Bridging The Digital Literacy Divide in the Provision of Basic Education among Pastoralist Students: A Study of West Pokot County, Kenya

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Abstract: The paper explores the status of bridging of digital divide in provision of basic education in West Pokot County. The study was conducted in remote areas of Central Pokot and North Pokot Sub Counties. The study uses mixed method research design involving a target of 88 public secondary schools. From this, a sample size of 26 schools was selected from which 1 principal and 2 teachers participated in the study. Data was collected using questionnaire and interview schedule. Analysis of quantitative data has been performed through descriptive statistics with the help of SPSS (version 25.0). Qualitative data was analysed using thematic content analysis. Results show that only 40.0% of teachers possesses higher level digital of skills. Secondly, only 35.0% of schools were found to have adequate digital infrastructure to support integration of technology in teaching and learning in schools. Watching of television channels by students and internet research by teachers was common method of integrating digital skills in teaching. Some of the challenges found were: inadequate digital training to teachers, inadequate ICT resources, outdated ICT resources, poor internet connectivity, lack of electricity among others. Therefore, government needs to provide digital training skills to teachers, ensure there is electricity and fibre optic cable connection in schools and school management to work with stakeholders in acquisition of digital infrastructure resources.

Keywords: *Digital, Divide, Pastoralists, Technology, Basic, Education, Bridging*

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1. Introduction

Education sector is undergoing transformation and improvement in the recent past due to changes in technology revolution (Achieng, Ogola & Muchanje, 2024). The rapid diffusion and development of information communication technology has opened new frontiers to the information world and digital age where time and distance barriers are reduced and the use of digital network and tools connectivity has increased (Zhao, Pinto Llorente & Gomez, 2021). The significance of technological innovation happening across other sectors has seen its adoption in the academic sector (Koc & Demirbilek, 2018). Bilvalova et al. (2020) said that digitalisation of education has resulted to changes in the educational standards, performance, labour market and teachers' role in the educational processes. Therefore, education systems are expected to prepare learners with digital knowledge and skills in order for them to fit in the highly digitised world (Suzer & Koc, 2024).

The digital transformation has brought significant changes in the education sector mostly in curricula development and instructional approaches. In the instructional environment, digitisation offers opportunities for students and educators to fit in the globalised digital age (Demissie,

Labiso & Thuo, 2022). Gioko and Waga (2019) said that digital literacy (DL) is one of the competencies recommended for teachers to be embedded in the Kenyan Competency Based Curriculum (CBC) in preparation for learners for the 21st century skills. For teachers to effectively ensure that digital devices are integrated in teaching and learning process they require training and capacity development. Johnson et al. (2016) said that teachers require access to professional development programmes on technology and if they lack such opportunities, the full benefits of conducting classroom instruction using technologies in classrooms will not be realised. Radhamani and Kalaivani (2023) opined that secondary school teachers need to possess digital competencies to enable them utilise these technologies in their classrooms for effective teaching and learning. The degree to which teachers possess digital competencies is an area this paper focuses on. Suzer et al. (2024) adds that present educators are expected to utilise digital technologies well in their teaching to equip their learners with digital skills and prepare them for challenges that they will encounter in a digitalised world. For the learners to acquire these skills, there is need for usage of these devices in classroom learning; internet, tablets, mobile phones, computers, laptop, software, photocopiers, printers, projectors, scanners, television and radios (Bariu, 2020; Achieng, et al., 2024). These digital devices are expected to be provided in adequate proportions. When these devices are used by teachers in school, it makes learning to be more interesting, active and realistic (Atmojo, Ardiansyah, & Wulandari, 2022). This paper examines the availability, adequacy and usage of digital devices in secondary schools in Kenya with specific reference to pastoral communities.

This study is anchored on the provisions of Sessional Paper No. 1 of 2019 on 'Reforming Education and Training for Sustainable Development in Kenya' which states that ICT can help to transform education and address significant challenges of access, quality, relevance and equity faced by the education system. Achieng, Ogola and Muchanje (2024) said that the sessional paper provide direction on how digital strategies can be applied in infrastructure acquisition, provision of training for teachers, management and security of ICT resources and development of digital content curriculum material for use by students in schools. But research statistics across the country shows there is digital gap with respect to teachers and students' digital competency and skills (Bariu, 2020; Chebet & Kirui, 2021). Johnson et al. (2016) identified three external constraints to bridging the digital divide: access, training, and support with technology. Research by Bariu (2020) found out that use of the ICT infrastructure is almost negligible as evidenced in the fact that almost 95% of schools have not embraced use of ICT in Meru County. In arid and semi-arid areas where pastoral communities live, the digital gap has been a challenge. Research by Chebet

and Kirui (2021) discovered that despite efforts to provide digital resources to schools in Baringo County, lack of technical support and maintenance resulted to underutilisation of available digital technology, leaving teachers poorly equipped to embrace the CBC's digital demands. The challenges associated with bridging digital divide has denied students the opportunity to attain the benefits associated with the use of the digital devices in secondary schools. This calls for research to explore how digital divide problem has been addressed across various contexts and to propose solutions on how to address them.

1.1 Statement of the Problem

The demand for education among children among pastoral communities in Kenya has been on the rise as a result of government, religious groups, non – governmental organisation and community-based initiatives aimed at ensuring education for all objectives have been attained. Digital literacy is an indispensable skill for every child in the modern age. The realization of education for all objectives and sustainable development goals objectives remains a pipe dream for students from arid and semi-arid areas (ASALs). Learners from pastoralists communities encounter significant challenges in accessing basic education because of the nomadic lifestyle of their families. One of the initiatives the government has undertaken is the establishment of boarding primary and secondary schools in arid and semi-arid areas of Kenya. In 2010, the government of Kenya introduced distance learning programmes through having radio and TV lessons to target students in ASALs areas where nomadic pastoralists are based. Later from the year 2015, the government began investing in digital infrastructure and training in schools around the country but the degree to which these initiatives have impacted provision of secondary education in pastoral areas remains researched. Whereas other parts of the country digital penetration are quite high, the situation in pastoral areas in the country appears to be low. Research examining the bridging of the digital divided improvising basic education to children in marginalised semi and arid areas of the country where pastoral communities are found remains inadequate. To bridge this gap, various initiatives have been introduced by the government to bridge the digital divide in the provision of basic education. It is against this backdrop that the paper investigates the status of bridging of digital divide in provision of basic education in West Pokot County.

1.2 Objectives of the Study

The specific objectives of the paper are:
1. To determine secondary school teachers' level of digital competencies,

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2. To establish the status of digital infrastructure in public secondary schools,
3. To examine the methods used to bridge digital divide in provision of secondary education in schools and
4. To find out the challenges influencing bridging of digital divide in the provision of basic education in West Pokot County public secondary schools.

2. Literature Review

Various studies have been conducted across the globe with respect to bridging of digital divide in the elementary and secondary level of education in the areas of teacher training on digital skills, provision of digital infrastructure, methods of delivery curriculum through digital medium and challenges that influences digital divide in the provision of basic education across the world. one research in Central Anatolia of Turkiye by Suzer and Koc (2024) determined teachers' digital competency on the basis of European DigCompEdu framework and its relationships with demographic and teacher characteristics. It was as a cross–sectional survey guided by quantitative research paradigm that sampled 368 (199 males and 169 female) teachers. Findings showed that participating teachers were at the integrator (B1) level of digital competency on average. Those who were male, taught mathematics and science related courses, have postgraduate degree, and worked in metropolitan cities were more digitally competent than their counterparts. However, it was found out that teachers' digital competency is independent of their age and type of school. The gap created by Suzer and Koc was that it compared teachers from rural and urban setting while the present paper focuses on teachers from rural siting in pastoralism area of West Pokot.

Recent research by Kumar and Sharma (2024) in India examined the digital competence in relation to gender, locale and type of institution of 500 teachers in secondary. It was revealed that there existed significant difference in digital competence of male and female teachers in secondary school with male teachers being more digitally competent. Secondly, it was found out that urban teachers had higher digital competence compared to the rural teachers. Lastly, private school teachers had higher digital competence compared to those from public schools. The gap created from Kumar and Shamar research on the comparison of teacher level of competency between private and public schools and those in urban and rural setting. This study sets to examine digital competency of teachers from rural public secondary schools. Radhamani and Kalaivani (2023) investigated the digital competence of secondary teachers. A sample of 155 secondary teachers was selected for the study. Research found out that there was a significant difference in digital competence among secondary teachers based on their age, major subject studied and completion of computer courses, whereas there was no significant difference in digital competence of secondary teachers based on locality. This study will determine whether the demographic characteristics of respondents influenced their digital competency level in West Pokot County. In India, Reang and Mohalik (2023) investigated ICT competency of secondary school teachers. Survey was conducted with a sample of 48 secondary school teachers selected through stratified random sampling technique. It was found out that 47% of the teachers had low competency levels in ICT. Further, there existed no significant difference between male and female, arts and science and urban and urban teachers with reference to ICT competency.

Demissie, Labiso and Thuo (2022) study focused on technology integration in classroom activities. Data was collected from teachers, principals, and pedagogical centre coordinators from secondary schools. Findings indicated a high rating for content, pedagogical, and pedagogical-content knowledge domains. Besides, all six knowledge domains, including technology, content, pedagogy, and their interactions, had a positive and significant relationship with the Technology-Pedagogical-Content Knowledge (TPACK) application. Results revealed that teachers' in-service training, attitude towards technology, technological and content knowledge, technology-pedagogical knowledge, and technological-content domains best predict TPACK application. In Kenya, Gioko and Waga (2019) determined the level and frequency of embedding the digital literacy abilities after the teachers and school leaders in a 3-day preparation and 8 weeks of implementation with virtual support through Communities of learning. A self-administered survey evaluated seven abilities based on the level and frequency of implementation. It was concluded that despite the deployment of devices there is still very low implementation of DL and there is a significant relationship between the level and frequency of implementation. Bariu (2020) ICT investigated state of ICT infrastructure in teaching and learning in Kenyan secondary schools. The study adopted a descriptive survey research design. Questionnaires, interviews and observation schedules were used to collect data from the respondents. The study established that most schools have low investment in ICT infrastructure due to high costs of computer hardware, software and related accessories. The use of ICT infrastructure has necessitated the need for development of new skills and competencies among teachers, school heads and learners.

In Baringo County, Too, Kipkoech and Keter (2024) assessed level of teacher's ICT competency in the implementation of competency-based curriculum in public primary schools. A descriptive research design was adopted that was mixed method approach. The target population

involved 748 head teachers and 6039 teachers in the 748 primary schools. It was revealed that there were significant gaps in teachers' ICT competency in relation to the implementation of the CBC in primary schools. Most teachers reported insufficient training on ICT facilities necessary for CBC, and many lacked the proficiency to use computers effectively for teaching. Despite some positive feedback on training, the overall ability of teachers to integrate ICT into their classroom practices remained limited. Research by Achieng, Ogola and Muchanje (2024) assessed availability of ICT infrastructure in public primary schools in order to develop learners' digital skills in Homa Bay County. Constructivist learning theory guided the study which was embedded with concurrent mixed method. It was found out that majority of public primary schools in Kasipul lack internet connectivity and only 32.1% have computer labs. Also, teachers had basic knowledge and skills in digital literacy. But only 23.2% of teachers have been trained in digital literacy.

3. Methodology

The study was conducted in West Pokot County remote rural areas of Central Pokot and North Pokot (Kacheliba) Sub Counties. A total of 88 schools were targeted. The study uses mixed method research design which combines qualitative and quantitative methods. Considering the target was quite high (88 public secondary schools) which could be impossible to cover with the limited time and resources, a sample size of 26 schools was selected which represented 30.0% as recommended by Kothari (2014) for mixed method research. From each of the 26 schools that formed the sample, 1 principal and 2 teachers were selected to participate in the research. The principals of secondary schools were selected using purposive sampling methods while the teachers were selected using simple random sampling technique. The study collected data through use

of questionnaire for teachers at secondary school and interview schedule for principals. Analysis of quantitative data was performed through use of descriptive statistics with the help of Statistical Product and Service Solutions (SPSS version 25.0) computer software. Qualitative data from interview was analysed using thematic content analysis. The researcher ensured that the principles of confidentiality, privacy, anonymity and permission were followed when conducting the study.

4. Results and Discussion

A total of 20 out of 26 principals participated in the interview while 49 out of 52 teachers responded to the research questionnaires. Therefore, the instrument return rate was 76.9% for principals and 94.2% for teachers. The average response rate for the research instrument was 85.6% which is acceptable in mixed method research.

4.1 Secondary school teachers' level of digital competencies

Digital Competence is the most required skill for the teachers in this digital era (Radhamani & Kalaivani, 2023). The head teachers were asked to comment with respect to their school teachers' level of digital competencies. According to 10 principals, their teachers' level of digital competency was low, 8 said that it was average with only 2 indicating that their teachers' level of digital literacy was high. This finding implies that majority of teachers teaching in secondary schools in ASAL regions of Kenya digital literacy was low. When asked to indicate their level of digital competencies, here is how teachers responded as shown in Figure 1.
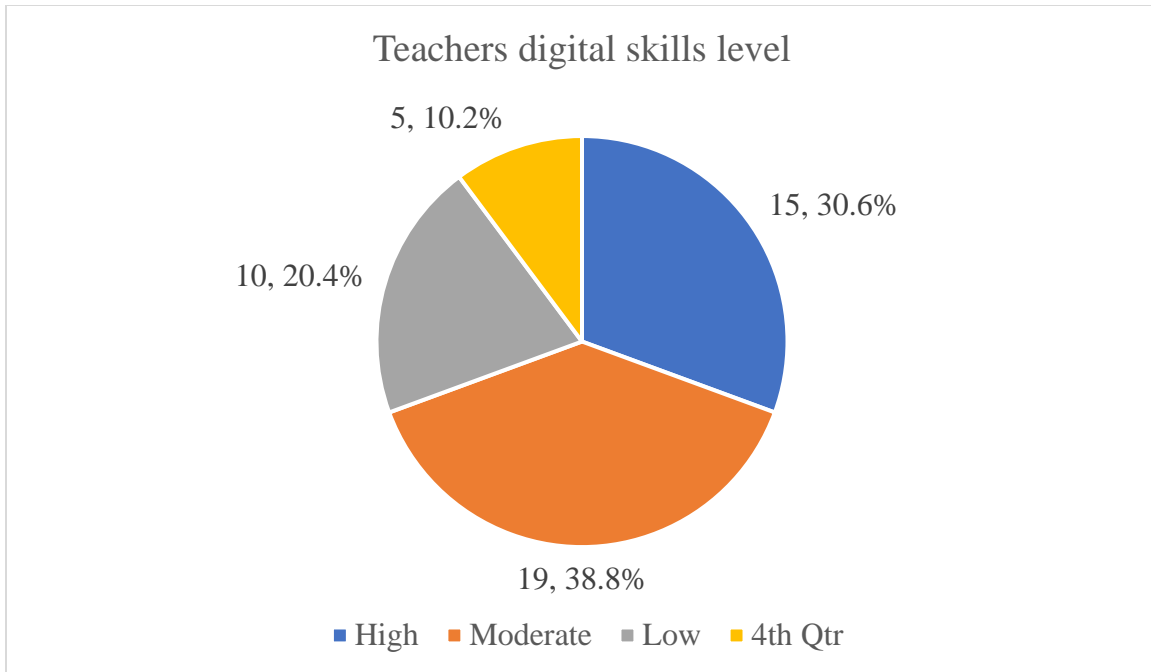
Figure 1: Secondary school teachers' level of digital competency

Results show that most 19 (38.8%) indicated their digital literacy level to be moderate, 15 (30.6%) said that it was high, 10 (20.4%) said it was very low and 5 (10.2%) did not possess digital competency. The above result coincides with what principals indicated that most teachers in public secondary schools in West Pokot Sub County digital skills is on average. This may affect their ability to integrate digital media in their classroom teaching and learning process. Considering most schools were located in rural settings, Suzer and Koc (2024) research found out that teachers from remote areas had lower digital competencies compared to those from urban settings. Reang and Mohalik (2023) also found out that close to half (47.0%) teachers had low competency in ICT in schools. Comparison across gender revealed existence of difference between male and female teachers' digital literacy. Male teachers' digital competency level was found to be high compared to female. The findings differ Reang and Mohalik (2023) who found out that there was no significant difference between male and female teachers' digital competencies level. Additionally, teachers who were aged 45 years and above were found to have less digital competency skills compared to those who were aged 45 years and below. This implied that teachers who appeared to be younger possessed digital skills compared to those who appeared to be older. The findings concur with Radhamani and Kalaivani (2023) who found existence of significant difference on digital competencies of secondary schools' teachers based on their age. From the findings and discussions, it can be said that a significant number of secondary school teachers in pastoralist areas of West Pokot county level of digital skills competency was found to be low. Too *et al.* (2024) found

out that the low level of digital competencies by teachers in Baringo County was due to inadequate training opportunities provided to them to implement CBC.

4.2 Status of Digital Infrastructure in Public Secondary Schools

The second objective of the paper examined the status of digital infrastructure in public secondary schools in selected remote schools in West Pokot County. This was divided into two; supportive infrastructure (facilitating conditions) based on the technology acceptance model and the digital resources and equipment present in schools. With respect to the infrastructure present, the study found out that only 8 out of 20 secondary schools were connected with electricity with the rest depending on solar panels and diesel generators to power the whole schools. Even in those 8 schools that were connected with electricity, the principals and teachers reported that there were regular power interruptions from the utility company which has resulted to some of them to have standby generators. With respect to internet connection, the study established that none of the 20 schools were connected with digital fibre (cable systems). Whereas other parts of the country are enjoying some schools being connected with cable systems, most schools in West Pokot county are not connected with any fibre optic cable network. Most principals reported that they depended on cellular networks (from mobile phone companies) as a source of internet network for their schools. However, there was limited coverage of cellular network in some schools making it

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impossible for them to have adequate network coverage to enable various schools and communication activities to take place. None of the schools reported that they had satellite internet service provider as principals said that the installation of satellite dishes was too expensive for their schools. This means that the poor digital infrastructure condition curtailed the supply of digital resources for use in teaching and learning process in public secondary schools in the area. The findings concur with Achieng et al. (2024) who found out that most public primary schools in Kasipul Sub County, Homabay County lacked internet connectivity. The study also found out that only 3 out of 20 public secondary schools in the area had computer laboratory designed for computer lessons for their students. Some schools set aside some classes that were not appropriately configured to act as temporary computer laboratories. The findings form principals coincide with Bariu (2020) research from Meru that showed that most schools have low investment in ICT infrastructure due to high costs of computer hardware, software and related accessories.

Further, teachers were asked to state whether the following digital infrastructure facilities were present in their schools and whether they were inadequate or adequate. Their responses are provided n Table 1.

Table 1: Adequacy of digital infrastructure facilities in schools

Digital facilities	Adequate Freq	Adequate %	Inadequate Freq	Inadequate %	Unavailable Freq	Unavailable %	Total Freq	Total %
Digital projectors	8	16.3	16	32.7	25	51.0	49	100.0
Computers for students use	12	24.5	28	57.1	9	18.4	49	100.0
Laptops for teachers	8	16.3	12	24.5	29	59.2	49	100.0
Tablets / e-readers for students	6	12.2	8	16.3	35	71.4	49	100.0
Interactive white boards / smart boards	14	28.6	9	18.4	26	53.1	49	100.0
CDs/DVDs	15	30.6	16	32.7	18	36.7	49	100.0
Radios	7	14.3	9	18.4	33	67.3	49	100.0
Televisions	10	20.4	25	51.0	14	28.6	49	100.0
Memory sticks & other storage devices	9	18.4	26	53.1	14	28.6	49	100.0
Application software	12	24.5	24	49.0	13	26.5	49	100.0
UPS / Battery back ups	4	8.2	15	30.6	30	61.2	49	100.0
Printers/Photocopies/Scanners	16	32.7	22	44.9	11	22.4	49	100.0

Result shows that majority of secondary schools in the area do not have digital resources required for digital learning in schools. For instance, research shows that 59.2% of schools did not have laptops, 71.4% did not have tablets (e – readers), 67.3% did not have radios and 61.2% of teachers said that they did not have a UPS back up system for power in their schools. From the results it can be said that majority of secondary schools in West Pokot County did not have adequate digital facilities to enable integration of them in teaching and learning process. This finding agrees with Too et al. (2024) who said that inadequate ICT facilities affected the implementation of CBC in Baringo county schools. One of the reasons mentioned by the head teachers interviewed was lack of adequate finances, electricity, network and technical support for teachers to enable their supply, integration and maintenance in their schools.

4.3 Methods used to bridge digital divided in provision of secondary education in schools

Despite results showing that most schools had inadequate digital resources for learning, the researcher asked principals and teachers to indicate what they were doing to bridge the digital divide in the provision of secondary education curriculum in public secondary schools in West Pokot County. Considering radio lessons have been programmed for primary schools unlike secondary schools, the principals said that students in their schools watched TV lessons (through EduTV) which is provided through KBC TV. For schools with computer laboratory, the principals said that students at least once a week undertook computer lessons in the laboratory. Owing to the irregular power supply, some teachers conducted their lessons using conventional methods despite having the capacity of utilising digital media resources for teaching. On their part, the teachers were asked to indicate the frequency to which they were conducting their lessons using the digital platforms and the results are provided in Table 2.

Table 2: Methods used to bridge digital divide in secondary school's lesson delivery

integrating technology in teaching	Regular		Sometimes		Never		Total	
	Freq	%	Freq	%	Freq	%	Freq	%
Learning through the internet (google classrooms)	6	12.2	14	28.6	29	59.2	49	100.0
Use of PowerPoint and slideshows in lesson presentation	14	28.6	18	36.7	17	34.7	49	100.0
Learning through the TV (viewing)	17	34.7	22	44.9	10	20.4	49	100.0
Listening and viewing audio-visual recording lessons	12	24.5	17	34.7	20	40.8	49	100.0
Accessing educational materials online	26	53.1	15	30.6	8	16.3	49	100.0
Posting assignments, homework, quizzes online	5	10.2	6	12.2	38	77.6	49	100.0
Conducting online lessons and meetings (WhatsApp, Microsoft Teams, Google Meet & Zoom)	10	20.4	14	28.6	25	51.0	49	100.0
Using email, messenger and video calls for communication	16	32.7	15	30.6	18	36.7	49	100.0
Use of various software and tools for lesson and notes preparation	15	30.6	18	36.7	16	32.7	49	100.0

Result shows that teachers rarely integrated digital technology in undertaking their instructional tasks. Out of the 9 areas of integrating digital media in their instructional process, 53.1% of teachers said that they regularly accessed educational materials online. This was high because most teachers have smart phones which makes it easier for them to check, search and download educational materials online from their comfort of their locations. The second area where digitisation occurred although on rare occasion was learning through the TV lessons. The results also show that due to inadequate technology infrastructure in schools, most teachers could not prepare their lessons through use of various applications or project their lesson presentation through PowerPoint slideshows. From the above results, it can be seen that digital technology was rarely integrated in teaching and learning activities in public secondary schools in West Pokot county.

4.4 Challenges Influencing Bridging of Digital Divide in The Provision of Basic Education

The fourth objective of the paper examined challenges that affected bridging of digital divide in provision of secondary education curriculum among pastoral communities in Kenya with specific reference to west Pokot county. Qualitative results outcome showed that most teachers and principals agreed that the remoteness of their schools made it impossible for infrastructure facilities (internet cables, communication network and electricity) to be set up. Lack of investment for the technological infrastructure by government and school management was found to be a challenge that influenced bridging of digital divide in

public secondary schools in West Pokot county. Another challenge that emerges was due to the schools' financial challenge which made it impossible for them to set up computer libraries, purchase digital devices, install power backup systems and satellite internet dish and sponsor their teachers for digital training. Because many students come from poor background most of them are sponsored by government, well-wishers and charitable organisations and therefore the capacity of their parents to support schools in setting up digital infrastructure projects becomes impossible. Teachers lack technological skills was also a challenge that influenced bridging of digital divide in public secondary schools in West Pokot County. This finding was supported by Too et al. (2024) findings that showed that many teachers lacked proficiency to use computers effectively for teaching.

5. Conclusion and Recommendations

5.1 Conclusion

The study investigates bridging digital literacy divide through provision of basic education among pastoralist students in West Pokot Sub County secondary schools. Considering the nomadic lifestyle of households in the area, the study has found out that government initiatives towards providing blended learning approaches through integration of digital instructional media has not been undertaken as envisaged through provisions of sessional paper No. 1 of 2019 and Kenya's ICT policy. The policies of government through the Ministry of Education in ensuring that all children across Kenyan schools irrespective of their location benefit from digital education programmes seems far to be realised in West Pokot county

as most schools are not connected to electricity, they do not have computer labs, they are not connected with fibre optic cables or even served with 4G or 5G internet coverage. Additionally, whereas the ministry of education was expected to provide digital training for teachers, more than half were found to have inadequate digital competencies. This means that teachers' capacity to implement digital learning in their classrooms was hampered by their low level of technological skills. The paper has also established that schools did not have adequate digital infrastructure resources like; computers, projectors, interactive whiteboards/smartboards, laptops, tablets among others to enable digital learning in classrooms. Only TVs were found to be regularly utilised in the study. Teachers accessed online materials through their phone as opposed to laptops or computers from their schools and most teachers could not undertake blended teaching mode in their curriculum activities.

5.2 Recommendations

1. The study recommends that government and schools should support teachers training on digital skills.
2. The government should increase capitation funds to enable schools purchase required digital infrastructure resources to enable bride digital gap in provision of secondary education curriculum in secondary schools located in pastoral areas of Kenya.
3. The government through Ministry of ICT should also ensure that all schools around the country are connected to the internet (through fibre optic or even satellite) to enable students from those places enjoy similar privileges being enjoyed by those in other parts of the country.
4. School board of management should partner with non-governmental organisation in provision of digital infrastructure facilities and training o teachers.

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