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CHALLENGES AND OPPORTUNITIES IN THE USE OF MOBILE DEVICES FOR TEACHING AND LEARNING IN PRIMARY SCHOOLS IN MARANI SUB-COUNTY, KENYA

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ABSTRACT

The government is encouraging the integration of information and communication technology (ICT) in teaching and learning. The most accessible ICT devices are mobile devices such as tablets, smartphones, laptops, and mobile phones. These devices have achieved tremendous popularity in recent years because of their portability, versatility, multi-functionality, adaptability, and ability to customize individual experiences. The requirements of the Competency-Based Curriculum (CBC) are that learners should be meaningfully exposed to digital devices such as mobile phones, smartphones, iPads, tablets, laptops, and desktop computers, so as to acquire digital literacy. This would enhance learners' acquisition of knowledge, skills, and positive attitudes in Marani sub-county where primary schools perform poorly in the Kenya Certificate of Primary Education (KCPE). The purpose of this study was to explore perspectives, challenges, and opportunities in the use of mobile devices for teaching and learning in primary schools in Marani sub-county, Kenya. The specific objectives of the study were: to find out the challenges and opportunities encountered in the use of mobile devices for the teaching and learning process. The study was guided by systems theory. The target population was 88 head teachers, 88 chairpersons of parents' associations, 234 teachers, 4224 class seven pupils, and a sub-county director of education. The sample consisted of 27 head teachers, 27 chairpersons of PA, 71 teachers, 1268 class seven pupils, and a sub--county director of education. The study employed stratified sampling, simple random sampling, saturated sampling, and purposive sampling techniques. Data were collected using questionnaires, interview schedules, and observation schedules. The research instruments were assessed for validity by the researcher's peers and supervisors. The reliability of questionnaires was ascertained by Cronbach alpha. The reliability coefficient of the teachers' questionnaire was .73 and that for the students' questionnaire was 0.8. Statistical Package for Social Sciences (SPSS) version 27 aided in data analysis. The data were analysed using descriptive statistics such as frequencies and percentages and means and presented in the form of tables. The study revealed that teachers had positive perspectives on the effects of mobile devices on primary school pupils' academic performance. The study found out that, the challenges encountered in relation to the use of mobile devices were: inadequate mobile devices, unreliable power supply, lack of the necessary ICT skills, and lack of internet connection. On the other hand, the opportunities that accompany mobile device use in teaching and learning were that learners and teachers get exposure to more information and current trends in academics. In addition, learning can take place anytime and from anywhere; makes learning interesting and connecting learners with teachers and other learners, which promotes faster content coverage. The study recommended that, the Ministry of Education should develop clear guidelines on the use of mobile devices in teaching and learning. The government should also facilitate teachers by providing grants and cheap loans for the acquisition and use of mobile devices, regularly review the acquisition and in-service programmes by intensifying the integration of technology with a view of improving the trainees' skills and attitude on the use of ICT.

Key words: *Challenges and Opportunities, Mobile Devices, Teaching and Learning, Primary Schools*

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INTRODUCTION

Globalization has changed our lives from the era of communicating with pen and paper, which took more time before information could get to the destination. One of the ways in which globalization has changed our lives is how we communicate efficiently and effectively through advancements in Information and Communication Technologies (ICTs). On this note, technology is evolving to be a societal basic need and right (Balfagih & Sciences, 2017). Technology has permeated into many areas of our lives, making information more accessible, improving communication, changing transportation, and others (Fakokunde, 2017).

Mobile devices are the most accessible information and communication technology devices. Based on this evidence, there is considerable interest in utilizing these technologies to increase access to education (Balfagih & Sciences, 2017). This is because mobile learning that utilizes mobile devices is one of the approaches that provide great promise to increase access to education within developing countries (Kaliisa & Picard, 2017).

Mobile devices are portable electronic equipment that can connect to the internet (UNESCO, 2012). Examples are tablets, laptops, mobile phones, and smartphones. In addition to being a type of educational technology, mobile devices have an impact on students' social and psychological habits. With the ability to engage students in both physical and virtual learning experiences, mobile devices appear to have the potential to resolve the differences between classroom settings and computer laboratories (Kızılkaya & Ph, 2015).

In Europe, mobile phones were initially restricted for students to use in school campuses as there was a high worry that students would involve in criminal activities such as connection with other learners and gangs. Later, many schools surrendered to the pressure from parents for allowing their children to use cell phones in schools for the parents to easily contact them (Fernandez, 2018). Indeed, in the United Kingdom, at the time of joining secondary schools, 91 percent of 12-yearyear-old students have mobile phones, which allow users to read PDF files, spreadsheets, and word-processed files (Kihwele & Ed, 2013).

In Pakistan, educators and learners utilize mobile phones to exchange knowledge and refer to dictionaries and thesauruses for academic purposes (Fernandez, 2018). Stakeholders in Malaysian education perceive a chance for mobile phones to be used as a teaching and learning tool in secondary schools. The study also found that 95% of Japanese people between the ages of 15 and 24 own web-enabled smartphones, which they use to read news, send and receive emails, connect with friends, and access educational resources (Kihwele & Ed, 2013).

The ban on mobile phones in class is to be revisited due to COVID-19 and the Competency Based Curriculum (CBC). The schools ue to the COVID-19 pandemic rendered e-learning the only way to cover the syllabus. This is because, as mobile devices are the most accessible ICT devices, learners could use them to access educational materials. Moreover, one of the 21st century skills, which is the sixth core competence in the Competency Based Curriculum (CBC) that is currently implemented up to Grade 7, is digital literacy (Republic of Kenya, 2017).

This implies that learners need to be meaningfully exposed to digital devices. According to the Republic of Kenya (2017), digital literacy focuses mainly on network-enabled devices and should not be confused with computer literacy skills. Examples of network-enabled digital devices include mobile phones, smartphones, iPads, tablets, laptops, desktops, and others (Republic of Kenya, 2017; Kenya Private Schools Association, 2018). In the Competency-Based Curriculum (CBC), ICT is to be integrated into all learning areas, which would increase access to information and knowledge. By increasing access to information and knowledge, ICT would help reduce inequality among learners as envisaged in Sustainable Development Goal (SDG) 10 which aims at reducing inequality within and among countries. This would facilitate social and economic progress, even for the disadvantaged segments of society (United Nations, 2023). Hence, use of the digital devices was a daily routine for the learners in the CBC curriculum (Kenya Private Schools Association, 2018).

However, although the use of technology among learners promotes the positive development of core competencies, there is inadequacy of digital resources in basic education institutions (Government of Kenya,

2023). The digital literacy may be hampered if the mobile devices such as mobile phones, which are the most accessible digital devises, are banned from schools. According to the new curriculum, students who have digital literacy are innovative; creative; communicative; problem solvers and analytical.

Mobile devices, which are now widely available in the country, have the potential to radically alter secondary school dynamics. A one-of-a-kind educational experience is feasible, as suggested by international researchers, as a result of mobile learning technology, particularly cell phones, which, with time, may become more accessible and inexpensive to more Kenyan students.

Indeed, the Covid-19 pandemic left most countries grappling with problems in their education. The disease forced some countries to close their learning institutions. Some learners who had access to the relevant ICT terminals would learn from their homes. Some of the terminals that can be used in educating learners remotely are mobile devices. Some of the mobile devices can act as radio broadcasting or TV terminals. This implies that mobile devices can enable learners to access learning materials from a variety of libraries or benefit from the best quality teachers. Despite their potential benefits, certain mobile devices seem to cause disruptions in schools due to inappropriate usage and inadequate supervision. The majority of schools in several countries, including Kenya, forbid students from using cell phones in class. Certain schools have tight standards outlined in their rules and regulations that forbid pupils from using cell phones. The goal of the cell phone ban in schools is to enhance student conduct (Beland & Murphy, 2015).

Statement of the Problem

In the recent past, there has been a decline in the academic performance of students in primary schools in Marani Sub-county. The trend is a concern for various educational stakeholders. The government has tried to address the poor performance by providing grants to needy learners, employing more teachers, providing teaching and learning resources to schools, in-service training of teachers, but poor performance persists. The government encourages the integration of ICT in teaching and learning, which could improve the acquisition of knowledge, skills, and attitudes by making learners innovative, creative, communicative, problem solvers, and analytical. The most accessible ICT devices for primary school students are mobile devices such as laptops, tablets, smartphones, and mobile phones. Moreover, the CBC curriculum is encouraging the adoption of digital devices such as mobile phones, smartphones, iPads, tablets, laptops, desktops, etc. in the curriculum, and parents are encouraged to guide learners on its positive usage since its use in teaching and learning is a daily routine. In addition, due to the disruption of learning in most schools across the world because of the COVID-19 pandemic, education has changed dramatically, with the distinct rise of e-learning. Furthermore, the fact that the government encouraged e-learning during the schools' closure and the fact that the CBC curriculum encourages the use of ICT devices, including mobile devices, implies that we should embrace mobile devices in teaching and learning.

Purpose of the study

- To find out the challenges and opportunities in the use of mobile devices for teaching and learning in primary schools in Marani sub-county, Kenya.

Research Questions

- What are the challenges and opportunities encountered in the use of mobile devices for teaching and learning in primary schools in Marani Sub-county, Kenya?

Scope of the Study

The study was carried out in the primary schools of Marani Sub-county, Kisii County, Kenya. It has two divisions: Marani and Sensi. It borders Nyamira, Kisii South, and Kisii Central Sub-Counties. The economic activity in this Sub-County is mixed farming. The education level seems to be low compared to other Sub-Counties because the sub-county has the lowest average mean score in KCPE compared to the other sub-counties in Kisii County. Primary schools were considered for this study because they are currently

implementing CBC, under which digital literacy is emphasized. Teachers were also part of this study since they teach and interact with these pupils under study and therefore are likely to be in a position to tell how the mobile devices would affect teaching and learning. Principals, who are also teachers, were involved in curriculum monitoring and supervise the implementation of the curriculum and therefore be in a position to understand how the introduction of mobile devices to primary school pupils could affect their academic performance.

Theoretical Framework

This study was informed by the Systems Theory developed by Ludwig Von in 1968 (Chikere & Nwoka, 2014) which postulates that an organized enterprise does not exist in isolation; it is dependent on its environment in which it is established. They add that the inputs from the environment are received by the organization, which then transforms them into output after processing such inputs.

The students, who are the inputs, are admitted into the school system. Mobile devices are some of the subsystems within the school system that would affect the processing of the input and hence this is likely to affect the output. The effectiveness of the processing is measured through the output, which is measured in terms of their academic performance.

There are debates in many countries as to how schools should address the issue of mobile devices. Some advocate for a complete ban on some of the mobile devices while others advocate for the use of the mobile devices as a teaching tool in classrooms. This debate has most recently been seen with the Mayor of New York removing a ten-year ban on mobile phones in school premises in March 2015, stating that abolition has the potential to reduce inequality (Beland & Murphy, 2015). Moreover, although Kenya has banned students from using mobile phones in schools, the same government advocates ICT integration in teaching and learning. Despite the extensive use of mobile phones by New York students and the heated debate over how to treat them, the impact of mobile devices on primary school student performance has not yet been academically studied. Mobile devices are used in many systems in the world. Within the education system, there is still some skepticism about whether or not some of the mobile devices would interfere with learning.

However, (Alice, 2012) argues that the availability of mobile devices does not guarantee the realization of stated learning outcomes. The devices should be presented in an orderly manner at an appropriate time and in a conducive environment. Without doing so, poses a lot of challenges to both teachers and learners, that this study sought to investigate which mobile devices were used, how they are used, and their benefits to the education of the child, and the challenges and opportunities, and thus make recommendations on how to overcome the challenges.

Conceptual Framework

A conceptual framework is a group of concepts that are broadly defined and systematically organized to provide a focus, a rationale, and a tool for integration and interpretation of information (Twum, 2014). It is usually expressed abstractly through word models and is a basis for many theories. According to (Twum, 2014), a concept is an abstract or general idea inferred or derived from specific instances. According to Sommet & Elliot (2017) a conceptual framework is a collection of overarching concepts and principles drawn from pertinent academic disciplines and utilized to organize a presentation. It is a research tool used to help a researcher get insight into the subject of their examination. In this study, the dependent variable was the perspective of teachers, parents, challenges, and opportunities related to the use of mobile devices by primary school students on their academic performance, while the independent variable was the use of mobile devices in teaching and learning on academic performance in primary school students.

The extraneous variable in this study was school category. This extraneous variable was controlled by stratified sampling of schools. The schools were stratified into private and public. The conceptual framework, which illustrates the interaction of variables, is presented in Figure 1 below.

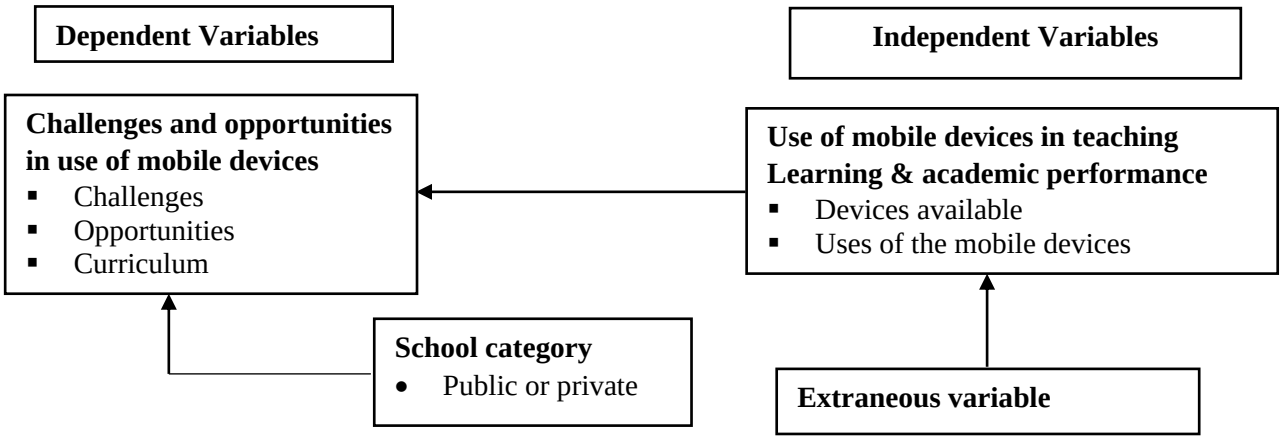

Figure 1: Conceptual Framework Source: Researcher (2022)

Empirical Review

Challenges and opportunities encountered in the use of mobile devices for the teaching and learning in primary schools

ICTs are thought to enhance the capabilities of teachers and learners by enabling communication and interaction, providing novel methods of instruction, and fundamentally changing the processes of teaching and learning. Among the various types of information and communication technologies (ICTs), mobile devices are considered to be highly appropriate instruments for promoting education in underdeveloped areas due to several compelling factors. Mobile devices are the dominant form of information and communication technology (ICT) in developing countries, and their usage is increasing rapidly. Mobile penetration in Asia experienced a rapid increase, with the average penetration rate rising from 19.7 per 100 inhabitants in 2001 to 40.9 in 2005 (Andrew, 2020). Additionally, it is noteworthy that mobile device ownership is becoming increasingly prevalent among individuals belonging to the lower socio-economic category of society (Andrew, 2020). Furthermore, mobile devices possess a distinct advantage as 'leapfroggers' due to their utilization of the radio spectrum. Furthermore, this implies a reduced requirement for additional physical infrastructure, such as roads and phone wires. Additionally, base-stations can be powered by generators in areas lacking an electrical grid (Twum, 2014). Furthermore, apart from facilitating voice communication, mobile phones enable the transmission of data, which can be very advantageous for disseminating instructional material across vast distances.

As per the study conducted by Balfagih and Sciences (2017) , mobile devices provide various advantages that can assist in academic learning. These include the flexibility to learn from any location and at any time, the capability to access educational resources, and fast internet connectivity. They argue that these technologies also provide teachers the opportunity to enhance their own knowledge and education. Mobile devices are highly beneficial in educational settings for taking notes and utilizing instant messaging software to facilitate engagement in campus activities such as group work and discussions. Academic blogs and online websites can effectively encourage students to utilize their own unique thoughts, ideas, and abilities, and then engage in online discussions with other students to share their understandings. Hence, the influence that these technologies can exert on the educational achievements of students is significant. Additionally, mobile devices have the potential to enhance accessibility for students hailing from economically disadvantaged neighborhoods and those residing in developing nations. Portable devices have the ability to offer educational materials to promote and enhance equal access to digital resources, reaching and motivating underserved people. Mobile learning facilitates learning in authentic settings by enabling students to get and analyze information beyond the confines of the classroom (Shuler & Ed, 2009). Users possess the capacity to consistently and spontaneously access and engage with various contexts (Biloš et al., 2017).

The portability of mobile devices offers numerous widespread possibilities for teaching and learning that extend beyond the limitations of the classroom (Aker & Ksoll, 2016). In 2009, the Joan Ganz Cooney Centre at Sesame Workshop conducted a report to demonstrate the usage and impact of mobile technologies such as cell phones, iPod® devices, and portable gaming platforms. It can be utilized for educational purposes (Shuler & Ed, 2009). The paper emphasized that one of the main advantages of mobile technologies for learning is their ability to provide learning opportunities anywhere and at any time. Students studying languages at the Brearly School in New York City utilized the iPod® to listen to a diverse range of materials obtained via the school's internal server (Gatotoh, 2017). According to McQuillan, the iPod® is portable, which enables users to listen to it at their convenience, whether it be at home or on the bus to school. Participants have the opportunity to engage in the educational program at their own discretion Ngesi et al. (2018) agree and assert that mobile devices provide users with ownership and authority over the content, timing, and location of their learning.

In 2007, a cohort of 10 students at a university in New Zealand utilized iPods® to facilitate the completion of their Māori language coursework. These students were engaged in remote learning, which allowed them to avoid the requirement of attending frequent in-person classes with the facilitators. The program aimed to enhance students' oral communication skills by providing opportunities to practice situational and functional Māori language skills. Prior to the introduction of iPods®, students were required to listen to and record their comments on audiotapes in the language laboratories of the university, and subsequently submit the completed assessments to their teachers. Students participating in the experiment who had access to computers and the Internet opted to utilize mobile iPod® technology instead. The course content and language tools were transferred to iPods® with video capabilities, allowing students to access them outside of the university campus language laboratory (Kimoni, 2012). As a result, the inconveniences and shortcomings of cassette tapes and associated progressively insensitive and unreliable recording and playback devices were eliminated (Kimoni, 2012).

Mobile technologies facilitate users' access to resources stored on or accessed via the device, thereby integrating in-class and out-of-class learning (Pignato, 2010). Therefore, individuals have the capacity to effectively employ their free time or periods of waiting, such as when waiting for public transportation or during travel (McKenzie, 2014).

An additional benefit of ICT-based learning is the ability to learn at an individual's preferred speed (Kimoni, 2012). According to (Mfaume, 2019) and (Kimoni, 2012), ICT tools enable users to access genuine language resources, such as emails to language experts, and engage in online chats with e-pals. Students are afforded the opportunity to privately hone their speaking abilities in a manner that is not feasible inside a conventional classroom setting. ICT tools can facilitate instructors' access to networking and idea-sharing with colleagues during PLD training sessions.

On the other hand, the literature examined for this review consistently highlights the issue of limited availability of ICT tools, professional growth, and continuous training (Aker *et al*., 2016); (Kimoni, 2012); (Rabiu *et al*., 2016). The study conducted by Rabiu *et al.* (2016) examined the variables influencing the utilization of information and communication technology (ICT) and the teachers' opinions of their proficiency in using ICT among ESL instructors in Malaysia. The consensus among instructors regarding obstacles related to access encompassed substandard or obsolete gear (such as printers and computers), limited availability of computer laboratories, and insufficient time and chances to acquire computer skills and ICT-focused teaching methods.

In spite of a substantial allocation of personnel and money, there were additional obstacles to the utilization of the iPods®. Managing content storage, access, sharing, and distribution posed significant issues due to the presence of multiple systems. There was a lack of established mechanisms for procuring audio content in large quantities for educational purposes. Additionally, the gadget had certain limitations. For instance,

content could only be loaded through synchronization, and the recordings made on the iPod® were inadequate for certain academic environments in terms of quality. Another obstacle identified was the limited proficiency of certain faculty members and students in effectively utilizing the iPod® features and applications for academic purposes (Herrington, 2007). The author further concurs that insufficient technical support for users and difficulties in network connectivity are technology-related challenges. Daly, McKenzie and Tabitha (2014) conducted research that confirms the difficulties faced by teachers in England due to the limited availability of flexible ICT in classrooms. This lack of access was found to have significant negative impacts on teachers' engagement in continuing professional development for ICT in Key Stages 1-4 of the National Curriculum. The teachers also noted issues related to insufficient time for acquiring new technical skills and consolidating information to properly utilize technology in the classroom. The researchers observed that teachers required more time to thoroughly investigate the technology after the training sessions. Another requirement was the opportunity to engage in discussions with peers regarding practice, as well as the availability of time to devise innovative teaching and learning methods. Nevertheless, several schools incorporated dedicated time for contemplation during staff meetings, during which an information and communication technology (ICT) session was consistently included, resulting in a beneficial effect on teachers.

The necessity for ICT training, properly maintained hardware and software, and affordable ICT access was also highlighted by Rosenberg (2018) and Mfaume (2019). These factors may hinder the establishment or expansion of current disadvantages for certain persons who are learning English as a second language (ESOL). Webb conducted a study that examined the impact of various environments in Australia and different forms of tutoring on learners' experiences and views of the educational effectiveness of CD-ROMs (information and communication technology-based learning) for English language acquisition. Webb also noted a challenge regarding the necessity of incorporating elements in the CD-ROM software that would promote self-monitoring and allow learners to concentrate on learning objectives that align with their individual interests and needs.

Students are adversely affected by the absence of access to ICT tools. Mfaume (2019) and Aker and Ksoll, (2016) found that students' insufficient proficiency in computer skills hindered their utilization of ICT technologies. The use of personal multimedia players, cell phones, and handheld gadgets (mobile-assisted language learning) into the foreign language classroom is increasingly prevalent in numerous secondary and higher education institutions (Aker et *al*, 2016; Ali, 2018). Aker *et al*., (2016) Undertook a small-scale investigation including eight foreign language classrooms at Old Dominion University in Virginia. The purpose was to assess the educational advantages of incorporating podcasts into the curriculum vs using them as an additional or revision tool. Several students participating in the study perceived the absence of in-class instruction on subscribing, downloading, and saving podcasts as an obstacle to utilizing the podcasts. Additionally, students expressed skepticism regarding the usefulness of the podcasts for their learning or cited time constraints as a reason for not downloading them. If students had received in-class instruction on subscribing, downloading, and saving the podcasts at the start and during their course, it is likely that these obstacles could have been solved. Aker *et. al.* (2016) revealed that mobile-assisted language learning is revolutionizing the methods of teaching foreign languages and transforming students' study habits. Furthermore, the researchers perceived a shift in instructors' approach to teaching and utilization of classroom time due to the integration of these mobile devices. The study offers preliminary evidence that podcast technology has the potential to yield additional advantages when utilized beyond its mere function as a reviewing tool. Nevertheless, the researchers emphasized the necessity for more meticulously constructed studies that regulate how instructors utilize the technology. These studies are required to ascertain the significance of the differential impacts and to pinpoint the instructional application that yields the greatest learning improvements.

Morara (2020) proposes conducting additional study on barriers to ICT, specifically focusing on sector-specific and subject-specific obstacles. Efforts should be focused on certain areas of education that require enhancement in the utilization of ICT. Jones recommends investigating the obstacles and facilitators that are unique to each technology, such as the iPod®, in order to enhance their utilization in the classroom. This would be beneficial for the current study on the difficulties and advantages of mobile devices in achieving proficiency in the Māori language.

The teachers in the United Kingdom noted that the mobile device's size, rapid start-up, and battery life are distinct aspects that can potentially provide advantages. A experiment was conducted between 2002 and 2003 in England, involving around 150 teachers from 30 schools, to assess the effectiveness of using gadgets, mostly PDAs, to enhance teaching and learning (Herrington, 2007). The users highlighted the device's cost-effectiveness compared to laptop computers, as well as its suitability for outdoor use, as further advantages. According to Shuler and Ed (2009), mobile devices can effectively address the difficulties commonly associated with larger technology, as they seamlessly integrate into different learning situations.

However, according to Herrington and Herrington (2007) , the mobile device's screen size was considered a drawback by certain users, as well as its lack of durability for educational institutions. Inadequately designed mobile technologies have a detrimental impact on usability and can divert children's attention away from their learning objectives (Shuler & Ed ,2009). They also pointed out that the small screen size, restricted text entry, and limited battery life were physical factors that could hinder an optimum learning experience.

The national report of the United Republic of Tanzania on the Development of Education (2008) states, “the ICT policy aims to empower learners, teachers, education managers, and leaders to use ICT judiciously and effectively for expanding learning opportunities and ensuring educational quality and relevance”. The effective use of ICT offers more opportunities for learning new knowledge through interaction, sharing knowledge, and information with others.

Kenya Secondary Schools Heads Association chairman Indimuli Kahi argues that schools are still grappling with the challenge of students sneaking phones into schools. “Going forward, there is a need to relook at the issue and make sure students can be allowed to use phones in school again, however, with some restrictions. Kahi also proposes that phones be registered, fitted with trackers that can be monitored, and be used only during a specific time."

METHODOLOGY

Research Design: This study used a mixed methods approach. A mixed methods approach involves the use of both qualitative and quantitative research methodologies According to (Beckman, 2016), mixed methods, the researcher collects and analyses data, integrates findings, and draws inferences using both quantitative and qualitative methods in a single study. Mixed methods were used because a qualitative or quantitative approach alone is not effective in studies that investigate social phenomena. Table 1 shows the major designs for mixed methods research as classified by Creswell (2009).

Table 1: The Major Designs for Mixed Methods Research

Design type	Timing	Mixing	Notation
Triangulation	Concurrent: qualitative and quantitativeat the same time),	Merge the data during interpretation or analysis,	QUAN + QUAL,
Embedded	Concurrent or sequential	Embed one type within a larger design using the other type of data,	QUAN(qual) or QUAL (quan).
Explanatory	Sequential: quantitative followed by qualitative	Connect the data, and at the two phases	QUAN→ qual
Exploratory	Sequential: Qualitative followed by quantitative	Connect the data between the two phases	QUAL→ quan

Source (Creswell, 2009)

This study adopted the Concurrent Triangulation Research design. Concurrent design, which involves collecting both qualitative data concurrently and then comparing the two databases to determine if there is convergence or difference. This 2009). It is important because it takes the shortest time possible since both quantitative and qualitative data are collected at the two phases.

Location of the Study: The study was carried out in Marani Sub-county. The sub-county has eighty-eight (88) primary schools and experiences precipitation consistently throughout the year. It has rich volcanic soils which make it have high agricultural potential. It is one of the sub-counties in Kenya that has a very high population density (Kenya National Bureau of Statistics (KNBS), 2019). In terms of communication, the location can be easily reached via the Nairobi-Kisii-Kisumu-Malaba route and has access to the Suneka airstrip and Lake Victoria. The researcher chose the sub-county because it is one of the sub-counties that perform poorly in Kenya Certificate of Primary Education and lags behind in adopting technology in relation to Kisii County ranking of Sub-Counties (County Education Officer, Kisii County, 2022).

In addition, due to the researcher's familiarity with the region, this would enhance better management of the study and adopting Alice (2012)'s argument that factors such as familiarity with an area, time limitations, and money would influence the researcher's choice of a locale.

Target Population: The target population is the group of individuals that the researcher intends to conduct research in and draw conclusions from (Gall, Borg & Gall, 2007). The target population was 4635 individuals comprising 88 headteachers, 88 chairpersons of parents' associations, 234 teachers, 4224 class seven pupils, and a sub-county director of education.

Sampling Techniques: Sampling is the process of selecting a few cases to provide information that can be used to make judgments about a much larger number of cases (Kathuri and Pals, 1993; Beckman, 2016). As it may be impossible to study the entire population because of limited funding and time, it is necessary to study a sample of the population as an alternative to formulate predictions about the entire population. A sampling procedure is a definite plan for obtaining a sample from a given population.

Stratified and proportionate random sampling techniques were used to select schools. The researcher stratified schools into two groups which is public and private schools. Then the researcher proportionately sampled schools from the public (84) schools and private (4) schools using simple random sampling of each stratum. This was based on the fact that every member school of either public or private schools has a known and equal chance of being selected. After identifying the number of schools to be sampled, they were randomly selected. The sampled schools were investigated to explore the use of mobile devices. The sampled schools also provide a sample of 27 head teachers and 27 chairpersons of PA for this study. From the sample schools, 71 teachers and 1268 grade seven pupils were selected by proportionate random sampling. Each stratum had the same sampling fraction, which was 30% of the target population. According to Mugenda and Mugenda (2003), a sample size of 10-50% is acceptable. From the 27 schools, simple random sampling was used to select 10 schools that provide the classes whose lessons were observed, so as to explore the use of mobile devices during the lessons. In the school where lessons were observed, the class whose lessons were observed was selected by simple random sampling from classes between grades one to six. Although some experts recommend a minimum of 10% sample size, slightly higher sample figures were used to minimize errors related to sample size.

Sample Size: A sample is the number of individuals from a population who provide data that can be generalized to the entire population (Kathuri & Pals, 1993). Table 2 shows the target population, sample size, and sample size percentage of the population.

Table 2: Target Population and Sample Size

Subjects	Target Population	Sample Size	Percentage
Public schools	84	26	30%
Private schools 4	4	1	30%
Head teachers	88	27	30 %
Chairpersons of PA	88	27	30%
Teachers	234	71	30%
Grade seven pupils	4224	1268	30%
A sub-county director of educ.	1	1	100%

The County Education Officer of Kisii County (2022)

Target population was 88 head teachers, 88 chairpersons of parents' associations, 234 teachers, 4224 grade seven pupils and a sub-county director of education. The sample constituted 27 schools, 27 head teachers, 27 chairpersons of PA, 71 teachers, 1268 grade seven pupils, and a sub- county director of education.

The researcher assigned random sequential numbers to each of the public and private schools in the population, which would act as ID numbers – e.g. 1, 2, 3, 4 and so on up to 84 or up to 4, respectively. The researcher wrote the numbers on pieces of paper, placed them in a container, shook the container to mix the papers, and then picked the number of papers required to provide 27 schools. From these same schools is where the sample size of 27 head teachers and 27 chairpersons of parents' association was found. When it comes to 71 teachers and 1268 pupils, the researcher used the 27 schools to provide the teachers and pupils in the sample schools. The researcher defined the population and subgroups, and separated the population into two strata: public and private primary schools. Then, the researcher decided on the sample size for each stratum. The researcher related the total sample size to the teacher and student population of the sampled schools to decide on the proportion to be sampled from each school. In the sampled schools, the researcher then numbered the teachers or pupils. The researcher wrote the numbers on pieces of paper, placed them in a container, shook the container to mix the papers, and then picked the required number of papers to provide the necessary number of teachers and learners. Finally, 71 teachers and 1268 pupils were obtained. Saturated sampling technique was used to pick out a sub-county education officer. The saturated sampling technique is a form of sampling in which all individuals are included in the sample.

Data Collection: The study employed in-depth interview guides, questionnaires, and observation schedules to collect data.

In-depth interview guides: An interview is an oral exchange between an interviewer and interviewee (Kathuri & Pals, 1993). Interviews involve conversations that help to gain personal information, knowledge, attitudes, or opinions from a list of prepared questions asked to each participant in the same manner. In-depth interviews were appropriate for the study because the language level of the respondents can be adjusted, interviewees may answer questions and make clarifications, the researcher can prompt and probe deeper into the given situation. Interviews can be modified to fit the needs of the situation, convey empathy, build trust, collect rich data, and provide a clear understanding of the respondent's view. In this study, the interview technique was used to explore objectives 2, which examines the perspectives of parents on the effects of mobile devices. Objective 3 explores how various mobile devices are used in the teaching and learning process in primary schools in Marani sub-county, and 4 which intends to find out the challenges and opportunities encountered in the use of mobile devices for the teaching and learning process.
Three interview guides were used to conduct the in-depth interviews, namely: In-depth Interview guide for school head teachers (IIFHs) (Appendix B), In-depth Interview guide for Chairpersons of PA (IIFCPA) (Appendix C); and In-depth Interview guide for sub-county Director of education (IIFSCDE) (Appendix D).

In-depth interview Guide for school head teachers (IIFHs): A face to face IIFHs was used to solicit responses from head teachers. An in-depth interview was more appropriate for these respondents because

they were fewer in number. The questions in the interview guide had a common format, which made it easier to be focused, analyze, code, and compare data (Appendix B). The interview was carried out in the respective school of the head teacher and took between 30 to 45 minutes. Recording of the conversation was done by jotting down the key points of the conversation and transcribing it the same day to avoid forgetfulness.

In-depth Interview Guide for chairpersons of PA (IIFCPA): In objective two, three and four a face to face IIFCPA was used to solicit responses from chairpersons of PA. These respondents were chosen because they are representatives of parents and since they visit schools and interact with the teachers, parents and pupils, they are likely to understand aspects of educational interest related to the use of mobile devices in teaching and learning. The questions in the interview guide have a common format, which makes it easier to be focused, analyse, code and compare data (Appendix C). The interview was conducted at the respective school of the chairpersons and lasted between 30 to 45 minutes. Recording of the conversation was recorded by jotting down the key points of the conversation and transcribing it on the same day to avoid forgetfulness.

In-depth interview Guide for sub-county director of education: A face to face IIFSDCEO was used to solicit responses from a sub-county director of education (Appendix D). A few guiding questions covering objectives three and four of the study formed the basis of the conversation. The sub-county director of education was chosen because the officer supervises, conducts induction workshops, and monitors the curriculum implemented for quality teaching. The interview was carried out in one of the private rooms in the sub-county director's office and lasted 45 minutes. Recording of the conversation was done by jotting down the key points of the conversation and the same transcribed the same day to avoid forgetfulness.

Questionnaires: A questionnaire is a collection of items to which a research subject is expected to respond. Questionnaires were used to allow the researcher to reach a large sample within a short time (Mwapwele & Roodt, 2016). The study employed two questionnaires, namely: Questionnaires for teachers (QFTs) (Appendix E) and Questionnaires for grade Seven Pupils (QFCSPs) (Appendix F).

Questionnaire for teachers (QFT): The study used QFT (Appendix F) to collect data from 71 teachers of the sampled schools. These questionnaires had three sections as (Alice, 2012) advises. i) Demographic data, ii) closed-ended questions weighted on a Likert scale of 1-5, that is Strongly Agree, Agree, Undecided, Disagree, and Strongly Disagree, respectively, iii) Open-ended type of questions. The questionnaires were developed to address the following objectives: to explore the perspectives of teachers on the effects of the introduction of mobile devices to students on their academic performance in primary schools; to explore the frequency of use of various mobile devices and how they are used in the teaching and learning process in primary schools;finally, to find out the challenges and opportunities encountered in the use of mobile devices for teaching and learning in primary schools.

Questionnaire for grade seven pupils (QFP): The study used QFP to collect data from the sample of grade 7 pupils in the sampled schools. The questionnaires were used because they offer a considerable advantage of being administered to a large population (Appendix F). These questionnaires had three sections as (Alice, 2012) advises. i) demographic data, ii) closed-ended questions weighted on a Likert scale of 1-5 , that is, Strongly Agree, Agree, Undecided, Disagree, and Strongly Disagree, respectively, iii) Open ended type of questions. The questionnaires were developed to address the following objectives: to explore the frequency of use of various mobile devices and how they are used in the teaching and learning process in primary schools; and finally, to find out the challenges and opportunities encountered in the use of mobile devices for teaching and learning in primary schools.

Observation Schedule: Observation is a method of collecting data in which a researcher notes things or occurrences as they occur naturally (Kathuri & Pals, 1993; Morara, 2020). In this study, the researcher prepared an observation schedule (Appendix G) for collecting data related to the available mobile devices in the targeted schools and how they were used.

Pilot Test: Pilot testing is a preliminary survey (Almalki, 2016). A pilot test was carried out in two schools from Marani Sub-county within Kisii County. This is in line with Mugenda and Mugenda's (1999) recommendation that a pilot sample of between 1% and 10% is appropriate. The pilot sample of two schools in this study was 7% of the total sample of schools. As Alice (2012) advices, the pilot schools were not to be used in the main study. The purpose of the pilot study was to test the viability of the study as well as the appropriateness of the research tools.

Participants in the pilot test were chosen because, although to (Dorcah, 2018) though they would not participate in the study, they were similar to the intended participants. The participants were encouraged to make comments and suggestions which were used to improve the items, such as restructuring and re-wording the questionnaire and interview guides.

Reliability of the instruments: Reliability is the extent to which research results would be consistent if the same instrument or procedure is repeatedly used (Best & Kahn, 2003; Beckman, 2016). Besides, it gives the extent to which the findings can be generalized and is used to estimate the amount of error attached to a score. In this study, Cronbach's coefficient alpha (α) was used to test for the reliability of the instruments. Cronbach's coefficient alpha was considered appropriate for this study because it is suitable for both open-ended and closed items (Gall, Borg & Gall, 2007). In this study, the instruments had both open-ended and closed items. A reliability coefficient of 0.7 and above was considered acceptable (Frankfort-Nachmias & Nachmias, 1996). The reliability coefficient of the teachers' questionnaire was .73 and that for the students' questionnaire was

Validity of the Instruments: Validity is the quality of a data gathering instrument or procedure that enables it to measure what it is supposed to measure (Best & Kahn, 2003; Arts, 2014). The data gathering instruments are usually validated by correlating the scores against some outside criterion, which may be scores on data gathering instruments of acceptable validity, successful performance or behavior, or expert judgment of recognized authorities. Establishing construct validity was applied as recommended.(Arts, 2014): pilot test of the tools was conducted against a sample with similar characteristics as the actual sample. Using a panel of "experts" familiar with the construct was a way in which this type of validity was assessed. The experts, who are research supervisors, examined the items and guided on what specific items measured. Sampled respondents were involved in this piloting process to obtain their feedback.

Data Collection Procedure: After having been cleared by the office of the Director, Board of Post Graduate studies of Jaramogi Oginga Odinga University of Science and Technology (JOOUST) to conduct the study, clearance was then sought from the Ethics Review Committee (ERC) of JOOUST. A research permit was then obtained from the National Commission for Science, Technology and Innovation (NACOSTI). The researcher got further clearance for carrying out research in Marani sub-county from the County Director of Education (CDE), Sub-County director of education (SCDE), and County Commissioner of the county.

The researcher visited the schools on set dates, consulted with the principals, and sought permission to make further visits to issue and collect questionnaires. The researcher also made prior arrangements to administer the in-depth interview schedule to HTs and SCDE at their convenient time through face-toto-face conversation. For PA, the researcher requested the HTs to communicate with them for a face-toto-face interview with the researcher at their convenient time and also share the contact with the researcher. The researcher also informed the head teacher of the intended observation. The 10 teachers who served as research assistants were identified from the sampled schools and trained for the lesson observation. During data collection, the researcher also carried out observations by observing the staff rooms, head teacher's office, and library/store, to ascertain the mobile devices available in the schools. Lessons in classes were observed by research assistants who were trained by the researcher.

Data Analysis: Data analysis is the process of bringing order and meaning to the raw data collected (Dorcah, 2018). This study collected both quantitative and qualitative data. Once the data was collected from the field,

it was sorted and then coded, and keyed into the Statistical Package for Social Sciences (SPSS) version 27. The data was then screened to identify errors made in data entry. Qualitative data generated from the open-ended items in the research instruments were organized into themes based on the study objectives and questions. Quantitative data was analysed using descriptive statistics such as frequencies, percentages, and means, and then presented using tables.

Ethical Considerations: A research is always supposed to stay within sound and ethical considerations (Kathuri and Pals (1993) The research adhered to ethical standards by using the principles of secrecy, anonymity, and informed consent. Before conducting the investigation, the researcher obtained approval from NACOSTI, the Sub-county Director of Education, Rachuonyo South sub-county, and the head teachers where this research was carried out. The aim of the research was explained to the participants, and their consent to participate in the study was sought before being involved in providing data. Furthermore, to ensure confidentiality and anonymity of participants, names of participants were neither sought nor written on data collection instruments. Instead, codes were used. Moreover, to ensure confidentiality of interviewees, the interviews were conducted in secluded rooms within the schools. Sources of information were acknowledged in order to address the problem of plagiarism.

RESULTS AND DISCUSSION

Challenges and opportunities encountered in the use of mobile devices in the teaching and learning process

The fourth objective of this study was to find out the challenges and opportunities encountered in the use of mobile devices for teaching and learning in primary schools in Marani sub-county, Kisii County, Kenya. Data to address this objective was collected using questionnaires and interview schedules. For example, the questionnaire for teachers contained an item requiring the teachers to indicate their level of agreement in relation to the challenges encountered in the use of mobile devices in the teaching and learning process. The data is contained in Table 3 below.

Table 3: Challenges of using mobile devices in the teaching and learning process n=71

Use statement	**Extent of Agreement**				
	SA n(%)	A n(%)	U n(%)	D n(%)	SD n(%)
Inadequate power supply makes it difficult to use mobile devices in teaching and learning.	11(16.0)	48(68.0)	6(8.0)	6(8.0)	0(0.0)
Teachers lack the necessary ICT skills for using mobile devices	40(56.0)	22(32).0)	3(4.0)	6(8.0)	0(0.0)
The inadequacy of mobile devices makes it difficult for them to be regularly used for the learning process	6(8.0)	53(76).0)	6(8.0)	3(4.0)	3(4.0)
Lack of internet connection contributes to the underutilization of mobile devices in learning	22(32).0)	40(56.0)	6(8.0)	3(4.0)	0(0.0)

Source: Research data (2023).

SA Strongly Agree), A (Agree), U (Uncertain), D (Disagree), and SD (Strongly Disagree).

As shown in Table 3, most teachers (68.0%) agreed that inadequate power supply makes it difficult to use mobile devices in teaching and learning, 11(16.0%) strongly agreed. This inadequate power supply makes it difficult to use mobile devices in Teaching and learning. This disagrees that, while computer labs and desktop computers are rare in schools in developing countries, mobile networks, mobile phones, and now smartphones have the potential to introduce new methodologies to learning and teaching (Grimus & Ebner, 2015). Mobile penetration compensates for the lack of infrastructure, offering the chance to provide on- and offline content for learning and knowledge creation, reachable with mobile devices (Alice, 2012). On the contrary, very few teachers (8.0%) were uncertain, and also 8.0%) disagreed that inadequate power supply makes it difficult to

use mobile devices in teaching and learning. Teachers who agree that teachers lack the necessary ICT skills were predominantly more (56.0%) than those who strongly (32.0) agreed that teachers lack the necessary ICT skills. This finding aligns with the research conducted by Bingimlas (2009), on three secondary schools in Kenya. The study revealed that recently hired teachers received training in utilizing information and communication technology (ICT) for word processing and internet applications. This is because they have recognized the necessity of equipping instructors with fundamental ICT skills in order to ensure its efficient implementation. The results are consistent with those of Ali, (2018) who similarly discovered in his research that preschool teachers in Malaysia necessitate extensive instruction in ICT utilization to effectively incorporate it into the classroom, hence fostering cognitive development and creativity. Their research indicates that educators continue to encounter challenges when utilizing specific technologies and applications. In the long run, teachers must continuously enhance their skills and stay updated through ongoing professional development to maintain confidence in their technological expertise and its application. For the long term, it is: On that in order to remain confident in their knowledge about the application of technology, teachers need to improve their skills on a regular basis and stay up to date through continuing professional development (Ali, 2018). However, 3(4.0%) were uncertain and 6(8.0%) disagreed that teachers lack the necessary ICT skills. This disagrees with the argument that there is a need to enhance teachers' skills whilst providing them with ICT resources to consider designing new ways which enhance pupils' learning (Jatileni, 2018). Kenya being a third world country, the technological skills are low among the general population. (Kimoni, 2012).The teachers generally supported the use of instructional technologies in teaching, but the majority of teachers rarely used mobile devices except textbooks and chalkboard. Out of 25 teachers, 6(8.0%) strongly agreed that the inadequacy of mobile devices makes it difficult for them to be regularly used for the learning process, 53(76.0%) also agreed that the inadequacy of mobile devices makes it difficult for them to be regularly used for the learning process. Though, 6(8.0%) were uncertain whether the inadequacy of mobile devices makes it difficult for them to be regularly used for the learning process. While 3(4.0%) disagree and 3(4.0% strongly disagreed that the inadequacy of mobile devices makes it difficult for them to be regularly used for the learning process. On the other hand, the majority of the teachers, 40(56.0%) agreed that the lack of internet connection contributes to the underutilization of mobile devices in learning. 23(32.0%) on the other hand, strongly agreed that the lack of internet connection contributes to the underutilization of mobile devices in learning. Nevertheless, 6(8.0%0%of the teachers were uncertain, and 3.0%) of the other teachers disagreed that the lack of internet connection contributes to the underutilization of mobile devices in learning. All in all, many of the available mobile devices were inadequate in terms of quantity. Not all the available mobile devices were easily accessible to both teachers and students for the teaching and learning process since, in some schools, the tablets were kept in strong rooms to avoid theft. The information in Table 4.11 is echoed by the information given by teachers and learners while responding to the question requiring them to state the challenges encountered in the use of mobile devices in the teaching and learning process. Table 4 below shows the responses given by teachers and learners to the question requiring them to indicate the challenges in the use of mobile devices in the teaching and learning process.

Table 4: The challenges in the utilization of mobile devices in the teaching and learning processes as reported by teachers and learners

Challenges	Teachers Frequency (n)	Percentage (%)	Pupils Frequency	Percentage
Inadequate and unreliable power	17	24.0	649	64.1
Lack of internet (	43	60.0	982	97.0
Inadequate mobile devices	14	20.0	1001	99.0
Inadequate ICT skills and exposure	26	36.0	72%)6	72.0

Source: Research data (2023).

Several challenges are involved in the utilization of mobile devices in the teaching and learning process. In our present study, majority of teachers and pupils reported a lack of internet, 43(60.0%) and 982(97.0%), respectively, as the most prevalent challenges which undermine the utilization of mobile devices in their schools during the teaching and learning process. A research conducted by Reche, (2012), no significant correlation between time spent on Internet-associated activities, in terms of school-related and non-school-related uses, and academic achievement, or text messaging activities for school-related purposes. These findings reaffirmed that despite the prevalent smartphone usage among tertiary level students, the extent to which this technological device has contributed to academic achievement is still inconclusive, hence further research should be conducted.

Inadequate ICT skills and lack of technological exposure among teachers are the second most prevalent challenges, 26(36.0%) while inadequate mobile devices became the highest percentage for the learners1001 (99%).0%).This is in line with a research done in Namibia primary school which reported that technological advancement in this digital age requires teachers to innovatively integrate and use Information Communication Technology (ICT) in teaching and learning across the curriculum. However, the perceptions of stakeholders such as teachers hold towards the use of ICT in teaching and learning are the key determining factor to the success or failure of use of ICT in education (Jatileni, 2018).

Other challenges highlighted by teachers and pupils are inadequate and unreliability of power, 17(24.0%) and 726(72%) respectively, and mobile devices utilization being expensive to acquire and maintain, 14(97.0%) teachers and 1001(99%) pupils.

On the other hand, the 27 head teachers responded to the question requiring them to indicate the challenges in the utilization of mobile devices in the teaching and learning process. The challenges were inadequate mobile devices, negative attitudes, lack of power/electricity, network problems, lack of ICT skills, lack of data, insecurity, and expensive maintenance of mobile devices. The respondents gave different opinions.

HT_4 argued that the spread of mobile devices is facing a lot of challenges from within and without. The challenges affect all stakeholders directly and indirectly. He continued:

" ....one great challenge facing the use of these devices is ignorance from both teachers and pupils. Some members of the two groups are ignorant of the use of these gadgets hence can't participate in spreading it." "

This disagrees with a research done at the Malaysian Online Journal of Educational Technology, which that with the advent of Information and Communications Technologies (ICT) in education, teachers form their own beliefs about the role of ICT as a teaching tool, the value of ICT for student learning outcomes, and their own personal confidence and competency (Ghavifekr *et al*., 2016). At the same time, barriers exist in integrating ICT in teaching and learning (Bingimlas, 2009). The barriers are extrinsic to the teacher and include lack of resources, time, access, and technical support.

Another HT_{10} argued that,

"*Challenges that face the widespread use of these gadgets is the misunderstanding. This has a different view for or against the devices hence instead of spreading it there is silence, quarrels, and push and pull amongst teachers." "*

HT_6 concurred that, *"In fact, there is also a challenge of economy. Many parents see it as a great threat to their economy. They need a good amount of cash apart from buying the gadget; they need cash to maintain it in repairing and also buying data bundles since many homes are not electrified. To this far, they feel the devices are a threat to their low financial status."*"

HT_{21} argued that, *"the rate at which mobile devices are stolen is a threat to the widespread use of the device since they can easily be converted to money by selling them to third and fourth parties. They are easily stolen*

from both within and outside of members. At the same time, most of the devices sold to third world countries are not original, being second-handhand,a good number are not in very good condition. They easily get out of order and become hard to repair. Most of them are dumped in homes and schools without being used. Third world countries need to be given chances of coming up with their own mobile devices since they are capable of doing so."

These agrees with the fact that mobile devices ownership is increasingly more common in the lower socio-economic segments of society (Andrew, 2020).

HT_4 concurred with HT_{21} that, "*I lock instructional technologies in strong rooms and make strict rules for anybody who wishes to use them because I am tired of theft."*

On perceived challenges of integrating mobile devices in the teaching and learning process, parents also identified different challenges in the utilization of mobile devices in teaching and learning processes.

PA_1 argued that "*I feel that the devices waste learners' time because I think that learning is only assessed by writing and reading. My child is assessed by what she writes in her exercise book. The teacher checks whether my child has copied his work or not." "*

PA_{19} argues that, *".....fear for my child's information to go viral for everybody is likely to know his performance which may not go well with the majority of African children who live in fear and superstition. At the same time, I prefer my child should use a mobile device in my presence to monitor him." "*

This agrees with research which indicated that cross-cultural differences existed in the ways parents monitor and regulate digital activities.(Topper, 2017). (Topper, 2017) further reported that American parents prefer having an open discussion with their children. (Beckman, 2016) found that parents in Ireland and the United Kingdom prefer restrictive mediation, whereas Nordic parents prefer active mediation of Internet use, as cited in Zaman (2016). O'Sullivan-Donnell (2014) stated that in various studies also that Central Europe, 70% of parents talk to their children about what they do on the Internet, and 58% monitor usage by staying nearby when their child is online

Further, parents noted that several challenges and opportunities arise as a result of mobile device utilization in the teaching and learning process. In this case, parents identified lack and unreliability of power, lack of internet, and inadequate gadgets as the main problems facing the use of mobile devices.

Similarly, teachers indicated that lack of internet and inadequate mobile devices, and also unreliable power supply, are the major challenges facing the utilization of instructional mobile devices in the teaching and learning process. Seemingly, teachers understand themselves better than parents, and parents' responses were based on students' updates to parents. The challenges of using mobile devices as reported by parents are shown in Table 5 below.

Table 5: The challenges in the use of mobile devices for the teaching and learning process as reported by parents are:

Challenges	**Frequency (n)**	**Percentage (%)**
Expensive	16	80.0
Lack of internet (	15	76.0
Inadequate gadgets,	15	76.0
unavailable power supply	12	60.0

Source: Research data (2023).

In total, 16(80.0%) of the participants reported that mobile devices are expensive in terms of maintenance and acquisition processes.0%) reported that the lack of internet and inadequate gadgets also posed a serious

challenge in the use of the devices. Unavailability of power supply was reported by 12(60.0) parents as one of the main challenges facing the use of mobile devices in the teaching and learning process.

The Sub- County director of education stated that there are challenges the learners are experiencing challenges in the school as regards to the use of mobile devices. This agrees with the questionnaire for teachers that contained an item requiring the teachers to indicate their level of agreement in relation to the challenges encountered in the use of mobile devices in the teaching and learning process, which supports the same where 53(76.0%) agreed that the inadequacy of mobile devices makes it difficult for them to be regularly used for the learning process.

On the other hand, parents noted the opportunity that arises as a result of using mobile devices in the teaching and learning process is that students get exposure to the current trend in academics and hence promote academic performance. For example, PA_{16} argued that:

"This Internet makes our kids get connected and hence improve their academic performance, and they also enable them to get to understand current trends in the academic sector." "

Similarly, several opportunities were noted by teachers during quantitative data analysis, including promoting academic performance, making teaching easier for teachers, promoting content coverage, and above all, teachers' exposure to ICT trends in the teaching and learning process. In conclusion, the quantitative and qualitative analyses strongly supported each other, and the findings were in agreement.

A sub-county director of education also in support of teachers on introduction of mobile devices in the teaching and learning process, that it enables learners to access more information and improve their academics, helping teachers to cover more content within a shorter time, and interesting and encouraging learners to master content well. The director further highlighted that:

"*The mobile devices have played a great role in time management as far as teaching and learning is concerned. A large content can be covered within a short time when using mobile devices. I also find the learning can take place anywhere, not necessarily in the classroom. Teachers are able to cover the curriculum design within a very short time and do revision. The device can also involve parents in the learning process as they assist their children in learning. Teachers can give work to be done out of class, which is well covered and done without much problem. Due to this,learners can do more work on their own within a short stipulated time."*

The Sub-County Director of education further said:

"The mobile devices offer several benefits that can aid academic learning, the mobile devices offer the freedom of location and time, and high-speed ability to access teaching materials".

Opportunities mobile devices present to a teacher in relation to the teaching and learning.
Teachers were also asked to respond to items in relation to the opportunities presented by mobile devices to the teaching and learning process. Their responses are shown in Table 6 below.

Table 6: The opportunities mobile devices present to a teacher in relation to the teaching and learning process as reported by teachers.

Opportunities	Frequency (n)	Percentage (%)
Promote Learning	51	72.0
Encourage creativity	14	20.0
Exposure	17	24.0
Making learning easy	34	48.0

Source: Research data (2023).

What is the difference between promoting learning and making learning easy?

The teachers noted the following opportunities as a result of mobile device utilization, as recorded in Table 6. The most predominantly reported opportunity as a result of mobile device use in the teaching and learning process was promoting learning (51, 72.0%), making learning easy (34, 48.0%), encouraging creativity14(14, 20.0%) and finally ensuring proper academic exposure among teachers and students (17, 24%).0%).

Head teachers were also asked to indicate the opportunities presented by mobile devices to the teaching and learning process. HT_7 in one of the primary schools said that:

"Teachers keep learning from their peers, and this improves their pedagogical skills, which translates to high academic performance.at the same time, they have been trained to be literate and not feel underrated in any way. Almost all teachers in many schools now are computer literate and can be in a position of handling any computer classes without any problem or getting stuck."

According to the above excerpt, mobile devices enable teachers to keep learning, which makes them always updated with current knowledge and skills.

HT_{14} concurred and said,

"Learners' and teachers' potential have been increased, thus making them have a wide range of problem-solving mentality.""

HT_{11} also argued that,

"The use of mobile devices has led to innovations and creativity in the teaching and environment. This has resulted to many learners discovering wide range of things within and outside their environment, giving them the ability to explore their opinions in a different fields of education."

HT_{19} agreed that,

"The knowledge acquired by the use of mobile devices has equipped the teachers and learners by increasing their curiosity giving them a different approach and styles to various issues in the modern world."

This concurred with, (Rosenberg & Asterhan, 2018) and (Mfaume, 2019) who reported the need for training in the use of ICT, for well-maintained hardware and software, and for low-cost access to ICT.

HT_{16} further argued that,

"As a teacher the mobile devices has immensely increased the exposure as one is able to conduct lessons from one continent to another. This has also contributed to large employment (self) of teachers." He further says, *the devices also afford the teachers the opportunity to update their own knowledge and education.*

HT_{20} who highlighted that:

The devices creates a forum for the learners to learn more globally for they are able to know what others are doing outside classroom. They don't need to waste time moving from one school to another. The devices gives learners self-motivation because they are able to work alone without any supervision from neither parents nor teachers.

Some of the principals were also of the opinion that most teachers concurred with them that there is much fun and enjoyment in using mobile devices. The learners enjoy by learning from known to unknown. The learners are exposed to using more senses in learning hence enhancing and computing a lot of interest and this encourages learners to not only capture but also master content which is retained for a long period of time.

HT_{10} said that:

Learners are able to answer all their problems by using mobile devices. This has made the work of teachers and parents easy because the learners are kept busy. The parents appreciate all that the devices are doing. Work is made easy and interesting. He further continued to say that, *the content is well mastered and used all through. The older children educate and involve their siblings in the learning process hence discipline is made easy and manageable. All senses are manipulated well and learning is made much easier, interesting and orderly.*

This agrees with the research conducted by (Balfagih *et.al*, 2017) who investigated the impact of M-learning on student performance, specifically in terms of academic achievements and conversational skills. The findings revealed that M-learning significantly enhances both academic achievements and conversational abilities of students.

Further findings were revealed during interviews with the head teachers. Majority of the head teachers, 57% (15) felt that the homework given to the learners is a vital tool for enhancing lesson delivery, assessment of learning progress as well as performance of learners in any subject. They also indicated that experience has helped teachers in making necessary decisions, upholding good practices, proper management of school resources, overcoming challenges that may hinder good performance, ensuring team work and betterment of performance of students in school. This was captured in a statement by HT_{22} who argued that:

The issues of undone homework is much forgotten when it comes to the usage of mobile devices. All learners struggle to do their homework for they enjoy to manipulate the devices which guides to get more and more materials on the work the need.

From the above remark of the head teacher twenty two, this may positively affect the performance of learners both in class and national examinations. This also concurred with HT_{20} who also accorded that:

Long breaks and freedom is forgotten to teachers, the learners spent their breaks on tablets which are in school. They are always made and kept busy. The teacher only passes to oversee what is happening. The learners are always on the teacher's shoulders to learn more and more. Teachers enjoy teaching knowledge to learners who are ready to learn and retain the knowledge given which they in return to transfer to others.

It seems that the use of mobile devices reduces idleness among learners. HT_{18} said that:

The devices assist the learners learn globally for they are able to know what others are doing and also the same time learn from their schools are at a position of competing with each other from where they are. They don't need to waste time and money moving from one place to another. The devices give learners self- esteem because they are able to work alone without any supervision but produce what is expected and appreciated. A learner can evaluate himself by the way they work.

This agrees with some studies which showed that there are various applications which could be designed for school students through mobile learning, such as for scaffolding learning about bird-watching (Twum, 2014), learning between schools and museum (Naismith *et al.*, 2006), and vocabulary learning (Gatotoh, 2017). Evidences gathered suggested that mobile learning has focused attention on its potential applications for school education.

Another HT_{17} disagreed with HT_2 and said that:

It's my view that no teaching should be done minus the devices for this saves time and exposes the learner to the world of digital dispensation right from an early age. As the child grows he would be able to access any materials digitally with easy. The device also be able to control a big number of learners at the same time with only one teacher as a controller. Time used in manual marking also be reduced in the sight of the teacher as this would be digital.

This aligns with a research conducted in the United States of America, where Wiregrass Ranch High School is among the educational institutions employing mobile phones for educational purposes. Tampa Bay high schools permit the use of cell phones in class (Herrington, 2007). These activities encompass the utilization of mobile devices during literary and mathematics classes, as well as for the purpose of note-taking. The stakeholders, including parents, staff, and students, have responded positively and applauded the school's management for its effective application of mobile phones in the teaching and learning process. Nevertheless, this assertion conflicts with the findings of other researchers who discovered that individuals who have the capability to instantly access and read social media updates and messages on their smartphones are more prone to often checking their devices (Ali, 2017). Given the prevalence of mobile devices among students, there is a strong temptation to utilize them for purposes other than learning, such as engaging in social media or instant messaging, especially if someone is sending them messages during a session. This can lead to their distraction and less motivation to focus on the teacher's speech. Integrating some activities into classroom instruction can potentially reduce student distractions, as they are already actively involved in their academic tasks.

On the other hand, parents also perceived opportunities of integrating mobile devices in the learning and teaching process. For example, PA_3 said that:

"I love mobile devices in teaching and learning because they are faster and efficient when both teachers and learners are using them."

PA3 considers mobile devices to be more efficient. This was echoed by PA_{12} who argued that:

"It is through a mobile devices I bought my car from China. If I can transact a business using a mobile device what of the teacher and a learner who just google a content from internet and get all they require."

PA_2 argued that:

"I can't just pretend that there are no opportunities present in teaching and learning. Mobile devices have become a basic need globally."

Another PA8 concurred with PA2 and said,

"You can't miss to use any mobile device. It is the campus of the navigators. One can go anywhere in the world just using google."

The Sub-County Education officers concurred and said:

"I prefer the use of mobile devices than the use of paper and ink work. This is because you can save and use it even after a century." He further added, *the government should support fully the use of instructional mobile devices.*

According to the sub-county director of education, information in mobile devices can be long lasting if the device is well maintained.

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

This study also explored the challenges and opportunities encountered in the use of mobile devices in the teaching and learning process. Most teachers agreed that inadequate power supply makes it difficult to use mobile devices in Teaching and learning, others strongly agreed that inadequate power supply makes it difficult to use mobile devices in Teaching and learning.

A number of parents noted that the introduction of mobile devices to learning negatively impact learning. On the other hand, a some parents noted that the introduction of mobile devices to the teaching and learning

process has a positive impact on the academic performance of their students. The majority of parents had mixed opinions on the effects of the introduction of mobile devices on students' academic performance.

The research substantiates the notion that mobile devices have numerous advantages that can facilitate academic learning, such as the flexibility of location and time, the capability to access educational resources, and the rapidity, efficiency, and efficacy in communication. This study additionally discovered that the devices provide teachers with the chance to enhance their own knowledge and skills. Mobile devices are highly beneficial in educational settings for taking notes and utilizing instant messaging software to facilitate engagement in campus activities such as group work and discussions. Academic blogs and online websites can effectively encourage students to utilize their own unique thoughts, ideas, and abilities, and then engage in online discussions with other students to share their understandings. The potential influence of such technologies on learners' educational achievements is significant.

According to the present findings it can be concluded that some teachers had limited skills in the use of some mobile devices; mobile devices were not enough; expensive; limited time to use the various mobile devices as the syllabus was so wide that they may not cover it; some head teachers locked instructional technologies in strong rooms and made strict rules for anybody who wished to use them; there was also unreliable power supply.

Conclusions

This study investigated the perspectives, challenges and opportunities in use of mobile devices for teaching and learning in primary schools in Kenya. Based on the findings of the study, the following conclusions were made: It was concluded that teachers had limited skills in the use of some mobile devices; mobile devices were not enough; expensive; unreliable power supply; limited time to use the various mobile devices as the syllabus was so wide that they may not cover it; some head teachers locked instructional technologies in strong rooms and made strict rules for anybody who wished to use them. Among the opportunities presented in the use of mobile devices in the teaching and learning process were students get exposure to more information and current trend in academics. In addition, learners get more exposure and learning can take place any time and from anywhere hence this promotes academic performance; makes learning interesting and connects learners with others and teachers and hence improve their academic performance. Mobile devices also make teaching easier for teachers, promoting faster content coverage, and above all makes teachers exposed to the current trends in the teaching and learning process.

Recommendations of the Study

In connection with the findings, the study recommends that:

- The Ministry of Education should develop clear policies on the use of mobile devices in the primary school curriculum; regularly review the teacher training programmes by integrating technology with a view of improving the trainees' skills and attitude on the use of mobile devices;
- Teachers to work hand in hand with parents, sponsors and other stakeholders in education to prioritize the provision of adequate mobile devices to ease the problems of inadequacy of instructional technologies in primary schools; ensure mobile devices have appropriate content according to the syllabus.
- The government through the Quality Assurance Officers (QUASO), have regular visits to the schools, to assess the availability, state and utilization of mobile devices. This is likely to make teachers alert and prompt them to prepare and use the mobile devices frequently.

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