Tablets make up 27.24% of the devices, while printers account for 10.10%. Desktop computers have a relatively lower percentage at 5.70%, and smartboards are the least prevalent, with only 0.63%. These findings indicate that a majority of primary schools have integrated ICT devices into their educational environments. The higher percentages for laptops and tablets can be attributed to the government of Kenya's initiative to provide free laptops to standard one pupils.

III. DATA STORAGE DEVICES

The study focused on data storage devices used in schools, which encompass technologies for recording and storing information. Various devices were considered, including computer data storage, hard disk drives, USB flash drives, SD cards, DVDs, and CDs. The data collected aimed to investigate the types of storage devices utilized in schools for data storage. The findings are summarized in Table 2.1: Data Storage Devices:

Table 2.1: Data Storage Devices

		Frequency	Percent (%)
Valid	CDs	5	6.02
	Hard disk drive	19	22.89
	Flash disk	31	37.35
	Google drive	7	8.89
	More than two devices	19	22.89
		1	1.20
	None	1	1.20
Missing	System		
Total		83	100.0

Table 2.1 presents the results of the data analysis regarding the storage devices used by respondents in schools. The findings indicate that 37.35% of respondents utilize flash disks as their storage device of choice. Hard disk drives follow closely at 22.89%, while 8.89% opt for Google Drive to store their data. Compact discs (CDs) are used by 6.02% of respondents, while 22.89% employ more than two storage devices. Only 1.20% of respondents reported not using any of the mentioned devices for data storage. These results imply that the majority of primary schools have storage devices, with flash disks being the most commonly used. The frequency of flash disk usage can be attributed to its ease of use, portability, and cost-effectiveness.

The study also collected and analyzed data to determine whether respondents stored their data on devices, as depicted in Table 2.2: Storage of Data on Devices:

Table 2.2: Storage of Data on Devices

		Frequency	Percentage (%)
Valid	Yes	54	65.06
	No	16	19.28
	I don't know	11	13.25
Missing	System	2	2.41
Total		83	100.0

Table 2.2 reveals that 65.06% of respondents confirmed that they store their data on devices. On the other hand, 19.28% stated that they do not store data on devices, while 13.25% reported being unsure about the storage of data on devices. Additionally, 2.41% of respondents did not provide a response to the questionnaires. Based on the findings in Table 2.2, it can be inferred that a significant majority of respondents are aware of data storage devices and recognize the importance of data storage.

IV. CLOUD TECHNOLOGY

The study collected data from respondents regarding the use of the internet in schools, access to information online, and the utilization of internet technologies such as email, video conferencing facilities, and social networking platforms (e.g., Facebook, Twitter). The data obtained from the respondents were analyzed to determine the extent of cloud technology usage. The focus of inquiry was on whether respondents possessed personal email accounts and how frequently they accessed them. A cross-tabulation of email accounts and access rates is presented in Table 3.1: Email Account and Access Rate.

Table 3.1: Email Account and Access Rate

Count	How often do you access your e-mail?			Total
	Non	Not frequently	Frequently	
Do you have a personal e-mail account?	58	21	4	83
es				
Total	58	21	4	83

Table 3.1 displays a cross-tabulation of respondents who have personal email accounts and their frequency of email access. Out of the total respondents, 58 (69.88%) indicated that they possess a personal email account but do not use it, 21 (25.30%) have a personal email account but do not access it frequently, while 4 (4.82%) have a personal email account and frequently utilize it. These

findings suggest that the majority of respondents have email accounts, but they do not regularly utilize these accounts. It is important to investigate the various obstacles hindering the full exploitation of this valuable cloud resource.

The data was further analyzed to determine the hosting providers for the email accounts of the respondents. The research aimed to identify who hosts the email accounts of the respondents. The results of the cross-tabulation are summarized in Table 3.2: Email Account Hosting.

Table 3.2: Email Account Hosting

Do you have a personal e-mail account?	Who hosts your e-mails?		Total
	Google	Yahoo	
	54	24	78
Total	54	24	78

Table 3.2 reveals that 54 (69.23%) respondents have email accounts hosted by Google, while 24 (30.77%) respondents have their email accounts hosted by Yahoo. It is worth noting that 5 respondents did not disclose the hosting provider for their email accounts. The findings indicate that the majority of the respondents' email accounts are hosted by Google.

Further analysis was conducted to determine the purpose of the email accounts held by the respondents. The guiding question aimed to identify the primary purpose of personal email accounts. The cross-tabulation results are summarized in Table 3.3: Purpose of Email Account. Table 3.3: Purpose of Email Account

Do you have a personal email account?	Yes	No	What do you e-mail for?			Total	
			Communication	Storing documents	Other		
	50	2	0	8	2	18	78
			3	0	0	0	5

Total 52 3 8 2 18 83

Table 3.3 presents a cross-tabulation of respondents with personal email accounts and the purpose for which they use them. The results indicate that 50 (64.10%) account owners primarily use their email accounts for communication, 8 (10.26%) use them for storing documents, and 3 (3.85%) use them for other purposes. Additionally, 2 (2.56%) respondents reported not having a personal email account. It can be inferred that the majority of the respondents are familiar with email usage and frequently utilize it for communication purposes.

V. INTERNET CONNECTIVITY IN THE SCHOOLS

Internet connectivity plays a crucial role in schools as it enables access to the global network and facilitates the utilization of various technologies, including cloud computing. Without an internet connection, schools cannot fully leverage cloud technologies in education. Internet connectivity is a vital component in integrating information and communication technology (ICT) in education, enabling information sharing, collaboration among students, research, and data storage in the cloud. However, according to the data analysis and interviews with primary school head teachers, it was found that a significant number of schools lack internet connectivity. The findings regarding the availability of internet in schools are summarized in Table 4.1: Availability of Internet in Schools.

Table 4.1: Availability of Internet in Schools

	Frequency	Percent (%)
Yes	27	32.53
No	56	67.47
Total	83	100.0

Table 4.1 demonstrates that 67.47% of the schools surveyed do not have an internet connection, while only 32.53% have internet connectivity in their schools. These percentages align with the information gathered from interviews conducted with primary school head teachers. This indicates that learners in these schools are unable to share resources, access information, or store their data using cloud storage devices.

VI. INTERNET ACCESS

An analysis was conducted to determine how the respondents connect to the internet services in their schools. The guiding question aimed to establish whether the respondents have internet access and the methods they use to connect to the internet in their schools. The cross-tabulation results are presented in Table 5.1: Internet Access and Connection Technologies.

Table 5.1: Internet Access and Connection Technologies

	Do you have Internet in your schools? Yes	Total
Modem	40	40
Mobile phone	31	31
Wireless connection	10	10
Total	81	81

Table 5.1 reveals that 40 (49.38%) respondents connect to the internet in their schools via a modem, 31 (38.27%) use mobile phones for internet access, and 10 (12.35%) respondents utilize a wireless connection (Wi-Fi). These findings indicate that the majority of the respondents rely on modems to connect to the internet, despite the cost inefficiency of having one modem per machine, which does not allow for resource sharing.

VII. FUNDING OF INTERNET CONNECTION

The study aimed to determine the various funding sources for internet connectivity in schools. A cross-

tabulation analysis was conducted to examine the funding agencies for schools that had internet access. The results are summarized in Table 6: Internet Connection and the Funding Agencies.

Table 6: Internet Connection and the Funding Agencies

	Do you have Internet in your schools? Yes	Total
Government	22	22
Others	6	6
Total	28	28

Table 6 illustrates that among the schools with internet connection, 22 (78.57%) of them were funded by the government. The remaining 6 (21.43%) schools received funding from other agencies, including initiatives by parents, donations from donors and well-wishers, and funds generated through income-generating projects within the schools. These findings indicate that the government plays a significant role in ensuring connectivity in the majority of primary schools.

VIII. DEVICES USED TO ACCESS INFORMATION FROM THE INTERNET

The study examined the devices used by respondents to access the internet and access information. The findings are summarized in Table 7: Devices Used to Access the Internet.

Table 7: Devices Used to Access the Internet

	Frequency	Percent (%)
Smart phone	56	67.47
Tablet	14	16.87
Laptop	8	9.64

Valid

Desktop	2	2.41
I don't have any device	2	2.41
Missing System	1	1.20
Total	83	100.0

The analysis in Table 7 reveals that the majority of respondents, accounting for 67.47%, access the internet using smartphones. Additionally, 16.87% of respondents use tablets, 9.64% use laptops, 2.41% use desktop computers, and 2.41% of respondents reported not having any device to access the internet. These findings indicate that smartphones are the most commonly used devices to access the internet among the respondents, followed by tablets. This observation aligns with the availability of these devices in many of the sampled schools.

IX. TYPES OF INTERNET APPLICATIONS

Data was collected and analyzed to identify the various internet applications used by teachers to access different content on the internet through their mobile phones, tablets, and laptops. The cross-tabulation results are summarized in Table 8: Applications Cross Tabulation.

Table 8: Applications Cross Tabulation

	Do you access any data/information from the Internet?	Total
	Yes	
e-mails	26	26
which application do you access on the Internet	19	19
Facebook		
Google app	38	38
Total	83	83

The findings presented in Table 8 indicate that respondents utilize different internet applications when accessing content on the internet. The majority of respondents, accounting for 38 (47.78%), reported using Google apps as their preferred search engine for accessing information on the internet. Additionally, 26 (31.33%) respondents mentioned using emails to retrieve information, while 19 (22.89%) respondents stated that they access information through Facebook. These findings highlight a mixed perception regarding the mentioned applications and their usage for accessing academic information. It also emphasizes the need for respondents to be educated about relevant internet-based applications, including search engines and browsers.

X. AVAILABILITY OF COMPUTER ROOM

The study interviewed several head teachers of schools to determine the availability of computer rooms in their respective schools for the installation and storage of computing devices. The responses were analyzed and are presented in Table 9: Availability of Computer Room.

Table 9: Availability of Computer Room

	Frequency	Percentage (%)
Yes	41	49.4
No	42	50.6
Valid		
Total	83	100.0

Table 9 indicates that 50.6% of the head teachers reported not having computer rooms in their schools for the installation and storage of computing devices. On the other hand, 49.4% of the head teachers stated that they do have computer rooms. It was also observed that not all head teachers fully understood the concept or purpose of a computer room, which may have slightly affected the accuracy of their responses regarding the availability of computer rooms.

XI. COMPUTER NETWORKS IN THE SCHOOLS

The study collected data to determine whether the computing devices used in schools were networked, enabling communication, collaboration, and resource sharing. The responses to the question "Are the computers networked?" are presented in Table 10: Networking of Computers. Table 10: Networking of Computers

Table 10 indicates that 56.8% of the respondents reported having their computers and devices networked, while 29.5% indicated that their computers were not networked. However, these findings do not align with the head teachers' reports from the interviews, nor do they correspond with the absence of computer labs, as indicated in the table. This mixed reaction suggests a varying understanding of what computer networking entails among different personnel in the schools. Some individuals may perceive networking only in terms of physical wiring (cabling), while others may consider it as both physical and wireless connections. It is worth noting that most schools had Wi-Fi and wireless printers, allowing laptops and tablets to connect for printing or resource sharing through the "Share" functionality on the devices. Although this represents a form of networking, it may not be perceived as such by some respondents.

XII. COMPUTERS USE IN SCHOOLS

The study collected and analyzed data on the use of computers in schools, specifically focusing on their use for presentation, simulation, and e-learning purposes. The findings are summarized in Table 11: Use of Computers in Schools.

Table 11: Use of Computers in Schools

		Frequency	Percent (%)
Valid	Presentation	41	49.40
	Simulation	9	10.84
	E-learning	7	8.43
	All the above	24	28.92
Missing	System	2	2.41
Total		83	100.00

Table 11 reveals that 49.40% of teachers use computers for presentation purposes in schools.

Additionally, 10.84% use computers for simulation, and 8.43% utilize them for e-learning. Furthermore, 28.92% of the respondents reported using computers for multiple purposes, including presentation, simulation, and e-learning. However, 2.41% of the respondents were unable to indicate any specific use for computers, possibly due to a lack of knowledge or familiarity with the devices. It is worth noting that some schools may have the devices but have not yet incorporated their use into the educational process. Based on the findings in Table 11, it can be concluded that computers are predominantly used for presentation during the teaching and learning process.

CONCLUSION

In conclusion, this comprehensive analysis of the technological landscape in Kenyan primary schools provides valuable insights into the current state of technology integration in the educational system. While significant progress has been made in terms of computing devices, internet connectivity, and the use of computers for presentations and e-learning, there are still areas that require attention. The availability of computer rooms, funding for internet connections, and the need for further teacher training and support in utilizing technology effectively are areas that should be addressed to ensure a more robust and comprehensive technological infrastructure in Kenyan primary schools. By continually investing in technology and providing ongoing support and training, Kenya can further enhance its primary education system and empower students with the necessary digital skills for success in the modern world.

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