

**PREPAREDNESS FOR IMPLEMENTATION OF INTEGRATION OF DIGITAL  
LEARNING IN PUBLIC PRIMARY SCHOOLS IN MERU COUNTY, KENYA**

**DAVID KAARIA KIUGU**

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KENYA METHODIST UNIVERSITY**

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## **DECLARATION AND RECOMMENDATION**

### **Declaration**

This thesis is my original work and has not been presented for a degree or any other award in any other university.

Signed-----Date-----

**David Kaaria Kiugu**

**EDU-4-0090-1/2015**

### **Recommendation**

We confirm that the work reported in this thesis was carried out by the candidate under our supervision.

Signed-----Date-----

School of Education

Dr. Kibaara Tarsilla PhD

Kenya Methodist University

Signed-----Date-----

Dr. Rebecca Wachira PhD

School of Education

Kenya Methodist University

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## **DEDICATION**

This work is dedicated to God for enabling me to reach this far and to my parents Mr. and Mrs Francis Kiugu for the firm education foundation.

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## ABSTRACT

Digital learning integration (DLI) in schools has positive implications for the education systems. DLI programme was rolled out in Meru County alongside other 46 counties in Kenya in 2016 after several postponements. However, DLI programme adoption is attributed to several preparation challenges. This study looked into the integration preparedness on implementation of DLI programme in public primary schools in Meru County. The objectives were: to analyze teachers' preparedness, examine the adequacy of digital learning infrastructure, analyze effects of technical support staff, and examine the extent of involvement of parents in DLI. The study was guided by Roger's diffusion of innovation theory and Boum's project management cycle. It used descriptive survey design and adopted mixed method approach. The study targeted 710 public primary schools in 9 sub-counties. Data was provided by 710 head teachers, 7032 teachers, 2004 Parent Teachers Association (PTA) executive members, and 25,720 grade 3 DLI programme pioneer pupils. A 10% sample of schools was considered sufficient which was obtained using simple random sampling technique. As a result, 71 head teachers and 703 teachers were obtained. Purposive judgmental sampling technique was used to get 201 PTA members. Further, Sloven's formula was used to get a sample size of 396 pupils that formed Focus Group Discussion (FGD) each consisting of 8 learners, and 9 SCDEs were purposively sampled. Questionnaires were used to collect data from head teachers, teachers and PTA while interview schedules and FGDs were used to get data from SCDEs and from learners respectively. Observational schedule was also used to provide guide for focusing observation and recording data. The research tools were pre-tested for validity and reliability. The quantitative data was analyzed using IBM SPSS Statistics for Windows version 22. The data was analyzed, interpreted and reported using percentages, measures of central tendency. Univariate regression analysis was used to test hypothesis. Qualitative data was analyzed according to themes based on study objectives and reported in narratives. Through computation of Pearson product moment correlation coefficients confirmed that there is significant positive correlation between variables teachers' preparedness, adequacy of digital learning resources, effectiveness of technical support staff, and involvement of parents against DLI at 0.05 level of significance ranging from  $r = 0.753$  to  $r = 0.943$ . Majority of teachers were not trained and those trained were ill prepared. Resources such as tablets, internet connectivity, computer laboratory and electricity were noted to be inadequate. Repairs, maintenance and application of digital learning tools in the classroom were not possible due to lack of technical support staff in schools. Parents as key stakeholders were not involved though they appreciated the free tablets from the government. Learners who were introduced to DLI appreciated and were always eager to learn using the digital technology. In addition, there was no monitoring or evaluation of the digital programme after roll out by quality assurance and standards officers as per the policy guidelines. The study concluded that preparations for digital programme were inadequate. The findings will be useful to educationists, parents, teachers, and policy makers. The study recommended that MoE should go back to the drawing board, have all teachers computer technology compliant through continuous in-servicing and pre-service courses. Adequate resources such as tablets, desks, computer laboratories, network connectivity and electricity among others should be availed to all schools. Technical support staff should be availed to schools. MoE should own the innovation and facilitate its full adoption by coming up with apt monitoring and control systems. Political objectives should not be allowed to overshadow policy structures such as planning, management and administrative processes.

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## **ABBREVIATIONS**

<b>BOM</b>	Board of Management
<b>CBC</b>	Competence Based Curriculum
<b>CSO</b>	Curriculum Support Officer
<b>DLI</b>	Digital Learning Integration
<b>DVD</b>	Digital versatile Disk
<b>GoK</b>	Government of Kenya
<b>H/T</b>	Head Teacher
<b>ICT</b>	Information Communication Technology
<b>IT</b>	Information Technology
<b>KEMI</b>	Kenya Education Management Institute
<b>KeMU</b>	Kenya Methodist University
<b>KESI</b>	Kenya Education Staff Institute
<b>KNUT</b>	Kenya National Union of Teachers
<b>MoE</b>	Ministry of Education Science and Technology
<b>NCPD</b>	National Council for Population and Development
<b>OLPC</b>	One Laptop per Child
<b>OTPC</b>	One Tablet per Child
<b>PPS</b>	Public Primary school
<b>SCDE</b>	Sub - County Director of Education
<b>SD</b>	Standard Deviation
<b>SE</b>	Standard Error
<b>SK</b>	Skew
<b>TSC</b>	Teachers Service Commission
<b>TSS</b>	Technical Support Staff

## CHAPTER ONE

### INTRODUCTION

#### **1.1 Background of the Study**

Digital learning integration means access to the right digital devices for learning, by incorporating digital resources such as laptops, tablets and other digital tools (Roblyer & Doering, 2014). The digital technologies include items such as tablets and laptops support students learning and increase student success (Kozma, 2012; Bandung & Langi, 2011; Bitter & Legacy, 2009). The decision to start using digital technology in schools relies on the policies of individual countries' preparations and the management of DLI programmes (Keiyoro et al., 2011).

Digital learning in teaching and learning is facilitated by digital technology as an instructional media (Doering & Roblyer, 2014). The digital learning integrations are capable of providing interactive content through visual cues such as videos, animations, audios cartoons, exercises and quizzes which eventually improve the learning experiences. The activities are integrated into a lesson plan, offering independent learning programs that can be completed during students' own time (Doering & Roblyer, 2014; Kozma, 2012; Teczi, 2011; Hennessy, 2010). Introduction of digital learning integration program to schools has not been easy (Kindombo et al., 2012). However, sound educational digital learning integration policies coupled with sound leadership and management skills from school level to the higher level of national policy formulation ensures proper organization that leads to successful preparations for digital learning integration in the classroom (Keiyoro, 2012).

Based on adequate planning and preparations DLI is a useful tool for improving quality work of a teacher and knowledge acquired by learners across the globe (Peeraer et al., 2012; Kozma, 2012). The growth of digital learning integration has placed continuous pressure on countries that had not embraced the digital learning integration to do so and benefit from their educational potential (Peeraer & Van Petegem, 2012; Eshet, 2012). DLI requires a combination of digital technology, digital content and instruction. The digital technology provides the mechanism that delivers content by providing tools that facilitate how students receive content. It includes internet access, hardware and software (Lee et al., 2015; Laaria, 2013; Sang et al., 2011). In addition, within the learning environments, teachers become facilitators and students become constructors of knowledge (Almalki & Neville, 2012).

The adoption, organization, planning preparations and management of DLI in the classroom is complex and involves link between policy and politics, coalition of education public officials, parents, teachers and practically all aspects of school management and administration (Bebell & Kay, 2010). Impediments such as management of the development of teachers' skills, provision of digital learning resources, and involvement of stakeholders and availability of technical support staff reduced the effectiveness of DLI in the classroom (Ghavifekr et al., 2012; Bebell & O'Dwyer, 2010). Appropriate policies are essential to enabling concrete and adequate preparations and eventual successful digital learning integration programmes. Therefore, preparations to ensure DLI as a tool for enhancing students' learning and as a catalyst for improving access to quality education are a necessity.

Various countries have made use of teachers' preparedness making it possible for them to integrate digital learning that supports and enhances the actual teaching and learning

process. For example, Malaysia, had digital learning integration program entrenched in both primary and secondary curriculum to equip learners with technology practical knowledge, innovation, and be conversant with technical know-how (Ghavifekr & Sufean, 2011).The government committed resources and sought support from parents and government departments in the education system and provided enough funds to start and maintain digital learning programme in schools (Ghavifekr & Sufean, 2011). The guiding policy principles led to development of necessary basic systems and services, development resource persons, investors' participation, supplying and testing of digital learning tools (Chan & Fong-Moe, 2015). In addition, the management teams were well coordinated and cascade model was used by the education ministry to disseminate training of teachers (Ghavifekr & Sufean, 2012). Though Malaysia managed to reduce the digital gaps that existed in different parts of the country through good preparations and management, the country lacked adequate technical support staff (Chan & Fong-Moe, 2015). Thus, having DLI tools in schools does not guarantee their effective use but, teachers' preparedness through acquisition of DLI skills necessary for facilitation of pupils' learning activities is key to the use of digital tools in the classroom.

Other countries have also successfully embarked on digital learning integration preparations in education (Haddad, 2013). In Cambodia for example, teachers were trained on basic skills as part of preparations for DLI (Richardson, 2011). In US, digital learning integration policy catered for the provision of laptops to public primary school pupils in the ratio one computer to every ten children to begin with and have teachers trained to be computer literate and to acquire pedagogical skills (Judson, 2010). Despite US having good policies, the education department rolled out the program before teachers had been in-serviced or trained which affected the quality of application of DLI



in the classroom (Judson, 2010). The studies indicated that lack of trained teachers on various DLI applications and tools operations that were important in enhancing their teaching experiences compromised their integration competency. This underscores the need for teachers' preparedness on DLI.

Digital learning integration in the classroom is a complex task that involves collaboration and consideration of several factors such as teachers who are knowledgeable on digital technology, pedagogical skills, availability of digital learning resources, technical support staff and involvement of parents in Saudi Arabia (Almalki & Neville, 2012). Teachers' administrative supports such as training to acquire the required computer knowledge, provision of technical support staff and pedagogic development to achieve their educational objectives were lacking. For successful DLI program, technical support is essential in assisting teachers and learners in addition to diagnosis of digital systems problems, servicing the technology leading to optimization of the technology use in schools (Tinio, 2015; Li & Walsh, 2010). Installations, operations, maintenance, regular updating and repairs of digital equipment require knowledgeable and skilled persons. Technical support on site prevents loss of time and money due to technical breakdowns (Tinio, 2015; Neyland, 2011; Bingimlas, 2009).

Having digital learning resources in schools and the entire infrastructure without making use of them as intended due to lack or ineffective technical support is a big waste (Tinio, 2015). Availled technical support staff (TSS) to teachers in schools make digital learning integration easier, assist them develop competencies to enable them plan systematically for the selection, utilization, evaluation of the technology tools (Tinio, 2015; Nkula & Krauss, 2014). That is why lack of timely technical support personnel was a major

impediment to optimizing digital learning resources making the teachers' work difficult in Manila Philippines (Tinio, 2015).

In the Kingdom of Saudi Arabia, the provision of technical support was an impediment that was affecting digital learning integration in schools due to poor planning, preparations and management (Almalki & Neville, 2012). Despite Malaysia and the Kingdom of Saudi Arabia preparing adequately for DLI project in schools, they failed to hire technical support staff with the hope that the trained teachers could play the role. This indicates a gap between preparedness and digital learning integration.

Parents are key stakeholders in education and have vested interest, in the performance of their children in school directly or indirectly (O'Hara, 2011). Parental involvement within schools educational set up, greatly enhanced the morale of students, their general attitude towards education, and their academic achievement across all subject areas in UK (O'Hara, 2011). Similarly, Linden (2011) noted that parents in conjunction with teachers were a vital resource towards enhancing the digital learning integration experiences. Furthermore, parents played a leading role when it came to creating and nurturing an environment in which children learn and improve their academic work. In Singapore for instance, when pupils reach class 4, parents purchase digital learning devices for their children until they complete the primary level. This was made possible through public-private partnership collaboration and support of the national digital learning policies. This was an indicator that parents were incorporated and involved in preparations for DLI of their children and that there was collaboration between parents and the government (Lee et al., 2015). As a result their digital learning programs were very successful.

Resources are necessary tools that can bring about effective learning outcomes (Rebecca & Marshal, 2012). Institutions can realize their goals when facilitation resources are enough and available in good time. Availability of learners' digital equipment when measured using indicators such as student-computer ratio or access to the internet can be used to gauge the level of preparedness for digital learning to be rolled out (Li & Walsh, 2010).

Most developed countries are endowed with resources for digital learning. For instance, in Singapore the ratio of student to computer in 2015 was 2:1 in class one and 1:1 in class two and three (Lee et al., 2015). Further, the success of digital learning in Singapore emanated from good management practices, adequate preparations, and provision of the required resources and effective partnership with stakeholders. However, schools that had scarce digital learning resources experienced hardships while trying to implement digital learning integration in the classroom. For example, a study carried out by Rebecca and Marshall (2012) in India showed that electricity fluctuations and inadequate digital learning equipment in public primary schools was a major stumbling block to digital learning integration in the country. Similar impediments were also experienced in Keerom-Papua in Indonesia where availability of electricity was limited and low network connectivity (Bandung & Langi, 2011). In those countries where digital learning resources were inadequate DLI had challenges. Adequacy of resources is a gap between DLI and preparedness.

The African countries have made significant efforts in planning and adopting the DLI programs in their respective countries. Considering the emerging digital literacy of today and tomorrow's learners, strategies were developed to support improved teaching and learning (Nyambura, 2015). However, the management of the governments' strategies,

vision, and long-lasting commitment was lacking. For instance, Bizimana and Orodho (2014) noted that, although Rwanda had adequate DLI resources, some of the public primary schools did not have TSS which limited their ability to take advantage of digital technology. Similarly, Neville and Gafar (2012) documented that secondary schools in Nigeria lacked technical support expertise which contributed to delay in using digital technology tools (Neville & Gafar, 2012; Neyland, 2011).

Involvement of parents in DLI programs in the African region exists both at home and at school such as participating in schools' policy making, helping children with homework and communicating with teachers. In South Africa for example, parents' involvement in homework has significant influence on pupils' academic performance (Nkula & Krauss, 2014; Ramolora, 2013). Socio-economic background factors including income and poor parents' educational backgrounds weakened their involvement on DLI in rural public primary schools. This was because they could not afford to purchase laptops for their children to enable them doing assignments at home (Nkula & Krauss, 2014). In any public school, parents' participation in basic preparations for school projects is appreciated. Involvement of parents as key stakeholders in education was a gap which was limiting DLI success in South Africa.

Trained teachers on DLI are required to produce the intended results in their respective schools (Naiker, 2010). For example, South Africa was among the richest country in Africa yet, it presents an overall dismal picture of digital learning integration. Most teachers had not been prepared with basic computer skills in rural public primary schools of South Africa before introducing computers to learners (Naiker, 2010). Similarly, Nigeria initiated a One Laptop per Child (OLPC) programme for the 24 million public primary school pupils in 2006 without policy foundation and adequate preparations,

notwithstanding political commitment taken at presidential level. Only one million laptops were purchased and the program collapsed leading to a lot of resource wastage and conduit to siphon public funds (Hennessy et al., 2010). In addition, teachers in Nigeria were not competent in basic computer operations since they had neither undergone any training nor attended an in-service course leading to low penetration of DLI in public primary schools (Modasiro & Modupe, 2011). The success of DLI programme depended on how teachers were trained in that respect. Thus the teacher preparedness on DLI was a gap identified that hindered successful DLI.

East Africa countries have appreciated the importance of digital technology and have embarked on DLI programmes into the pre-existing education framework. In Uganda for example, the need to have computer literate population, the creation of an enabling environment for digital learning became inevitable (Markon, 2013). According to Markon (2013), Uganda made a significant push through policy formulation to have computer laboratories and a computer curriculum in secondary schools and purchase of modern computers. However, lack of serious management, leadership in the education system, caused the schools to be unprepared since they lacked the information of how to successfully handle the digital transition and schools also lacked technical experts, teacher training for equipment use and inadequate digital learning resources (Laaria, 2013). Most of the computers used in schools in Uganda were donated by U.S. and Great Britain. Without availing digital learning integration resources by various stakeholders in education and after assessing the necessary conditions and parameters of each school, digital learning integration cannot be successful. The study identified gaps in preparedness on the adequacy of digital learning resources to enable successful DLI.

Some parents in East Africa participate in their children's school matters as if they have equal responsibility with the school or as if it is mainly or wholly their responsibility (Laaria, 2013). In Tanzania for example, private primary schools parents invested heavily on digital learning integration (Laaria, 2013). The parent-private schools took advantage of the national digital learning integration guidelines which were advisory in nature and sponsored DLI programme in their schools. However, there was no collaboration between parents of public primary schools and the head teachers or a school-level policy to advance the support of digital learning integration (Markon, 2013). Not involving parents in digital learning program is an impediment to digital learning integration (Sang et al., 2011). A lot of support is required financially, morally, and in planning and management by parents as key stakeholders in education to ensure DLI was fruitful. The study identified involvement of parents in preparations for DLI as a gap that contributed to unsuccessful DLI programme.

Technical support staff is not available for schools in East Africa (Markon, 2013). In Tanzania, for example, the digital learning integration policy does not have a strategy on how technical support staff will be availed to schools to ensure maintenance and sustainability (Hennessy, et al., 2010). Some minor repairs, fixing technical faults and network configurations were a great impediment in Uganda for lack of technical support staff (Markon, 2013; Laronde, 2012). Where technical support was lacking, it meant that preparations were inadequate or lacking leading to a lot of wastage in terms of time, resources, hence, ineffective DLI programme. The study identified preparedness of effective technical support staff as a research need.

Kenya DLI strategy in the policy documents seek to facilitate development of digital content, power supply to schools, training of teachers and supply of tablets to learners

(Nyambura, 2015). Digital learning in Kenya is viewed as a key enabler for Vision 2030 and the education system is undergoing reform so that it is aligned to the Government's DLI initiative (Nyambane & Nzuki, 2014). The Government of Kenya (GoK) is committed to ensuring that all the children are given opportunities to develop digital skills and attributes that could enable them become successful learners and responsible citizens (Kenya, Education Management Institute, 2011).

The GoK embarked on digital learning curriculum development through Kenya Institute of Curriculum Development (KICD) in 2013. Interactive subject matter for Mathematics, Science, Social studies, English and Kiswahili subjects was prepared by KICD. In addition, power supply to public primary schools (PPS) in the country and preparing teachers to acquire skills that were required for DLI programme was scheduled to have been completed by December 2015 (Nyambura, 2015). About 150 public primary schools were selected for a pilot run of the digital literacy to benefit lower primary pupils (Kenya Information Communication Technology Authority, 2016). Three schools from each county were selected for piloting to explore and demonstrate the feasibility of digital learning integration. The schools selected in Meru County were Kigane, Amwamba, and Kaaga primary schools. The pilot study was undertaken from January to October of 2015 (Kenya Information Communication Authority, 2016). Adequate preparations measures are essential before embarking on project preparations. The study noted DLI programme preparations as an impediment to a successful programme implementation.

Teachers with both digital technology and teaching methods skills are significantly effective in digital learning integration in the classroom (KEMI, 2011; Okutoyi, 2013). However, in Kenya, lack of well trained teachers on digital technology skills and

pedagogical skills to handle digital learning integration in secondary schools has been recognized as a major impediment (Dzidonu, 2010). Secondary schools teachers in Nyeri County lacked expertise in digital learning integration hence could not integrate digital learning in their respective schools (Khatete et al., 2015). Despite training of teachers being given priority as indicated in the policy document, teachers were insufficiently trained on digital literacy (Nyambura, 2015). It is evident that in-servicing or training of teachers in digital technology may support teachers in gaining knowledge, skills and confidence for DLI application in the classroom. Teachers' training on DLI was a research gap that this study looked into.

A policy guideline on digital learning integration in Kenya had put into account provision of adequate infrastructure to facilitate DLI (Hennessy, et al., 2010). Strategies of equipping schools with relevant and up-to-date digital learning resources were essential in any learning institution (Sang et al., 2011). Lack of resources prohibits the adoption and use of digital learning integration (Li & Walsh, 2010). Primary schools in Kenya lack adequate resources for DLI (Kindombo et al., 2012). For example, Musa Gitau primary school with 405 students had 20 computers with no network connectivity, and Githunguri with 800 pupils had 14 computers without connectivity (Kindombo et al, 2012). Lack of enabling resources, including classrooms, electricity, internet connectivity and computers posed a hurdle to the integration of digital learning education curriculum (Mugo, 2016; Keiyoro, et al, 2012). With, insufficient digital learning integration resources, the acquisition and use of 21<sup>st</sup> century skills that involve inquiry based learning was not likely to be achieved sooner rather than later. Making DLI possible and easier through resource mobilization before rolling out the digital programme was identified as a research gap.



Digital learning integration TSS when provided to undertake maintenance and repairs of digital technology tools ensures that the resources were not underutilized. Technical support was lacking in majority of Kenyan secondary schools (Laronde, 2012). Maintenance of digital learning integration tools was an uphill task without regular technical personnel in Kenyan secondary schools (Kelles, 2010). Having technical support staff in schools was a policy and should be effected and supported by administrators and managers of both schools and MoE (Onduru, 2012). Several secondary schools in Buuri sub-county have many un-updated, unrepaired and unmaintained computers leading to underutilization due to lack of technical support staff (Kwamboka, 2015). The poor state of maintenance of digital learning resources shows that the policy guidelines were not offering solutions without a follow up from those charged with the responsibility. The study established availability of technical support staff as a research need.

Most parents in Kenya are always ready and willing to be incorporated in education matters of the learners (Ogembo et al., 2012). Parents actively participate in planning and monitoring of school projects and programs in Kenya if they were sensitized and involved (Mugo, 2016). Although parents were represented in the Board of Management of Schools through the Parent Teachers Association (PTA), parents were rarely involved in digital learning integration programme preparations. However, the success of the DLI programme is dependent on involvement of key stakeholders such as parents. Therefore, it was at the prerogative of the head teachers to decide when and where to incorporate them. Involvement of parents on digital learning integration programme preparations was a research gap that the study identified.

Policy framework for digital learning integration in Kenya was formulated in the form of session paper No 14 of 2012 where the government through MoE promised to enhance DLI (Gikundi, 2013). Policy as a link indicates clearly on what is to be prepared for successful DLI programme. Teachers' needs digital technology knowledge and pedagogical skills which affect the quality of DLI application in the classroom (Mugo, 2016). However, any DLI policy without emphasizing teacher preparedness through training was most likely to fail (Sang et al., 2011). A study by Mwiti (2014) revealed that although 75.2 % of the PPStutors in North Imenti sub-county had been inducted to handle DLI in the classroom, only 42.35% of those inducted teachers attempted a DLI lesson. Similar impediments to DLI were noted in Tigania West Sub-County secondary schools (Gikundi, 2013). However, the studies did not analyze the causes that led to teachers' failure arising from interplay between policy, management of DLI, and DLI strategic planning on teacher training and establish why teachers were not trained first before embarking on the integration. PPS in Meru County could be experiencing similar impediments of teachers' preparedness as the schools embark on digital learning integration program. Knowing how these barriers affect teachers' digital learning integration process formed the basis for the study. It was against that background that the study analyzed preparedness of teachers from policy to the classroom application of DLI programme for effective programme implementation in Meru County.

Teachers often face digital technology tools breakdown in the classroom. These include tablets, computers among others which give teachers significant constraints, especially when there is no technical support (Neville & Gafar, 2012). Technical challenges that impede the smooth DLI were found to be a major barrier in Buuri sub county secondary schools (Kwamboka, 2015). Similar situation was found in Tigania West sub-county

(Gikundi, 2013). The two studies however, did not go into details of the policy, integration preparations and the management of the entire DLI program. To ensure DLI tools work effectively leading to desirable DLI programme TSS is inevitable. It was against that background that the study analyzed the preparedness for digital learning integration with respect to availability of TSS.

Parents in local schools in Meru County are involved in secondary school matters through their representative PTA whenever they are called to do so (Gikundi, 2013). Very little research had been done on involvement of parents with respect to preparedness on DLI in public primary schools from locally to global perspective. Despite huge investments in public education parents are not actively involved in complementing DLI investments in schools. Against this background, and since DLI was relatively a new program for public primary schools, this study addressed the following: teacher preparedness through DLI training, availing digital learning resources, availing technical support staff, and parents' involvement in DLI preparations before the program was rolled out.

### **1.2 Statement of the Problem**

Adequate preparations before embarking on DLI programme in schools are critical in order to satisfy the requirements of the pupils and the country at large. DLI has been found to be very useful in teaching and learning process (Bitter & Legacy, 2009; Bandung & Langi; 2011). However, the conception, adoption and eventual integration of DLI depend on preparedness of individual schools and institutions (Keiyoro et al., 2011). Adequate preparations, such as training of teachers, adequacy of digital learning resources, effective technical support staff and involvement of parents in DLI have made the programme very successful in several countries such as Malaysia (Ghavifekr &

Sufean, 2011), China (Li & Walsh, 2010), Turkey (Goktas et al., 2013), UK (O'Hara, 2011) and Israel (Blau & Hameiri, 2016).

Notwithstanding the above, some countries embarked on DLI programmes without adequate preparations in schools with respect to training of teachers on DLI in US (Judson, 2010), provision of adequate resources in India (Rebecca & Marshall, 2012), providing technical support staff to schools in Manila Philippines (Tinio, 2015), and not involving parents in South Africa (Nkula & Krauss, 2014) DLI had challenges in schools. Thus, preparedness determined the success of DLI.

The GoK rolled out DLI programme in PPS in the 47 counties in 2016. It allocated Kenya shillings 17.58 billion for preparations through deployment of digital learning devices, development of digital learning integration content, teachers' capacity building, hire technical support staff, sensitize and involve parents in DLI in public primary schools in 2015/2016 budget (Kenya Information Communication Technology Authority, 2016). It was expected that with such huge budgetary allocation, teachers would be trained, adequate resources supplied, avail TSS to schools and involve parents in preparations for a successful DLI programme. However, digital learning integration programme which was scheduled to take off in January 2014 in 47 counties was pushed to January 2015, then to January 2016 and then again to January 2017. Further, the programme was marred with confusion as MoE made contradictory statements on DLI preparedness of PPS against what was on the ground. The problem can be attributed to schools' preparedness on DLI before rolling out the programme. Teachers and stakeholders had raised issues through the media since teachers had not been in-serviced or trained on DLI and the programme had been rolled out before adequate digital learning resources were distributed to all schools. Further, effective technical support

staff had not been constituted nor had parents as stakeholders sensitized and included in digital learning integration programme preparations (Sossion, 2017). There were complaints that money disbursed was too little and that digital equipments were lacking (Onyango, 2018). Further, budget for the digital programme was thwarted by members of parliament by reducing the budget by nearly 6.4 billion for the financial year 2018/2019 and that 4,951 PPS had not received tablets by July 2018 (Otieno, 2018) yet the programme was on course. The consequences of such inadequacies are unsuccessful DLI programme leading to resource wastage bearing in mind that the future of education lies in embracing DLI, online learning and other forms of digital learning that depended wholly or partially on digital technology.

Despite the government commitment to digital learning integration programme implementation, the process in PPS in Meru County seemed very slow with the problem directed to preparedness gaps with respect to; training of teachers to equip them with digital technology skills, adequacy of digital learning resources, provision of technical support staff to schools and involving parents in readiness for DLI programme. This study identified preparedness for DLI before the programme roll out in PPS in Meru County as a problem that needed to be looked into. Further, previous studies majority of which were carried out in secondary schools have not addressed how the gaps affected DLI in PPS in Meru County. If the problem is not addressed, digital learning integration program is likely to be unsuccessful hence leading to resource wastage, inadequate learning outcomes, inequitable access to digital learning resources, diminished public benefit and fail to alleviate basic educational disparities. It is on the basis of this research gap that the study was conducted to analyze preparedness for DLI programme with

respect to teachers' preparedness, adequacy of digital learning infrastructure, effectiveness of TSS and parental involvement in PPS in Meru County.

### **1.3 Purpose of the Study**

The aim of the study was to analyze the extent of readiness of public primary schools in Meru County for digital learning integration programme. This was meant to validate the specific preparations with regards to planning, training arrangements, sensitization, and involvement of parents.

### **1.4 Objectives of the Study**

The following four objectives guided the study:

- i. To analyze teachers' training preparedness on digital learning integration programme in public primary schools in Meru County.
- ii. To examine the adequacy of digital learning resources in public primary schools in Meru County.
- iii. To analyze the preparedness of technical support staff on DLI programme in public primary schools in Meru County.
- iv. To examine the extent of involvement of parents in preparations for digital learning integration programme in public primary schools in Meru County.

### **1.5 Research Hypothesis**

The study had four research hypotheses that guided the investigation. They were tested at  $\alpha = 0.05$  statistical level of significance.

- i.  $H_{01}$ : There is no significant relationship between teachers' preparedness for digital literacy programme and digital learning integration in public primary schools in Meru County.

- ii. Ho<sub>2</sub>: Adequacy of digital learning resources does not significantly affect digital learning integration in public primary schools in Meru County.
- iii. Ho<sub>3</sub>: There is no significant relationship between preparedness of technical support staff and digital learning integration in public primary schools in Meru County.
- iv. Ho<sub>4</sub>: There was no significant relationship between parents' involvement in digital learning integration program preparations and digital learning integration in public primary schools in Meru County.

### **1.6 Significance of the Study**

The intention of the study was to analyze the preparedness of schools for DLI programme before it was rolled out in PPS in Meru County. The findings are of great importance to public primary schools in Kenya, policy formulation and decision making in respect to effective digital learning integration programme. The study exposes the level of government investment preparedness and achievement of the same in readiness for DLI program roll out. The GoK, as a financier and project owner would like to see a successful DLI program that was capable of making a significant contribution to education in the county and the nation at large. Therefore, the study provides useful insights on continuous improvement of the digital learning integration planning and preparations and management matrix that can help to optimize the application of digital technology in classroom learning acquisition of knowledge.

The study gives direction on how the digital learning integration policy should be interpreted, the magnitude of the preparations before program implementation by MoE officials, county and sub-county Directors of Education (SCDEs), stakeholders, PTA, head teachers and teachers. It exposes strengths and weaknesses about digital learning

integration program preparations which can be reinforced and rectified respectively. The findings are of great use when formulating education policies and when evaluating the current policies on digital learning integration preparations to enable them harmonize the documented policies, the actual practice, procedures on the ground, and provide suggestions on areas of future development.

The findings are also useful to sectors in the GoK such as MoE, Ministry of finance, Ministry of ICT and other stakeholders such as donors and parents. They inform policy changes needed in fostering digital learning in public primary schools. The findings are useful in informing the general public about the progress of DLI programme and to understand the existing issues. The findings are important as a means to understanding how various aspects work together in making digital learning a reality. The findings will further enhance public awareness about DLI. Future studies may be built on the findings to provide more insights on how to help teachers improve the preparations of DLI environments for effective application of the innovation. The findings are useful to other researchers who may wish to undertake research on DLI in PPS, add empirical information to existing literature on digital learning and form a basis for further research since digital learning is emerging as a permanent feature for closing the knowledge gaps in the classroom and it is gradually being entrenched in the education sector worldwide. Moreover, the findings contribute to filling the knowledge gaps which were initially identified, and are useful tool for building knowledge and for sharing valuable information to the society at large.

### **1.7 Scope of the Study**

The study was undertaken in Meru County only though DLI was a programme that was rolled out in all PPS in Kenya. The study aimed at analyzing the preparedness of PPS in



Meru County towards DLI which was a new programme that was rolled out in 2017. The study covered all PPS in Meru County. It targeted SCDEs as coordinators of the programme in the county, head teachers, PTA as school managers, teachers as implementers of the programme in the classroom, and pupils in grade 3 as the first learners to be introduced to the digital programme. The study concentrated on four constructs: preparedness of teachers', availability of digital learning resources, availability of TSS and involvement of parents in DLI programme. The study did not examine deeper internet peripherals such as internet protocols wide and local area networks and related devices. The study did not also collected data from the MoE officials.

### **1.8 Limitations of the Study**

The study was undertaken in Meru County though DLI was a program that was rolled out in PPS in Kenya. However, there was inadequate literature on DLI in PPS hence overreliance on secondary schools' literature. PTA executive were used due to limited ability to access all parents. PTA is a body selected by parents to represent them in all school matters hence their remarks and observations were considered adequate. The study covered PPS only though there are private primary schools in the county. This is because DLI programme is fully sponsored by the government and covers only public primary schools. This implies that the findings cannot be applied in private primary schools. Observing the implementation of integration patterns over time was not possible in this study. This research was transactional in nature as data was collected once. In this study respondents were posed with interrogative questions that helped to establish intrigues of implementation and which further assisted in establishing how such could be attributed to level of preparedness for integration.

### **1.9 Assumptions of the Study**

The assumption of the study was that all public primary schools are undertaking DLI programme and that learners and teachers were actively engaged in the classroom application of digital tools. Further, the study assumed that parents embraced the digital programme.

### **1.10 Operational Definition of Terms**

The terms used in the section are explained with the intention of have a meaning that is clear and easy to understand with respect to the study.

#### **Analysis:**

A detailed examination of anything complex in order to understand its nature or determine its essential features (Mirriam-Webster, 2020).

#### **Adequacy:**

The state, or quality of being sufficient (MLA CHICAGO APA, 2020). Digital learning resources were required to meet the needs of the pupils satisfactorily

#### **Digital Learning Programme:**

A type of learning that is facilitated by digital technology tools such as laptops, tablets and their accessories or by teaching people through making use of pedagogy and graphics that enhances knowledge retention power and students' learning skills (Kenya Information Communication Authority, 2016)

#### **Digital Learning Integration:**

Transforming teaching and learning through integrating technology in the learning environment. The learning system allows the teachers and students to improve teaching-learning processes and get immediate feedback for their responses and then move on to the next section. Digital learning can also improve the students' and

teachers' communication, investigative, numerical, literacy and other skills (Roblyer & Doering, 2014).

**Digital Technology:** These are electronic tools, systems, devices and resources that aid pupils and teachers in the classroom during lesson progression. The study considered digital tools such as network connectivity, tablets, laptops, computers and their accessories among other digital tools as digital technology (Roblyer & Doering, 2014).

**Education Policy:** The documented plan of action that influenced preparations for DLI programme and the application in the classroom to make better the quality of teaching-learning process and achieve the desired targets in schools (Singh, 2016).

**Implementation:** Providing a practical means of accomplishing something (Princeton's Word Net, 2020). DLI plan needed to be executed.

**Involvement:** Condition of participating in something (lexicon.com, 2020). Parents do participate in education matters of their children when required.

**Information Communication and Technology Skills:** The ability to perform some specific behavioural tasks with respect to ICT (Rabah & Sanja, 2013).

- Preparedness:** Involves planning and provision for digital learning integration. DLI programme required planning, coordinated activities and programmes or structures that enable effective and optimal output, and reduced resource wastage and duplication. For example, training of teachers and eventual digital learning integration is an indicator of preparedness, whereas, with the technical support, the indicators will be through the repairs and continuous maintenance of digital learning tools (Haddad, 2013).
- Pedagogical Skills:** Teaching methods that teachers use in digital technology integrated lesson delivery and the activities designed to ensure effective learning takes place (Boundless, 2017).
- Parental Involvement:** Parental involvement can be explained as parent-reported participation in attending scheduled school meetings, as a school committee member or involvement in school activities such as the provision of resources such as classrooms, laboratories, books, digital learning tools and many others. The involvement of parents in education matters such as digital learning integration in school ensures improved communication, relations, better reputation and improved community support of the school and the programs hence improving the performance of the learners (Ryan, 2017).

**Stakeholder:** A person, group or organization that has interest or concern in an organization. For this study parents are the stakeholders (Roblyer & Doering, 2014)

**Tablet:** Tablets are portable fully functional computers that have interactive content for Mathematics, Science, Social studies, English and Kiswahili for DLI programme (Roblyer & Doering, 2014)

**Teaching and Learning Digital Resources:**

Infrastructure and digital machinery that teachers use to deliver instructions that support students' acquisition of knowledge (Rebecca & Marshall, 2011).

**Technical Support:** Technical assistance such as repairs and maintenances provided to users of digital machinery such as laptops, computers, tablets and software by teachers (Tinio, 2015).

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

The chapter provides a discussion on reviewed literature on preparedness on digital learning integration. The discussion herein has been organized according to the main themes as reflected in the objectives of the study. The main constructs cover preparedness on implementation of digital learning integration; preparedness based on digital learning resources, technical support, involvement of parents in digital learning integration, and a discussion on national policy on digital learning integration. The chapter concludes by discussing theories that informed and guided this study as well as a presentation of a conceptual framework which helped to operationalize this study.

#### **2.2 Theoretical Review +Theoretical Framework**

The study was anchored on Rogers Diffusion of Innovation theory (RDI) by Everett Rogers (1995) and on Warren Boum's Project Cycle (1992).

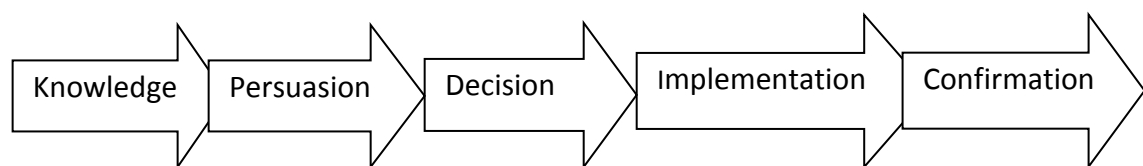
##### **2.2.1 Rogers Diffusion of Innovation theory**

Rogers (1995) RDI theory provides a general way of understanding innovation and how it spreads within and across institutions with respect to the human application and progress with the aim of improving and expanding individual capabilities, outcome and learning.

Everett Rogers is considered as the founding father of diffusion theory and how innovations are adopted, spread, and used. The RDI theory describes how an innovation is passed on through a social system from an individual to another, organization to another and so on (Rogers, 2003). The diffusion process has effects on four elements: emergence of innovation, avenues of passing the innovation, time taken for the

innovation to be adopted, and the individuals involved (Rogers, 2003). A new idea or technology as considered by the user is an innovation (Rogers, 2003). The rate of new technology acceptance and use depend on the mode of communication and how individuals communicate among themselves (Rogers, 2003). The process of individual's acquisition of knowledge to the final stage of adoption requires time and preparations for the innovation adoption. Therefore, time and preparations were essential before the adoption of DLI. A social system is made up of individuals, groups or organizations that are set to achieve common goals through their participation (Rogers, 2003). An individual or organization must seek information about the innovation in which the process becomes the source of motivation for the innovation adoption (Rogers, 2003). Schools should be in the forefront in ensuring that teachers have the necessary skills to implement DLI. Five steps: knowledge, persuasion, decision, implementation, and confirmation are involved in innovation- decision-process. Figure 2.1 shows the innovation-process.

**Figure 2.1: Stages of Innovation-Decision process**



Adopted from Diffusion of Innovations Theory, Fifth Edition (Rogers, 2003)

Knowledge stage involves understanding acquiring the skills about the innovation (Rogers, 2003). Three types of knowledge are mentioned in RDI theory: firstly, is the awareness-knowledge representing the existence of knowledge of innovation which eventually motivates the individuals to adopt. Thus, sensitization of all key stakeholders including teachers about the digital project before the project is rolled out is essential. Secondly, knowing the advantages of an innovation to be able to make use of it, thirdly,



is acquiring knowledge of the working principles of the innovation. Therefore, a person using the innovation should be knowledgeable on how to use it effectively and productively. Teachers' acquisition of skills on how to use digital technology in teaching is relevant. Digital technology creates good learning environments and opportunities for schools and learners since it improves engagement, improves knowledge retention, encourages individual learning, encourages collaboration, and useful skills are learnt (Pano, 2020). Teachers must have pedagogical skills before undertaking digital learning integration activities to boost their output. Teachers should have adequate preparations through training to make them knowledgeable about digital learning integration before introducing it in the classroom (Kamau, 2014).

The attitude is shaped after the individual knows about the innovation during persuasion stage (DeMerez et al., 2011). Teachers' attitude is significant in adopting and applying the innovation in the teaching process (Naiker, 2010). Teachers should have a positive attitude to effect digital learning integration program progressively. Individuals or an organization decides what the best thing to do during decision stage is. Quality decision to roll out the programme was best placed to be done after pilot study and training of teachers. Once the innovation is accepted it is put into practice. In this case technical support team is needed to ensure the implementation is successful. Technical help to teachers to enable them use computers and other products during digital learning integration teaching process was inevitable. Adoption of innovation is confirmed if its performance is satisfying and meets the needs of the individuals. The innovation therefore, must have relative advantage, compatible with individual's needs, not complex, can be applied and the results are confirmed. The understanding of relative advantage is that DLI will be better compared to similar products. The innovation DLI

should not be complex so that it can easily be adopted while in trial ability learners should access the innovation.

Hardware and software and other related digital learning integration tools should be user-friendly and advantageous compared to other innovations to avoid complexity which is an obstacle to innovation adoption. The more the innovation is tried the greater the rate of adoption and that the results should be visible to others hence acting as a motivational factor in adoption (Rogers, 2003). Availability of digital learning resources is of necessity for faster digital learning integration. The digital learning integration enables students to generate knowledge and practice and acquire new skills since the digital technologies are interwoven into curricula. Therefore, the innovation offers a relative advantage (Nkula & Krauss, 2014).

The Rogers Diffusion of Innovations Theory shows clearly that teachers' increased access to digital technology resources, training to meet technological and pedagogical needs, access to technical support to deal with technology challenges, and involving parents who are key stakeholders in education were critical to DLI preparations and adoption. For effective use of the digital technology in the teaching process, teachers' digital knowledge and pedagogical skills were key prerequisite. The variable teacher preparedness via training, resource availability, technical support and parental involvement was critical to the study. The RDI theory was useful to this study on digital learning integration preparedness in PPS. The theory made the understanding of technology innovations in training of teachers on digital technology useful. The demand for quality education has significantly made the digital learning integration to become imperative (Naicker, 2010).

Parental participation involves links between family and school interaction in the provision of digital learning resources (Linden, 2010). Resources and parental involvement were also variables under scrutiny in the study. Thus, diffusion of innovation was useful in answering questions regarding the nature of preparations done in advance before introducing DLI to PPS. That is, the kind and number of digital resources purchased in advance, and prior participation of parents in the preparation to digital learning of their children.

The RDI theory failure to reach 100% perfection due to weaknesses such as preparations, cost, lack of support resources, and failure to make immediate impact, which makes the theory to be criticized. In addition, the theory structure provides a one-way information flow. It moves from the opinion leaders downwards to the locals and not vice versa. The person controlling the change controls the direction of outcome of the innovation adoption. The theory does not quite give a clear prediction of how the innovation will be successfully be integrated or implemented (Ismail et al., 2013).The theory does not talk about the management of the innovation on or before integration in a complex environment such as schools which requires a participatory approach.

### **2.8.2 Warren Boum's Project Cycle**

Warren Boum (1992) project management cycle is primarily an instrument aiming to achieve a certain goal by planning, controlling and scheduling within the boundaries of an organization (Erno-Kyolhede, 2000). A project is an endeavor that requires adequate and collaborative preparations within a clearly specified time, cost, and supportive environment (Prokaoiadon, 2011). Project management cycle is based on thorough planning including start and end dates, resources availed, clear budgets, schedules of activities and dynamic leadership. Project management cycle ensures proper planning for resources, participation and ownership by all stakeholders, agreements, and

commitments that ensure sustainability for investment. In addition, project management approach ensures principles of good governance that leads to transparency, accountability, accuracy, and credibility of reports. In this case involvement and collaboration between head teachers MoE, SCDEs to prepare, supervise the whole process of digital learning integration was inevitable (Laaria, 2013).

Projects have phases that require preparations for implementation to achieve the desired results (project life cycle). The life of the project is divided into four phases: project formation (conceptualization), project build-up (planning), main program phase (execution), and phase-out (termination) (Boum, 2010). The policy phase at conceptualization enters the planning phase to influence action in the project but its importance diminishes as the project progresses. The first phase also requires identification and understanding of the problem to be addressed by the project by carrying out needs assessment and baseline survey. The theory was relevant to this study because digital learning integration project required the stages of project management. The GoK is undertaking a digital learning integration project in all the PPS. The project aids in achieving desirable learning outcomes in the classroom to raise the standards of learning which in turn will be fruitful to the locals and the nation at large. In project preparation stage, the goals and objectives are clearly defined. A design is developed containing what will be done, time frame of doing the tasks and persons responsible for the task (Boum, 2010). This stage forms the basis for evaluation, establishes a contract and sets out the duties and responsibilities of each of the involved parties. At this stage, it is ensured that everything is ready before the roll out of the project.

The study analyzed the state of preparedness of PPS for digital learning integration project with respect to provision of digital learning resources, training of teachers, and

availability of technical support staff and involvement of parents in digital learning integration project. Therefore the stage was relevant. If the project was well planned, then it must be technically feasible, workable, politically sustainable, and socially acceptable (Kennedy & Nevcombe, 2011). In project appraisal stage, reviewing of all the aspects of the project are done to give information of whether the project should proceed or not. The benefits and gaps are identified, and the core problems come out clearly. The study sought to analyze whether teachers were trained, infrastructure and digital learning tools were available and hiring of technical support staff was available and whether stakeholders were involved in preparations before the roll out of the program. Therefore, project management required a series of activities carefully planned, studied and implemented as per the schedule so as to meet project requirements (Kennedy & Nevcombe, 2011). Teachers required specialized knowledge and skills, resources, technical support staff, and involvement of stakeholders to reduce the level of risks and wastage thereby enhancing the likelihood of project success.

Negotiation takes place throughout between team leaders and the financiers of the project (Kidombo et al., 2012). Head teachers and MoE officials were team leaders in digital learning integration project and therefore they were expected to be always being in touch with the government. This is because various management processes and techniques are required to monitor the project, control quality, time, costs, and scope of the project through strategic planning, capital budgeting, project management, internal communications, change management, quality management, and time management (Kidombo et al., 2012). The last stage was implementation after evaluating that all work was done as was planned. The project team leaders are in charge of the supervision and allow other stakeholders also to supervise the project. In this stage, the activities involved are: Production of training manuals, Training of teachers, provision of

resources, orientation of teachers, production of curriculum materials for the learners, orientation of key project personnel, construction of laboratories and storage rooms, hiring technical staff, cost management, quality control, and many others. At various stages of project development and implementation, evaluation studies are undertaken to provide direction to the project. Evaluation attempts to determine the relevance, effectiveness, efficiency, and effects of project activities in light of the objective of the project. It is learning and action oriented process for improving activities. Such an activity that ensures largely that input leads to output and those activities are implemented as was planned (Kidombo et al., 2012).

Project Management theories have been criticized for not being scientific models but instead they are of something an art. This shows that theory and practice are different. Thus the project management is hands on through practice and mobilization of resources for implementation (Lalonde et al., 2010). The project can easily fail if human factors such as conflict between actors, political issues, power relations, policy interpretations, management styles, and communication problems are encountered (Lalonde et al., 2010). The theory should be used to enrich ones understanding of the project from different angles hence the theory weakness did not affect the study.

### **2.3 Empirical Review, Conceptual Framework and Operationalization**

This section provides a discussion on studies that have been done on DLI preparedness in public schools. The reviewed literature is organized according to the research objectives namely: teachers' preparedness on DLI, adequacy of digital learning resources, effectiveness of TSS, involvement of parents in DLI programme preparations.

The chapter concludes with a summary of reviewed literature and a review of theoretical and conceptual framework that guided the study.

#### **2.4 Teachers' Preparedness on Implementation of Digital Learning Integration**

Preparations before embarking on any teaching task in the classroom are significant for any meaningful learning to take place. Teachers' knowledge of digital skills and pedagogy influence directly or indirectly on digital learning integration success in the classroom (Wambiri & Ndani, 2016). Teachers' preparedness indicators that were found to be very useful in DLI programme preparations were as follows: teachers' information on the working of digital tools and pedagogical skills through training, in-service programs, management of training in DLI by MoE, and application of DLI tools in the classroom.

Digital skills refers a wide ranging set of abilities related to digital technology including computers, websites, online platforms and much more and their applications (Roblyer & Doering, 2014). Knowledge on digital skills focuses on which tool to use and how to use it (Richardson, 2011). A qualified teacher in education field must have knowledge on how to operate and use the most current digital and information tools that deal directly with teaching and learning applications in the classroom (Doering & Roblyer, 2014). Teachers should acquire knowledge in areas such as: word processing skills, spreadsheet skills, database manipulation skills, working knowledge of computer security, computer peripherals and related data storage devices, educational copyright knowledge, world-wide web navigation and many other skills (Doering & Roblyer, 2014). In a DLI programme, teachers provide guidance and assist the learners in the teaching and learning process (Higgins & Moseley, 2011). Therefore, teachers should be prepared

with digital skills and knowledge so as to engage the learners fruitfully in the course of integrating digital technology in the classroom (Fammi et al., 2013).

Teachers' preparedness requires high competency on digital technology skills which are acquired through training. Inadequate knowledge or lack of it on digital technology delays the progress to the realization of digital-related objectives (Nyagowa et al., 2014).

Teachers may provide project-based activities and approaches that involve the students (Hu & Garimella, 2014). Additionally, teachers must come up with different strategies for learning that allows them to be able to advise the learners on which strategy best suits them, and work towards the desired academic outcome (Perira & Perira, 2013). With well-trained teachers on digital technology skills, the classroom delivery can be very effective and in realizing the education needs of learners and nation (Rahuman et al., 2011).

Global investments in digital learning integration to make teaching better in schools have been initiated in education sector worldwide but not void of challenges (Bebell & O'Dwyer, 2010). The US faced challenges of not having enough trained primary school teachers and also the extensive and intensive in-service teacher training offered was inadequate though the schools were well equipped (Nut, 2010). The purpose of having a DLI trained teacher is to ensure that DLI is effective and that there is value addition to the learners. Malaysia successfully implemented DLI because teachers were adequately prepared through training (Ghavifekr & Sufean, 2011). This is because merely providing digital learning integration equipment is not sufficient to promote meaningful educational change in the curriculum. Tay et al., (2013) study in Singapore recommended that teachers need to be supported in renewing skills which would enable them to integrate digital technology in the learning environment. Their findings further



revealed that without preparing teachers while in advance through training on DLI the quality of teaching would be compromised. Singapore is one of the countries that successfully implemented DLI in primary schools from grade 1 after retraining teachers on DLI. Sri Lanka lagged behind in rolling out digital learning integration in schools because teachers recruited lacked digital technology skills (Rahuman et al., 2011). Therefore, digital learning integration management strategies had not identified training of teachers as a priority in US and Sri Lanka which made technology rich classroom environments challenging to teachers.

In Chinese secondary schools, ninety-one percent (91%) of the teachers had received training where seventy-five percent (75%) of the training was how to develop course plan, teaching notes and exercises, website access was about (69%), and e-mail communications (68%). In addition, 65% of the teachers were trained on how to undertake PowerPoint presentations while 61% in the use of Excel (Li & Walsh, 2010). Correspondingly, the trained teachers made their classroom instruction more engaging and motivating to the learners, and offered more efficient teaching and learning (Li & Walsh, 2010). However, in Chinese rural primary schools did not have adequate trained teachers on DLI yet the program was on course. Without supportive leadership, planning and action from the school leaders, successful digital learning integration in the classroom cannot be realized (Hatlevik & Arnseth, 2012). It was evident that schools that had trained teachers were doing very well whereas the rural primary schools did not have. From the reviewed literature, it is evident that trained teachers on DLI determined how successful the digital programme was. The study found out teacher preparedness through training was a gap that affected DLI implementation.

In Africa, success of digital learning integration has been influenced by teachers' knowledge on digital technology skills. In Ghana for example, some teachers in primary schools were partially trained while others were not trained at all (Yaw Sykyi, 2012). This made the digital learning integration ineffective. As a result, Yaw recommended to education service board that a lot of training, in-service and workshops for teachers was required if quality digital learning integration was to be witnessed in the classroom. Similarly, Nigeria introduced a programme where each child was to get a laptop in all PPS after the president made political commitment before preparing teachers to acquire the necessary skills and knowledge (Hennessy, et al., 2010). Introducing digital learning integration in the curriculum without first preparing teachers through training was retrogressive since teachers are implementers of the programs in the classroom. The two countries had digital learning integration policies, the management preparations and strategies that could have allowed the training of teachers before embarking on the project were lacking. The questions that arose and required answers were: do teachers need to be trained or in-serviced on DLI? Are teachers able to use digital tools in the classroom for teaching and learning process without training? The study found out that for a successful DLI, capacity development to improve the quality of teachers is inevitable. This study collaborates with the above studies on the need to prepare teachers on DLI before rolling out the programme in Meru County.

Digital learning integration in East Africa was viewed as important because of its ability to aid facilitation of teaching. Though Tanzania had introduced digital learning integration in public primary schools, teachers were not trained to enable them focus on increasing efficiency and integrating digital learning integration to improve teaching and learning outcomes (Markon, 2013). It was also observed that teachers in Uganda who

were unable to integrate digital learning into their lessons cited lack of complete understanding of digital learning resources. This was because the computers had arrived before the training of teachers could be done. However, those teachers who appreciated the opportunity to improve their lessons struggled to work on their digital skills individually (Markon, 2013). Broader skills, such as planning, management of digital learning preparations and implementation strategies that could have spearheaded the training of teachers were lacking in East Africa countries (Laronde, 2012). Acquisition of digital learning skills individually through experience cannot achieve the required standards since there were still gaps on training of teachers. Planning, effective leadership and management before introduction of the program were inevitable. These interventions can only be realized with adequate preparations. The study sought to find out the extent of teachers' preparedness on DLI before the project was rolled out in Meru County.

In Kenya, digital learning integration in public primary schools was rolled out in January 2017 in all the 47 Counties. The government embarked on digital learning integration program in all PPS by availing appropriate digital learning tools and requisite infrastructure required to support DLI programme (MoE, 2016). The Ministry of Education trained a team of 150 master trainer teachers from across the country that was then sent to the county level to train their fellow teachers. Furthermore, KICD) prepared a software that was to be used for the digital learning (ICT Authority of Kenya, 2016). That was a step forward because some of the children especially in rural and slum areas did not have suitable educational material and their parents could not afford the textbooks required (Kisirkoi, 2015).

A study carried out on providing computers to primary schools in rural western Kenya by Ogembo et al., (2012) found out that about (11%) of the schools had at least a compliant ICT teacher who needed a refresher course. A teacher was required to know how to operate a laptop to enable him access programs, use word processor, use spreadsheet, prepare a presentation for learners, use internet to access learning resources, use multimedia applications, develop and use appropriate materials that aid teaching and effective transfer of knowledge to the learners using digital technology as a foundation of preparedness (KICD, 2014). Teachers should be to be trained as part of preparations before rolling out the digital learning integration program (Ogembo et al., 2012). Lack of trained teachers showed a major weakness on schools' and MoE officials leadership and management of the training of teachers through implementation of policy guidelines (Kidombo et al., 2012).

Digital learning integration in PSS in Tigania West sub-county was not effective because teachers could not use the digital tools effectively in the classroom (Gikundi, 2013). Qualified teachers were seen as a catalyst in effecting digital learning integration (Murithi, 2013). Therefore, teachers' preparedness on DLI before introducing the programme was lacking. The foregoing discussions are indicative of the importance of teachers' training in preparations for DLI to ensure that they are not technology challenged during classroom applications. Further, not much literature was available for review on teachers' preparedness on DLI in PPS in Meru County. Based on this understanding therefore, it was necessary to investigate whether teachers in PPS in Meru County were adequately prepared through training or not. Hence, the study analyzed teachers' preparedness with respect to their training to gain the relevant digital practical

skills and understanding prerequisite to digital learning integration in PPS in Meru County.

Teachers' acquisition of pedagogical skills through training is very useful in transmission of learning content to learners' effectively indifferent subject area. That practice ensures that learning experiences were relevant and meaningful to the students according to Centre for the Use of Research and Evidence in Education (CUREE), (2012). Pedagogical skills involve: practical, active and experiential learning, enquiry and problem solving, linking the curriculum and the real world, working in collaboration with other students, group work and corporative learning, students' consultation and students' voice, building explicitly on students' prior learning (CUREE, 2012; Boundless, 2017). Effective leadership and management on digital learning integration led to teachers' acquisition of pedagogical skills hence experiencing no difficulties on digital learning integration in the classroom (Leach & Moon, 2010).

Students learn and teachers teach in many different ways such as learning something which was not known before, group discussions, hands-on activities, doing assignments and through correspondents which signifies that a teacher should have pedagogical skills in order to apply them appropriately (Laaria, 2013). Teachers equipped with pedagogical skills were able to vary the instructions and exercises facilitated by digital technology which contributes to students' motivation and are also able to cope with cognitive abilities and pace of learning of the learners (Laaria, 2013).

Studies have shown that people are able to remember about 20% of what they hear, 30% of what they see, 50% of hands-on activities and nearly 90% of what they have seen and heard simultaneously (Sanja & Rabah, 2013). Therefore, learners understand educational

concepts and instruction better through listening, seeing or by doing (kinesthetic). In order to be able to effectively combine and vary the many different types of teaching methods, teachers' pedagogical skills help in the application digital learning integration (Sanja & Rabah, 2013). Combination of the teachers' new pedagogical skills with traditional (teacher-centered) ways by structuring the learning environments encourages cooperative interaction and active classroom that is eager to learn (Mwiti, 2014). Further, the pedagogical skill development of a teacher was thus seen as the crucial component that could spur improvement in the education sector through the implementation of digital learning integration (Mwiti, 2014).

According to Blau and Tumar (2016), the necessary language, processing and computer-based skills can be combined into the following list of increasing difficulty: listening, reading, note-taking, and recall of knowledge, analysis and problem-solving with the help of pedagogical skills. Pedagogical skills enable the teacher to vary teaching methods and to effectively integrate digital learning in the curriculum (Heeks, 2010). In the same way, teachers using DLI attain additional pedagogical digital learning skills from exposure to digital learning tools and interaction with the students in the classroom (Leach, 2011). Likewise et al., (2013) summarizes in his study that classroom delivery on digital learning integration requires professionally developed teachers. From the evidence of Rebecca and Marshall (2012); Charifekret al., (2012) and Lee et al., (2015), trained teachers on pedagogy are key players in the presentation of digital learning integration and expose pupils to a variety of learning experiences. Training of teachers to acquire pedagogical skills reinforces their feeling of competence thus contributing to the improvement of the effectiveness of their work in class (Mugo, 2016).

Effective DLI application in the classroom pedagogical preparedness is essential. In China for example, teachers' response was that they required being prepared on pedagogical skills to enable them to communicate effectively with the learners in the classroom when using digital technology (Li & Walsh, 2010). These findings by Li and Walsh revealed that 78% of the teachers were confident on digital learning skills since they were certificated but 11% of them were not confident in classroom delivery because their pedagogy skills were inadequate. Despite considerable effort made to equip teachers with computer skills with the aim of overcoming the digital divide in public primary schools, they failed to consider and plan for training of teachers on pedagogical skills. Training of teachers to acquire pedagogical skills needs to be looked into as part of the preparations because of the many types of pedagogic interactions required.

The digital learning integration achievements in Africa public primary schools have been affected by low number of teachers trained on pedagogical skills. In Ghana for example, inadequacy in teachers' pedagogical skills prevented them to use digital technology in secondary schools. Teachers' required pedagogical knowledge to enable them exploits their potential in order to enhance learning in the classroom (YawSekyi, 2012). Similarly, the role of teachers in facilitating students' development of digital competences in rural public primary schools in South Africa was unsatisfactory because they lacked pedagogical methods (Mihai & Nieumenhuis, 2015). There is no question that digital learning integration has become valuable, useful resource and tool for teaching and learning, but when you have teachers not equipped with pedagogical skills that is an indicator of poor policies or weak management (Naicker, 2010). The study found out that teachers needed training on professional development which ultimately was aimed at raising their productivity of the content delivery. Therefore, the study

analyzed the preparations which were undertaken before the program of digital learning integration was rolled out.

Kenya was focusing on computerization of public primary schools with the aim of overcoming the digital divide as a way of addressing the basic deficiencies of educational infrastructure (Judson, 2010). Teaching using computers in both primary and secondary schools in recent years was insignificant despite the sacrifices made to finance the same because teachers lacked pedagogical skills among other skills (Judson, 2010).

Kenya's ICT framework for integrating digital learning in schools is formulated in form of Session Paper No. 14 of 2012. The policy underscores the ministry's commitment to facilitate the integration of digital learning that leads to acquisition of 21<sup>st</sup> century digital technology skills and attitudes (MoE, 2012). The ministry of education therefore, targeted over 300,000 teachers to be trained on digital learning pedagogy skills to prepare them for digital learning integration (Murute, 2013). Teachers' pedagogical skills are essential to determining the effectiveness of the teaching process. Low levels of teachers' pedagogical skills on digital learning integration in Kenya were a stumbling block in the introduction of digital technology in the curriculum (Kidombo et al., 2012). Embarking on digital learning integration before teachers had acquired the appropriate pedagogical skills would lead to total wastage of resources (KEMI, 2011).

Locally, the issue of inadequacy of teachers' pedagogical skills was conspicuous in many PSS in Tigania West sub-county (Gikundi, 2016). The study did not investigate why the use of the innovation was not based on DLI pedagogical considerations. Teachers in North Imenti failed to fully make use of the donated computers in the classroom (Mwiti, 2014). However, Gikundi (2016) and Mwiti (2014) did not investigate the teachers'



preparedness with respect to DLI pedagogical skills training and acquisition of digital technology knowledge. The study noted that teachers were still teaching using traditional methods despite their schools acquiring digital tools in Tigania West and Imenti North secondary schools. The sub-counties could be experiencing pedagogical impediment which made teachers not to maximize the digital learning resources to enable the learners get appreciable output.

Based on studies by Nut (2010); Tay, et al., (2013); Li and Walsh (2010); Rahuman, et al., (2011); Mihai and Nieuemehuis (2015); Yaw Sekyi (2012) and many others cited above, it was evident that teachers in many countries worldwide were inadequately prepared to effectively embark on DLI hence they needed concrete pedagogical background. It was evident that without pedagogical skills, teachers cannot be efficient and effective and cannot create lesson activities which allow learners to enjoy different learning styles simultaneously. The study did not find data on whether the master trainers cascaded the training of teachers at county or school levels. Therefore, the study found a gap on the management, planning and training of teachers as part of digital learning integration program preparations. Therefore, the study analyzed teachers' preparedness on digital learning integration through training to acquire DLI pedagogical skills and knowledge on computers before the programme was introduced in Meru County.

### **2.5 Preparedness on Digital Learning Resources**

A resource is a valuable possession that helps the teacher to organize and effectively utilize the classroom and school environment to maximize learners' engagement rates and eventually improve the learning outcomes (Rebecca & Marshall, 2012). Digital learning technology resources are support tools that help teachers teach well and students learn better. Computer laboratories, electricity supply, websites, software, online, DVDs,

CDS, teachers, and many others are the essential digital learning resources before digital learning integration was undertaken (Tinio, 2017). Inaccessibility of digital learning tools can also be brought about by other factors including poor utilization of available resources, sub-standard hardware, incompatible software, or lack of appropriate training among the teachers (Bizimana & Orodho, 2014). The infrastructure and digital learning materials are the fundamental resources for effective digital learning integration, content delivery and uplifting the standards of learning (Orodho, 2014). In addition, availability of digital learning resources promotes good preparations, lesson flow, clarity and momentum (Li & Walsh, 2010). Similarly, availability of digital learning integration resources enhances discussions, collaboration, project work and many others (Orodho et al., 2013).

Successful DLI is influenced by availability of technology equipment and access to the available infrastructure facilities. Countries such as New Zealand planned to be spending over \$410 million every year on schools digital learning resource allocation and updating (Johnson et al., 2009). In the U.S. the necessary infrastructure and digital learning tools were put in place before embarking on digital learning integration in the classroom (Nut, 2010). Teachers therefore effectively used the tools and techniques to achieve their goals. As a result, learners had a chance for practical work that enabled them to make their own conclusions from their findings (Sang et al., 2011). In China, availability of digital learning integration resources, both at home and at schools such as computers and internet access were at 87% and 96% respectively. This enhanced better content understanding, increased learners concentration and attention in class (Li & Walsh, 2010). Equally, students had both the laptop which they carried home to do assignments

and personal computers which they use during lesson time. Further, 96% of students were able to use the local network (Li & Walsh, 2010).

The government of Saudi Arabia committed herself to improve digital technology resources required for digital learning integration in primary schools although the cost was high for the supply and maintenance. However, inadequacy of digital learning resources undermined the connection between the availability of digital learning resources and digital learning integration (Gafar & Neville, 2012). Thus, embarking on DLI programme before first preparing the resources is a waste of time and energy because there is no meaningful learning that can take place without resources. Therefore, availing adequate digital learning resources to schools before rolling out the programme is an important undertaking for successful DLI programme. Preparedness of schools with respect to procuring adequate digital learning resources which affects reliable DLI was found to be a gap that this study addressed accordingly.

Many African countries have embarked on huge investments in digital learning infrastructural developments in preparation for digital learning integration. A variety of devices are increasingly being used to spread and display teaching and learning content in electronic and digital formats though not without challenges (Buabeng, 2012). However, inadequacy of resources was found to impede teachers' effectiveness on digital learning integration as well as focusing on the individual learner in Africa (Naikar, 2010). In Ghana for example, lack of sufficient and relevant materials required for the implementation of digital learning programs in PPS and PSS constrained teachers during DLI hence rendering the process ineffective and eventually affecting the attainment of good academic results (Yaw Skyi, 2012). Paramount among the teacher's responses were power fluctuations, lack of suitable computer peripherals such as printers and scanners,

while a number of teachers also decried the lack of adequate time allocated in the timetable for the practical sessions. Due to the lack of computers and other devices necessary to implement digital learning, there was the likelihood that teachers may end up compromising students learning concepts that they cannot easily understand and identify with. Such a scenario was likely to defeat the whole idea of introducing digital learning in the curriculum at lower levels of education (Yaw Skyi, 2012). Similarly, digital learning integration in South Africa had not picked up at the desired pace due to inadequacy of digital learning tools. Further, impediments range from inadequate resources such as: Interactive Whiteboard (IWB), laboratories, insufficient computers, standard classrooms, limited hardware and software (Naiker, 2010). Workable policy, planning, preparations and effective management to equip rural public primary schools in South Africa with appropriate DLI infrastructure that supported teaching and learning process was required (Nkula & Krauss, 2014).

Teachers in Zambia were able to gradually implement DLI due to the fact that the costs for digital tools continued to fall and as the devices themselves became more widely and readily available (Sanja & Rabah, 2013). Schools and the governments must invest heavily on digital learning integration programs to achieve an OLPC level. Workable policies, coordinated management and leadership teams provide the necessary digital learning integration tools and infrastructure. Policies should point out the management strategies that would ensure that resources are provided before the roll out of the program. The studies above reveal that digital learning resources and other resources significantly determined the success of DLI in a school. Based on this gap the study was set out to examine the adequacy of digital learning resources in public primary schools in Meru County.

East Africa equally faces digital learning integration barriers resulting from inadequate resources (Markon, 2013; Orodho et al., 2013). Uganda for instance, experienced lack of classrooms and desks in many public primary schools and inadequate digital learning integration tools among others. However, the Ministry of Education is determined to have computer labs and computer curriculum in the schools (Markon, 2013). The students to computer ratio range from 40:1 to 160:1 in primary schools (Hennessy, 2010). Though the country had policy guidelines the introduction of DLI could have been gradual since some schools lacked necessary infrastructure. Similarly, schools in Rwanda had barriers such as insufficient digital resources and poor infrastructure leading to poor teaching and learning outcomes (Orodho et al., 2013). The issue of digital learning resources has not been addressed appropriately in many East Africa countries in the digital learning integration process. However, the adequacy of DLI resources remained a mirage. The policies are good, but why there was no systematic planning and eventual supply of adequate digital learning resources was a concern to the study.

The digital learning integration policy guidelines emphasize availing of appropriate digital learning resources in public schools in Kenya (Hennessy, 2010). Though, the curriculum is reformed and aligned to Vision 2030, only 2% of PSS in the country have the necessary digital learning resources (Murrira, 2013). Limited electricity supply in rural areas, persistent power disruptions, inadequate digital learning resources such as computers and digital technology, and lack of trained teachers discouraged an institution from embarking on digital learning integration programs (Muriira, 2013). Digital learning inequalities exist in secondary schools in Kenya with rural schools experiencing inadequate resources, facilities and manpower. That was as a result of poor planning in advance by management which led to DLI impediments (Sanja & Rabah, 2013).

Availability and access to digital learning tools and infrastructure was a factor influencing digital learning integration application in Githunguri and Musa Gitau primary schools (Kidombo et al., 2012). Internet connectivity is neither readily available nor cheap in rural areas and these calls for proper planning and management (Laronde, 2012). Seamless digital learning integration cannot be achieved if resources were not available. Digital learning integration in schools is a complex process that requires coordination and interplay between several stakeholders who will harmonize policy, leadership and management. Digital learning integration leadership means championing and providing the prerequisite resources to enable sufficient and efficient programme in the classroom.

The local situation was not different. The computer to student ratio in PSS in Tigania West sub-county acquired through public-private partnership approach was inadequate (Gikundi, 2016). Further, the study indicated that majority of the schools could not effectively use computers for teaching and learning since (70%) was could not access the internet (Gikundi, 2016). However, schools that had internet were connected through various channels such as gateway or sometimes referred to as access point, Wi-Fi, modems and satellite dish. Similarly, only 10% of the public primary schools in North Imenti had received digital learning tools (Mwiti, 2014). However, the study did not investigate planning, procurement and allocation of the resources for the programme.

Digital learning integration program requires resources to enable teachers employ the new teaching and learning methods and increase in computers in schools enabled them to achieve baseline targets (Kwamboka, 2015). Additionally, provision of digital learning integration resources to schools through planning and offering appropriate leadership and management strategies influenced the adoption of the technology by secondary

school teachers in Buuri sub-county (Kwamboka, 2015). Failing to provide the digital learning resources and at the same time introducing the program in the curriculum can be a serious shortcoming on the side of policy, planning, and management.

Availability of digital learning resources such as sufficient computers, internet connectivity, laboratories and many others significantly enhance the quality of digital learning integration (Keiyoro et al., 2011). The studies reviewed reaffirmed the importance of having adequate digital learning resources in schools before embarking on the programme. However, there is a gap on resource preparedness to guarantee desirable DLI. Inadequate digital learning integration resources eventually lead to unfulfilled expectations. The study found preparations to provide digital learning resources as a research need. Therefore, the study analyzed the availability of digital learning resources, their appropriateness and their working conditions in Meru County public primary schools as the county embarks on digital learning integration programme.

## **2.6 Preparedness of Technical Support in Digital Learning Integration**

Technical support staff offers assistance by providing a variety of services to the users of digital technology such as computers typically aiming at solving specific problems. The technology users might be having problems with the products in areas such as computers, trouble shooting, software and many other problems the users' experience. General competencies are required for installation, operation, maintenance, network administration and many other services to digital learning integration tools and infrastructure require technical support (Tinio, 2015). An innovation without technical support is unreliable. Lack of technical support will lead to teachers' frustration and hence digital learning integration will not be enhanced (Keiyoro et al., 2012). Due to computer technology application challenges teachers require technical assistance. Lack

of technical staff to assist teachers impedes digital learning integration in schools (Ertmer, 2012). In Turkey for example, technical support was found to be very essential since teachers did not waste the lesson time dealing with technical problems but instead focused on teaching (Goktas et al., 2013). Technical impediments in rural primary schools in Indonesia threatened digital learning program due to lack of maintenance personnel (Bandung & Langi, 2011). Indonesia failed to consider maintenance of digital learning integration tools a threat so as to include it in the policy. In Malaysia, teachers (70.5%) could use computers comfortably in classroom delivery but making repairs was not possible (Ghavifekr, et al., 2013). Though Malaysia had an elaborate plan to train the teaching staff on digital learning integration, the management failed to consider hiring of technical staff (Chan & Fong-Moe, 2015). The studies therefore, bring to fore the need to have technical support staff in schools to address such impediments. From this development it was well understood that in countries where schools had technical support staff the learning outcomes were desirable. Despite schools having trained teachers and having digital learning resources, they continued to experience challenges on DLI due to lack of TSS. Technical support staff preparedness was a gap identified and addressed accordingly in PPS in Meru County.

Similar impediments were experienced in South Africa rural public primary schools where technical experts were unavailable (McGarr & O'Reilley, 2011). Teachers need technical support because, in addition to the existing digital tools, technology changes too rapidly and therefore require constant upgrades and additions to keep resources current and useful (Ngugi et al., 2010). Inadequate technical support was identified as a barrier in Ghana during the piloting stage (Hansen et al., 2009). Schools rush to implement digital learning integration programs without first ensuring that they can



access technical support staff. This is because of lack of comprehensive digital learning integration policy including that of school and lack of supportive, enthusiastic, and visionary leadership (Hennessy et al., 2010).

Digital learning integration planning and preparations management have not considered provision of technical support staff as a priority in East Africa public primary schools. Schools in Uganda lack technical support (Markon, 2013). A similar situation exists in Tanzania (Laaria, 2013). Provision of technical support staff is a policy and management issue that influence digital learning integration in an indirect way. Without technical support staff, schools will be wasting time to start digital learning integration programs since sustaining the project pose big challenge (Hennessy et al., 2010). The study identified provision of effective technical assistance to schools as a research gap.

The GoK developed policies and strategies to help the DLI in schools. The policies are documented in the National ICT policy of 2006, Session Paper No. 1 of 2005, and Kenya Education Sector Programme 2005-2010 (Kidombo et al., 2012). Lack of technical support was among the challenges facing digital learning integration in secondary schools in Kenya (Laronde, 2012). Although considerable numbers of computers have been acquired by secondary schools in the country, the actual application of those computers was not qualified due to lack of technical experts (Judson, 2010). Although considerable efforts were made by various stakeholders and the significance of digital learning integration, most of the policies have remained in draft form (Kwamboka, 2015). Kenya is yet to fully integrate digital learning in her public primary schools. A study in Western Kenya involving 100 primary schools established that about 13.5% of schools utilized computers sparingly while about 38% of schools could not because they

lacked technical assistance (Ogembo et al., 2012). Studies by Judson (2010) and Laronde (2012) show that policy implementation strategies and professional leadership had not taken into consideration the provision of technical support staff before embarking on digital learning integration programme.

Increased DLI application in the classroom can be linked to appropriate policies that allow technical support staff to be incorporated in the program (Sang et al., 2011). Teachers need to be assisted by technical experts so that they do not waste lesson time solving technical issues. In Tigania West Sub-County, Meru County teachers experienced barriers where (55.5%) of the secondary schools had no TSS to guide the teachers. In the majority of the secondary schools (60%), maintenance of the school ICT was done by schools' own staff while in a few secondary schools it was either by a company or an individual contracted by the school (30%) (Gikundi, 2016).

Digital learning integration policy required those charged with the management of the programme to be actively involved with respect to the provision of the technical support staff (Onduru, 2012). Among the few secondary schools that had technicians, they responded promptly in case a problem occurred with the computers or any of the digital technology infrastructures in Tigania-West sub-county (Gikundi, 2016). Availability of technical support staff for digital learning integration in Tigania- West secondary schools, allowed the teachers to utilize digital learning tools in the classrooms without wasting time troubleshooting software and hardware problems (Gikundi, 2016). In Imenti North sub-county there was clear evidence that only 25.62% of the PPS could afford to engage technical support staff (Mwiti, 2014). Despite the GoK having sponsored the digital learning integration program, the study did not look into policy, strategic planning, leadership and management that were essential to provide the

necessary support measures before rolling the programme. The questions that arose from the reviewed literature were: do schools have effective TSS? Do schools have TSS assisting pupils, teachers and undertaking repairs and maintenance to ensure successful DLI? This study collaborates with the above studies on the need to prepare effective TSS in schools before rolling out the DLI programme.

There are positive impacts on schools, teachers and the learners when technical support is available and functional when integrating digital learning in schools. Where the technical team was unavailable there were negative impacts hence eventually diminishing the performance of the learners. The study identified planning and organizing for technical support staff as a research need. Therefore, the study analyzed the preparedness of effective TSS in PPS in Meru County.

### **2.7 Involvement of Parents in Digital Learning Integration**

Involvement of parents is defined as parents' participation in attending scheduled school meetings, serving as a committee member or assisting the school in many other areas financially or services, innovating ways that can foster their children's school achievement and how they can influence development of attitudes and motives that are essential towards school learning (Linden, 2010). Parental involvement is concerned with the participation and support parents give to schools so that their children can have a learning environment where they can exploit their full potential (Linden, 2010). In addition, parents also influence the basic intellectual development of their children and academic socialization while at home which positively contributes to the positive educational performance of their children, and also results in substantial benefit to parents, educators, school and the country at large (Olibie, 2014).

Participation of parents' in education matters of their children at home was greatly affected by socio-economic factors (O'Hara, 2011). Parents provide tutoring to their children when it is needed. This has been found to enhance children's educational experiences and attainment. Parents' teaching is embedded in every-day life experiences and occurs in many subtle and indirect ways. Parents support for academic activities such as provision of learning resources are important factors for school achievement. Thus, parents take the role of teacher at various points at home, create a home environment that encourages learning and provide direct reinforcement for academic improvement (Olibie, 2014). Parents' involvement in digital learning integration of their children was essential in academic success but several impediments reduced their participation (Linden, 2010). Economic barriers of parents' contribute greatly making them unable to fully participate in their children's digital learning integration. Other obstacles are: language barrier, time pressures, differing ideas from those of teachers, ineffective communication from school, lack of adequate parental education and schools' unwelcoming atmosphere (Linden, 2010).

However, parents' have ways in which they use to overcome some of the barriers. In UK for instance 79% of children have access to digital technology such as laptops and other computers at home, 90% access mobile phones, 97% access DVD player, 54% access digital cameras and 81% accessed games (O'Hara, 2011). Children accessibility to digital technology made them confident when using the same or similar technology in schools. Digital technology was providing opportunities for their children at home much more skills and attitudes and subsidized the school's integrated digital learning (O'Hara, 2011). Additionally, parental support has proved very fruitful in the integration of digital learning process and its sustainability. Their appreciation and involvement in school

activities enabled them to gain more knowledge and a better understanding of the educational programs and what teachers expect of them. However, the study indicated that there was no harmony between the documented policy guidelines and the interpretation. Leadership and management of the program were essential to ensure pupils do not access unauthorized materials to guarantee the support of the program from the parents.

On the contrary, parents appreciated their involvement in the introduction of DLI programme of their children in Sri Lanka. Parents expressed pride and privilege of having free One Laptop per Child (OLPC) programme. However, only about 10% of the parents linked excessive use of OLPC in playing games and failing to give attention to physical game during their free time away from school (Wakramamayake & Hawamage, 2011). In Israel, the inclusion of families into the integration of digital technology in primary schools had positive impacts. It was noted that majority of the parents had the skills to foster both cognitive growth and achievement motivation, created conducive environment for learning, and provided laptops to be used at home. Those families provide all that was required by the schools to make digital learning a success (Blau & Hameiri, 2016). However, the study did not look into ways of sensitizing the parents so as to maximize their participation and support. Leadership and management that involve other stakeholders like parents directly or indirectly are essential.

Parents who are economically challenged encounter difficulties in trying to provide all what was required by their children in school. For instance, in South Africa depressed economy made poor parents not to afford to buy computers for their children hence making digital learning integration challenging. Further, it was not possible for children without laptop to do assignments at home (Ramorola, 2013). The encouragement

parents' give their children motivates them and was extremely important in promoting the use of computers (Ramorola, 2013). However, the policy was silent on how the two groups of economically advantaged and disadvantaged parents could be harmonized in order to have them participate in digital learning integration programs. There were no documented studies to show the outcome of initiatives of involving parents in digital learning integration. In Nigeria, parents complained of lack of policy guidelines and poor leadership since they were not involved on OLPC and that their children were freely accessing content meant for adults (Hennessy, et al., 2010). Involvement of parents in digital learning integration so as to build a strong foundation of harmonized and supportive stakeholders was lacking in most countries. The study identified parental involvement as a research gap.

Similarly, the education of children may be influenced indirectly as parents become involved in preparations, volunteering to assist, curriculum monitoring and much more as the school's dictates in East Africa (Laaria, 2013). For instance, this scenario was observed in majority of private primary schools in Tanzania where digital learning integration is still in progress although without formal setting or a policy framework. The pressure comes from parents whose desire was to have their schools improve their respective grades in national examinations (Tanzania Country Report, 2015). Uganda secondary schools' parents agreed to fund the construction of computer laboratories an indicator of approval of their involvement in children's education (Mingaine, 2013).

In Kenya, the digital learning integration program is sponsored by the government in all PPS. A survey on Computerizing Primary Schools in Rural Kenya carried out in the former Rift Valley, Nyanza and Western Kenya provinces revealed that 86.5% lacked desks and classrooms. The lack of facilities forced parents to supplement government

funding through fundraising and pledges to acquire necessary learning equipment (Ogembo, et al., 2012). In addition, parents were involved severally in raising funds for a certain project through “Harambee”- a Kenyan tradition of community self-help events that encourages individuals and communities to team up and mobilize their resources for a particular project. However, existing research rarely focus on policies, leadership and management of digital learning integration with respect to involvement of parents.

One of the well-established institutions in all PPS is PTA and it is entrenched in the Kenya Constitution (2012). Among other responsibilities PTA encourages parental involvement in school projects and programs. Parents of PSS in Tigania West sub-county were not involved in preparations nor were they sensitized on digital learning integration in their respective secondary schools (Gikundi, 2013). Similarly, parents of secondary schools in Imenti North Sub-County were not involved in facilitation of digital learning integration since the digital technology tools and other logistics were catered by the MoE (Murithi, 2013). The study by Murithi (2013) indicated that parental involvement in school projects and programs was a requirement and necessary collaboration between parents and schools, therefore, should be studied. Few studies have explored how involvements of parents on digital learning integration contribute to its success in the schools. The reviewed studies have showed that sensitized parents and eventual involvement in school projects in the preparations, management, they appreciate and give their support financially or otherwise. Further, it was noted that where there was collaboration between teachers and parents and between parents and government, digital learning integration in schools was successful. The pertinent issue here is whether parents were involved in DLI programme preparations to make the project succeed and improve the learning outcome of their children. Based on this gap, the study was set to

examine the involvement of parents in DLI programme preparations in public primary schools in Meru County.

## **2.8 National Policy on Digital Learning Integration**

A successful digital learning integration in schools requires quality preparations based on good workable policies. A policy is a principal of action adopted in response to a problem that requires attention (Singh, 2016). Policies on DLI are essential to enable our learners to interact and achieve quality learning through planned procedures, regulations and rules (Wong & Wong, 2019). MoE recognizes the benefits of DLI in education and it is committed to ensuring that learners in the education sector are equipped with digital skills and knowledge in line with the global digital trends. However, in order to achieve the goal, every school, institution, teacher, learner and stakeholders should be equipped with appropriate DLI resources, competencies and policies. Major challenges in education policies in China were that they emanated from theories and discussions which had no empirical evidence (Jun Li, 2017). The adoption and eventual DLI depends on the policies and the preparations required for successful project (Keiyoro, Gakuu & Kidombo, 2011). The guiding policy principles led to digital infrastructure development, human resource development, and involvement of stakeholders in education made Malaysia to reduce the digital divide in various parts of the country in both primary and secondary schools (Chan & Fong-Moe, 2015).

ICT policy in Tanzania is guided by the country's vision 2025. The policy on ICT offers new opportunities to enhance education and to improve quality of education in all areas by deploying a broad-based national strategy to address Tanzania's development agenda (Kalolo, 2019). The Kenya Institute of Curriculum Development is mandated to initiate and conduct research to curriculum policies in all education levels except university (KICD, 2016).



## **2.9 Summary of Literature Review**

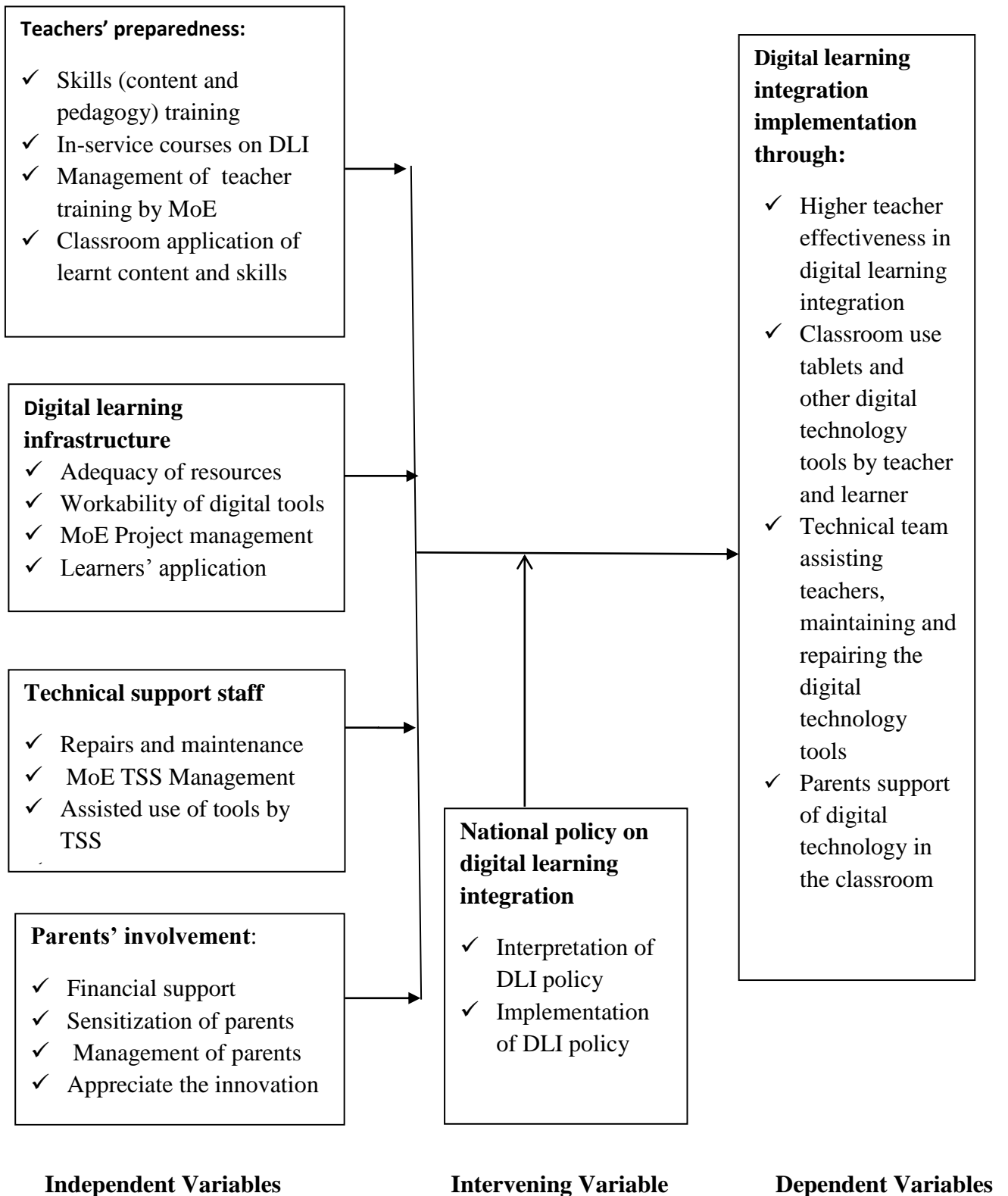
This foregoing discussion has provided a detailed literature on the nature of preparations on implementations by individual countries and their respective schools before DLI programmes were rolled out. The review has covered policies, strategic planning, school policies and other logistics pertaining to the development of teachers' knowledge and skills on DLI, preparing resources and TSS, and involving parents as stakeholders before rolling out the programme. The reviewed literature has pointed out gaps that hindered the effective implementation of DLI. Key gaps noted in the reviewed literature were:

Ineffective teacher's training on DLI both in-service and pre-service to ensure continuous capacity building. Since teachers are key implementing agents of DLI, proper orientation and preparations are inevitable. Though teachers are trained to teach any curriculum, DLI requires schools to have teachers to undergo specialized training especially on the use of digital technology. Inadequate DLI resources that were in good working condition were identified as the second gap. Digital resources are valuable in helping a teacher to communicate effectively to learners. Ineffective TSS in schools to ensure DLI resources are serviced and repaired accordingly is the third gap. Teachers require technical support to deal with technical challenges. Inadequate sensitization and failure to involve parents in DLI programme preparations is the fourth gap. An enlightened parent will participate better in education of their children when involved appropriately.

## **2.10 Conceptual Framework**

The conceptual framework on Figure 2.1 provided a lens that enabled the understanding of how four independent variables namely: teachers' preparedness on DLI, adequacy of digital learning infrastructure, effectiveness of technical support staff, and involvement of stakeholders impacted on the dependent variable digital learning integration.

Figure 2.2: Conceptual Framework



The conceptual framework shows the relationship between the dependent variables and their respective indicators against the independent variables and their respective indicators. The intervening variables mediates between the the dependent and the independent variables.

Effective digital learning integration in Meru County was expected to be achieved through adequate planning, preparations, management, policy interpretation and implementation. Further, great collaboration between head teachers, teachers, and parents, technical support teams, training of teachers, availing digital learning resources and Ministry of Education officials in charge of the program before the program was rolled out was expected. Preparedness and eventual integration of digital learning was expected to be achieved through training of teachers on digital learning skills and pedagogical skills. That could make them gain confidence, effectively integrate digital learning in the classroom and eventually improve the learning outcomes. MoE was expected to ensure that teachers have been trained and continuously in-serviced to enable them to integrate digital learning in their respective schools accordingly. Enlightened teachers prior to the programme roll out prevent confusion and end up with higher teacher effectiveness in DLI.

It was expected that provision of digital learning integration resources and the necessary infrastructure could significantly lead to better students' learning outcomes. That was to be achieved by ensuring that the government provision of adequate digital learning resources for use by learners and their management was possible. The government leadership and responsibility through MOE officials were to ensure that the digital learning devices were delivered in good time and when they were in good working conditions ultimately leading to successful digital learning integration in public primary

schools' curriculum. DLI is quite demanding and requires one to have things like laptops, tablets, smart phones, good internet connectivity and electricity among other tools. With adequacy of digital learning resources, DLI could be successful through classroom use of the digital tools by the teacher and the learner. When resources are adequate and accessible, making meaningful use of them the results are appreciable as explained by Rogers (1995) Diffusion of Innovation Theory.

Having supportive and effective technical staff was considered as a necessity to overcome any barrier that could interfere with increased student benefits as well as quality by making teachers work easier. Maintenance of digital learning equipment at school was equally important. Digital learning support staff was required for the purpose of repairing and helping teachers whenever the need arises. Availability of technical support staff was to ensure successful digital learning integration and continuity through repairs, maintenance and handling other technical challenges related to digital tools. The government and MoE through county directors of education management were expected to take responsibility to ensure public schools have technical support staff, which can assist teachers to ensure learning continuity to avoid time and resources wastage. DLI being a new innovation in schools, teachers and pupils needed technical support staff to enable them maximize the digital tools.

Good leadership and management that involved parents in digital learning integration could lead to better results through concerted efforts such as the provision of digital learning resources, frequently helping children to do homework and many others. Parents were expected to collaborate with head teachers and MOE officials. That was the team of officers tasked with the responsibility of ensuring that digital learning integration was successful. Parents are flexible, adaptable, creative and innovative hence whenever they

were involved, they proved very useful. Parents can provide useful resources like storage rooms, laboratories, and many others all geared towards the successful integration of digital learning. The appreciation of the DLI programme by parents was evident through support of the digital programme in the classroom. Enlightened parents participate effectively by providing all what was required by their children and collaborating with teachers in adopting the technology.

Leadership and management of schools were inevitable for successful digital learning integration. The success of digital learning integration depended on leadership and management styles of head teachers. The head teachers were the immediate supervisors of the teachers in addition to his/her teaching load. Therefore, the head teacher should be a role model in preparing for digital learning integration, visionary, and ability to plan. The successful digital learning integration program would be determined by the smooth and effective management and operations of the school, the relationship among the staff, and provision of digital learning resources, setting the standards for performance and influencing the school culture. The education leadership system is hierarchical and mostly 'top-down' and therefore there were factors such as policy, provision of digital learning resources which affect the recipients at the 'bottom'. If the head teachers were lacking some qualities such as role model, vision, encouragers of innovations, and teamwork facilitation, then digital learning integration program was likely to die gradually.

Quality leadership in schools was important in coordinating and supporting digital learning integration in schools. Headteachers were change management team leaders in their respective schools, hence they should spearhead the facilitation and support for planning and management of digital learning integration program. The head teachers

should exhibit total quality management style in which they should be involved, concerned, supervise, delegate where applicable and be team players. The head teachers' communication channels should be very clear and effective since their leadership yields a high degree of influence on students' academic performance.

The integration of digital learning in public primary schools could be achieved through training of teachers. A well trained teacher on digital technology skills and pedagogical skills gains confidence. Provision of infrastructure and digital learning tools enhances the digital learning integration. Effective technical teams were to ensure that learning was not interrupted by failure to repair or maintain the digital learning tools. Involvement of parents who are key stakeholders was to ensure that they provided the necessary resources and other forms of support to ensure the successful digital learning integration program.

MOE recognizes that digital learning integration in schools can play a widening access to education to many learners. The development of policy represents a critical step in streamlining efforts towards digital learning integration into education sector. The success of digital learning integration can be affected by policy interpretation, implementation and enforcement. Investing on digital learning integration in schools is a costly endeavor hence careful planning and financing of the program ensured that digital learning integration was achieved. Thus, through financing sustainability was guaranteed and any budgetary constraints can affect project outcome. Further, through proactive measures, MoE was expected to have adequate digital infrastructure in schools. Overstretching some resources through lack of repairs and maintenance is not healthy for the learners.

## **CHAPTER THREE RESEARCH METHODOLOGY**

### **3.1 Introduction**

This chapter provides a description of the type of research methodology used and the rationale for its use in the study. The chapter shares details about the research design, descriptive survey design, descriptive survey design, research philosophy, location of the study, target population, sample size and sampling procedure, instrumentation, piloting, validity and reliability of data collection instruments, procedures used in data analysis, and ethical considerations of the study.

### **3.2 Research Philosophy and Approach**

The research was guided by pragmatism philosophical paradigm. A research paradigm can be defined as a philosophical position that describes the basic set of beliefs that guide and dictates which scientist in a particular discipline influence the nature of the study, how it should be conducted and how the results are interpreted (Morgan, 2014). Therefore, a research paradigm philosophically brings an understanding of social phenomena by examining and attempting to offer an explanation and how data from such phenomena should be gathered, analyzed and used (Gichohi, 2016).

Positivism attempts to identify causes which influence outcome while the positivity methodology aims at explaining the relationships hence positivistic statements are descriptive and factual. Interpretive paradigm holds that the reality is subjective. Positivism results are descriptive, quantifiable leading to statistical analysis and qualitative data giving in-depth insight. The two data sets are embedded during analysis with positivism paradigm taking a leading role while the interpretive supported allowing the utilization of both (Creswell, 2013). Quantitative research generates numerical data which is transformed into usable statistics and generalize results from a sample while

qualitative data enables the study to gain the understanding of the underlying reasons, gain a deeper understanding and meaning of the research phenomenon (Bryman, 2012).

This study was largely descriptive in nature. Descriptive survey studies have important role in educational research because they increase the knowledge of what happens in schools (Creswell, 2014). The design was the best since it enabled the study to explain, describe, predict, and recommend with accuracy surrounding the problem. Views and opinion were sought from head teachers, teachers, PTA, SCDEs, and digital learning integration pioneer pupils. SCDEs were interviewed while data was obtained from pioneer pupils through focus group discussion. Interview allowed an in-depth investigation by probing further producing a qualitative data that supported the quantitative data. The two methods were carried out concurrently and given equal weighting. This helped to achieve data triangulation. The two data sets were embedded with quantitative data taking a superior role and qualitative data supporting the resulting arguments.

### **3.3 Research Design**

A research design can be defined as the overall strategy of investigation established to address the research problem effectively in a coherent and logical way (Creswell, 2013; Ranjit, 2011). The design helps to conceptualize an operational plan to handle the various procedures and tasks required to complete a study. The study adopted descriptive survey design.

### **3.4 Descriptive survey design**

Descriptive survey design is concerned with describing particular characteristics of a specific population of elements at a fixed point in time (Gill & Phil, 2011). The design was considered suitable for this study because of its capacity to yield valid and accurate answers to the research objectives (Patton, 2015). The study found the design appropriate



since it could provide answers to questions and an expanded understanding of the research problem. This was the method that could get information concerning the current situation of the problem so that descriptions, explanations and testing of the findings can be done. The design allowed inclusion of multiple variables for analysis (Creswell, 2013). The design is the best to describe on what is happening in schools, yield rich data that can lead to important recommendations. The design was also found to be appropriate because it describes natural or man-made educational phenomena that are of interest to policy makers and educators. Further, quantitative and qualitative research approaches were adopted.

In this study, preparedness of public primary schools in Meru County on DLI was investigated. The study variables included teachers' preparedness on DLI, adequacy of digital learning resources, effectiveness of TSS, and involvement of parents in DLI programme preparations. Underlying issues and concerns on each construct from the viewpoints of SCDEs, head teachers, teachers, and parents were investigated and appropriate recommendations were made to MoE, and other concerned stakeholders.

The study was guided by pragmatism philosophical paradigm. According to Morgan (2014) the research paradigm is a philosophical position that describes the basic set of beliefs that guide and dictate which scientists in a particular discipline influence the nature of the study, how it should be conducted and how results are interpreted.

### **3.5 Qualitative Research**

Qualitative research focuses on obtaining data through interviews and general observations so that views of the participants are not restricted (Bhat, 2020; Creswell, 2013). This process requires a high level of participation from the site. Qualitative research method requires the participants to be identified and sites, gain access,

determine the type of data to collect, develop data collection schedules and administer the process taking into considerations of ethical issues. In this study the intent of the qualitative inquiry was to develop an in-depth exploration of the preparations that were done in readiness for DLI programme in Meru County. The method involved obtaining detailed information through observations, open-ended questions, focus groups discussions, and in-depth interviews.

### **3.6 Quantitative Research Method**

Quantitative research is a strategy that focuses on quantifying the collected data through polls, questionnaires, surveys, or by manipulating pre-existing statistical data using computational techniques (Pritha, 2020). Participants are systematically identified through sampling. Quantitative research method can be used to find patterns, averages, make predictions, test causal relationships, and generalize results across group of people, or to explain a particular phenomenon.

In this study, the quantitative research was used to generate variety of ideas about integration preparedness for DLI programme in a spontaneous free-flowing manner, determine the relationships between the constructs teachers' preparedness, adequacy of digital learning resources, effectiveness of TSS, involvement of parents in DLI preparations and the outcome variable DLI in PPS. The analyzed quantitative data provided frequency distribution tables, descriptive statistics, inferential statistics that helped to enhance generalization of concepts more widely, predict future results on DLI.

### **3.7 Location of the Study**

The study was undertaken in Meru County, Kenya which borders the following counties: Isiolo, Laikipia, Nyeri and Tharaka-Nithi. Meru County had 710 public primary schools, which were spread throughout its eight sub-counties. In this county, the public primary

schools are undertaking digital learning integration programme under the sponsorship of the Kenya government with the aim of uplifting the education standards in the county. Survey carried out by National Council for Population and Development (2017) indicated that the use of computers in secondary schools in Meru County in teaching and learning was minimal and only few students took it as an optional subject in few schools. Further, studies on DLI preparedness done in PPS in Meru County were inadequate bearing in mind that digital technology defines our world and there is need to prepare learners for today's realities. The studies available covered secondary schools in Tigania West and Imenti North (Gikundi, 2013; Murithi, 2013). The studies revealed that there was need to strengthen digital learning integration programmes in schools by generating a county based data that can be used to entrench DLI programme.

The primary schools' enrolment in Meru County expanded rapidly as a result of Free Primary Education (FPE). However, Meru County had never featured among the top ten counties in national examinations according to the data obtained from Meru County Education office records (2016). Good performance in national examinations is an indicator of performance. Further, majority of pupils attend public primary schools and that the teacher pupil ratio stood at 1:60 (Meru County Education Office records, 2016). According to data provided by the Department of Education and Meru County Integrated Development Plan, 2018-2022, the Meru County has 710 primary schools with a total enrolment of 335,879 pupils and 5,520 teachers. This raises questions on materials preparedness alongside other learning resources. With vast schools being in rural areas, the question of requisite preparations for the implementation of DLI was of great interest. Additionally, the study by Kirera (2013) indicated high dropout rates of pupils. Inadequate resources were among the contributing factors. It was also clear that some

public primary schools had been chosen for testing of DLI in Meru County, hence, the need to ascertain the diffusion of lessons learnt to other schools in enhancing preparedness towards the implementation of digital learning integration.

### 3.8 Target Population

Target population refers to the entire group of individuals of interest to the study aimed at getting information from them in order to generalize and draw conclusions (Alvi, 2016; Orodho, 2010). The study targeted 710 public primary schools in nine sub-counties from which respondents comprising of 668 head teachers, 7,032 classroom teachers, 2004 PTA executive members representing parents, 26,720 pupils in grade 3, and 9 sub-counties were drawn. The data in Table 3.1 was obtained from Meru County education office records (2016).

**Table 3.1:**

*Distribution of population per sub-county*

<b>Sub-county</b>	<b>Number of schools</b>	<b>Pioneer pupils</b>	<b>Number of teachers</b>	<b>PTA executive</b>	<b>Sub-county Directors</b>
Buuri	54	2160	590	162	1
Imenti South	80	3200	881	240	1
Imenti North	59	2360	648	177	1
Igembe South	65	2052	638	195	1
Igembe Central	78	2503	960	234	1
Igembe North	98	2420	591	294	1
Tigania East	101	4025	1010	303	1
Tigania West	90	3600	992	270	1
Meru Central	85	3400	722	255	1
<b>Total</b>	<b>710</b>	<b>25720</b>	<b>7032</b>	<b>2130</b>	<b>9</b>

Source: Meru County Education Office Records (2016)

SCDEs and the head teachers are responsible for policy interpretation and implementation in addition to DLI programme preparations. Head teachers as leaders are responsible of influencing the digital learning integration process in their respective school by inspiring stakeholders through a shared vision and common goal. Additionally, they are also required to monitor, evaluate and give feedback about the progress of digital learning integration program to the MoE as well as interpreting the policy guidelines. Teachers are responsible for DLI hence they are rich in information sought by this study. The school's PTA as part of the management team were always in touch with the school's activities and programs hence they were knowledgeable about the digital learning integration programme. Also, the school committee had the required basic education as per the MoE guidelines hence they understood the day-to-day running of their respective schools. Therefore, they stood a better chance of providing adequate information sought by this study. The pioneer digital learning integration class gave firsthand information as the end users of the project. Therefore, they were in a better position to give their wealth of experience as the program was getting rolled out.

### **3.9 Sampling Technique and Sample Size**

The sampling technique is the act of choosing the number of subjects to include in the sample (Orodho, 2010). The sample size is an important feature of any empirical study in which the goal is to make conclusions about a population from a sample (Potts & Fugard, 2015). Where the population is large, 10% to 20% of the population is a good representation (Orodho, 2010; Emmel, 2013). The study accessed 9 SCDEs obtained through non probability sampling technique, 71 public primary schools through probability sampling.

The study used target population indicated in table 3.1 as the sampling frame. The study used lottery method to select the schools using the following steps: in step 1, a list of the schools in each sub-county was made containing the names of the schools; step 2, schools were assigned numbers sequentially. This was the sampling frame from which simple random sample was drawn; step 3, using the sampling frame, the numbers assigned to schools were written on pieces of papers of the same size. The papers were then put in a box and mixed thoroughly and randomly selected one name at a time to include in the sample. The study considered the method as the best since it was practical, best probability sampling method which catered for homogeneity; helped to reduce bias, cost, time and accuracy. It was considered easy to apply (Orodho, 2010). Further, each member of the population had an equal chance of being chosen for the study. That guaranteed that the sample chosen is representative of the population and that the sample is selected in an unbiased way. Therefore, the statistical conclusions drawn from the analysis were valid.

The PPS in the county have a common property throughout hence homogenous. The study therefore used proportionate simple random sampling from the sub-counties. Schools were first sampled. Since the schools were too many 10% of the schools were sampled using simple random sampling. Thus, 10% of (54, 80, 59, 65, 78, 98, 101, 90, 85) schools were sampled from Table 3.1 to get a sample size of (5, 8, 6, 7, 8, 10, 10, 9, 8) respectively totaling to 71 public primary schools. As a result, head teachers, and executive PTA members from the sampled schools were considered. Teachers from sampled school were also considered in the sample. SCDE were purposively sampled while 8 pupils from DLI pioneer grade in the sampled schools were randomly sampled to form focus group discussion (FGD). Table 3.2 shows the sample size.

SCDE represent MoE on management of schools and teachers as per the existing policy and guidelines as well as coordinating the curriculum in their respective sub-counties hence they were rich in information on DLI. The pioneer class was the first to be introduced to DLI programme hence they had information to give. PTA represents parents in the management of the schools and also to provide an appropriate education for each learner at the school. Purposive judgmental sampling technique was used in selecting the PTA respondents. Choice of chairs of PTA executive to represent parents was arrived at using researcher's judgment to save time and money since locating bigger number of the PTA members was not easy. Head teachers are in charge of the schools. Therefore, PTA as well as head teachers were also DLI information rich. Similarly, ten percent of the teachers' proportions from the sub-counties were in the sample. Thus, 10% of (590, 881, 648, 638, 960, 591, 1010, 992, 722) gives a sample size of teachers as (59, 88, 65, 64, 96, 59, 101, 99, 72) respectively, totaling to 703 teachers. Sloven's formula  $n = N/1+Ne^2$  was used to get the sample size of the pupils where, n = sample size, N = population size, and e = level of confidence (Ryan, 2013). Applying the formula, 396 pupils were selected to participate in the sample. Table 3.2 shows sample size consisting of PPS, head teachers, teachers, pupils, PTA, and SCDEs.





**Table 3.2***Sample Size*

<b>Sub-county</b>	<b>10% of Schools</b>	<b>Head Teachers</b>	<b>Pupils FGD</b>	<b>Teachers' (10%)</b>	<b>PTA (10%)</b>	<b>Sub-county Directors</b>
Buuri	5	5	24	59	15	1
South Imenti	8	8	48	88	24	1
North Imenti	6	6	32	65	18	1
Igembe South	7	10	40	112	30	1
Igembe Cental	8	7	48	96	23	1
Igembe North	10	10	54	107	30	1
Tigania East	10	10	54	101	30	1
Tigania West	9	9	48	99	27	1
Meru Central	8	9	48	72	27	1
<b>Total</b>	<b>71</b>	<b>71</b>	<b>396</b>	<b>703</b>	<b>201</b>	<b>9</b>

The sample size had a total of 1380 respondents consisting of 9 sub-county Directors of Education, 71 head teachers, 703 teachers, 201 PTA, and 396 pupils.

### **3.10 Data Collection Instruments**

The study considered data collection tools that met specific study objectives in addition to systematic collection of primary data. The choice of data collection instruments determined the accuracy of the findings that contributed significantly to the overall research (Wilson, 2010). The literature review aided in identifying specific questions. Questionnaires, interview guide, FGD and observational schedule were used. The research tools were constructed by the researcher after consulting experts on digital

technology and quality assurance and standards departments at KeMU. In addition, literature reviewed in chapter two was referenced. Head teachers, teachers and PTA were subjected to questionnaire tool; digital learning integration pioneer classes were subjected to FGDs while the County and SCDEs were interviewed.

### **3.10.1 The Questionnaires**

The questionnaire gives respondents freedom to express their views by answering the questions on the questionnaire while the focus group discussion enabled the learners to be asked about their perception, opinions and beliefs about the classroom interaction with the digital tools as asserted by Orodho (2010). Further a questionnaire facilitated the collection of information from many respondents and can be distributed a wide region (Kombo & Tromp, 2009). The questionnaire instrument was preferred for this study because it allowed greater uniformity of questions, information can easily and conveniently collected from the answers given. The instrument was also easy to administer.

Each questionnaire had a set of questions to be responded to and contained five sections namely: demographic details (A), items organized as per objective namely teachers' training (B), adequacy of digital learning resources (C), availability of technical support staff (D), parental involvement(E) and open-ended questions (F). Three sets of questionnaires that also included open-ended questions were used for: head teachers (Appendix II), the teachers (Appendix III), and for PTA (Appendix IV). Open-ended questions helped the respondents to complete the questionnaire with freedom of response while the closed ended questions helped the respondents to select the answers that best describe their situation.

### **3.10.2 Interview Schedule**

The interview schedule guided the collection of information from the SCDEs (Appendix I). An interview schedule is a tool that guides a purposive conversation in which the researcher seeks to find out the respondent's opinion regarding the phenomenon under study (Kumar, 2012; Bloomberg & Volpe, 2008). Further, since interviews are face to face encounters, they provide in-depth data by using probing questions, which would not be possible to get using other types of tools. The interview schedule in appendix I contains interview items covering the four objectives. The variables and the corresponding indicators guided the construction of research tools. The researcher obtained telephone contacts of SCDEs and contacted them to organize for date, venue and time for conducting the interview. On the dates of administering the interview, the researcher interacted with the respondent on one-on-one with the respondent guided by the predetermined set of questions in the interview schedule. The responses were written down on the spaces provided in the schedule. The researcher requested for clarification of responses that were not clear before writing them down. The interview schedule was useful in generating data required to meet study objectives. In addition to the interview schedule, the researcher used audio tape as a backup to the notes he was taking. That ensured that the researcher had an accurate record of the conversation.

### **3.10.3 Observation Schedule**

Observation schedule form (see appendix V) was used to confirm the digital learning resources available to pupils. This was an analytical form filled by the researcher during observation. The form contained a list of digital learning resources which were required to be prepared in readiness for the DLI programme. The observational schedule guided the researcher to collect data through observations which provided more than just

recording of data from the environment as supported by Creswell and Planoclerk (2011). First hand data was obtained by observing the adequacy of digital learning resources. Very rich data that was not captured through use of other tools was obtained. The observations were then quantified.

#### **3.10.4 Focus Group Discussion Guide**

Focus group discussion guide tool (appendix VI) was used to gather data from the eight identified pupils from DLI pioneer class. Focus group discussion is a tool for facilitating a group interviewing process gathering qualitative information (Potts & Fugard, 2015). Focus group discussion was useful in exploring not only what the learners thought, but how they thought, why they thought that way and their experiences in a naturalistic environment where they will be free to air their views freely. The researcher moderated the session. Each discussion took 40 minutes. The researcher explained the pupils that they should freely participate in the discussion. Class teacher assisted in organizing the pupils.

#### **3.11 Piloting of Research Instruments**

Pre-testing of data collection tools was done before they were administered to ascertain their reliability and validity. PTA, teachers, DLI pioneer pupils of school Ntharagwene primary school, SCDE from Isiolo sub-county were subjected to the research tools. The resources observational tool was also pretested in the same pilot school. The research tools were tried out on the selected respondents similar to the ones that were to be researched on. The results were analyzed, patterns and major differences noted. Areas such as clarity of the questionnaire, suitability of the tool content to the respondent, time needed, possible obstacles that could arise were looked into. Thereafter, the tools were revised accordingly.

Pre-testing ensured that the tools yielded consistent results, correct wording and clarity of sentences, unambiguous, and that the responses were unbiased (Marshall & Rossman, 2010). The data obtained was tested for adequacy and workability of the research instruments and determined what resources were required (Kumar, 2011). Further, the tests were to show that the questions were answered as it was intended (Hilton, 2015). In pre-testing, a small number of respondents were used to test the appropriateness of the research instruments and check for clarity of the questions. The tests were administered to eight teachers, six PTA members, two groups of grade 3 learners consisting of eight pupils each, SCDE and ten head teachers were tested. The rationale of conducting the pilot study was to ensure the full-scale study can be conducted in the way that had been planned or should some components be altered. Readers should interpret the results and implications correctly. Other reasons of conducting pilot study were to ensure that the process, resources to be used, and problems with data management were addressed. The study involved large data emanating from four tools.

### **3.11.1 Reliability of Research Instruments**

Reliability test ensures that items in the research tools yielded consistent results and respondents understand and interpret the items in the same way (Mugenda, 2008; Wilson, 2010). The study used split-half reliability tests of the instruments. Head teachers, teachers and PTA Likert scale questions were subjected to split-half reliability test. The school is a single stream in peri-urban area with characteristics similar to most schools. After visiting Ntharagwene primary school, questionnaires were distributed to 10 teachers, and 12 PTA members. Questionnaires were also given to ten head teachers in Isiolo County. The test questions were randomly divided into two parts. Scores for

each split half were obtained and correlation coefficients worked out. The split-half enabled the study to assess how well the test components contribute to the construct that was being measured. Also the clarity, user-friendliness of the instrument, and the average time required to administer the instruments were noted.

Reliability test results show Spearman-Brown coefficients were above the required 0.8. That showed a strong internal consistency between variables in the section. A strong positive correlation between results of the same test indicates reliability.

In the same school, two FGD groups were tested for about 20 minutes each. Two separate observations were made using the observation schedule, one accompanied by the head teacher and the other by the teacher in charge of DLI programme in the school. SCDE from Isiolo County was interviewed. The open-ended questions, interviews, observational schedules, and FGD were reviewed by experts in the same field at KeMU University and validated to verify the correctness, credibility and dependability.

### **3.11.2 Validity of Research Instruments**

According to Kumar (2012), validity refers to ability of an instrument to measure what it is designed to measure. Validity establishes relationship between data and the variable or construct of interest. Validity ensures correctness of the facts and easy to understand deductions from the data collected through the use of a tool or a scale for each constructor variable (Kumar, 2011; Mugenda, 2011). Validity is the degree to which results obtained from a study are acceptable and represent the phenomenon under investigation. Any inadequacy of the instruments was rectified before subjecting the instruments to the target population as supported by Silverman (2011). Content validity was ensured by constructing related question items with respect to the study objectives.

The assessment content and composition therefore, was appropriate and ensured that the desired trait was measured to avoid bias. The researcher's supervisors studied the items in the research instruments and made their recommendations accordingly. Sentences that were not clearly stated reconstructed and wording checked to ensure that the content was valid. This enabled the researcher to make the necessary adjustments including altering or reframing questions asked on the tool. Face validity was carried out to measure the construct of interest. The ambiguous items were modified accordingly to improve face validity. The researcher's supervisors too were monitoring the entire research process and ensured quality and trustworthiness of the research report. Further, they ensured face validity, accuracy and consistency of the tools. The findings were presented to experts to validate. The output from the validation enabled the researcher to rectify inconsistencies as asserted by Kumar (2011).

### **3.12 Data Collection Procedure**

The necessary permit and authorization documents were obtained from the National Council for Science, Technology and Innovation (NACOSTI, Appendix XI) and County Director of Education (Appendix XII) after getting an introductory letter from Kenya Methodist University (Appendix X). The researcher then proceeded to book appointments from the SCDEs and from the head teachers of the sampled schools before embarking on data collection on the agreed dates starting with the SCDEs before proceeding to schools. Visits and telephone calls were means used to reach out SCDEs and head teachers from which it was possible to make arrangements on how and when to collect data.

### **3.12.1 Procedure for Conducting Interviews**

After visiting the SCDEs on the agreed date, and after introductions, respondents were briefed about the study before embarking on the interview. Data was gathered from the SCDEs through in-depth interview on one-on-one basis. The interactions with the respondents were guided by the predetermined set of questions in the interview schedule (Appendix I). The responses were written down in the spaces provided after the researcher understood the responses. The interview schedules were coded per sub-county (A – I).

### **3.12.2 Procedure for Administering Questionnaires**

Questionnaire is a tool that allows a lot of data to be collected and from and from a large number of people simultaneously (Wilson, 2010; Kumar, 2011). Further, the tool could deal with both likert scale and structured questions at the same time thus, minimizing time and cost significantly. Questionnaires were organized and delivered to the head teachers, teachers, and PTA directly on the agreed date and time. After introductions, the researcher requested teachers and head teachers to fill the questionnaires. The researcher requested the head teachers to introduce him to the PTA so that they can fill the questionnaires. The PTA was met during the time they met for their scheduled meetings or upon request by the head teacher to shortly come to schools. The filled questionnaires were collected there and then or later or delivered to the researcher. The questionnaires were coded per sub-county and school such as sub-county A, school 01 respectively for head teachers (HT), Teachers (T) and PTA. For example, sub-county A school 01: A/01/HT (Head teachers), A/01/T (Teachers), and A/01/PTA (PTA executive).



### **3.12.3 Procedure for Conducting FGD**

Through the head teacher, the researcher requested to sample 8 pupils to participate in FGD. The researcher accessed the pupils through the class teacher. The class teacher assisted in sampling pupils through simple random technique. The group and the researcher were shown a room or place where they sat and carried out the discussion with the researcher as the moderator. The researcher took notes of the proceedings. The responses were coded for example A/01/FGD (sub-county A/school 01/FGD).

### **3.12.4 Procedure for carrying out Observations**

The head teacher, deputy head teacher or the teacher in charge of DLI programme showed the researcher the digital learning integration resources as he counterchecked against the list on the observavational schedule upon the request. The researcher participated in the observation so as to gain greater understanding of of what is being studied through viewing and actual counting. The data was coded as A/01/ OS (sub-county A/school 01/Observational Schedule). The researcher always thanked all the respondents after the exercise.

### **3.13 Data Analysis Procedure**

The collected data was sorted out to identify the fully completed and incomplete responses and organized first before analyzing. Analysisof data involved organizing the data into units easy to understand, combined separate ideas, and identified similar patterns as supported by Kurtar (2007). The quantitative data was presented using descriptive statistics (percentages), inferential statistics (testing of statistical hypotheses) and testing for normality in form of tables, charts while the qualitative data was narratives. The normality tests were done to ascertain that data was normally distributed.

### **3.13.1 Analysis of Quantitative Data**

The questionnaire data was first coded and levels of measurements associated with quantitative data identified and assigned arbitrary values before entering the data. The Likert scale items ranked on the satisfaction scale 1-5 were assigned; 5 = strongly agree, 4 = agree, 3 = neutral, 2 = disagree and 1 = strongly disagree. The response scale was specific to the type of statements and questions posed and the sample targeted. The agree/strongly agree were on the positive side while disagree/strongly disagree were on the negative side. The analysis facilitation is easier to understand and interpret since at the end we want to know whether the responses were negative answers or positive answers (Eljack, 2019).

The coded data was then entered using IBM SPSS Version 22 software and following the order name, data variable view type numeric or string decimal, scale and then label. The data was then analyzed per objective by selecting the most appropriate statistics to enable data description in form of figures, frequency and percentage distributions depending on the output required. The distribution of the data was checked before embarking on the inferential analysis. Testing of statistical hypotheses was used on the four objectives. Inferences were made to look for patterns, determine if there was a relationship between an intervention and an outcome variable as well as strength of that relationship. Further, evidence was sought to either support or reject hypotheses formulated. The data obtained from the observational schedule supported the quantitative data. The bio-data was analyzed using frequencies and percentages for the four categories of respondents. The inferential statistics analysis, specifically, univariate regression analysis was carried out to test hypothesis. This helped the study to reject or fail to reject the null hypotheses.

### **3.13.2 Analysis of Qualitative Data**

Qualitative data was transcribed by typing the text from the written essays into word processing files. The data was read many times dividing it into segments of information. The 10-20 segments were coded accordingly. The codes were reduced removing the overlaps to about 20 codes which were finally collapsed into 5 fully developed ordinary themes after reaching saturation point where no more themes emerged. The data collected from the directors of education was first be organized thematically and then coded accordingly. The themes were then be grouped according to the objectives.

Similarly, the data from the focus group discussion and open-ended questions was analyzed in a similar way. The conclusions drawn from the qualitative data supplemented quantitative information. Through such analysis the researcher is able to make senses of large masses of data obtained from the fieldwork (Creswell, 2013). Narratives were transcribed and presented in reported speech and direct quotations in order to capture actual responses. Further, responses that did not recur and were found relevant were used without codes. Further, some responses from the open-ended questions were first organized per objective indicators in a frequency distribution table before computing the percentages.

### **3.13.3 Analysis of Observational Data**

Data obtained through observational schedule was organized in a frequency distribution table and percentages worked out. The data was useful in supporting qualitative and quantitative data during discussion.

### **3.14 Operationalization of Variables**

Table 3.3 shows operationalization variables, their indicators, level of measurement approach analysis and objectives. The level of analysis for the four objectives was descriptive and inferential statistics. Indicators and elements of measures are shown in Table 3.3 in the appendix XIV.

### **3.15 Ethical Considerations**

The concept of ethics in research encompasses the analyses and employment of concepts such as right and wrong, good and evil and transparency, accountability and responsibility (Bryman, 2012). It is the responsibility of the researcher to ensure that acceptable procedures are followed and ensure that that the rights of the respondents are not infringed (Mugenda, 2011). The researcher first got letter of introduction from KeMU to facilitate him get the research permit from NACOSTI and other relevant offices. The researcher carried out the research study competently and confidently and took into consideration of the following ethical issues. Privacy, where the respondents had the right to control access to themselves and their information, was guaranteed by the researcher. The researcher had a cover letter (see appendix VI) that introduced the study and assured respondents confidentiality.

Further, respondents were informed that the data obtained was for the purpose of the study only and no undesirable persons would have an access to the data. The researcher upheld anonymity in that the respondents were not required writing their names or any other personal details. In a school set up, the learners are under school care through the leadership of the head teacher. Teachers therefore take care of learners in a school. Pupils were accessed through the class teachers. The researcher went through the class teacher after getting the permission to seek consent from the learners. Children were given clear

and adequate information in order to participate freely and fruitfully in FGD. The information was passed to the learners with the help of the class teacher. Children who were willing to participate were grouped together to form FGD. The class teachers permitted the researcher to conduct the discussion. Data obtained was confidential and accessible only to the researcher. The researcher always thanked the respondents after the exercise. Further, to ensure non-fabrication of the data all sources consulted were acknowledged accordingly using APA referencing system.

## CHAPTER FOUR

### RESULT AND DISCUSSION

#### 4.1 Introduction

This chapter explains and discusses many different aspects of the findings using descriptive statistics, inferential statistics, and qualitative thematic narrative. The findings are organized according to research objectives. The results have also been discussed in context of other related studies.

#### 4.2 Reliability Statistics

Fitness of data for analysis was determined by conducting statistical analysis. The test results were subjected to Spearman's Brown formula  $p' = np/1 + (n-1)p$  where  $p$  = test reliability and  $p'$  = reliability of the test replicated  $n$  times. When  $n=2$  we have Brown correlation for halves of equal length shown in Table 4.1

**Table 4.1: Spear-Brown Reliability Test**

*Spear-Brown Reliability Test*

Section of the questionnaire	the Items (PTA) correlated	Spearman Brown (SB)	Items (H/T)	SB	Items (Teachers)	SB
Teachers preparedness (B)	10	0.936	6	0.887	6	0.904
Availability of resources (C)	10	0.810	6	0.933	6	0.838
Technical support staff (D)	10	0.939	6	0.914	6	0.948
Involvement of parents (E)	10	0.930	6	0.891	6	0.804
DLI (F)	8	0.918	6	0.820	6	0.846

The selection of the items and conclusion was based on Kaiser-Meyer-Olkin and Bartlett's tests (KMO measure of sampling adequacy and Bartlett's test of sphericity). Reliability test results indicate that spearman-Brown coefficients were above the required 0.8 indicating the goodness of the items in the data for carrying out statistical analysis.

### **4.3 Response Rate**

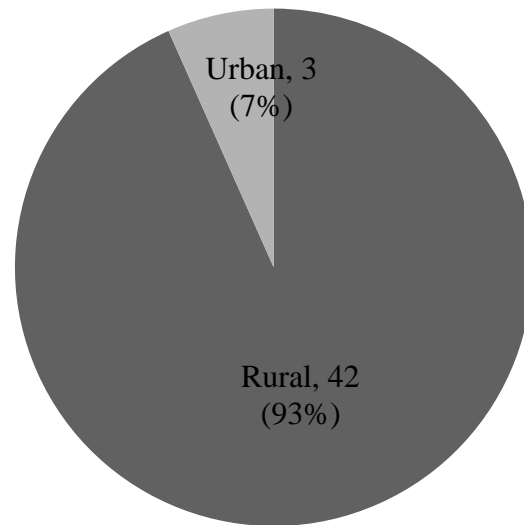
This section provides response rate from units of analysis followed by response rate from units of observation. The units of analysis in this study were public primary schools while the units of observations were SCDE, head teachers, teachers, PTA and learners from the pioneer classes, that is, grade three.

#### **4.3.1 Response rate from public primary schools**

Out of the 71 public primary schools which were sampled, 45 responded, representing a response rate of 59%. This response rate was attributed to insecurity hence some sampled schools were not reached. Another challenge was caused by head-teachers who refused to respond. The location of these schools was also sought. Each school has its own unique challenges with respect to accessing power connectivity among other challenges depending on its locale. The study found it worthwhile to categorize the schools in their naturalistic state into rural and urban to find out whether some schools had advantages over the others with respect to having resources to aid in preparations for DLI programme. Teachers and head teachers indicated schools' locations as illustrated in Figure 4.1.

**Figure 4.1**

*Location of Schools*



Majority of the schools 42 (93%) in Meru County are located in rural regions while 3 (7%) are in urban region. The naturalistic conditions of where the schools were located contributed to the uniqueness of the schools. Some schools were endowed with resources while others have meager or none depending on the location. Schools that benefit from the rich environments are able to engage parents and make them participate in provision of resources for the learners (O'Hara, 2011). There are natural impediments such as unreliable rain, scarcity of water, infertile land which affects the development of the school. That ultimately affects the provision of resources such as classrooms, desks and many others. The urban communities have access to markets, transport and economic activities which enable them support their schools. The study found out that the location of the school was useful in provision of useful data relating to preparedness for DLI programme.



### 4.3.2 Response Rate from Units of Observation

The expected respondents were 8 SCDEs, 67 head teachers, 703 teachers, 67 PTA and 67 FGDs from DLI pioneer classes. The frequency and percentage of respondents are as shown in Table 4.2.

**Table 4.2**

*Response Rate*

Respondents	Frequency (f)	Percent (%)
SCDE	8	100
Head teachers	45	67
Teachers	496	71
PTA	43	64
Pioneer Classes	45	67

The findings indicate that the response rates were reliable according to Saldivar (2012). The response rate for the SCDE was 100%. Where the SCDE did not have adequate information, the researcher was referred to the CSOs for additional information. The response rate for the head teachers, teachers, PTA and pioneer class was 45 (67%), 496 (71%), 43 (64%) and 45 (67%) respectively. The ratio of the number of responses to the total number of respondents approached was calculated and expressed as a percentage to get the response rate. Response rate of above 80% in face-to-face interviews was good, 50% was adequate for responses from questionnaires and also 60% was good for FGD (Saldivar, 2012). The response rate showed that the survey was well executed and the participation of the respondents was good. It was also a good indicator that the study got quality feedback free from bias. Therefore, the response rates were found to be good for

representative of the target sample and that the questionnaire performed as was intended in the examination of the state of preparedness for DLI.

#### **4.4 Demographic Profile of Respondents**

The background information of the respondents' in the area of study was captured in this section. The bio-data helped the study in collecting useful information from the respondents through profiling. Analysis was done based on respondent's gender, academic qualification, years of experience in their area of jurisdiction, number of lessons taught by respondent, classes they were teaching, number of students per class, pedagogy skills acquired through training and computer literacy. The respondents' quantitative data was reported in the sub-sequent sub-section.

##### **4.4.1 Respondents' Gender**

Gender of SCDEs, head teachers, teachers and PTA was captured in this sub-section. These are the respondents who were directly took part in the preparations of digital learning integration programme in Meru County. Respondents' gender was as shown in Table 4.3. The dimension taken by respondents in preparing to adopt the innovation was of interest to the study. Both gender needed to be prepared on DLI to be able to expose students to the latest trends in digital technology and media.

**Table 4.3***Respondents' Gender*

Respondents	Males (f)	%	Females (f)	%	Total (f)	%
SCDE	3	38	5	62	8	100
Head Teachers	26	58	19	42	45	100
Teachers	155	32	341	69	496	100
PTA	26	61	17	40	43	100

According to Table 4.3 male participants were; 3 (38%) SCDE, 26 (58%) head teachers, 155 (32%) teachers and 26 (61%) PTA. The female participants were 5 (62%) SCDE, 19 (42%) head teachers, 341 (69%) teachers and 17 (40%) PTA. Teachers and PTA female respondents were slightly more than their male counterparts. A study by Heather, Ozkan and Serkan (2012) on teacher-learner gender dynamics in primary schools showed that female ill-prepared teachers on DLI were not confident in challenging environments. Further, male science and mathematics teachers were enthusiastic and aware applications of computers in teaching compared with arts teachers. Therefore, it was necessary for both gender to have knowledge and understanding of the role of computers in DLI process so that they could effectively participate in the study (Philomina & Amutha (2016). The results indicate that gender distribution was balanced and therefore their participation in decision making and influence on DLI preparations and implementation strategies were undertaken by both gender.

#### 4.4.2 Respondents' Age

Teachers both young (20 - 40 years) and old (over 50 years) are found in the teaching service in primary schools. The various categories of age brackets have varying exposure, knowledge, and experience to digital technology media that was very useful to the study. They also have varying degrees of wisdom, patience, energy, maturity and skills among others that were required for the preparation for DLI programme. The age brackets of head teachers and teachers were as shown in Table 4.4.

**Table 4.4**

*Respondent's Age*

Age bracket (years)	Teachers (f)	%	Head teachers (f)	%
20-30	56	11	0	0
31-40	78	16	0	0
41-50	197	40	16	36
51-60	165	33	29	64
Total	496	100	45	100

Most of the head teachers were in the range of 51-60 years constituting 64% while 36% ranged 41-50 years. Age ranges for the teachers were 20-30 (11%), 31-40 (16%), 41-50 (40%) and 51-60 (33%). The findings revealed that teachers whose age was below 41 years were not appointed as head teachers.

The findings indicate that different ages of teachers provided useful data arising from their DLI programme preparations experiences. According to Albion (2011) the digital technology knowledge gap arising from the age gaps affected teachers and administrators in preparation and adoption of the innovation. Albion (2011) study is in agreement with

Rogers (2003) theory that an innovation has three levels of adoption namely early adopters who happen to be young compatriots, middle adopters category of young and the old generations and the late adopters where majority of old people have difficulties in using new technologies among other challenges. All the age groups were represented in schools which were relevant to the innovation adoption. That was significant because DLI programme preparations required both experienced and the newly recruited teachers in the teaching profession to form a collaborative team. Therefore, consideration of the age of the respondent in the study was essential.

#### **4.4.3 Respondents' Education Level**

Schools expect teachers to be digitally savvy and professionally experts who can navigate effectively on DLI applications (Murute, 2013). The education level of a teacher, administrator or manager can make them be confident in their current technological abilities, desire to improve and the application of creative ways to accommodate students' varied developmental levels and needs (Cher & Siew, 2015). Further, research questions required recall of the requested information from memory, visual cue and explanations. Therefore, the questions demanded literacy. The response from SCDEs, head teachers, teachers and PTA was as presented in Table 4.5.

**Table 4.5***Respondents' Education level*

Level of Teachers education	Teachers		Head Teachers		PTA		SCDE	
	(f)	%	(f)	%	(f)	%	(f)	%
Masters	18	4	7	15	0	0	5	62
Degree	126	25	18	40	11	25	3	38
Diploma	119	24	16	36	0	0	0	0
P1 Certificate	233	47	4	9	24	56	0	0
Form Four	0	0	0	0	5	12	0	0
Class Eight	0	0	0	0	3	7	0	0
Total	496	100	45	100	43	100	8	100

Table 4.5 indicates that 233 (47%) teachers are P1 certificate holders, 119 (24%) were diploma holders, 126 (25%) degree holders and 18 (4%) masters' holders. This was an indicator that the content in the tool was understandable by majority of teachers. Further, the education background helped the study to get relevant data. The head teachers' level of education was satisfactory with 7 (15%) being masters' holders, 18 (40%) degree holders, 16 (36%) diploma holders and only 4 (9%) with P1 certificates. For the SCDE, 3 (38%) had degrees while 5 (62%) had master's degree. PTA education level was low compared to teachers and head teachers though it met the minimum threshold of inclusion to the study. However, they understood as stakeholders the benefits of the study as a tool for improving the education programmes in schools.

The education level was important in understanding, adoption and management of the innovation. Teachers work with students of all age groups to help them develop

intellectually. Teachers are generally responsible for lesson planning, information transmission to learners, advice, and behaviors so that they graduate as responsible and reliable members of the society. Moreover teaching requires good academic certificate and classroom readiness training. Broad education therefore is necessary in providing broad knowledge and different vocal points. Inadequate training hindered teachers from obtaining a solid base of essential knowledge classroom delivery. The study found out that the education of the respondents could be relied on to get credible data, and that teachers had requisite knowledge in teaching and hence they could be re-sharpened to advance digital learning in their schools.

#### **4.4.4 Teaching Experience of Head teachers and Teachers**

Teachers gain teaching experience upon placement after completing the teacher training course. Teaching is a complex activity that involves planning for learning, preparation of lesson materials, prioritizing ideas, interacting with learners and giving learning tasks among other activities. Head teachers and teachers were the respondents who were directly dealing with the learners in DLI programme. The study found out that varied teachers' experiences could yield adequate and reliable data of preparations for DLI programme. The teaching experience of the respondents is as shown in Table 4.6.

**Table 4.6***Teaching Experience of Head teachers and Teachers*

Years of service	Teachers (f)	%	Head Teachers (f)	%
1-5	95	19	0	0
6-10	92	19	4	9
11-30	233	47	22	49
30 – 40	76	15	19	42
Total	496	100	45	100

Teaching experiences indicated in Table 4.6 shows that head teachers teaching experiences in the ranges 6-10, 11-30 and over 30 years were 4 (9%), 22 (49%) and 19 (42%) respectively. Years of service for the teachers in the ranges 1-5, 6-10, 11-30 and over 30 were 95 (19%), 92 (19%), 233 (47%) and 76 (15%) respectively. The experience of teachers and head teachers was corresponding to their age brackets as shown in Table 4.3. Teachers that were in career for long were expected to be more knowledgeable in education matters and hence reliable. Teaching involves the use of wide body of knowledge to pass ideas, concepts and information about the subject being taught and methodology to select the optimal application tools to teach that subject (Ghavifekr et al., 2012). Notably experienced teachers have acquired more pedagogical skills than inexperienced teachers. Therefore, the experience of the teacher was relevant in preparation for adoption of the innovation. Teachers need time to gain experience if they were to become confident in teaching using computers. Experienced teachers make their interactions with learners much easier and worthwhile. A lot of rich information was gathered from the experienced teachers as they embarked on the preparations for DLI. At



the same time, inexperienced teachers too responded well on the challenges encountered and how they navigated through.

#### 4.4.5 Class Taught by Teachers and Head teachers

Classes differ in size and format. The unique characteristics of the class are always considered by the teacher to enable him/her prepare class activities and assignments that can best support learning. For example, digital learning resources need to be prepared while in advance to create conducive learning environments in which learners successfully meet their learning objectives. The classes respondents were teaching were of great value in getting reliable data on preparations for DLI programme. Responses are shown in Table 4.7.

**Table 4.7**

*Classes taught by Teachers and Head teachers*

Class	Teachers (f)	%	Head Teachers (f)	%
1-3	121	34	0	0
4-8	325	66	45	100
Total	496	100	45	100

Table 4.7 shows that 171 (34%) teachers taught lower classes (grades 1-3) while 325 (66%) indicated that they taught upper classes (4-8). The lower classes were the pioneers of the digital learning integration programme. It was inevitable to note teachers who were handling classes 1-3 since they were the main targets of DLI programme roll out in the first instance. The findings indicate that all head teachers were not teaching classes 1-3. The findings were important since the school administrators were expected to be exposed to the two levels of learners both lower and upper primary.

Finding out which class the teacher was teaching was necessary since he/she was expected to prepare a safe and better learning environment for DLI programme (Mihai & Nieumenhuis, 2015). Mastery of DLI content for the class which the teacher was handling could ensure proper usage of lesson time and optimal management of resources. Some teachers have uneasy relationship depending on the class they were handling and their DLI preparedness. The study found information on the class which the teacher was teaching relevant with respect to the DLI preparedness. Teachers are facilitators of the DLI programme. The study noted that head teachers were not confident and competent on DLI. Introducing DLI program to learners with ill-prepared teachers led to program failure in Nyeri public secondary schools (Katete et al., 2015).

#### **4.4.6 Pupils Enrolment per Class**

The DLI classrooms were expected to have computers, tablets, smart boards, and other types of digital technology. The digital resources are supposed to be linked to the learners in order to make it possible for the learners to be helped to improve the learning outcome. There is set standard on the maximum number of learners a teacher should have to enable him/her to effectively instruct the learners and accommodate their varied needs (Perira & Perira, 2013). The number of learners the teacher was handling in a class was relevant to the study. Table 4.8 shows respondents who indicated the number of pupils they taught per class.

**Table 4.8***Pupils Enrolment per Class*

Number of pupils	Teachers (f)	%	Head Teachers (f)	%
10 -30	94	19	11	24
31-40	269	54	15	33
41-50	43	9	12	27
50 – 70	90	18	7	16
Total	496	100	45	100

Table 4.8 shows the number and percentages of learners that teachers and head teachers were handling in the classes they were teaching were as follows: less than 30; 94(19%), 31-40; 269 (54%), 41-50; 43 (9%) and over 50; 90 (18%) for teachers while for the head teachers were: <30; 11 (24%), 31 – 40; 15 (33%); 41 – 50; 12 (27%) and > 50 7 (16%). The number of learners per class was important because of the resources and the teacher-pupil ratio. These requirements were necessary for the provision of quality attention in DLI, evaluation and class management. According to Bertlett and Kenneth (2016) primary school programs are designed to provide a solid foundation for learning. An ideal number of learners per class should have the necessary required teachers, digital learning resources, specialized teaching spaces, staff preparation room, adequate equipment, computer rooms, and adequately sized classrooms among others.

**4.5 Teacher Preparedness on Digital Learning Integration**

The first objective of the study was to analyze the extent to which teachers were prepared for DLI programme in PPS. The objective covered the following indicators: teacher training on digital technology and pedagogy skills, in-service courses for teachers,

management of training of teachers, and classroom teachers' application of learnt content and skills.

Teachers are responsible for DLI in the classroom. Teachers' ensures that learners are given the right direction in the classroom. Their involvement in DLI training was crucial as part of preparations for the adoption and implementation of the innovation. Therefore, teachers were asked whether they attended workshops to acquire digital technology knowledge and skills. The training workshop was to prepare them before the roll out of digital learning integration programme. Head teachers who are in charge of schools' academic programmes and resource management were trained on DLI. Good leadership and management practices were required to make DLI successful. For head teachers effective adoption of the innovation, mastery of technology knowledge and skills was inevitable. Head teachers were to prepare for the programme roll out in their respective schools and supervise the integration hence they needed the training. Table 4.9 (in the appendix) shows data collected from 496 teachers and 45 head teachers.

The findings presented in Table 4.9 indicate that only 147 (30%) teachers had received digital learning integration training while majority of the teachers 341 (69%) did not attend. The findings revealed that only a third of the teachers were trained yet all teachers were expected to adopt the innovation equally. Further, 421 (85%) teachers were not satisfied with the quality of training because only a small number was effective after training. Only about 56 (11%) teachers were satisfied. Therefore, all teachers were not trained and the training was inadequate, an indicator of inadequate preparations for DLI programme. This was evidenced by report by 395 (80%) teachers who felt that teachers were not effective in classroom delivery. About 95 (19%) teachers felt that they were effective. The study noted that rolling out of DLI programme with two-thirds of the

teachers not trained was an exercise that was doomed to fail. This proposition agrees with Ghavifekr et al. (2012) who asserted that training of teachers must be done in advance to enable them acquire appropriate knowledge and skills.

Teachers are trained so that they can have the greatest chance of success in developing pupils' knowledge, skills and attitude. Without training, teachers cannot effectively use resources in the classroom to improve the learning outcomes (Fammi et al., 2013). The findings revealed that the quality of training of teachers fell below the threshold for the acquisition of DLI skills and knowledge that they were required to have if at all digital learning integration programme was to be effectively entrenched in the school curriculum.

The findings showed that DLI in most schools remained a mirage. Majority of the teachers were unable to effectively use the digital tools because of their ill-preparedness. Introduction and adoption of DLI programme in PPS required adequate teachers' preparedness if any meaningful change was to be realized. With 69% of the teachers not trained and 85% not satisfied with the kind of training that was done shows teachers' capacity building was inadequate and that teachers' competency in DLI dynamism was lacking. Further, the study noted that teachers did not have a wide understanding of the DLI programme, an indication that they were ill-prepared to adopt and use the innovation. Therefore, the design, planning, preparations attendance for digital training workshop were lacking. The findings concurred with those of Ching Fong-Moe (2015) who found out that out of good planning, taking action and good management practices ensured good preparation that enabled teachers to have the prerequisite knowledge before attending a digital integration lesson in the classroom. The study concludes that the programme was over ambitiously introduced in public primary schools without major

focus and emphasis on teachers' preparedness as facilitators of the programme in the classroom.

Further, data indicate that about 30 (67%) head teachers did not receive adequate knowledge and skills during training and about 30 (67 %) did not acquire pedagogical skills. Only 11 (24%) head teachers agreed that they acquired adequate knowledge and skills. On the adequacy of the training, 33 (73%) head teachers indicated that training was inadequate. Similarly, 38 (84%) head teachers indicated that there were no practical sessions during training. However, only 10 (22%) and 5 (11%) head teachers concurred with the facts that training was adequate and effective and that teachers were subjected to practical work respectively. Head teachers still do some teaching besides their managerial roles. Training of the head teachers was important so as to enable them to understand and lead the change process and preparations and having a clear and shared DLI strategic plan. Practical sessions were important during training since the trainees required hands on activities for practice and better understanding. The study noted inadequacy of technology knowledge on the side of head teachers. Therefore, head teachers' supervisory role on DLI was likely to be ineffective. Head teachers required continuous professional development. Therefore, the data can be relied upon to strongly indicate that the programme rolled out was headed for failure. The study was in agreement with that of Doering and Roblyer (2014); Rahuman et al.,(2011) who found out that without adequate knowledge and appropriate skills on how to operate and use most current digital and information tools that deal directly with teaching and application, made lesson delivery inefficient and insufficient. Teachers' responses to open-ended number 51 are shown in Table 4.9. The question required teachers to give reasons for attending or not attending the training.

**Table 4.9***Teachers' Reasons for attending /not attending DLI Training*

Response	f	%
Attended. Only 3 teachers who teach grades 1-3 per school to attend	103	21
The head teacher selected teachers to go for training	52	11
We were not informed	27	5
No comment	366	74

Table 4.9 indicate that about 103 (21%) teachers attended the training because they were teachers who teach grades 1-3 per school while 52 (11%) teachers were chosen by head teachers. Majority of teachers 366 (74%) failed to comment while 27 (5%) teachers were not informed. Failure to inform some teachers about the training was a serious breakdown of communication and indicates inadequate preparations or lack of willingness to support the programme. Further, the study indicate that although teachers from grades 1-3 were required to attend the training, the head teachers had the upper hand of deciding who was to attend. The findings were supported by Ghavifekr and sufean (2012) who found out that the success of DLI in Malaysia was brought about by well-coordinated teams in training of teachers. Further, a study of Fammi, Regea and Cantoni (2013) who found out that teacher should be prepared with digital skills and knowledge to effectively engage pupils in DLI constructively reinforced the study.

Head teachers response to open-ended question 69 of the questionnaire on how they rated the teacher preparedness on DLI programme before the roll out with respect to (a) acquisition of computer knowledge (b) acquisition of pedagogical skills is shown in Table 4.10.

**Table 4.10***Head teachers response on Teachers' DLI Preparedness*

Response	f	%
Acquisition of computer knowledge was fair to teachers who had prior knowledge	12	27
There was no other training for teachers since 2016	23	51
No pedagogical skills acquired by teachers during training	27	60
Training was to make teachers familiarize with digital learning technology tools	4	9

The rating of DLI training indicate that 12 (27%) head teachers reported that acquisition of computer knowledge was fair only to those who had prior computer knowledge while 4 (9%) said that training was about familiarization with digital technology tools. About 23 (51%) head teachers reported that training was inadequate since it was done in one week and only once since 2016. One week was not adequate to cover introduction to computers which is a whole course that should take several months. Therefore, continuous teachers' capacity building was lacking which complicated the DLI application in the classroom because of the two-thirds of the teachers were not trained. Some of the teachers who were trained were transferred to other counties, retired or left the service for one reason or the other. The training was shallow and pedagogical skills were omitted according to 27 (60%) head teachers. Further, teachers had not been sensitized hence some resisted the change.

The study found out that teachers were not trained on pedagogical skills to enable them use computer technologies so as to achieve meaningful learning outcome in the



classroom. Teachers without the knowledge and skills made the technology appear complex which made them not to administer the instructions (Li & Walsh, 2010). The study found out that DLI programme was unable to fit in with the established school framework because teachers lacked pedagogical skills. The study concurs with that of Boundless (2017); Wambiri and Ndani (2016) who found out that management of class activities and programmes were effective when the teacher had studied the science of pedagogy. The study found out that the data was very reliable.

The sub-county directors of education were asked to give their response on the attendance of digital learning integration training workshop. The responses were similar to those given by head teachers. Sub-county directors had the following to say;

SCDE A reported: *“it was a directive from MoE from the headquarters through the County Directors that they should mobilize teachers to attend training and identify the venue. Further, they neither knew the trainers nor the content which was to be covered or training logistics”*. SCDE B revealed: *“the county was not able to organize a single in-service training for teachers on digital learning integration program”*. Responding on quality of the program the SCDE C indicated: *“the training was shoddy and a flop. The training was about familiarization with digital tools and there were no pedagogical skills learnt. The classes handled were too large for the trainers hence hands-on activities were lacking. The knowledge acquired was inadequate and fell below the expectations. Basic skills on computers are pre-requisite so as to enable teachers undertake digital learning integration in the classroom. However, teachers who had prior computer basics were able to refresh their knowledge”*.

The study found out that training of teachers was not well coordinated, comprehensive and satisfactory. Further, the study noted that with shoddy training, teachers were not

competent on digital technology skills that were necessary to enable them engage pupils effectively. The study was supported by studies of Nyagowa et al., (2014); Higgings and Moseley (2011) who noted that with inadequate knowledge on digital technology, it was impossible to guide and assist learners on digital-related goals.

In-service training of teachers help them updates their knowledge and skills. Introduction of digital technology innovation in public primary schools required teachers to be in-serviced regularly to enable them to effectively implement DLI programme in their respective schools. The respondents were 45 head teachers and 496 teachers. Table 4.11 shows data on in-service training of head teachers and teachers.

**Table 4.11**

*In-service Training of Teachers and Head teachers*

Statement	Strongly agree A (%)	Agree B (%)	Combi ned (A+B) %	Neutr al C (%)	Disagre e D (%)	Strong ly disagree E (%)	Combi ned (D+E) %
Teachers received in-service training	90(18%)	74(16%)	164(34%)	12 (2%)	143(29%)	173 (35%)	316 (64%)
N = 496 Teachers							
MoE in-serviced all teachers	0 (0%)	0 (0%)	0 (0%)	1 (2%)	0 (0%)	44 (98%)	44 (99%)
N = 45 Head teachers							

Table 4.11 indicate that 316 (64%) teachers and 44 (99%) head teachers disagreed with the fact that teachers were in-serviced by MoE in preparation for DLI programme roll out but 168 (34%) teachers agreed. Teaching profession requires constant updating to improve the performance and effectively confront the emerging challenges. However, in-service training is a process that requires preparations and strategies (Modasiro & Modupe, 2011). The findings indicate that teachers were not in-serviced. Teachers are crucial in implementing DLI programme hence they needed to be in-serviced so as to be able to interpret and undertake the integration according to the aims and objectives. The study was in agreement with that of Ogembo et al. (2012) which revealed that teachers should be trained as part of preparations before rolling out the DLI programme. Further support came from Tay et al. (2013) who noted that teachers needed to be in-serviced to enable them undertake DLI effectively in learning environments.

The 45 head teachers also responded to the open-ended question which read; “With respect to in-servicing of teachers, explain what was not done and what needs to be done to enable improvement DLI programme. Table 4.12 shows data from head teachers on DLI in-service courses’

**Table 4.12**

*Head teachers’ Responses on DLI in-servicing*

<b>Response</b> N = 45	<b>f</b>	<b>%</b>
Hands- on-activities were lacking	22	49
Competent trainers were inadequate	11	24
Teachers needs frequent in-servicing	34	76
Time allocated for training was inadequate	29	64

It was expected that MoE would provide an opportunity to make it possible for all teachers to obtain the skills needed so as to efficiently incorporate digital technology in the curriculum. However, from Table 4.12, in-service training was not successful because hands on activities were lacking according to 22 (49%) head teachers, 11 (24%) said that the trainers were incompetent and 29 (64%) said that time allocated for training was inadequate. About 34 (76%) head teachers recommended that teachers should be exposed to frequent in-service courses. All teachers needed to be in-serviced so that they could be actively involved in guiding the pupils towards higher standards of learning and self-development. In-service training makes the teacher to be abreast with the current changes in the curriculum hence improving the effectiveness (Wambiri & Ndani, 2016). The study noted that MoE failed to prepare and develop concrete and effective professional programs with respect to DLI technological and pedagogical skills. That could have made the incorporation of digital technology in the curriculum easier. The study was supported by Hatlevick and Arnseth (2012) study which revealed that teachers must have the relevant technology knowledge and pedagogical skills on DLI if successful DLI was to be realized in the classroom.

All the SCDE agreed that there was no in-service course organized by the county education office. They however said that knowledge and skills on digital learning integration require constant updating by teachers hence provision of in-service course was lacking. In-service courses if offered could make teachers competent, develop positive attitude and become relevant partners in the development of digital technology in the schools (Nut, 2010). The findings revealed that failure by the county to organize in-service courses showed that the DLI programme preparations lacked good planning, leadership and management structures. SCDE H indicated: “*implementation of DLI was*

*done hurriedly whereas in-servicing of teachers required thorough, intensive and systematic preparations*". SCDE F revealed: "MoE did not have DLI qualified staff to carry out valid, reliable and constructive assessments on DLI in-servicing preparations and administration at County level".

The study concluded that teachers did not have requisite skills on DLI because no in-service training was organized in the county. The findings are supported by study of Richardson (2011) and Yaw (2012) studies who found out that in-servicing of teachers to enable them acquire basic skill as part of the preparations for digital learning integration was inevitable and if not done can make DLI ineffective.

PTA is empowered by MoE to promote quality of education for all learners, budget and allocate resources among other responsibilities. PTA manages schools on behalf of MoE and the sponsors for the benefit of the pupils. The study investigated the role PTA and MoE they played on the management of training of teachers on DLI. Table 4.13 shows data on management of DLI.

**Table 4.13**

*Management of Digital Training of Teachers*

<b>Response (N = 496)</b>	<b>f</b>	<b>%</b>
No, some schools did not present teachers for training	7	16
No, all head teachers were not trained	17	38
No, there was no follow-up of the untrained	9	20

The data shown in Table 4.13 revealed that some schools did not present teachers for DLI training according to about 7 (16%) head teachers. In addition, 17 (38%) head teachers revealed that not all head teachers were trained. Further, 9 (20%) head teachers

reported that there was no follow-up of those who were untrained. Thus, the management of the entire training was not well prepared and managed. PTA did not plan, strategize or supervise DLI training. Also noted was that MoE neither adequately supervised nor did they make a follow-up of the untrained teachers to be trained. DLI requires up-to-date trained staff with skills and knowledge to deliver learning experiences and supervise learners in the classroom. Good management practices were required so as to identify and conceptualize relevant information that was needed to be taught to all teachers to enable them adopt the innovation easily, conveniently and effectively.

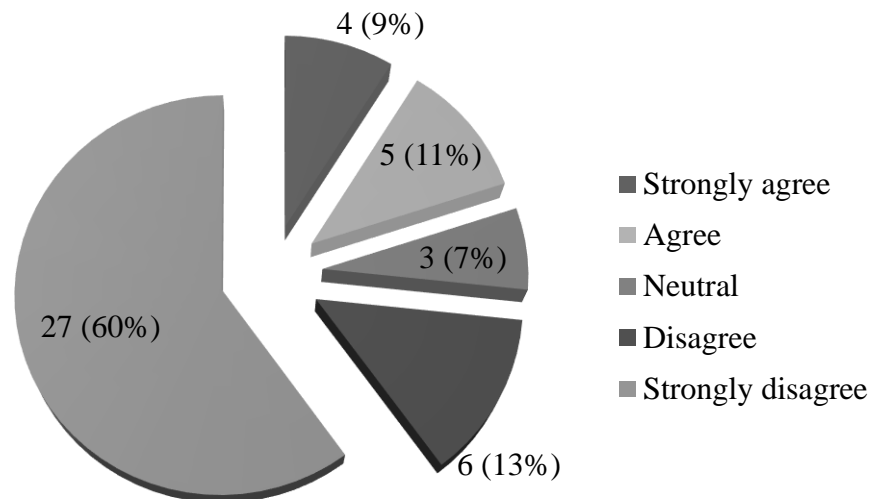
The findings revealed that management of DLI training was insufficient and hence could not be relied upon to effectively embark on the integration program. A study by Rahuman et al. (2011) had similar findings where it was revealed that Sri Lanka lagged behind in rolling out DLI programme because the management strategies had not prioritized training of teachers. MoE is mandated to develop skilled and innovative teachers who can competently undertake DLI in PPS in Kenya. DLI training of teachers for one week was inadequate. Ghavifeker et al. (2012) recommended the training of teachers should be thoroughly done in advance to enable them acquire appropriate knowledge and relevant skills to be able to plan and select the optimal application of tools that will enable them have meaningful digital learning integration skills and knowledge.

MoE and PTA are empowered to promote quality education for all learners by preparing a level ground for all the teachers and learners: by developing and improving teachers' skills and knowledge among other roles. Head teachers being the secretaries of PTA were also the public faces of the schools and were crucial in setting the education standards of their respective primary schools. The study analyzed the extent of

collaboration between MoE and head teachers on the management of digital training of teachers. Figure 4.2 shows data from head teachers who were the respondents.

**Figure 4.2**

*Responses from Head-teachers on management of DLI Training by MoE*



The data shown in Figure 4.2 indicate that there was no collaboration between MoE and head teachers on the management of the training of teachers on DLI as was indicated by 33 (73%) head teachers. When people or teams collaborate, they provide an opportunity to share ideas and continually learn from one another and improve. The collaboration could have created an opportunity for the head teachers to feel motivated and transfer the team spirit to schools. Rogers (2003) diffusion of innovation theory requires individuals or groups or organizations to work together to achieve common goals. The study revealed that the weak collaboration between head teachers and MoE led to majority of teachers 341 (69%) not getting trained on DLI as indicated in Table 4.13. The findings echo those of Bandung and Langi (2011) whose study concluded that training of teachers

on DLI program should be well managed and coordinated through team work and collaboration to form a good foundation for teachers.

Similarly, the findings indicate that the planning and management of DLI training by MoE alone was not in tandem with project management process that requires the undertaking to be done through collaboration for the realization of the project goals as was indicated by Boum (1992) project management cycle. A well-managed project creates a collaborative environment of vision and commitments among its participants (Boum, 1992). The findings echo those of Nut (2010) who found out that failure to train teachers militated against digital learning integration implementation and use. Failure by MoE to collaborate and directly deal with head teachers from planning to preparations made the entire DLI process a false start. Head teachers have a decisive role in influencing preparations for DLI development in their respective schools as well as a role model and a facilitator. Similarly, MoE was responsible for preparation of a design of a logistical set-up for the collaboration which could have enhanced an elaborate preparations, enhancement and development of effective DLI programme in schools. Lack of collaboration partly contributed to the programme failure. The SCDEs also gave their input on management of training of teachers on DLI through collaboration. The SCDEs were the coordinators of DLI program in their respective sub-counties. SCDE E reported *“The Sub-County Directors of education and head teachers should have been the first to be trained to prepare them for leadership, management and collaboration of the DLI training and in-servicing”*. SCDE F said *“collaboration and management between MoE and head teachers was insignificant since SCDEs were limited to identifying the training venue and inviting teachers to attend the training”*.



The findings revealed that the weak management and collaboration contributed to poor turn-out of teachers for training. Planning, collaboration and management of training of teachers are inevitable since applications of digital learning integration in teaching were complex (Bebell & Key, 2010). Planning, management of DLI preparations and implementations strategies is essential in spearheading the training of teachers (Laronde, 2012).

Application of learnt knowledge and skills was an indicator in objective 1 which was used to confirm teachers' preparedness on DLI. One way of verifying teachers' preparedness through training before the program was rolled out was through implementation of DLI in the classroom. Table 4.15 (in the appendix) shows the response from 45 head teachers and 496 teachers on application of DLI through interaction with the learners in the classroom.

Teachers' effectiveness in class after DLI training did not increase according to 30 (67%) head teachers. However, 15 (33%) confirmed effectiveness increased. On effective use of the digital tools in the classroom, about 14 (31%) head teachers felt that teachers were able to use them while 31 (69%) felt that they were not able. Twenty one head teachers reported that teachers appreciated DLI but twenty four did not. From the findings, it was evident that the preparations for training of teachers were inadequate because they could not effectively apply the knowledge and skills acquired during training. The findings were reliable since they confirmed that the application of DLI in class was limited and to some extent did not take place. Teaching involves changing the learners' lives and preparing them for future challenges and nation building. The teachers' acquired knowledge and skills are significant and should not be taken for granted (Rahuman, Wikrimanayake & Hewamage, 2011). Therefore, well trained teachers are needed in

every school to educate the young ones. Training empowers teachers to be confident and to have great organizational skills (Fammi et al., 2013).

Teachers as facilitators inspire the learners only if they have the right skills and knowledge through training. About 329 (66%) teachers revealed that the trained teachers were not effective on application of DLI in the classroom. Only 109 (22%) teachers felt that they had become better and therefore effective in their respective schools. Most teachers 324 (65%) could not operate digital tools efficiently. Only 160 (32%) teachers were able to practically and efficiently operate and integrate digital technology into teaching and learning process. About 160 (32%) teachers could operate digital technology teaching tools and admitted that the application was good. However, about 324 (65%) teachers could not operate the digital tools and 332 (67%) teachers refuted the assertion that the application was good. Findings indicated that head teachers and teachers concurred regarding teachers' application of DLI.

From Table 4.13 the study concluded that teachers failed to effectively apply DLI in the classroom in majority of the schools. That was an indicator that training was not adequate. Teachers should be well trained as part of preparations before rolling out DLI programme (Ogembo et al., 2012). The study was supported by that of Hatlevik and Arnseth (2012) who indicated that teachers as classroom directors were expected to give direction and guidance to the learners. Further, the 45 head teachers responded to open-ended questions as shown in the Table 4.14. The question required them to explain whether the actual DLI took place, challenges and positive aspects.

**Table 4.14***DLI Application in the Classroom, Challenges and Positive Aspects*

Responses from head teachers	Number of H/T	f	%
No actual learning took place since the school does not have a DLI trained teacher	45	33	73
Teachers were not adequately trained	45	31	71
Learning took place for a short while because the DLI trained teachers transferred	45	18	40
Time was inadequate for preparations because the new competency based curriculum was very involving	45	10	22
DLI content for grade 3 was not fully provided	45	6	13
Learners introduced to DLI appreciated and were always eager to learn more	45	17	38

About 33 (73%) head teachers confirmed that no actual DLI took place in their respective schools. DLI did not take place in schools because teachers were not adequately trained according to about 31 (71%) head teachers. The problem was compounded by the fact that DLI trained teachers in 18 public primary schools had been transferred to other schools on promotion or normal transfer. Others, although insignificant left the service through retirement, death or for satisfactorily jobs. Further, about 10 (22%) head teachers reported that preparations for DLI lesson were very involving and time consuming. There were a number of activities that were required to be undertaken before a DLI lesson could begin. Such activities involved getting the

tablets from the strong room, charging, conducting a 30 minutes lesson and taking them back to the strong room. Some schools as noted by 6 (13%) head teachers did have software for grade 3. On the other hand, 17 (38%) head teachers whose schools had introduced DLI reported that the learners were very excited and eager to learn. The study confirmed that teachers were not able to implement DLI because they were ill prepared. With majority of schools unable to implement DLI, it was evident that schools were not ready for the programme due to inadequate teachers' preparedness. Teachers needed to be updated on technology to be able to use it in a creative way, but it required adequate and all-inclusive planning, execution plan, good management structures through collaboration between MoE and head teachers during training.

The findings indicated that development of computer skills was essential before any digital learning integration lesson could be made possible in the classroom. The findings echo those of Tay et al. (2013); Murithi (2013) who found out that teacher needed to be supported in renewing skills which would enable them integrate digital technology in the learning environment and that qualified teachers were seen as catalyst in effecting DLI.

Teaching using DLI as interactive method is an important part of learning process. The study investigated whether teachers as facilitators applied the acquired knowledge and skills in classroom after training. It used the opportunity to explore and verify the adequacy of teachers' preparedness through training before the program roll out. The study through FGD confirmed that digital learning integration took place in a few schools and minimally. Pupil 07 from school 29 who participated in focus group discussions and had interacted with the digital technology shared "*I was curious and excited because the digital learning technology was new and interesting*". Pupils 05 and 08 from the same school revealed "*we appreciated the use of tablets and kept on asking*

*the teacher when the next lesson will be. It was interesting to interact with the tablets, watch cartoons and games*". Pupil 02 from school 15 shared *"we were introduced to tablets once*". Pupil 01 from school 21 revealed *"We use tablets to play games utmost twice a month when teachers are busy marking exams"*. Pupil 02 from school 21 reported *"We were effectively introduced to tablets and we were able to open, close, watch cartoons and games. Further, the tablets stimulated language development and made us learn many new words when playing computer games"*. Pupil 08, from school 18 said *"learning using tablets is joyful and helpful"*.

The study noted that none of the schools in the sample had embarked on DLI on daily basis and in every lesson. Pupils appreciated the use of tablets in learning because they could remember what they learnt several weeks back. Thus, they retained the content for a longer period, and enjoyed interacting with the gadgets. However, the study noted that in the schools that had introduced DLI, majority teachers were not using the tools frequently. Further, the study noted that it was unfortunate that a large number of schools had not introduced DLI to the learners despite the schools having received digital learning resources. Learners did not know teachers who were trained or not on DLI but they noted that very few of their teachers had shown interest of using digital technology teaching tools in their schools. Pupil 03 from school 16 said *"Our class has never seen the tablets but we hear our neighboring school has them"*. Pupil 03 from school 17 reported *"we were not taught every day using tablets but once in a while when teachers were available"*.

This confirmed that there was no serious digital learning integration taking place in public primary schools and this was possibly because teachers were not adequately prepared. Learners in schools admitted that most teachers were not conversant with the

digital computer technology. The study attributed this impediment to the inadequacy of digital technology trained teachers and lack of structured approach to integration. The study found that most learners did not appreciate the availability of digital learning resources in schools because their use in the classroom was minimal or lacking. The study concurred with that of Tay et al. (2013) who found out that without adequate pedagogical skills and digital knowledge on how to effectively undertake DLI in the classroom teaching, the desired change may hardly be realized.

The study noted that there was no evidence of value addition resulting from the DLI program indicating that the program had failed. The study attributed the program failure to lack of tablet aided instruction arising from inadequately prepared teachers. Further, the study found out that the digital innovation did not bring about the desired educational change. The study concluded that teachers required more training on digital media uses. The findings were supported by studies by KEMI (2011) and Okutoyi (2013) who revealed that the nature and quality of learners' interactions in DLI in the classroom is determined by the quality of training that teachers undergo.

In schools that had introduced the program, the study found that learners were not using tablets in the subject areas. The study noted three categories of schools: those that have never received the tablets and other digital tools (school 5, 6, 15), those that had not introduced DLI to learners though they received DLI resources (school 1, 36, 41, 8, 26, 32, 42, 10, 27, 38, 43, 22, 28, 34,39, 44, 23, 40, 45, 24, 33, 9, 25, 35, 30, 31), and those that are still using them though not regularly (school 2, 15, 17, 3, 29, 12, 7, 11, 18, 37, 19, 20, 13, 14, 21, 4). The findings from FGD revealed that there was no DLI taking place in public primary schools. The data obtained from learners confirmed the data on

Table 4.17 where head teachers 33 (73%) reported that DLI did not take place in their respective schools in Meru County.

DLI programme failed in Meru County PPS because learners did not acquire the anticipated change through the innovation. The application of digital technology was irregular in some schools while in others there was no use at all. Thus, DLI was treated as an option application in PPS. The study concluded that DLI program preparations were shoddy and lacking in leadership, management, and effective policy guidelines. The findings were in agreement with that of Keiyoro (2012) who indicated that sound DLI policies coupled with quality leadership and management strategies from school level to the policy formulation levels proper organization that leads to successful DLI in the classroom.

#### **4.5.1 Response from SCDE on Application of DLI in schools**

The SCDEs admitted that there was no meaningful learning using tablets that were going on in public primary schools. SDCE A reported *“Although there were other factors that lead to teachers not using tablets in classes such as high workload due to teacher shortage the main one was lack of know how”*. SCDE B said *“a small percentage of teachers had introduced the program though not frequently”*. SCDE C remarked *“teachers did not use the tablets as a pedagogical tool since they lacked knowledge and information about digital technology”*. SCDE D lamented *“schools that had introduced the program were combining the traditional methods of teaching though to a low extent and the digital technology media”*.

The study found out that teachers were digitally incompetent hence they could not help learners to work towards the desired learning outcome. Perira and Perira (2013) had noted that well trained teachers on digital learning integration technology skills the

classroom delivery can be very effective in realizing the education need of the learner. The study concludes that DLI program failed partly because of not preparing the tutors and their supervisors adequately before DLI program was rolled out. The study is further reinforced by Rahuman, Wikramanayake and Hewamage (2011) study which revealed that Sri Lanka lagged delayed rolling out DLI program because teachers recruited lacked DLI skills.

#### **4.6 Adequacy of Digital Learning Resources**

The second objective dealt on assessment of the adequacy of digital learning resources. The variable on digital learning resources was measured using four indicators: adequacy of digital learning resources, workability of the digital learning resources, and management of resources and learners application of resources in the classroom. The four variables were deemed very important in preparation for digital learning integration programme. Digital learning resources were needed to support teachers in raising teaching standards and learners in improving their academic performance. Shortages or inadequacies of school resources affect quality of instructions that learners receive in schools. Questionnaires, interview guides, FGDs and observational checklists were used.

Digital learning resources support teaching and learning. In digital learning integration, teachers' were expected to mobilize and use a wide range of digital learning resources while conducting their lessons. The head teachers also teach alongside their administrative and management responsibilities. Teachers required digital learning resources to effectively and satisfactorily implement DLI programme in schools. Views were collected from 45 head teachers and 496 teachers on the adequacy of digital learning resources. Data obtained is shown in Table 4.17 (in the appendix)..



Table 4.17 shows that out of the 45 sampled schools, 89% (40) did not have adequate digital learning resources, while only 5 (11%) schools had adequate digital learning resources. Majority of the head teachers 38 (84%) disagreed with the statement that PTA had ensured that each child had a tablet before DLI programme was rolled out. Only 7 (16%) agreed. MoE did not provide head teachers with laptops in about 39 (87%) of the schools. However, 6 (13%) of the head teachers accepted that they were provided with laptops and 4 (9%) agreed that teachers had laptops. Response from teachers indicates that digital learning materials were not enough for each learner according to 452 (91%) teachers. However, 43 (8%) teachers indicated that the digital learning materials were adequate. In most of the PPS, digital learning resources supplied were in good condition according to 415 (84%) teachers and about 81 (16%) felt that the DLI resources were not in good working condition. Schools did not have adequate digital reference materials according to 87% (433) of the teachers whereas 13% (63) of the teachers indicated that the reference materials were adequate. Most teachers 81% (402) reported that there were no individual laptops for each teacher supplied by MoE. Only 11% (56) of the teachers were affirmative. Learners did not have adequate desks according to 59% (295) of the teachers while 39% (195) agreed that the desks were adequate. Most of the schools did not have solar power backup according to 94% (467) of the teachers, but about 1% (4) of the teachers reported that their schools have solar panels which act as alternative power source when electricity from the national grid fails. Majority of the schools have a strong room for keeping digital materials according to 368 (74%) teachers.

The findings indicate that schools did not have adequate digital learning resources. The study considered the data reliable having come from the schools' leadership and teachers. Among the responsibilities of the head teachers was ensuring that learners

access adequate resources if any meaningful learning was to take place. Teaching and learning resources provide adequate challenging and engaging activities in a school which eventually lead to quality learning outcomes (Kidombo et al., 2012). In addition the resources aid teachers to teach better and optimize learning.

The findings indicate that digital learning resources were insufficient. In many schools, teachers were grappling with lack of necessary DLI infrastructure to fully embrace the programme. Digital learning integration is quite demanding and requires one to tools like laptops, projectors, tablets good internet connectivity, electricity and spacious rooms in addition to the desks. Lack or inadequate resources could lead to teachers developing negative attitude or ineffective teaching and learning hence low quality output. The findings concur with those of Orodho et al., (2013) who revealed that inadequacy of digital tools and other learning resources negatively affected teacher effectiveness and attainment of good grades.

The findings indicated that introduction and adoption of innovation in public primary schools required huge infrastructural and digital equipment investments. The study noted that with huge digital learning resource limitations, the indication is that comprehensive preparations to avail adequate resources were not carried out and that partly contributed to the programme failure. The impression is further reinforced by Muriira (2013) study which indicated that limited electricity supply in rural areas, persistent power disruptions, inadequate digital tools such as tablets, and lack of DLI trained teachers among others discouraged schools from embarking on DLI.

With a view to ascertaining the adequacy of DLI programme resources and how they were managed, an observation was done on selected public primary schools. Variety of digital devices and resources are required to spread and display teaching and learning

content in electronic and digital formats. Table 4.15 contains what was observed and the percentage of the items in good condition.

**Table 4.15**

*Resources Observational Schedule*

Items	Schools	Available	not available	Spoilt	good condition	
					N	(%)
1.Laptops	45	84	6	0	84	93
2.Tablets	45	2239	108	17	2222	99
3.Desktops	45	0	0	0	0	0
4.LCD projector	45	42	3	0	42	93
5.Reference books	45	0	0	0	0	0
6.Class textbooks	45	0	0	0	0	0
7.computer laboratory	45	2	43	0	2	4
8.Computer class	45	45	45	0	43	95
19.ICT trained teachers	45	0	0	0	0	0
10. Technicians	45	0	0	0	0	0
11.Store	45	45	45	45	45	100
12.Electricity	45	42	3	34	34	75
13.Internet	45	42	3	17	17	38
14.Braille embosser	45	0	45	0	0	0
15.Classroom set up	45	45	0	34	34	75
16.Printer	45	0	45	0	0	0
17.White board	45	0	45	0	0	0

The findings indicate that a number of digital learning resources were in good condition as shown in Table 4.15. Some essential digital learning resources like tablets, internet connectivity, laboratories, electricity, reference materials, were lacking or inadequate. Tablets, electricity and internet connectivity were the main digital technical tools behind the DLI programme.

The findings revealed that preparations to avail adequate digital learning resources were inadequate because there were failures in determining which resources were most essential and prioritize them accordingly. Further, the study noted that various administrative levels from school to MoE headquarters did not provide leadership and management strategies of better digital learning preparations. Without adequate digital learning resources DLI programme could not effectively take off in majority of the schools while in others the learning is not effective. The findings are supported by Gafar and Neville (2012); Naiker (2010) and Buabeng (2012) who found out that inadequacy of digital learning resources impeded teachers' effectiveness in the classroom.

The study revealed that despite digital learning resources being in good condition, they were not adequate. MoE being the only supplier of digital resources were not prepared since they did not supply enough. Teachers too did not get laptops or guide books or reference materials. A situation where learners share desks and tablets could not be expected to provide teaching and learning environment that was conducive. Schools cannot effectively make use of technology if they do not have the digital tools which enhance learning. The findings revealed that inadequacy of digital learning resources contributed towards the program failure. Therefore, schools were not prepared to develop meaningful and effective use of the innovation. The study is supported by Markon (2013) who found that it was a waste of time to start a program without adequate

resources. Similarly, Li and Walsh (2010) and Orodho (2014) concur with the study findings. Their studies indicate that preparation of digital learning resources before rolling out the DLI program is fundamental for effective classroom delivery.

Head teachers shed light in open-ended question number 73 on whether digital learning resources were procured, brought in good time and tested before DLI program was rolled out. Table 4.19 show data from responses of 45 head teachers.

**Table 4.16**

*Procurement, Delivery and Testing of DLI Resources before the Roll out of the Program*

Were DLI tools procured and tested before programme roll out?	f	%
Yes. Testing done by the supplier	28	62
The school is yet to receive tablets and other digital tools	3	7
No, they were brought after programme roll out but they were tested	7	16

Three schools in the sample had not yet received tablets and other digital learning resources by September 2018. About 7 schools (16%) had received digital learning resources after the programme was rolled out while 28 schools (62%) received digital resources before the programme was rolled out. The study found out that some schools received digital learning resources after the programme was rolled out while others are yet to receive four years later.

The findings revealed that all the SCDE admitted that the resources for digital learning integration were inadequate and in some schools lacking. Tablets were supplied for grade one (class one) only yet grades two and three were also supposed to have integrated teaching and learning digital programme. SCDE A shared *“the initial communication*

*from MoE was that each child from grade 1-3 would get a laptop (OLPC) which later changed to one tablet per child (OTPC) and that also did not happen. Currently the ratio is one tablet per three children (1:3) and teachers were using their own money to access internet which made the innovation to be abandoned since it was not advantageous to teachers and learners". SCDE C added "resources such as desks, electricity and electrical installations were a challenge in many public primary schools in the county". SCDE D lamented "DLI programme was a huge project that required thorough preparations, monitoring and evaluation before the programme roll out. The inadequate preparations were made worse by political pressure to effect comprehensive and rapid changes".*

The study noted that political influence and pressure without adequate preparation or provision of relevant infrastructure and resource development contributed greatly to the program ineffectiveness. Despite considerable political pressure to adopt DLI in teaching and learning process most schools expressed frustration due to inadequate or lack of digital resources hence abandoned the programme. The study concurred with that of Hennessy et al. (2010) in Nigeria where the introduction of OLPC project in the public primary school after presidential directive before digital and human resources were prepared collapsed.

The findings from FGD revealed that in most of the public primary schools tablets were satisfactorily enough for one grade only though not in the ratio 1:1. However, grades 2 and 3 were not supplied with tablets. Therefore, it was not possible for the three classes to use tablets at the same time unless when combined so as to share one tablet among three or four learners (1:3 or 1:4). Pupil 05 from school 29 reported "*we were sharing tablets and desks and at times there was frequent electricity failure and low internet*

*connectivity*". Pupil 06 from school 17 said *"we have limited access to the technology because our school does not have a computer laboratory. Our class was converted to a computer room and colleagues were constantly interfering with power sockets"*.

The findings revealed that inadequacy or lack of resources made digital learning integration to fail in most schools. There was limited access to innovation in schools due to lack of provision of digital support infrastructure such as tablets, energy, and network, computer laboratories among others. The study was supported by studies of Gafar and Neville (2012) and YawSkyi (2012) who found out that inadequacy of digital learning resources undermined effective digital learning integration.

Head teachers received DLI materials from MoE. Therefore they were responsible for their management as school administrators while teachers were responsible for classroom application of the digital resources in the classroom. Head teachers and teachers were asked if digital learning integration tools were tested to confirm their workability as part of the preparations for the program. The findings from the 45 head teachers and 496 teachers are as shown in Table 4.17.

**Table 4.17**

*Data from Head Teachers and Teachers Response on Workability of Digital Learning Resources*

Statement	Strongly agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly disagree (%)	Weighted Mean	Standard Error
All tablets were in good working condition (N = 45)	35 (78%)	6 (13%)	0 (0%)	1 (2%)	3 (7%)	1.04	0.044
All digital learning tools were in good working condition (N = 496)	401 (81%)	50 (10%)	0 (0%)	13 (3%)	32 (6%)	1.09	0.013

Head teachers and teachers were both in agreement that the digital learning tools supplied to schools were in good working condition. The means for head teachers and teachers were 1.04 and 1.09 while the SEs was 0.044 and 0.013 respectively. Thus, both head teachers and teachers were in agreement that digital learning tools were in good condition. The findings revealed that tablets were tested by the supplier on delivery. The workability of the tablets was confirmed by 89% (40) of head teachers while 4% (2) of the head teachers refuted the assertion. Teachers, about 84% (415) confirmed that digital materials supplied were in good working condition. Only 81 (16%) of the teachers dissented. However, the good condition of the digital resources can be attributed to the minimal use. Digital learning resources are designed to aid learning and teaching so as to achieve the goal and the objective. Learning and teaching resources also enable the



teacher to deliver the content effectively and efficiently, have good class control and teach comfortably. Teachers and learners can be stressed by teaching and learning malfunctioning resources which were likely to make them develop a negative attitude instead of being enthusiastic. The findings were supported by Larode (2012) who found out that without malfunctioning digital tools the lessons delivery were very smooth. The findings from SCDE indicate that tablets and other digital learning integration materials were tested on delivery. SCDE B reported *“a contractor from Jomo Kenyatta University College of agriculture and technology had a technician who ensured that testing was done in most schools. Further, the digital tools were brought directly from the source to schools by-passing SCDE”*. SCDE F remarked *“I relied on the CSOs who are the MOE field officers at zonal level to get information on the resources supplied”*.

Other SCDEs got the information about testing of the DLI infrastructure from the head teachers during term meetings. The study revealed that most schools had digital learning integration resources tested and found to be in good condition. The study concurred with that of Bizimama and Olodho (2014) who found out that incompatible software and faulty gadgets made DLI inaccessible.

Overseeing the way resources were being used to maximize learning output required sound management practices. DLI program required digital learning resource management planning and preparations. The study sought information from PTA on how digital learning integration project preparations were managed. Data obtained is shown in Table 4.21 (in the appendix).

Table 4.21(in the appendix) reveals that about 91% (31) of the parents did not provide resources for the construction of computer laboratory and only 9% (4) of the parents confirmed that they participated. However, 65% (28) of the parents confirmed organizing

for the building of the strong room for the safe keeping of digital learning resources and 35% (15) did not participate. Further, 95% (41) of the parents were not involved in availing digital learning resources before the program was rolled out but about 2 (5%) said that they were involved. Similarly, 41 (95%) parents said that they were not involved in provision of digital learning resources but 2 (5%) said that they were involved. Nearly 98% (44) of the parents were not involved in planning and provision of digital learning resources but about 2% (1) confirmed their involvement.

Planning and allocation of digital learning resources was a necessary management strategy to ensure efficiency and optimization of the project available resources (Nkula & Klauss, 2014). Parents are key stakeholders in education hence their involvement in school matters is very helpful in creating a sense of ownership (Olibie, 2014). The findings indicate that parents were not involved in the management of digital resources from procurement, allocation to monitoring and evaluation. Involvement of key stakeholders such as PTA is important since it builds transparency, accountability and success of the project. The findings revealed that failure to involve parents in program management showed that there were deficiencies in preparations for the program roll out. That was why there was under allocation of resources in some schools; others did not get the supply. Parental involvement is concerned with the participation and support parents give to schools so that their children can have a learning environment where they can exploit their full potential (Linden, 2010).

SCDEs were also interrogated during interview on availability of resources and their role in management. SCDEs A and C revealed that schools were given ksh 60,000 to prepare the storage facility. SCDE A remarked “*SCDEs did not have any role to play in the*

*management of digital learning integration resources nor were they afforded an opportunity to influence on how the DLI resources were to be managed to ensure continuity and their effective use". SCDE D stated "there were no structures, clear systems, and processes on how the resources were to be managed, replaced or maintained. Further, there was no management plan on how the program was to be maintained and improved to enhance teaching and learning". SCDE F revealed "from the minutes I have received from PTA and meetings I chair, I have not come across an agenda on how to improve infrastructure and resources on digital learning integration to promote dissemination of knowledge and skills. In addition, the government reduced the amount to be disbursed to MoE to procure tablets for the schools that had not received". SCDE B reported "some schools appointed a teacher to be in-charge of the digital resources".*

The study found out that management of digital resources was lacking; something that made gainful access to digital learning resources impossible by the learners. On the contrary a study by Li and Walsh (2010) found out that resources were well managed in China at 96% accessibility of digital resources by the learners.

The study found out that although the digital technology was a valuable resource for enhanced learning, the adequacy of digital learning resource was a challenge in PPS in Meru County. Resources available were not being used regularly in some schools while in others they have never been used. The study found out those schools without electricity, trained teachers, poor network coverage and tablets had not embarked on digital learning integration program. The study revealed that digital learning was not in progress in majority of the PPS due to inadequacy of digital learning integration resources. The study was in agreement with that of Tinio 2017 who indicated that

appropriate study rooms or laboratories available to house the digital technology appliances, appropriate electrical wiring, reliable electricity supply, heating/cooling systems and ventilation, safety measures, websites, software among others are essential digital learning resources before DLI is undertaken.

Data collected from SCDEs interview revealed that there are no assessment structures put in place to monitor DLI application. However, they registered their dissatisfaction on DLI program preparation since it is not working as they expected. SCDE F shared

*“Each school has its own unique challenges ranging from provision of digital learning resources, DLI trained teachers and infrastructure which made schools not to uniformly embark on DLI application. There was need to plug funding gaps and boost DLI. Schools faced financial limitations and DLI program faced financial cutback in 2018/2019 financial year”.* SCDE B narrated *“pupils were not introduced to tablets in most public primary schools. Further, schools faced logistical challenges on how to share the tablets meant for grade one with grade two and three without laboratory”.* SCDE A revealed *“some schools introduced digital learning integration to learners just to cover themselves in case learners were asked whether the program was on course. Thus, learners were not effectively and sufficiently using tablets to come up with meaningful learning”.* SCDE C remarked *“DLI program failed since the government stopped the issuance of tablets to grade one pupils and grades two and three had not all received their tablets. MoE should ensure that relevant and right proportions of DLI learning and teaching materials are available in schools. In some schools tablets were safe in the stores incase officers come checking, added the officers”.* SCDE H reported *“teachers were still teaching using traditional methods whereas they were supposed to*

*integrate digital technology which was capable of making the instruction more engaging to the learners”.*

Learners’ experiences with digital learning tool varied from one school to another. The study noted that DLI had not been introduced in majority of the schools. However, in the few schools that had introduced DLI, learners appreciated and enjoyed using them for learning or playing games. Pupils 04 and 07 from school 17 revealed *“we appreciated the use of tablets in learning and playing games. It was interesting to interact with the tablets and watch cartoons”*. Pupil 03 in school 34 shared *“we were introduced to tablets once. Our teacher was transferred to another school”*. Pupil 05 from school 21 revealed *“We use tablets to play games. We use them when class 6 teachers find time once or twice a month”*. Pupil 02 from school 11 reported: *“We are able to open, close, watch cartoons and games but its only once a week”*. Pupil 01, from school 06 said *“we have never seen the tablets. We hear our neighboring schools have them. We appeal to the government to supply our school with tablets”*.

Findings concluded that digital resources were not in use in majority of PPS in Meru County. This was contrary to the findings of Orodho et al. (2013) who indicated teaching using digital learning resources enhanced learning process and promoted skills such as drill practice, discussions, collaboration, project work and many others. In addition, lack of unity and coalition among stakeholders made the pupils not to effectively access the technology in schools and there was no monitoring or assessment of the progress. Further, the study confirmed that there was no mark of active adoption and continued development of the innovation in schools due to inadequacy of digital learning resources. Availability and access to digital learning resources was a factor that greatly influenced DLI in schools (Kidombo et al., 2013)

Digital learning uses digital technology resources to impart knowledge to the learners. The learning process is facilitated by the digital tools. The digital tools must be available and the tutors must have a comprehensive knowledge on how to use them. PTA (43) as school managers were requested to give information on how the schools applied the digital resources in the classroom. Table 4.22 (in the appendix) shows the results.

The findings indicated that teachers were using laptops for demonstration in class according to 15 (35%) PTA and 15 (35%) were of the contrary opinion. On the use of software from KICD in their subject area, teachers were not using the digital technology according to 35 (81%) PTA while 8 (19%) confirmed that teachers used software from KICD. Teachers' used VCD/CD ROM for teaching and learning according to 20 (46%) PTA while 46 (53%) were of the contrary opinion. Teachers assist pupils to use tablets to play games and do assignments according to 30 (70%) and 16 (37%) PTA executive members respectively whereas 8 (19%) and 23 (53%) had contrary opinion. Pupils and teachers appreciate the use of tablets in the classroom according to 35 (81%) and 122 (28%) PTA respectively while 5 (12%) and 22 (51%) respectively could not see it.

The findings indicate that the application of digital learning resources in learning and teaching was minimal according to parents. The subject content is contained in the software from KICD. In majority of the schools the software was not in use meaning that DLI did not take place in those schools. In schools where learners used the tablets teachers did not appreciate because the digital technology did not aid in time management but the learners appreciated. Learners accessed tablets to play games more than doing the assignments. The findings revealed that digital learning resources were inefficiently underused. Thus, preparedness to avail adequate resources that could have ensured optimal application of digital learning was lacking.

The findings revealed that most schools were not equipped to meet the learner's needs due to shoddy preparation. Learners could not be able to optimize the few available resources. Therefore, the incomplete investment was wastage because the expectations were not met. The study concurred with that of Keiyoro, Gakuu and Kidombo (2011) who found out that it was almost impossible to start a program without adequate resources since it was likely to backfire. Further, baseline targets were achieved when resources were available according to Kwamboka (2015).

The COVID-19 Pandemic exposed and confirmed the myriad challenges facing the public primary school DLI programme. We turned to virtual learning knowing very well that there were inadequate digital learning resources on the ground. Pupils are not using the tablets during this period.

#### **4.7 Preparedness of Technical Support Staff before DLI Programme Roll Out**

The third variable was the preparedness of technical support staff in PPS before DLI programme was rolled out. This variable was measured using four indicators: Prepared technical support staff, repairs and maintenance of digital technology tools, management of technical support staff and learners effective use of digital technology tools and uninterrupted.

Technical support staff is very useful in a school to ensure that the digital resources were serviced regularly and that teachers were assisted whenever they were stuck. Table 4.23 (in the appendix) shows responses from 45 head teachers.

The findings shown in Table 4.23 indicate that 44 (98%) head teachers reported that schools did not employ technical support staff to undertake maintenance and repairs of digital tools and only one school in the sample had employed. According to 78% (35) of

the head teachers, they were not mandated to contract technical support staff. PTA did not organize digital tools to be repaired outside the school according to 40 (89%) head teachers. About 38 (84%) head teachers denied the assertion that schools have technical support staff that maintains digital tools to avoid lesson interruptions and that only two schools had digital tools maintained. About 64% (20) of the head teachers refuted the fact that MoE technical support staff responds immediately when an emergency comes up and about 62% (28) of the head teachers reported that PTA does not hire technical support staff when need arises. Nearly 91% (41) of the head teachers reported that technical support staff was very helpful to teachers during DLI lessons. However, 44% (20) of the head teachers revealed that schools were unable to implement DLI due to lack of technical support staff but 40% (18) of them refuted the claim.

The findings revealed that PPS in Meru County did not have adequate technical support staff except one school where PTA had employed a staff. Technical support staff was important in any school to repair and maintain digital tools. With digital tools, teachers and learners can optimize those tools to gain quality knowledge and skills and improve the grades accordingly. Without well maintained digital learning resources, individual needs, abilities and a range of learning styles cannot be accomplished. When public primary schools do not have malfunctioning digital resources, teachers can design and develop an effective lesson plan, prepare and make effective use of those resources.

From the results, it is evident that without technical support staff, DLI program cannot be implemented effectively in schools. Thus, provision of digital learning resources without technical support staff was wastage and ill advised. The study is supported by that of Bandung and Langi (2011) who found out that lack of technical support staff derailed digital learning integration program in Indonesia rural primary schools. Further, the



study noted that DLI program was introduced with narrow understanding of the function of digital technology in public primary schools, and the role of teachers and technical support staff. The adoption rate of the innovation, efficiency and quality were compromised without technical support staff. The findings were reinforced by several studies among them Tinio (2015); Keiyoro, et al. (2012); Bandung and Langi (2011) who indicated that an innovation without technical support staff is unreliable, leads to teachers' frustration and can lead to program failure. The study concludes that the digital program was rolled out before adequate preparations as evidenced by the lack of technical support staff in every school public primary school in Meru County.

Teachers require technical support staff regularly to avoid time and resource wastage. Un-maintained or repaired digital resources can make teachers to strain or fail to meet the target. Teachers too can get frustrated and eventually give up if digital tools frequently malfunction or are inadequate. Similarly, PTA in a school provides strategic guidance and effectively oversees the school's management with accountability systems and approves expenditure and capital budgets and monitor the performance among others. Table 4.24 (in the appendix) shows data from responses from 496 teachers and 43 PTA members on availability of technical support staff to assist teachers and ensure DLI program was successful and fruitful.

The findings indicate that MoE and PTA did not employ technical support staff according to 88% (436) and 85% (422) of the teachers respectively while 1% (3) and 1% (5) were of the contrary opinion. Additionally, MoE and PTA did not contract technical support staff for schools according to about 469 (95%) and 452 (91%) teachers respectively while 19 (4%) and 11 (2%) concurred that MoE and PTA respectively contracted technical support staff. Neighboring schools share technical support staff

according to 52 (12%) teachers while 417 (84%) negated. The findings from teachers indicate that PPS were not prepared on TSS before the programme was rolled out. The findings concurred with those of head-teachers. The technical support staff was expected to monitor, maintain computer systems and network in public primary schools.

The study noted that technical assistance is essential in schools in order to give teachers time to prepare to achieve the lesson objectives. They also need to be assisted where they come across challenges. Pupils learning using digital technology tools require adequate preparations to provide technical support and other kinds of support to ensure optimal engagement with digital learning resources to acquire the required knowledge. Without technical support staff available for public primary schools, maintenance and benefits from such resources cannot be realized. The findings revealed that lack of technical support staff made DLI programme to stall. The study concurred with that of Ertmer (2012) who found out that lack of technical support staff in schools hinders DLI in the classroom. Further, the study was reinforced by studies of Sang et al., (2011); Laronde (2012); who revealed that without technical support staff in schools starting a DLI program is a waste of time since sustaining the project will pose a big challenge.

From Table 4.25 (in the appendix), the findings indicate that MoE did not provide majority of public primary schools with emergency technical support staff. This was indicated by 380 (77%) teachers and only 80 (16%) indicated that they received technical support staff. Teachers' response to whether PTA hired technical support staff when needed was about 27% (136) while 70% (345) were of the contrary opinion. Teachers were asked whether they share technical support staff from neighboring schools and the responses were; 59 (12%) confirmed while 417 (84%) negated. On the question of

whether repairs and maintenance was done by their knowledgeable colleague teachers, the responses indicated that about 135 (27%) were positive while 314 (63%) negated.

The findings revealed that the MoE did not provide technical support staff to schools nor did they respond immediately when they were called. Similarly, PTA did not employ or hire technical support staff. Further, PPS did not have technical support staff to share apart from those provided by NGO's like Lewa Conservancy that served neighboring public primary schools. Few public primary schools had knowledgeable teachers who were able to multi-task as classroom teachers and solve any technical issue arising from the digital technology such as maintenance and repairs. The study concluded that without maintenance and repairs digital learning was not possible without technical support staff in public primary schools and that the program was collapsing. The study was supported by that of Ghavifekr and Sufean (2013) who found out that with presence of technical support staff for the repairs and maintenance allowed teachers to smoothly focus on teaching rather without technical problems. Badung and Langi (2011) had similar supporting findings indicating that technical impediments in rural primary schools in Indonesia threatened digital learning integration program. Further concurrence supporting the findings are from Hennessy, et al (2010) who found out that without technical support staff schools will be wasting time to start digital learning integration program since sustaining the project pose a big challenge.

PTA as public primary school managers gave their responses on repairs and maintenance of digital tool as indicated in Table 4.30. Preparations to have digital tools repaired and maintained are essential for the success and continuity of the program. Responses from PTA indicate that about 3 (7%) schools were allowed to hire technical support staff by MoE however, 40 (93%) of the PTA said that they were not allowed. Similarly, 8 (19%)

of PTA were of the opinion that repairs and maintenance was done by more knowledgeable teachers while 35 (81%) had contrary opinion.

The findings indicated that there was no technical support staff provided by MoE and PTA to undertake repairs and maintenance hence digital program could not progress. Technical support staff is crucial to the program to carry out testing, repairs and replacing parts as required. The study concurred with that of Mc Garr and O, Reilhey (2011) which found out that impediment to undertake repairs and maintenance in South Africa rural public primary schools were due to unavailability of technical support staff. The interview of SCDEs on repairs and maintenance of digital tools revealed that their expectation was that the trained teachers could assist in maintenance and repairs of digital tools but it was not the case to be. The study found out that public primary schools in Meru County had no technical support staff to undertake minor repairs and maintenance of digital tools. This impeded the smooth lesson delivery. The study was supported by that of Markon (2013) who found that lack of technical support staff in Uganda was an impediment that led to wastage of time and resources because some minor fault repairs and network administration were lacking.

Head teachers and PTA are responsible for the administration and management of schools respectively with responsibilities such as setting strategies, coordinating the employees' daily activities and school programs. The duo was responsible for planning and preparing the DLI programme through application of available resources such as technical support staff. Head teachers and PTA were asked to respond to statement on how they were managing the technical support staff in their respective schools. Table 4.18 shows data from head-teachers and PTA.

**Table 4.18***Head teachers and PTA Responses on Management of Technical Support Staff*

Statement	Strongly agree	Agree	Combinational	Neutral	Disagree	Strongly disagree	Combinational	W/mean	SE
(N=45)	A (%)	B (%)	(A+B) (%)	C (%)	D (%)	E (%)	(D+E) %		
HTs organized for repairs of DLI tools (N=45)	0 (0%)	0 (0%)	0 (0%)	5 (11%)	16 (36%)	24 (53%)	40 (89%)	2.11	0.047
TSS made DLI management easy (N=43)	5 (12%)	3 (7%)	8 (19%)	0 (0%)	7 (16%)	28 (65%)	35 (81%)	1.81	0.060

Digital learning tools repairs were not done outside the school according to 40 (89%) head teachers while 5 (11%) remained non-committal. The standard error of 0.047 indicates that the sample was a good representation of the population and the deviation from the mean was insignificant. However, about 8 (19%) PTA were satisfied that management of digital learning integration was made easy by availability of technical support staff but 35 (81%) with a weighted mean of 1.81 and a standard error of 0.060 refuted the assertion.

The findings revealed that the management of the technical support staff was extremely poor and could lead to program total failure if it was not addressed in good time. The findings further revealed there was no technical support staff to manage from MoE and finances to enable PTA employ or hire. The study was supported by that of Markon (2013) who found out that management failed to consider provision of technical support staff as a priority before introducing digital technology to schools in Uganda. The information gathered from head teachers and PTA was confirmed by interview data obtained from SCDEs who reported that there was no staff to manage and there were no finances to hire technicians. SCDE F said “*there is no permanent technical support staff in schools*” The study was supported by that of Laaria (2013) who found out that lack of finances and good management framework led to lack of technical support staff in majority of secondary schools in east Africa.

Technical support staff engagement in preparations for DLI lessons in a school is significant to ensure efficiency and effective lesson delivery. Their services are useful in ensuring learner satisfaction and maximum benefit from the available resources. Head teachers, teachers and BOM interact with technical support staff in the course of working collaboratively for learner satisfaction. Views were sought from head teachers, teachers and PTA on how learners were benefitting from well serviced and maintained digital learning resources by the readily available technical support staff that also supported teachers whenever they had some problems. Table 4.19 shows data from head-teachers, teachers and PTA on the engagement of TSS in DLI application.

**Table 4.19***Head-teachers, Teachers and PTA Responses on Technical Support Staff Engagement*

Statement	Strongly agree	Agree	Combin	Neutra	Disagr	Strongly	Comb
Head Teachers (N=45)	ly	B (%)	ned	l C	ee D	ly	ined
	agree		(A+B)	(%)	(%)	disagr	(D+E)
	A (%)		%			ee E	%
						(%)	
Technical support staff assist teachers and pupils in DLI lessons	4 (9%)	9 (11)	9 (20%)	0 (0%)	12 (27%)	24 (73%)	36 (80%)
Lack of technical support staff made schools unable to implement DLI	8 (18%)	12 (27%)	20 (44%)	7 (6%)	8 (18%)	10 (22%)	18 (40%)
Teachers' Response (N=496)							
Lack of technical support affect learning	234 (47%)	65 (13%)	299 (60%)	18 (4%)	50 (10%)	29 (6%)	79 (16%)
PTA Response (N=43)							
Pupils were effectively learning using DLI tools and through technical support	0 (0%)	2 (5%)	2 (5%)	1 (2%)	16 (37%)	24 (56%)	40 (93%)

Study revealed that DLI in the classroom was not supported by technical support staff in 36 (80%) schools while only 9 (20%) schools registered support. Lack of technical support staff affected DLI implementation in 20 (44%) schools. That was supported by 299 (60%) teachers while in 18 (40%) there was contrary opinion that was supported by

179 (36%) teachers. About 93% (40) of the parents confirmed that there was no effective DLI taking place in schools with the support of technical support staff while 5% (2) confirmed the support.

With only two schools where learners had interacted with technical support staff, it was enough evidence that TSS was not prepared for DLI programme. The study noted that the program stalled in most PPS in Meru County which was attributed to the inadequate preparations to have effective technical support staff in place. The study was supported by that of Sang et al. (2011) who found out that classroom use digital learning integration can be linked to good planning and management practices that allowed technical support staff to be incorporated in the program. Other studies in agreement with the study findings include that of Ertmer (2012) who found out that optimization of DLI is hindered by ineffective technical support staff. Similarly ineffective technical support staff derailed DLI program in rural public primary schools in Indonesia.

#### **4.8 Parents Involvement in Preparations for DLI Programme**

The fourth objective of the study dealt on parents' involvement in preparation for DLI programme before rolling it out in PPS in Meru County. The objective covered four indicators; sensitization, financial support, management and support for the innovation

Parents as key stakeholders in education have an effect when they are involved in any education endeavor (Linden, 2010). Parents are involved in school activities, programs and school committees among others. Their involvement enhances the partnerships between the parents and schools hence increasing their participation (Mingaine, 2013). The study examined the sensitization of parents on DLI programme so as to enable them participate in schools' preparations before the program was rolled out. The respondents were 43 PTA members and 45 head teachers. The data is as shown in Table 4.20.



**Table 4.20***Sensitization of Parents before the Programme Roll out*

Statement	Strongly agree (%)	Agree A B (%)	Combined (A+B)%	Neutral C (%)	Disagree D (%)	Strongly disagree	Combined (D+E)%
(Parents N=43)							
Parents were sensitized on DLI programme Head Teachers N=45	3 (7%)	2 (5%)	5 (12%)	0 (0%)	12 (28%)	26 (60%)	38 (88%)
PTA organized change management meetings	9 (20%)	5 (11%)	14 (31%)	10 (22%)	6 (13%)	15 (35%)	21 (48%)
PTA constructed computer laboratory	0 (0%)	15 (33%)	15 (33%)	0 (0%)	9 (20%)	21 (47%)	30 (67%)

Data in Table 4.20 indicate that about 38 (88%) parents were not sensitized on DLI programme before the programme roll out while 5 (12%) confirmed that sensitization was done. PTA organized change management meetings according to 14 (31%) head teachers while 21 (48%) were of the contrary opinion.

Most of the public primary school parents were not sensitized. The participation of enlightened parents in education matters can be very productive because they will not be

prejudiced. It is important that parents' voice is heard and understood through sensitization. Involving parents in education programs of their children creates better awareness of the value for education. Sensitized parents can participate in shaping pupils learning environment and opportunities. COVID-19 pandemic became a huge threat globally, negatively affecting and paralyzing the education in both public and private schools. Unenlightened parents were so helpless in the face of pandemic with the daunting task of keeping their children busy at home and especially with studies. Parents and children were thrust into an unplanned and fraught experiment called online learning. Online learning became the main option of accessing education during this period of corona virus pandemic and parents had to adjust to the new teaching and learning methods. However, not every parent who can afford radio, Smartphone, Wi-Fi, desktops, laptops, tablets, and money for data bundles. On the contrary parents in UK were sensitized and had a lot of influence on many of the barriers and the digital technology provided a lot of opportunities for their children according to the study by O'Hara (2011).

SCDE interview revealed that parents were not adequately sensitized on digital program. SCDE G revealed *"parents were called to receive the digital tools or attend the launching ceremony. However, parents appreciated receiving free tablets from the government though the launching of the program was transformed into arena for politicians"*. SCDE A shared *"we had no role to sensitize the parents. As SCDEs representing MoE we were less visible yet we were best placed to sensitize the parents"*. SCDE H remarked *"failing to sensitize parents adequately on DLI limited their participation and understanding of the program"*. SCDE F shared *"parents were worried that their children once exposed to computer will be able to access unsuitable*

*content or behaviors by third-parties. Therefore, parents required to be sensitized in order to understand the program and adopt the innovation fully”.*

The study concurs with that of Blau and Hameiri (2016) who found out that sensitization of parents was very important so as to maximize their participation and support. A study by Blau and Hameiri supported this study by revealing that sensitized parents in Israel supported the DLI program by purchasing tablets for their children to be using at home. In addition, they enrolled for computer lessons so as to be able to help their children. Failing to sensitize parents increased their fear and worry of the negative impacts such as engaging in computer games and neglecting physical games, addiction and many others (Wakramamayake & Hewamage, 2011).

Parents as key stakeholders in education appreciate when their children perform well in academics. Increasing their involvement in education matters contributes greatly towards the promotion of the performance of the children in education. The study obtained data from the head teachers on parents’ involvement in financial support towards DLI programme. Table 4.21 shows the data obtained.

**Table 4.21***Head Teachers' Response on Parents Financial Support for DLI Programme*

Statement	Strongly agree A (%)	Agree B (%)	Combined (A+B) (%)	Neutral C (%)	Disagree D (%)	Strongly disagree E (%)	Combined (D+E) %	W/m	SE
PTA support ed DLI progra mme financia lly	0 (0%)	2 (4%)	2 (4%)	1 (2%)	19 (42%)	23 (51%)	42 (94%)	1.98	0.039
PTA built comput er lab	5 (11%)	10 (22%)	15 (33%)	0 (0%)	20 (45%)	10 (22%)	30 (67%)	1.81	0.060

The findings shown in Table 4.29 indicate that PTA did not support DLI programme financially according to about 42 (93%) head teachers and about 2 (4%) head teachers confirmed that there was support. Similarly, 30 (67%) head teachers refuted that PTA constructed computer laboratory while about 15 (33%) were in agreement. The findings revealed that parents were not involved in supporting DLI program financially. The study findings differs with that of Linden (2010) and Ramorola (2013) who found out that parents participate and support schools financially or other services so that their children can have a learning environment where they can exploit their full potential.

During the interview with SCDEs, it emerged that parents were not involved in any way in financing the DLI program. The digital learning integration program was fully

sponsored by the government. They reported that planning, development of the education programs staffing and allocation of the required funding was the responsibility of the government. SCDE A remarked “*DLI program is wholly a government project that was introduced through top-down influence*”. SCDE F shared “*DLI project falls under free education programme hence parents were not supposed to be levied. However, parents were willing to participate in fund raising whenever they were called upon to do so*”.

The study noted that parents were not involved in financing the DLI programme. However, in solidarity and appreciation they supported well-wishers, donors, and politicians on other projects through “harambees”, a Kenyan tradition of communities’ self-help events of giving what you feel like in support of the project. On the contrary, parents actively participated in planning and providing finances in public secondary schools towards digital programs according to Mugo (2016). The study by Mugo is supported by Mingaine (2013) who found out that those parents in secondary schools in Uganda agreed to fund the construction of computer laboratories, an evidence of parents’ involvement in child’s education. Similarly the study is supported by Blau and Hameiri (2016) who found out that those families provided all that was required by the schools to make digital learning a success in Israel.

The findings from learners during FGD revealed that parents were not involved on DLI program preparations in public primary schools since the digital technology tools and other logistics were catered for by MoE. A pupil 07 from school 10 remarked “*Our parents were invited to attend the launching of the DLI program by the area member of parliament. They were told not to pay a coin since the program is fully sponsored by the government*”. Pupil 05 from school 03 narrated “*parents were not involved in digital*

*learning integration program preparations but they were invited to participate in the school “harambee” to buy desks with the help of politicians”.*

The findings are supported by studies of Murithi (2013) and Gikundi (2013) who found out that those parents were not involved in DLI programs in public secondary schools in Imenti North and Tigania West sub-counties respectively. On the contrary parents in Israel and UK provided all that was required by the schools to make the program a success in the process and sustainability according to the studies by Blau and Hameiri (2016) and O’Hara (2011) respectively.

The support offered by parents to schools creates a good understanding and encouragement to the school management and the learners. The support also builds a long lasting relationship, trust between and among stakeholders. The study sought to establish the support offered by parents in the preparations for DLI programme. Table 4.30 (in the appendix) shows data obtained from the parents.

From Table 4.30 (in the appendix), the study findings indicate that parents were not involved in the management of DLI program according to about 41 (95%) PTA members but about 2 (5%) acknowledged their involvement. Similarly, the school management did not collaborate with parents on DLI program according to 31 (72%) PTA members while about 12 (28%) confirmed participating. However, parents were involved in the construction of a strong room for safe keeping of digital tools according to 28 (65%) PTA, while about 15 (35%) PTA refuted.

The findings indicate that parents were not involved in the management of DLI program. However, 28 schools engaged parents in the construction of a strong room for safe keeping of digital tools. Involving parents in the management of DLI program could

have aided in optimizing pupils learning. Thus, the program lacked concerted support efforts. The findings are supported by O’Hara (2011) who found out that where parents were involved in the management of DLI program the support proved very fruitful and the sustainability of the program guaranteed. O’Hara (2011) study is backed by that of Linden (2010) which indicated that parents’ involvement in management of DLI through their input and support ensured that schools had learning environments where pupils can exploit their full potential.

SCDEs were also interrogated on the involvement of parents in managing DLI program. SCDE B said *“management of public primary schools was not in their area of jurisdiction. It was the responsibility of PTA and head teachers to organize on how the program will be managed by involving parents”*. SCDE C remarked *“parents were not involved in any way on DLI program management except in public primary schools that had organized for a fund raising”*. SCDE D reported *“although parents were represented in the PTA the policy on the program was silent on how parents could be involved in DLI program”*. SCDE H shared *“the involvement of parents in management of DLI programme depended on head teacher’s leadership style hence the level of preparation varied from one school to another”*.

Therefore, it was the prerogative of the head teachers to decide when to involve parents on management of DLI programme provided they did not pay any levy to school. On the contrary a study by Gikundi (2013) and Murithi (2013) found out that parents of local public secondary schools in Meru County were involved in the management of digital learning integration program through PTA. Ogembo et al. (2012) concurred with the study by revealing that inadequate facilities in schools through government funding made parents to supplement through fundraising and pledges. The findings revealed that

about 15 (35%) parents have trust in DLI programme and that it would not spoil their children while about 28 (65%) were of the contrary opinion. Further, 27 (63%) parents wholly supported DLI program while 16 (37%) did not support the program. About 39 (91%) parents appreciated DLI and offered to provide security of the gadgets. However, only 4 (9%) parents did not appreciate the programme.

The findings indicate DLI programme was appreciated and supported by parents in most of the public primary schools. The support parents had for DLI program showed that they were ready to be engaged and participate in the development of the programme. Supporting the programme indicates that parents were eager to work and collaborate with other stakeholders to improve the education standards in their respective schools. The study concurs with that of Wakramamayake and Hawamage (2011) in which they found out that parents appreciated the free OLPC from the government in Sri Lanka. Olibie (2014) study noted appreciation of parents in supporting DLI programs by taking the role of a teacher at various points at home by creating an environment that encourages learning. Further, parents provided direct reinforcement for academic improvement. SCDEs were interrogated during the interview the support parents had for DLI program.

All SCDEs agreed that parents appreciated and were willing to give the required support of the innovation in their respective public primary schools. SCDE A reported *“most parents rated the tablets highly for their children’s’ development. They perceived that tablets were good devices for training of concentration”*. SCDE D revealed *“most parents had obstacles such as language barrier, finances, lack of communication from school and lack of parents’ education which reduced their participation on DLI at home and in school”*. SCDE E remarked *“although DLI program had not developed to an*



*extent that learners would be allowed to carry the tablets at home to go and complete the assignments, parents appreciated the government effort*". The study was supported by that of Olibie (2014); Anyikwa and Obidike (2012) who found out that parents who support the program take the role of a teacher at various points at home, create a home environment that encourages learning. Further, the two studies were supported by Ramorola (2013) study which indicated that parents contributed greatly in motivating children to embrace the innovation by buying laptops, influence and encouragement.

Parents should have been involved from the time DLI project was initiated. The foundation and support given by the parents is used by the teachers in erecting the intellectual capabilities of the learners. Parents have had successful support for activities and programmes in the past and DLI should not have been an exception.

#### **4.9 Hypothesis Testing**

This study had four hypotheses that needed to be tested. Univariate regression analysis was utilized. Before the univariate regression analysis was conducted diagnostic tests were done to satisfy the underlying assumptions. The specific tests done are discussed below.

##### **4.9.1 Normality Testing**

The normality testing was done using the Kolmogorov-Sminov test since the sample size was more than 50 respondents. The study assumed that the data was normally distributed according to Athanasiou et al. (2010). Further, the decision rule is that if p-value is more than the set alpha value ( $p > 0.05$ ), then data is normally distributed (Athanasiou et al., 2010). Moment test (Kurtosis) for dependent variable DLI was done to verify the outcome. Kurtoses are an efficient tool for evaluating normality and are able to detect

deviations from the normal (Murange & Qin, 2018).Table 4.22 shows Kolmogrov-Smirnov test.

**Table 4.22**

*Normality Test for Dependent Variable (One-Sample Kolmogorov-Smirnov*

Output variable with respect to composite	Kolmogorov- Smirnov test	
Variables X <sub>1</sub> , X <sub>2</sub> , X <sub>3</sub> , X <sub>4</sub> . N = 496	Statistic	Asymp. sig. (2-tailed)
Teachers' preparedness (X <sub>1</sub> )	0.3856	0.648
Availability of resources (X <sub>2</sub> )	0.3844	1.012
Effect of Technical support staff (X <sub>3</sub> )	0.3172	0.605
Involvement of parents (X <sub>4</sub> )	0.3228	0.840
Output variable DLI (Y)	0.3525	0.776

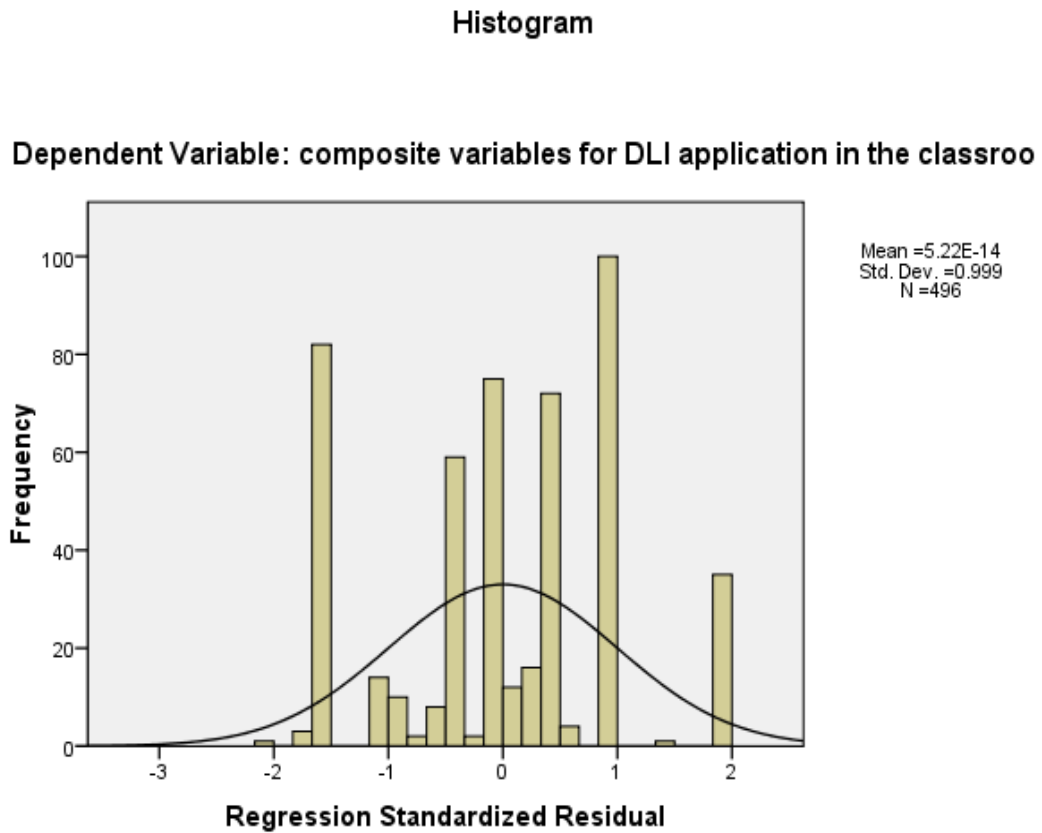
Table 4.22 shows that p-values for X<sub>1</sub>, X<sub>2</sub>, X<sub>3</sub>, X<sub>4</sub> are 0.648, 1.012, 0.605, and 0.840 respectively. Based on the output of the test, the p-values of the study variables are greater than 0.05 which indicate that the data was normally distributed according to Athanasiou et al. (2010).

#### **4.9.2 Kurtosis**

Kurtosis identifies the normality of the curve by measuring the distribution of the relative size of the two tails. The normal distribution is represented by histogram showing a bell shaped peak and most data within -3 or +3 standard deviations of the mean (Westfall, 2019). Figure 4.3– 4.6 shows a histogram of normally distributed composite variables.

**Figure 4.3**

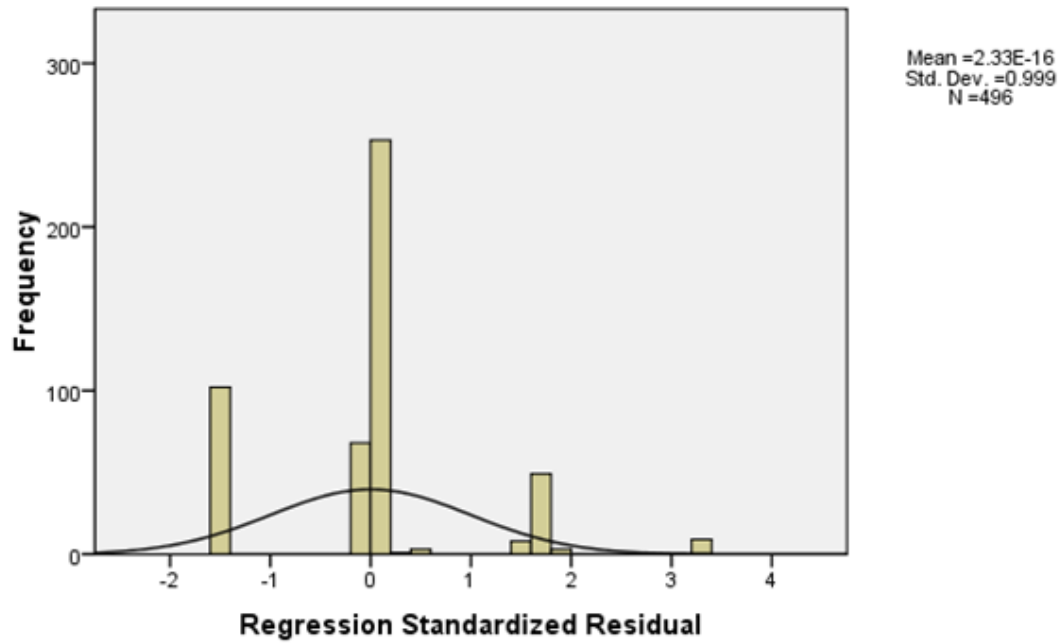
*Normality Test on Application of DLI in a Classroom*



The kurtosis is a mesokurtic showing that the probability distribution curve does not contain extreme values. The histogram shows that the data is normally distributed. The distribution therefore, provides the best fit for the data.

**Figure 4.4**

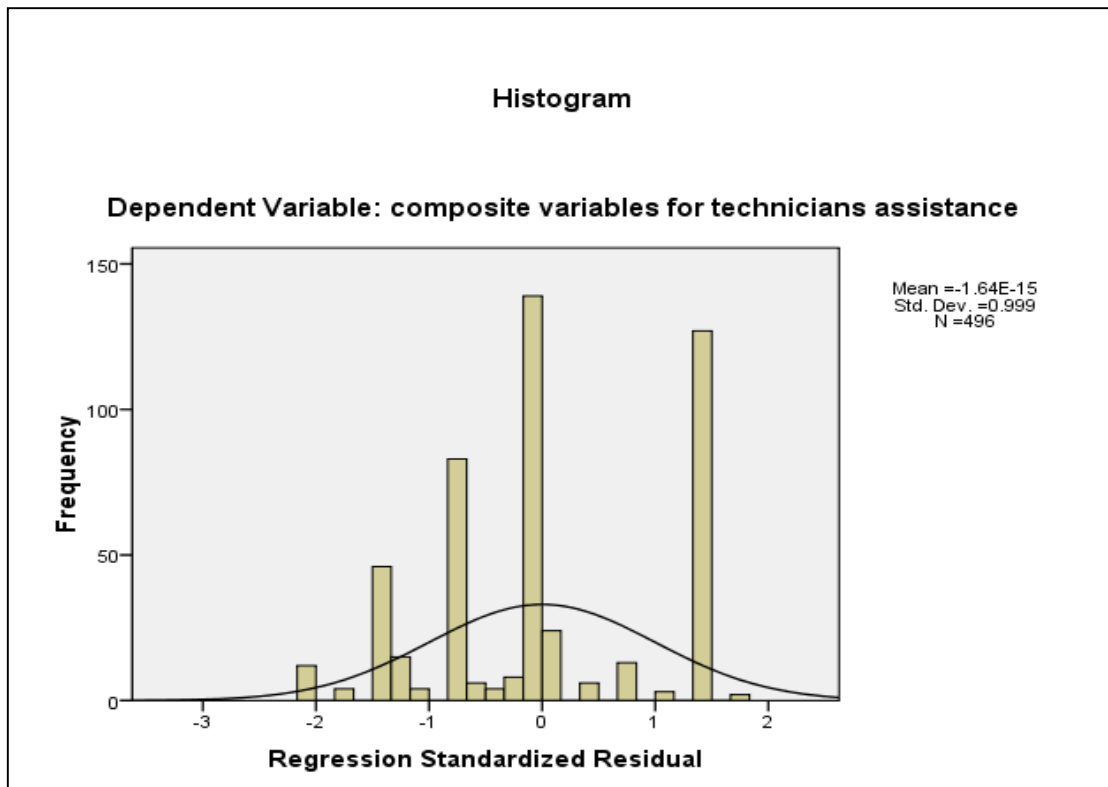
*Normality Test on Adequacy of Digital Learning Resources*



The histogram confirms the composite data on adequacy of digital learning resources was normally distributed as indicated by one-sample Kolmogorov-Smirnov test shown in Table 4.22.

**Figure 4.5**

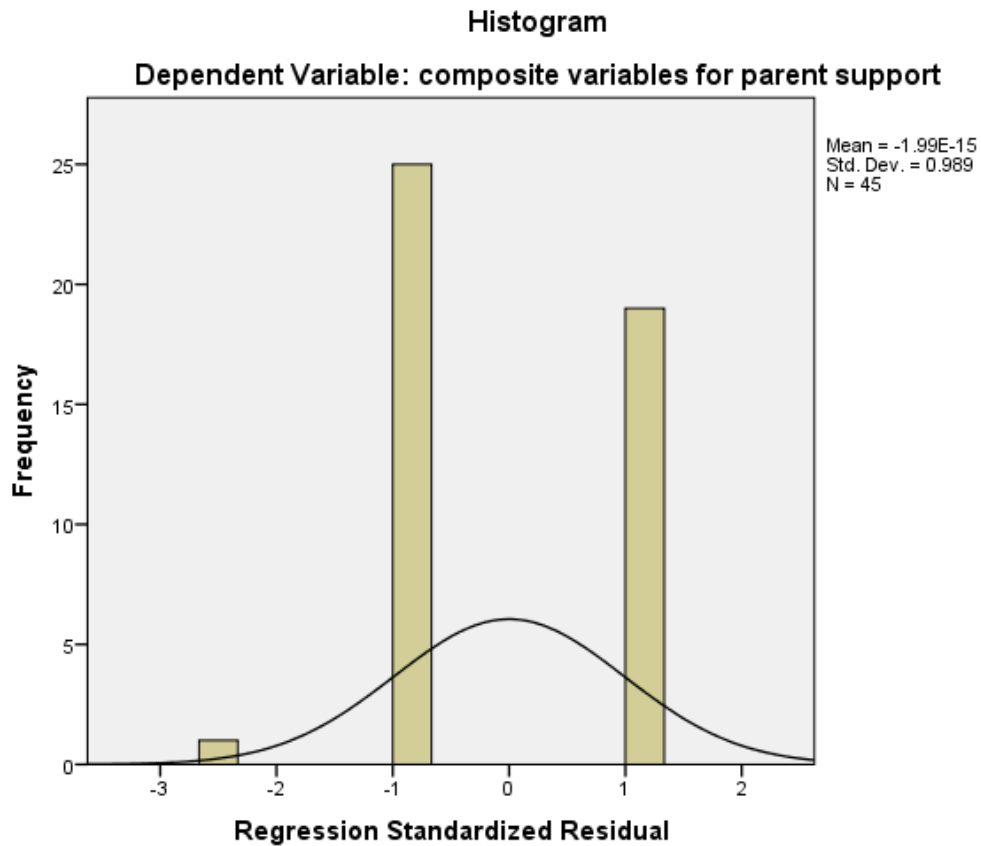
*Normality Test on Technical Support Staff*



The histogram shown by Figure 4.5 confirms the normality test indicated by one-sample Kolmogrov-Smirnov shown in Table 4.31 and represented by composite variable  $X_3$ .

**Figure 4.6**

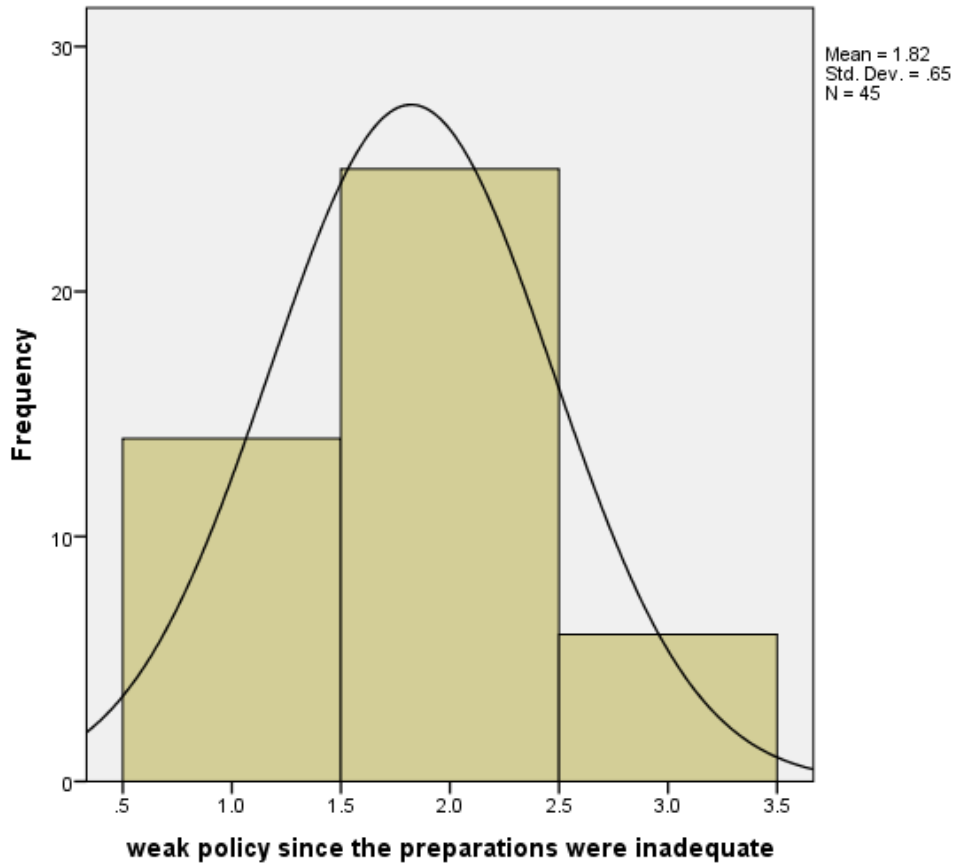
*Normality Test on Parent support for DLI Programme*



The Kurtosis shows that the dependent variable was normally distributed. The curve is mesokurtic and matches Gaussian distribution.

**Figure 4.7**

*Normality Test on DLI Policy*



The data follows a normal distribution since it follows a mesokurtic distribution. The curve shows that data on policy was normally distributed. Thus, data on policy fits many natural phenomena and useful in providing insights.

#### **4.9.3 Linearity Test and Hypotheses Testing**

The study established the relationship between composite variables (Independent) and digital learning integration (Dependent) using Pearson product moment correlation. Table 4.23 shows the correlation coefficient used to identify the direction of the composite variables.

**Table 4.23**

*Composite Construct for Independent Variables (X<sub>1</sub>, X<sub>2</sub>, X<sub>3</sub>, X<sub>4</sub>) against Composite Dependent Variable*

<b>Variables correlated</b>	<b>r-value</b>	<b>Sig. (2-tailed)</b>	<b>N</b>
Composite variable for teacher preparedness In DLI (X <sub>1</sub> )	0.943**	0.000	496
Composite variable for availability of Resources (X <sub>2</sub> ) against DLI	0.825**	0.000	496
Composite variable for availability of technical support staff against DLI	0.753**	0.001	45
Involvement of parents in DLI preparations (X <sub>4</sub> ) against DLI	0.854**	0.001	45

Note\*\* correlation significant at the 0.01 level (2-tailed)

The findings presented in Table 4.23 were obtained through computation of Pearson's product moment correlation coefficient. The data confirmed that there was significant correlation at 0.01 levels (2-tailed) between variables of the study. Ho<sub>1</sub>, Ho<sub>2</sub>, Ho<sub>3</sub> and Ho<sub>4</sub> were therefore rejected. The computed correlation coefficients ( $r = 0.943^{**}$ ,  $0.825^{**}$ ,  $0.753^{**}$ ,  $0.854$  and  $p = 0.000, 0.000, 0.001, 0.001$ ) for X<sub>1</sub>, X<sub>2</sub>, X<sub>3</sub> and X<sub>4</sub> respectively at alpha = 0.05 level of statistical confidence indicates a positive significant correlation between composite independent variables and composite dependent variables for DLI in PPS in Meru County. The values always range between -1 (strong negative relationship) and +1 (strong positive relationship) (Lund & Lund, 2015).

It is evident that teachers' preparations through training, availability of digital learning resources, effective technical support staff and involvement of parents in DLI programme had positive impact on DLI application in class. The study concludes that a



knowledgeable teacher on how to operate and use the most current digital and information tools that deal directly with teaching and learning significantly affect the classroom application of DLI. The findings are supported by Wambiri and Ndani (2016), Doering and Roblyer (2014) who indicated that a prepared teacher equipped with knowledge of digital skills and pedagogy influence directly or indirectly DLI in the classroom. Similarly, without adequate digital learning resources maximizing learners' engagement rates to improve the learning outcome is not possible. Orodho (2014) and Rebecca and Marshall (2012) supported the findings by revealing that infrastructure and digital learning materials are the fundamental resources for effective DLI.

Further, without TSS to assist teachers and learners, DLI in schools was not practically possible. Therefore, success of digital learning integration programme greatly depends on the effectiveness of technical support staff and it is a waste of time to embark on DLI application without technical support staff. This opinion is reinforced in studies by Tinio (2015) and Ertner (2012) who indicated that an innovation without technical support was unreliable and that lack of technical support in schools hinders DLI. In addition, writers such as McGarr and O'Reilley (2011) and Bandung and Langi (2011) highlight that lack of technical support staff was an impediment to DLI programmes in South Africa and Indonesia respectively. This study established that TSS was not available in majority of the schools and this has negative implications to DLI in the classroom. However, in schools where TSS was available DLI was effective. The study noted that in the absence of TSS in public primary schools, DLI programme was headed for failure. Though to a large extent parents were not involved in DLI programme preparations, there were positive effects in the schools which had involved parents. Parents needed to be sensitized so that they could be engaged in supporting the programme financially, in management and other kind of essential support to make the programme successful. The

involvement of parents in DLI programme preparations were hypothesized to not positively affect the parents' support for DLI but when tested it was found to have a positive effect on DLI application in the classroom. This is in harmony with the findings of Blau and Hameiri (2016) who found out that parents in Israel were involved in DLI programme preparations and as a result they provided all that was required to make the programme a success. The study is further supported by studies of Laaria (2013) and Mingaine (2013) who revealed that parent's private primary schools in Tanzania and Uganda secondary schools respectively fully supported the DLI programmes when they were involved.

#### **4.10 Regression Analysis on the Effect of Composite Independent Variables on Dependent Variable**

Regression analysis was done to predict how much effect each independent composite variable  $X_1$ ,  $X_2$ ,  $X_3$ ,  $X_4$  had on dependent composite variable  $Y$ . Results are shown in Tables 4.3.4; 4.3.5 and 4.3.6.

##### **4.10.1 The Regression ANOVA Output**

Table 4.24 shows the resulting regression analysis model summary.

**Table 4.24**

*Model Summary: Effect of Composite Independent Variable on Dependent Variable*

<b>Model</b>	<b>R</b>	<b>R<sup>2</sup></b>	<b>Adjusted R<sup>2</sup></b>	<b>Standard Error of the Estimate</b>
$X_1$	0.943*	0.890	0.889	0.138
$X_2$	0.825*	0.680	0.679	0.284
$X_3$	0.753*	0.567	0.556	0.209
$X_4$	0.854*	0.730	0.723	0.136

Note: Composite variables for \* predictors (constant),  $X_1$ ,  $X_2$ ,  $X_3$ ,  $X_4$

$X_1$  Teacher preparedness,  $X_2$  Adequacy of digital learning resources,  $X_3$  Effective technical support staff,  $X_4$  Involvement of parents in DLI programme

\*\* Dependent variable ( $Y$ )

The R value for the predictor composite variable “teachers’ preparedness against dependent variable DLI application was 0.943\*, indicating high level of correlation. A high percentage (89%) of the outcome is explained by teachers’ preparedness. With well trained teachers on digital technology skills, the classroom delivery using digital tools was very effective in meeting education expectations of the pupils (Rahuman, Wikramanayake & Hewamage, 2011). Successful DLI is influenced by availability of digital equipment and other resources. The R value for the predictor composite variable “adequacy of digital learning resources” was 0.825\* indicating high level of correlation and explains 68% of the outcome which is a high percentage.

The R value for the predictor composite variable “effectiveness of technical support staff” against dependent variable “DLI technical assistance” was 0.753\* indicating high level of correlation. Composite variables for effectiveness of technical support staff, explains 56.7% of the outcome which is a high percentage. The  $R^2$  shows that it was a good linear model after evaluating the scatter of the data around the fitted regression. The  $R^2$  provided the estimate of the magnitude of the relationship between the model and the response variable. Thus, effective technical support staff significantly contributed to the success of DLI in the classroom. The standard error estimates indicate that the success of DLI through technical assistance can be well predicted with 95% confidence and that the sample was unbiased. Therefore, the sample accurately represents the population. The high level of correlation confirms the Pearson product moment correlation shown in Table 4.32.

Parental involvement in school programs is a powerful lever for raising education achievements in a school. Parents need to work together with teachers to improve learning outcomes. The R value of 0.854\* indicates a high level of correlation. The

predictor variables for parent involvements are explained by 72.3% of the outcome which is a high percentage. The ANOVA test confirmed the rejection of the null hypothesis ( $p < 0.05$ ). This is an indication that changes in the involvement of parents in DLI programme were related to the changes in parents' support for DLI application in the classroom.

The R value for the policy represents correlation of 0.887 which indicates a high level degree of correlation.  $R^2$  indicates the total variation of the dependent variable that could be explained by independent variables. In this case 78.7% could be explained which was perfectly large.

#### **4.10.2 The Regression ANOVA Output**

ANOVA was used to test whether the difference of means were practically significant. Goodness-of-fit statistics was used to determine the degree in which the model could fit the data. Residual plots verified the model assumptions. The  $R^2$  explained the percentage variation in response. The higher value of  $R^2$  meant that the model agree with the assumptions. Residual plots verified the adequacy of the model in meeting the assumptions of the analysis as shown in Table 4.25.

**Table 4.25***ANOVA: Effects of Composite Independent Variables on Dependent Variable*

<b>Model</b>	<b>Sum of squares</b>	<b>df</b>	<b>Mean square</b>	<b>F</b>	<b>Sig.</b>
Regression X <sub>1</sub>	76.169	1	76.169	3.981E3	0.000**
Regression X <sub>2</sub>	84.561	1	84.561	1.050E3	0.000**
Regression X <sub>3</sub>	2.449	1	2.449	56.206	0.001**
Regression X <sub>4</sub>	2.155	1	2.155	116.095	0.001**

---

Note: Composite variables for (\* Independent variables; \*\* Dependent variable DLI)

X<sub>1</sub> Teacher preparedness, X<sub>2</sub> Adequacy of digital learning resources, X<sub>3</sub> Effective technical support staff, X<sub>4</sub> Involvement of parents in DLI programme,

The regression ANOVA output in Table 4.35 contains composite independent variables X<sub>1</sub>, X<sub>2</sub>, X<sub>3</sub>, X<sub>4</sub>. The significance of F-test was to compare fitting of the linear regression model containing independent variables and that without. Apart from F-test allowing the comparison of fits of different linear models, it is also capable of evaluating multiple model terms simultaneously. The F-test gave the significance for a regression model. The data fitting was perfectly valid for the models X<sub>1</sub>:  $F(1, 494) = 3.981E3$ ,  $p(0.000)$ , X<sub>2</sub>:  $F(1, 494) = 1.050E3$ ,  $p(0.000)$ , X<sub>3</sub>:  $F(1, 43) = 56.206$ ,  $p(0.001)$ , X<sub>4</sub>:  $F(1, 43) = 116.095$ ,  $p(0.001)$ . The model arising from the five predictors was found to be statistically significant in explaining digital learning integration in PPS in Meru County. The F-tests p-value was less than the expected p-value of 0.05. Therefore, the variability of the dependent variable around its mean we can be explained better than using the mean itself. The F-test confirmed overall that the relationship is statistically significant and the residual plots and output proved that there was no biasness in sampling.

### 4.10.3 The Regression Weights Output

Further, the regression coefficients are shown in Table 4.26 which contains the unstandardized and standardized coefficients.

**Table 4.26**

*Regression Weights: Effects of Independent Variables on Dependent Variable*

Variable	Unstandardized Beta	Coefficient SE	Standardized Beta	coefficient t	Statistics Sig.	Tolerance	VIF
Constant	0.195	0.026		7.420	0.000		
Teachers' preparedness X <sub>1</sub>	0.951	0.015	0.943	63.092	0.000	1.000	1.000
Constant	-0.508	0.070		-0.7220	0.000		
Adequacy of digital learning resources X <sub>2</sub>	1.345	0.042	0.825	34.400	0.000	1.000	1.000
Constant	0.073	0.291		0.252	0.802		
Effective TSS X <sub>3</sub>	1.024	0.138	0.705	7.434	0.001	1.000	1.000
Constant	0.032	0.085	0.381	0.705	0.001		
Parent Involvement X <sub>4</sub>	0.968	0.048	0.950	20.033	0.001	1.000	1.000

Note: \*\* Composite variables DLI

Results in Table 4.36 indicate that teachers' preparedness affected DLI by factor +0.951, adequacy of digital learning resources affected DLI by factor +1.345, effective TSS by +1.024, involvement of parents by +0.968 and DLI policy by +0.817. The regression

results show that the five variables are significant in determining the DLI. This means that to achieve success in DLI programme, teachers should be prepared, adequately, adequate digital learning resources procured, effective TSS prepared, involve parents and follow the DLI policy guidelines. The p-values tested show  $p < 0.05$  which means rejection of null hypotheses  $H_{01}$ ,  $H_{02}$ ,  $H_{03}$  and  $H_{04}$ . The teachers' preparedness, adequacy of digital learning resources, effective technical support staff and involvement of parents had significant relationship on DLI.

The study noted that teachers' preparedness was very useful in DLI programme application in the classroom. According to Wambiri and Ndani (2016), teachers' preparedness influence directly or indirectly on DLI. Similarly, adequate digital learning resources were essential for effective DLI. However, inadequacy of digital learning resources undermined the quality of DLI (Gafar & Neville, 2012). The test revealed that the perceived effectiveness of technical support staff was strongly related to DLI application. This might explain why DLI process in public primary schools in Meru County is slowly diminishing. As Ertmer (2012) and Laronde (2012) underline, ineffective technical support staff to a great extent reduced innovation adoption. Further, teachers and pupils needed to be assisted by having personnel to maintain and repair digital learning resources. The results are in agreement with research conducted by Ghavifekr, et al. (2013) according to which teachers could not repair broken computers to maintain lesson continuity was not possible without TSS in Malaysia. The F-test confirmed overall that the relationship is statistically significant and the residual plots and output proved that there was no biasness in sampling.

It is evident that the involvement of parents in digital learning integration program preparations had a positive impact on their support for digital learning integration

program application. The study concludes that without involving parents in DLI program preparations the support from parents in DLI application in the classroom is minimal. Therefore, success of digital learning integration program greatly depends on involvement of parents as key stakeholders in education and it is a waste of time to embark on DLI application without the support of parents. The findings are confirmed by several theme- related studies (Laaria, 2013; Ramorola, 2013; Blau & Hameiri, 2016) that revealed support of digital programs in schools by parents contributed greatly to the innovation adoption and application.

Parents' involvement in DLI (X<sub>4</sub>) data analysis indicate that for every one unit increase in parent involvement, parent support for DLI program increased by 0.968 units. The null hypothesis was rejected for the predictor composite variable since the p-values was 0.001 ( $p < 0.05$ ). Therefore, the low p-value suggested that the slope changes in the independent composite variable are associated with changes in the dependent composite variable. The predictor composite variable had significant relationship with composite parent support for DLI. This shows that the schools that are involving parents in DLI program as stakeholders received their maximum support.

The test revealed that the perceived involvement of parents' in DLI programme preparations is strongly related to parents' support for DLI application. The model reveals that where parents' involvement in DLI programme preparations took place, public primary schools in Meru County DLI programme outcome is significant. The opinion arising from the test is in accordance with Olibie (2014), Linden (2010) and O'Hara (2011) study which highlights the fact that parents involvement in the participations in activities and programmes such as DLI that can foster their children's



school achievement greatly influence the enhancement of DLI experiences, attainment and success.

#### **4.11 Analysis of Government Policy as an Intervening Variable**

The intervening variable helped explain whether there is a link between the independent variable and the dependent variable. In this study, government policy on DLI was anticipated to intervene by providing clear guidance on its implementation. Policies help schools to run smoothly and safely, create a productive learning environment. The study had one intervening variable on MoE policy guidelines on digital learning integration programme in PPS in Meru County to explain causal links between other variables. The study revealed that policy structures and guidelines were necessary and played a significant role to promote the educational needs of students. Introducing a new programme to schools required well prepared teachers as key DLI implementing agents, resource allocation, involvement of technical personnel and parents.

The findings indicated that though the policy guidelines on DLI were well documented, they were not followed to the letter since the implementation of DLI is not successful. The data was obtained from SCDE, head teachers, teachers and parents. The SCDEs reported that there is a policy on digital learning integration in schools but it was not adhered to. They reported that the government initiative to introduce digital learning integration in public primary schools was to reform the country's educational system to advance and uplift the teaching and learning in schools. Sub-county directors A reported *“SCDEs were over-looked hence they were not involved in the training preparations to ensure quality. Therefore, the training of teachers was not about policy but to ensure that the politicians carried the day”*. SCDE B remarked *“tax payers' money was wasted in procuring digital devices which were lying in store. The introduction of digital*

*learning integration was not aligned to the policy objectives that required resources to be availed before the program roll out. That was not done and hence it led to program stalling”. SCDE C revealed “policy was lacking or was ignored altogether since schools were not supplied with technical support staff to help learners, teachers and in maintenance of digital tools”. SCDE D remarked “digital learning integration was a campaign tool since stakeholders were not sensitized or involved in preparations which were also shoddy and could not make any meaningful change to learners”.*

Head teachers implement the government policy at school level. Head teachers have administrative responsibilities of ensuring that the curriculum was delivered to the letter. Table 4.27 shows views from head teachers on DLI policy with respect to preparations before the program was rolled out.

**Table 4.27**

*Head-teachers Data on DLI Policy*

Response	F	%
Not aware of the policy on DLI	16	36
Good policy but it was interfered with politically	4	9
DLI was about politics not about policy	9	20
Poor policy since the programme lacked coordination	2	4
Poor policy since parents as stakeholders were not involved	3	7
Poor policy since there weren't adequate finances to support DLI	15	33
Weak policy since the preparations were inadequate	15	33

The findings indicated that 16 (36%) head teachers were not familiar with policy on digitization of public schools in Kenya. In 4 (9%) schools, the head teachers reported

that the policy was good but it was interfered with politically. Head teachers from 9 (20%) schools indicated that DLI was politically initiated but it was not about policy because adequate preparations were not carried out as stipulated in the guidelines. The policy lacked coordination and also did not involve parents who are key stakeholders in education hence poor according to 4% and 7% of the head teachers respectively. The policy was also categorized as poor since there were no finances to support it. Similarly, the policy was termed as poor because the preparations were inadequate and the resources were inadequate according to 15 and 6 head teachers respectively.

The adoption and diffusion of DLI in large scale required a coalition of parents, politicians, MoE officials from all levels to undertake adequate preparations through planning and management to avoid wastage of public resources. The study findings were supported by that of Bebell and Kay (2010) who found out that the adoption, organization, planning and management of DLI in schools was complex and required link between policy and politics, coalition between MoE officials, parents, politicians and practically all aspects of school management and administration.

The table below provides the R and R square value. The R value represents simple correlation of 0.794 which indicates a high degree of correlation. R square indicates how much of the total variation in the dependent variable can be explained by the independent variables in this case 63.1% can be explained which is perfectly large.

**Table 4.28**

*Effects of Intervening Variable (policy): Model Summary*

Model	R	R Square	Adjusted Square	R	Std. Error of the Estimate
1	.794 <sup>a</sup>	.631	.549		.339

a. Predictors: (Constant),

weak policy because resources were inadequate, the respondent was not aware of the policy on DLI, poor policy since parents as stakeholders were not involved, poor policy since the program lacked coordination, good policy but it was interfered with politically, poor policy since there weren't adequate finances to support it, DLI was about politics not policy, weak policy since the preparations were inadequate

b. Dependent Variable: Application of tablets and other resources in class is good

ANOVA test confirmed that DLI is related to policy. This is an indication that changes in DLI programme application in the classroom are related to the changes in policy guidelines regarding DLI programme preparations. A p-value (sig.) of 0.001 shows significant linear relationship between correlated composite variables. The F-test confirmed overall that the relationship is statistically significant and the residual plots and output proved that there was no biasness in sampling.

**Table 4.29***Effects of Intervening Variable (policy): ANOVA*

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	7.063	8	.883	7.684	.000 <sup>b</sup>
	Residual	4.137	36	.115		
	Total	11.200	44			

- a. Dependent Variable: Application of tablets and other resources in class is good.
- b. Predictors: (Constant), weak policy because resources were inadequate, the respondent was not aware of the policy on DLI, poor policy since parents as stakeholders were not involved, poor policy since the program lacked coordination, good policy but it was interfered with politically, poor policy since there weren't adequate finances to support it, DLI was about politics not policy, weak policy since the preparations were inadequate.

ANOVA test confirmed that DLI is related to policy. This is an indication that changes in DLI programme application in the classroom are related to the changes in policy guidelines regarding DLI programme preparations. A p-value (sig.) of 0.001 shows significant linear relationship between correlated composite variables. The F-test confirmed overall that the relationship is statistically significant and the residual plots and output proved that there was no biasness in sampling. The test reveals that DLI application in the classroom is statistically related to the policy guidelines regarding DLI programme preparations. The regression coefficients are shown in Table 4.30 which contains the un-standardized and standardized coefficients.

**Table 4.30***Effects of Intervening Variable (policy): Regression Weights*

Model		Unstandardized		Standard	T	Sig.
		Coefficients		Coefficients		
		B	Std. Error	Beta		
1	(Constant)	.386	.267		1.446	.157
	the respondent was not aware of the policy on DLI	.277	.184	.339	1.507	.141
	good policy but it was interfered with politicaly	-.063	.246	-.067	-.258	.798
	DLI was about politics not policy	.145	.262	.153	.553	.584
	poor policy since the program lacked coordination	-.059	.245	-.049	-.239	.812
	poor policy since parents as stakeholders were not involved	.115	.176	.103	.649	.520
	poor policy since there weren't adequate finances to support it	.304	.186	.389	1.638	.110
	weak policy since the preparations were inadequate	.107	.219	.138	.488	.629
	weak policy because resources were inadequate	-.167	.208	-.173	-.806	.425

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a. Dependent Variable: Application of tablets and other resources in class is good

Table 4.30 reveal that awareness results show that for every one unit increase in awareness increased DLI application in class by 0.277 units while on politics influence the results shows that for everyone one unit increase in political influence DLI application decreased by -0.063 units. On policy coordination results shows that for every one unit decrease in coordination DLI application decreased by -0.059 units

While on parents involvement the results shows that for every one unit increase in parents involvement it increased DLI application by 0.115 units. On finances results shows that for every one unit increase in finances DLI application increased by 0.304 units while on preparation results shows that for every one unit increase in policy preparation increased DLI application by 0.107 units and on resources results shows that for every decrease in resources decreased DLI application by -0.167 units.

Thus, the study concludes that preparations were not in tandem with Boum (1992) project management cycle. Evidence that the DLI policy had massive weakness ranging from poor preparedness: resource planning, forecasting, resource leveling and allocation, poor coordination, political interference, and inadequate PTA awareness and involvement. The result suggests that policy process on DLI program was required from preparations to the classroom application. The study noted that clear policy guidelines, workable policies and structures to ensure that policies were implemented to the letter were lacking which to a large extent affected the preparedness. Nkula and Krauss (2014) arrived at similar conclusion that South Africa needed workable policies to enable her equip rural public primary schools with appropriate digital learning tools. In Kenya, most policies on DLI remained in draft form (Laronde, 2012; Kwamboka, 2015). Further, the result is in accordance with study conducted by Judson (2010) and Nut (2010) according to which they found out that failure to have effective policies affected DLI programs in

provision of adequate resources and training teachers among other required preparations. Lack of policy on DLI program made children to freely browse adult sites with explicit sexual content after the introduction of OLPC in Nigeria (Hennessy, et al. 2010).



## **CHAPTER FIVE**

### **SUMMARY, CONCLUSION AND RECOMMENDATIONS**

#### **5.1 Introduction**

Study conclusion and recommendations are summarized in this chapter. The study aimed at analyzing preparedness for implementation of digital learning integration program in the PPS in Meru County Kenya, before the programme was rolled out. The study addressed the following research objectives: to analyze teachers' preparedness in digital learning integration before the roll out of the programme; to examine the preparedness of digital learning infrastructural before the roll out of digital learning integration programme; to analyze the technical support staff availed for digital learning integration program; to examine the extent of involvement of parents in preparations for digital learning integration programme in pps in Meru County.

#### **5.2 Summary of the Findings**

The main points of the study are organized per objective. Views were sought from SCDE as the sub-county coordinators of the digital program, head teachers as the coordinators of the program in their respective schools, teachers as the implementers of the programme in the classroom, PTA as the school managers and learners from the pioneer class as the beneficiaries of the programme.

##### **5.2.1 Summary Based on Teachers' Preparedness**

The first objective was to analyze the preparedness of teachers on DLI before the program was rolled out. Teachers' preparedness covered the training and in-servicing of teachers to enable them acquire knowledge on digital technology tools and pedagogy skills which was to help them to effectively implement digital learning integration in the classroom.

On teachers' preparedness, the study noted that about 147 (30%) teachers were trained. Comparing the entire teacher population in the county, the number trained was infinitesimal. Further, the number of trained teachers on DLI was diminishing due to transfers, retirement, resignations or death and there was no immediate suitable replacement. The attendance of teachers was extremely low. Some schools were not represented in the training and there was no follow up. There was no other training organized since then to capture those that were not trained for one reason or the other. The training was inadequate and unreliable to enable them embark on DLI program confidently and successfully. The evidence obtained from pupils, parents and head teachers was that teachers were not very often using the innovation for teaching and learning in some schools while others have not even started.

The management of the training organized by MoE was poor since all teachers were not trained and there was no other training organized since 2016. The study revealed that there was no collaboration between SCDEs, MoE headquarters, head teachers and PTA on training of teachers. Therefore, the study noted that there was huge resource wastage as a result. SCDEs were not involved in training of teachers and their role was limited to inviting three teachers from every school and specifically those who were teaching grades 1-3 to attend the training. PTA was not involved in preparations for training and the entire management process.

The findings revealed that the program failed before launching because of failure to address teachers' preparedness before rolling out the program. Lack of collaboration, team work, follow-up, monitoring and evaluation and consistency among other factors led to the program failure. That also contributed to inadequate adoption of the innovation hence ending up digital tools that had no value addition. If there was adequate planning,

consultations and management structures that involved all stakeholders, then pedagogical skills should have been considered during training of teachers. In every lesson undertaken by the teacher, pedagogical skills are inevitable for any successful lesson.

The study found out that digital learning technology program was considered as an option application in PPS in the county. The study also found out that each school had its own unique challenges among them from the environment, locale of the school, ministry of education field officials who were the coordinators of the program, school leadership and the financial support from the county and central governments. There were no indicators of efficiency in teaching learning process neither using integrated digital learning nor improved learning outcomes. No single school made an effort to train the staff and in most schools DLI was one teacher activity bearing in mind that they had other activities to undertake. There was a strong Pearson product moment correlation  $r = 0.943$  and beta value of 0.951. Thus, without teachers' preparedness DLI would not take shape now and in future.

Teachers and pupils are unable to make use of digital learning tools during the period of COVID-19 pandemic which the main option now and better for future. COVID-19 clearly exposed teachers' unpreparedness on digital technical skills to enable them assist pupils via modern learning. However, no turning back, we accept DLI sooner than anticipated. Teachers should brace the digital era and support learners.

### **5.2.2 Summary Based on Availability of Digital Learning Resources**

The study found out that some resources were lacking, others inadequate and others malfunctioning. Two schools in Imenti central and one school in Imenti North had not received tablets and other digital learning resources from ministry of education by mid-October 2018. Computer laboratories were among the resources that were not available

in most PPS and which could have helped teachers come up with a time table to make learners optimize the resources since tablets were supplied for only grade one. Most schools lacked a free classroom that could be converted into a computer room. For example in school 3 in Buuri grade one classroom was the computer room such that if any other class wanted to access the facility the learners were relocated which was cumbersome and time wasting. Poor network connectivity in some schools, lack of electricity due to vandalism of transformers and power cables, incomplete electrical installations in some schools and installed fake transformers were evident. Some areas were not connected to electricity national grid and there was no solar power back up. Lack of finances to add and improve the existing resources was a challenge. Learners shared desks in schools with many pupils per class in some areas.

While the study acknowledges the importance of introducing digital learning integration to schools, it was affected by the poor management structures of resource acquisition. Views from stakeholders, ministry of education field officers, head teachers and teachers were not sought before embarking on DLI program. Each school had its own unique resource needs and challenges which MoE was unable to satisfactorily cater for. Leadership and management from MoE in championing and providing resources were lacking. Grade three learning content were incomplete. Key players in DLI program lacked team work, collaboration, leadership and management which led to resource constraints in schools. The program failed despite huge investment from the government because the programme was rolled out without meeting the preparations threshold. Inadequate resources made teachers to develop negative attitude leading to abandoning of the program and others resisting the change. Tablets were supposed to be one tablet per child from grade 1-3 but they were bought only for grade 1 hence the ratio is

approximately 1:3. There was no study that the government used to disburse resources to schools.

The digital learning resources supplied were in good condition and they were tested by the supplier upon delivery. Tablets and other digital learning resources were still new since they were not used regularly on daily basis. Though parents were not involved in planning, procurement and other preparation logistics, they appreciated the free tablets from the government. Although the head teachers were responsible of ensuring that digital learning integration program was successful in their respective schools, they were incapacitated by the inadequacy of resources. Head teachers were unable to influence digital learning integration implementation as role models due to lack of finances and digital technology resources. Although classrooms were converted to computer rooms, ideally they were not conducive for DLI due to overcrowding. There was no meaningful learning taking place with respect to the syllabus coverage using digital technologies. However, in some schools, pupils were able to play games. The study noted that for successful DLI lesson, the following resources were inevitable; a standard computer laboratory, electricity power back-up, non-fluctuating internet connectivity, adequate tablets and a reliable digitally trained human personnel that were pointed out in objective one. Thus, the program failed due inadequate preparations to avail the required digital learning resources. The beta value of 0.825 on regression analysis indicates that without digital learning resources DLI is not possible now and in future. During this period of COVID-19 pandemic, many countries including Kenya were unable to engage pupils in learning. Resources such as internet connectivity, electricity, handsets, laptops and many other digital gadgets learners to keep up with the changing times as a result of corona virus pandemic in countries like UK.

### **5.2.3 Summary Based on Availability of Technical Support Staff**

The findings revealed that MoE mobile technical support staff took several months to respond when they were called and only in one public primary schools PTA had employed TSS. A few other schools had technical support staff from Lewa conservancy. It was not possible to embark on DLI program in some schools without technical support staff. Schools that had introduced DLI to learners without technical support staff had lessons interrupted whenever a technical problem arose. The study noted that without technical support staff the learners learning needs were not fully met.

Public primary schools needed TSS to handle technical problems arising from internet connectivity, software, hardware, and power installations. The support was essential throughout the day if the learners were to optimize DLI. According to the SCDEs, the trained teachers were to act as technical support persons for the maintenance of digital learning integration tools and infrastructure. However, this was not possible since the skills acquired by the teachers within the 5 days of training were inadequate. Some of the head-teachers who were incorporated as trainers said that the training was to make teachers familiarize with the digital technology tools and not to make them technical support staff.

The study revealed that there was no repairs and maintenance of digital tools in the schools. Any broken or malfunctioning digital tool was kept safely in the store. Further, there was no replacement or addition of the digital learning resources since schools faced financial constraints. There was no information flowing from MoE on repairs, maintenance and replacement. This made teachers to develop negative attitude and hence abandon the program. Lack of adequate planning, management and leadership on provision of technical support staff by MoE as the project owner undermined the

objectives of the program. There was no individual or department which was charged with the responsibility of coordinating the program since the contractor was dealing directly with school head teachers. To a large extent, the program failed because of lack of technical support staff.

In addition to the ill-prepared teachers, lack of technical support staff made it almost impossible for public primary schools to embark on DLI program. The study noted that in the schools where technical support staff was available, there was meaningful teaching and learning. In addition, in schools that had introduced DLI, pupils were very happy, enjoyed the lessons, enthusiastic and confident when using the digital technology in the classroom. The learners were highly motivated when using the tablets. However, the study noted that grade one pupils had not developed their English and Kiswahili languages to be able to follow the lesson when using the tablets.

The study found out that the government's intention to create new channels for learning by use of innovations was good but unfortunately it was not directly proportional to the input. Schools were not adequately prepared through funding so as to be responsive to the radical changes linked to the innovation. The government did not care on the reforms required after the piloting the program before it was rolled out. However, the study found out that some schools were ahead of others since they received financial support to support the program from NGO's like Lewa conservancy or were given technical support staff to assist them. There was a strong Pearson product moment correlation of  $r = 0.753$ ,  $p = 0.000$  at  $\alpha = 0.05$  level of statistical confidence indicated a positive significant correlation between availability of TSS and DLI. Similarly the regression model of the two composite variables produced a coefficient of  $B = 0.750$  sig.  $0.000$ ,  $\alpha = 0.05$  level of statistical confidence. The success of DLI depended on availability of TSS. The

program failure is partly due to lack of TSS. For successful adoption and use of emerging technologies in the digital era technical support staff is inevitable.

#### **5.2.4 Summary Based on Parents' Involvement**

Majority of the parents were neither sensitized nor asked to finance DLI program. The study noted that parents were involved in receiving digital tools, launching of the program and buying new desks. Two schools had constructed laboratories through fund raising. The study revealed that parents appreciated the free tablets from the government and were ready to support the innovation. However, they were worried of the reducing momentum at which the innovation was getting entrenched into the education system in their respective schools.

Parents reported that learners were not allowed to carry the tablets home to allow continuity of the learning process because digital learning integration was still premature in their schools. Parents appreciated the use of tablets by their children in school and trusted that the digital technology would not spoil them. Further, parents were not involved in the management of the program. However, some schools involved parents in the construction of strong room for storing digital learning resources. The findings indicate there is a strong positive correlation of  $r = 0.854$  (Pearson product moment correlation) on composite variables of DLI indicators and  $\beta = 0.968$ . Thus, where parents were involved there were remarkable preparations that impacted positively on innovation adoption.

The application of tablets in the classroom for the schools that had started the program was not satisfactory. Pupils were not allowed to take the tablets home hence parents were not challenged by their children on the use of the digital technology. Therefore, none of the parents had registered for computer lessons so that they could help their children.



DLI programme in public primary schools was not successful. Parents associated the failure to poor preparedness of the government and failure to involve them. The study noted that there was a lot of resource wastage since the digital gadgets were lying in store instead of being used by pupils daily.

### **5.3 Conclusions**

The study conclusion is organized as per objective; analysis of the teachers' preparedness for DLI program, availability of digital learning resources, availability of TSS, and involvement of parents. In addition, conclusions based on policy and new knowledge gained from the study is included.

#### **5.3.1 Conclusion Based on teachers' Preparedness**

DLI program is not successful partly because teachers were inadequately prepared. The time to train them was too short. Teachers lack digital technological knowledge and pedagogical skills. While there was some evidence of tablets in schools, their use remained minimal due to lack of trained teachers hence limiting them access to technology. Teachers felt incompetent because they were not equipped with the necessary competencies which were evident during DLI application in the classroom.

#### **5.3.2 Conclusion Based on Adequacy of Digital Learning Resources**

Despite the government initiatives to have DLI in public primary schools the financial subsidies are inadequate to enable them acquire adequate, equitably distributed and appropriate digital teaching and learning infrastructure. The resources supplied by MoE were inadequate and in some schools lacking. In general there is limited digital infrastructural development including internet connectivity which was inevitable for the program. The study noted that insufficient DLI resources compromised the classroom application and effectiveness of content delivery when using the innovation.

### **5.3.3 Conclusion Based on Effective Technical Support Staff**

Digital tools were not well maintained or repaired due to lack of technical support staff and finances. Further, teachers were not able to effectively implement digital learning integration program due to lack of technical support staff in addition to their ill-preparedness. Although digital learning integration program in Meru County had a wide range of challenges from trained teachers on digital technology, resource distribution and adequacy, lack of technical support staff was the most conspicuous. However, schools that had access to TSS attempted to embarked on DLI program.

### **5.3.4 Conclusion Based on Involvement of Parents in DLI programme Preparations**

Parents appreciated the free tablets from the government. However, they were neither sensitized nor involved in the digital learning integration programme preparations. Parents were perturbed because the program appeared to be slowly dying. Ministry of education did not have systematic structures for planning and preparations that were significant in determining how the innovation was being interpreted and perceived by parents before the roll out. The adoption of the innovation was not good because it lacked parents' involvement as key stakeholders.

### **5.3.5 Conclusion Based on DLI Policy**

The project policy guidelines on planning, preparations, and coordination were not followed to the letter. The study also revealed lack of collaboration between government agencies, head teachers and teachers which made the program to fail. Further, although the schools received tablets for one class, their use remained minimal, optional and adoption of the innovation depended largely on interest of the teacher, his/her availability, availability of technical support staff and other resources such as electricity, internet connectivity, and computer classroom. For now, digital learning integration does

not appear as part of the education system since the integration is partial in some schools while in others nothing is taking place. KICD in conjunction with the Ministry of Education failed to prepare complete software for grade 3 and none for grade 4, an indicator that ministry of education was unprepared for digital learning integration program roll out. Political objectives overshadowed the MoE policy guidelines on DLI where preparations entailing planning, management structures and procedures that were the foundation for successful digital learning integration programme were overlooked.

### **5.3.6 Conclusion Based on New Knowledge Gained from the Study**

The study generated valuable insights on what needed to be prepared before rolling out DLI program. Responsible integration of the innovation into the curriculum is required. Barriers such as inadequate teacher training as change agents, inadequate technical support to aid learning optimization, inadequate digital learning resources, and involvement of parents as key stakeholders in education were identified. The study also contributes to new knowledge and data on DLI preparations in Meru County that could be referred to for improvement of the program or as literature for future studies. We need to be ready because technology is already with us and it is here to stay with more revolutions expected. Further, the study is timely because it responds to the emerging trends and challenges arising from DLI program preparations and provides further empirical evidence to MoE regarding which attributes influence DLI in public primary schools. No effective learning can take place when pupils access tablets for a limited period. The pupil to tablet ratio of 1:1 is ideal to enhance instruction and support pupils' learning. This is a tool for each teacher and learner needed to perform their work. The tools are not very useful DLI program when they are placed in the laboratory, library or computer rooms.

## **5.4 Recommendations**

This section contains recommendations based on the research findings and recommendations for further research.

### **5.4.1 Recommendations Based on Teachers' Training Preparedness**

Teacher-related variables affected directly and indirectly on preparations for DLI programme. The pupil who was the consumer of the programme required tutors equipped with digital technology knowledge and pedagogical skills to ensure their input was in conformity of the expected output. Therefore, teachers need a solid base of essential knowledge that can be obtained through adequate training. All teachers should be thoroughly trained or offered frequent in-service courses in addition to the pre-service courses on DLI so that they can become competent in utilizing the digital learning resources in the most effective way possible. The training should involve competencies in both the content and pedagogy, and done through long term professional development programs. Further, MoE should re-design through policy changes the DLI teacher training preparedness through training of serving teachers and teacher trainees who should take an examinable unit in ICT and corresponding pedagogy. Public primary school teachers failed to offer critical services to pupils on online learning during COVID-19 pandemic while the digital learning resources were under lock and key in their respective schools. Teachers should be encouraged embrace digital mode of teaching and learning given its importance by enrolling on short courses.

### **5.4.2 Recommendations Based on Digital Learning Infrastructure**

All public primary schools should have computer laboratories where learners can be going for their digital lessons. Alternatively each learner should have his/her tablet (OCPT) as was initially designed. Malfunctioning tablets should be replaced and power connectivity to the national grid done to all schools. Other areas that require attention

include replacement of broken tablets, dealing with power fluctuations or replacement of lost digital gadgets of which if not addressed can create gaps in teaching and learning process. Tablets should also be increased annually by MoE proportional to the exponential growth of the pupils' enrolment. In addition, development of DLI infrastructure by MoE should put into consideration the construction of more classrooms with desks and of appropriate sizes to ease congestion in some schools and ensure that the learning environment was conducive and appropriate for the adoption of the innovation. Schools should be assisted by MoE to undertake installations, wiring and furniture which limit the range of classroom activities. During COVID-19, parents, teachers and pupils had to adjust to the new teaching and learning methods. Online learning became the main option of accessing education during that period yet the critical learning resources are scanty both in school and at home. The pandemic exposed weakness and challenged MoE on provision of DLI resources to schools and that we are nowhere from close to achieving country's DLI and virtual learning. The runaway corruption that has plagued the education sector must be tamed; leaders must do what they are legally and ethically are supposed to do hence the need for parliament to come up with legislative measures which can be entrenched in the policy.

#### **5.4.3 Recommendations Based on Availability of Technical Support Staff**

Sustaining the adoption of DLI in schools required adequate preparations to provide permanent or reliable technical support staff that will cater for the needs of the end user. That will ensure that continuity of DLI was not diminishing. MoE should provide all schools with technical support staff who will assist learners, teachers, and undertake repairs and maintenance of DLI tools to ensure optimal use of the resources. That should clearly be articulated in the policy document. During COVID-19 pandemic, it was

evident that technical support staff offer critical services and therefore, they should be accessible to schools.

#### **5.4.4 Recommendations Based on Involvement of Parents in DLI**

Parents are key stakeholders who should be involved in planning and preparations of the programme so as to take a notch higher. Parents should be sensitized by MoE through the SCDEs, allowed to critique the policy guideline and at the same time inject their input during scheduled parent-teacher conference. They should participate in preparations of the education reforms so as to own the school and projects through the PTA representation. There should be collaboration, team work, and coordination between MoE, TSC, BOM, KICD, SCDE, head teachers and teachers regarding the magnitude and quality of preparations required in addition to strengthening the management and monitoring structures. That should be coordinated by County Director of education in conjunction with TSC. During COVID-19 pandemic period teachers lost in touch with pupils, parents' were strenuously doing teachers' jobs and with over 90% of the pupils not accessing online content. However, some parents' offered limited assistance to their children at home in areas of academics due to limited knowledge on digital technology and facilities. MoE should encourage parents to acquire knowledge on digital technology just parents did in Israel. That could boost their confidence; hence develop a positive attitude towards education and further show interest in kids school work. We have learnt from COVID-19 pandemic the importance of developing systems like DLI for prosperity. Further, SCDEs should sensitize parents to be involved in scrutinizing government funding in schools, elaborate procurement processes that ensure transparency and accountability, and participate in budgetary allocations that are sufficiently audited as per the policy guidelines.

#### **5.4.5 Recommendation Based on DLI Policy**

Policy guidelines gives direction to best practices, clarify principles and set standards to be met among other policy measures that needs to be put in place to guarantee a quality national and global product. The policy on DLI lacked direction on standards that were to be met before embarking on DLI program. The digital program required adequate preparations by providing digital tools in accordance with set standards that meets the curricula demands. Teachers required DLI specialized training to enable them teaches in challenging environments bearing in mind that public primary schools have unique challenges depending on the locale. MoE needs coordinated and concerted approach from the headquarters to the classroom level. Digital infrastructural tools and servicing are necessary in any school. Therefore, policy guidelines should take note of the fact that digital technology infrastructure requires preparations that are based on foresight, planning, and investment. Parents as key stakeholders in education should be sensitized and knowledgeable on programs before subjecting it to the learners. The policy should therefore fully support parents' involvement in education so as to boost shared responsibility and put into consideration of ordinary households and reduce inequality in education. COVID-19 pandemic should serve as a wakeup call to policy makers so that our forecast on DLI can be shortened, harness our potential, allocate adequate resources to schools as per the policy guidelines, and ensure accountability. Review and harmonize all policy instruments and guidelines relating to resource allocation, and enforcement. MoE should entrench blended learning in the new normal as the future of education after COVID-19 pandemic, review policies on virtual learning and interrogate new ones before implementation. Proactive policies which are not penetrated by politicians who hide behind shadows should be put in place.

#### **5.4.6 Recommendations for Further Research**

The study recommends that research needs to be carried out on:

- a) Impact of implemented digital learning integration programme in teaching and learning process in public primary schools.
- b) Initiatives spearheaded by parents to sponsor integration of digital technology in schools
- c) Whether DLI programmes in schools could succeed without technical support staff
- d) A detailed research to inform stakeholders in education about DLI policy, decision- making structures and application
- e) Examination of computer technology training in pre-service teacher education programs at primary colleges



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## APPENDICES

### Appendix I: Interview Guide for Sub-County Directors of Education Purposively Sampled

Dear Respondent,

The researcher is a student from Kenya Methodist University undertaking a study on analysis of Preparedness for Implementation of Digital Learning Integration in public primary schools in Meru County. Your Sub-County is among those selected for the study. Your honest response to the questions posed to you will be highly appreciated. All your responses and information will be treated with confidentiality and only used for educational purposes of the study. Thank you for your anticipated cooperation.

#### Section A

##### Bio-Data

1. What is your gender?

Male  Female

2. What is your age? 20-30  31-40  41-50  51-60

3. Which of the following educational qualification or degrees do you have?

(a) P1  (b) Diploma  (c) Bachelors Degree   
(d) Masters Degree  (e) others (specify) -----

4. How many years have you been heading the sub-county?

(a) 1-5 years  (b) 6-10 years  (c) 11-20 years   
(d) 21-30 years  (e) over 30 years

5. What levels are receiving tablets in the sub-county?

(a) 1-2  (b) 3-4  (c) 5-6  (d) 7-8

6. What is the average number of teachers per school?

7. How many teachers have been trained on digital learning in this sub-county? .....

**Section B: Interview Guide based on Objectives**

- 8 (a). Explain the strategies the sub-county had laid down to have the teachers trained to prepare them for the digital learning integration before the roll out of the program. -(b). Were all the teachers trained to enable them having adequate knowledge on tablets?.....
- (c ). Were in-service courses on digital learning integration organized by the County Director? Explain.....
- (d) Explain the role you played as the sub-county Director of Education with respect to the in-servicing of teachers.....
- (d) Did the teachers apply the knowledge and skills acquired after being in-serviced?.....
- (e) Did the teachers use the pedagogical skills learnt during training to effectively undertake digital learning integration?.....
- (f) Is teaching and learning taking place with respect to digital learning integration? ...
- 9(a). How did the sub- county Director of Education plan, manage and show leadership in availing the digital learning resources? Explain.....
- (b).Were the resources availed to all schools? Explain.....
- (c ). Do you carry out monitoring and evaluation on the use and the condition of digital learning resources? Explain.....
- (d) Are the learners using the digital learning integration resources as was planned?
- 10 (a). Do you have technical support staff in every school as was planned? Explain.....
- (b).Does the technical staff assists teachers, maintain and repair the digital learning integration tools as was planned? Explain.....
- (c ). Explain whether learning is affected by availability or non-availability of technical support staff. ....
- (d) Explain how the technical support staff was managed from hiring to monitoring and evaluating their work output -----

11(a). Were parents as stakeholders in education sensitized on digital learning integration program? Explain-----

(b). Did you plan that parents give financial support towards the program? Explain----(c

). Did parents as stakeholders approve and support the digital learning integration program? Explain -----

(d) Did you involve the parents in management of digital learning integration from planning, implementation to monitoring and evaluation? Explain -----

12. As the overall supervisor of digital learning integration program planning and execution of the plans in the sub-county, explain the challenges encountered and the gains you have made with respect to:

(a) In-servicing of teachers in Meru County. -----

(b) Provision of resources-----

( c) Availing technical support staff -----

(d)Involving parents-----

13. How do you rate the attitude of teachers towards digital learning integration? Explain

14. Explain national policy on digital learning integration in public primary schools?



## Appendix II: Questionnaire for Head Teachers

Dear Respondent,

The researcher is a student at Kenya Methodist University undertaking a study on analysis of the Preparedness of Implementation of Digital Learning Integration Program in Public Primary Schools in Meru County. Kindly fill your responses as frankly as possible. The data you provide will be treated in confidence. Thank you for your anticipated cooperation.

### Section A

#### Background Information

1. Sub-County-----

2. What is your gender?

Male

Female

3. Age 20-30

31-40

41-50

51-60

4. Which of the following educational qualifications or degrees do you have?

Diploma

Bachelors Degree

Masters Degree

Other (specify) -----

5. How many years have you been teaching?

1-5 years

6-10 years

20-30 years

Over 30 years

6. What levels are you currently teaching?

Class 1-4

Class 5-8

7. How many lessons do you teach per week? -----

8. What is the average number of students per class?

Less than 30  31-40  41-50

Over 50

9. What is the location of your school?

Rural  Urban

10. How many teachers in this school have been trained on digital learning?

-----

11. Have you attended any refresher courses in computer studies?

Yes

No

If the answer is no, give a reason -----

## Section B

### Teachers' Preparedness on DLI

This part of section "B" is about the training of teachers as part of preparations for digital learning integration program. Please tick against each statement and the corresponding appropriate response among the possible responses; "Strongly agree (SA)"; "Agree (A)"; "Disagree (D)"; "Strongly disagree (SD).", "Neutral (N)"

Statements	SA	A	N	D	SD
	5	4	3	2	1
12. I acquired adequate knowledge and skills on how to use Tablets/Laptop during in-service training before the roll out of the digital learning integration program					
13. I acquired adequate teaching skills (pedagogy) on digital learning integration before the roll out of the program					
14. Through collaboration between MoE and head teachers in-service course on digital learning integration was well managed and effective					
15. Teachers have had adequate training on digital learning integration pedagogy skills					
16. Through training teachers can now find digital learning integration additional teaching material on the internet for classroom use					
17. The ministry in-serviced all teachers as part of preparations for digital learning integration					
18. Teachers were involved in vigorous practical sessions and simulations during training hence they were confident					
19. The planning and management by both MoE and head teachers was effective and enabled all teachers to be in-serviced					
20. Teachers effectively implemented digital learning integration in the classroom successfully because they were well prepared					

### Section C:

#### Availability of Resources

This section is dealing with the availability of digital learning integration resources.

Please choose the most appropriate response for each of the statements indicated on the statement column.

Statements	SA	A	N	D	SD
	5	4	3	2	1
21. The school had adequate digital leaning integration resources before the roll out of the program					
22. The school management had ensured that each child had a Tablet before the roll out of the program					
23. Head teachers were each provided with a laptop by MoE					
24. Each teacher was provided with a laptop/Tablet by MoE before the roll out of the program					
25. All the Tablets are in good working condition					
26. The school management successfully planned and implemented digital learning integration program by providing all the required resources					
27. The school has a storage facility for keeping the tablets					
28. Digital learning integration teaching and learning is going on uninterrupted because they have all the resources					
29. The school was connected to electricity mains or solar powered panels					

## Section D

### Availability of Technical Support Staff

This section is dealing with Technical Experts who assist the teachers in preparations, maintenance of the digital learning tools and the general repairs. Read each statement and tick against the corresponding response accordingly.

Statements	SA	A	N	D	SD
	5	4	3	2	1
30. The government has employed technical experts to assist teachers on maintenance and repairs of digital learning tools					
31. The head teachers were mandated by MoE to contract technical support staff when need arises					
32. The school management employed a computer laboratory technician to undertake maintenance and repairs					
33. Arrangements are made by the school management to have digital tools repaired outside the school					
34. The technicians are very helpful to teachers in assisting them wherever they are stuck hence smooth learning					
35. The technicians maintains the digital learning tools very well and ensures that learning is not interrupted					
36. The technicians respond immediately whenever they are called upon to repair or maintain the digital tools					
37. The school is unable to effect digital learning integration due to insufficient technical support					

38. The management had modalities on how to engage technical support staff in schools					
39. Digital learning integration teaching and learning are taking place effectively because technical support staff was available					

### Section E:

#### Parent Involvement in DLI

This section is dealing with involvement of parents in digital learning integration program preparations before the program was rolled out. Read the statements on the statement column and choose your appropriate response accordingly.

Statements	SA 5	A 4	N 3	D 2	SD 1
40. The school management engaged parents as key stakeholders in planning for financial support on digital learning integration program					
41. Parents bought tablets for their children to make digital learning integration successful					
42. Through management of the school parents constructed computer labs and classrooms through fund raising to ensure digital learning integration was successful					
43. Parents were informed of the digital learning integration program in the school's parents' meetings					
44. The school management held change management meetings with parents before the roll out of the project					
45. Parents appreciated the initiative to introduce digital learning integration and planned for the security of the resources					

## Section F

### Digital Learning Integration in the Classroom

This section is about digital learning integration in the classroom. The statements on the item column are descriptions of integration in teaching and learning process in the classroom. Choose the appropriate statement against the responses “strongly agree (SA)”, “Agree (A)”, “Disagree (D)”, “Strongly Disagree (SD)”, “and “Neutral (N)”.

Items	SA	A	N	D	SD
	5	4	3	2	1
64. Teachers’ effectiveness in the classroom increased after digital learning integration training					
65. Teachers effectively used digital learning integration tools after training in teaching and learning					
66. The classroom application of Tablets and other resources is good					
67. Teachers and pupils are assisted by technical support staff and that the tools are well maintained					
68. Parents supports digital learning integration program					

## Section G:

### Open-ended Questions as per Objectives

This section contains open-ended questions covering the four objectives.

69. How do you rate teacher preparedness for digital learning integration before the roll out with respect to: (a) acquisition of computer skills? -----

(b) Acquisition of pedagogical skills? -----

70. With respect to in-servicing of teachers, explain what was not done and what needs to be done to enable improvement of digital learning integration program -----
71. Was the in-servicing of teachers on digital learning integration program well managed? Explain -----
72. Explain whether the actual teaching and learning of digital learning integration took place in your school, challenges and the positive aspects -----
73. Were digital learning resources procured, brought in good time and tested before the roll out of the program? Explain -----
74. Do learners use the digital learning integration resources in the classroom? Explain the challenges and positive aspects -----
75. Briefly explain how the school leadership organized to have technical support staff in place before digital learning integration roll out. -----
76. Explain your management of the resources from procurement to the classroom use, the challenges and areas that require improvement -----
77. Did parents give any financial support in digital learning integration program preparations? Explain -----
78. Explain how parents were sensitized on digital learning integration program -----
79. Explain ways in which parents support digital learning integration program in your school---
80. Did you have management challenges on digital learning integration planning and setting up all that was required before the roll out? Explain-----
81. Does the school have technical support staff? Explain-----
82. Does the technical support staff assist teachers, maintain and repair malfunctioning digital learning integration resources? Explain-----



83. Explain whether digital learning integration was effected in the classroom with the help of technical support staff and the challenges if any-----
84. Explain how you manage the technical support staff from employment/engagement, to their performance and remuneration-----
85. Explain teachers' attitude towards digital learning integration program -----
86. Explain what the ministry/government policy says about digital learning integration in public primary schools -----

### Appendix III: Questionnaire for Teachers

Dear Respondent,

The researcher is a student at Kenya Methodist University carrying out a study analysis of the preparedness for implementation of the digital learning integration in public primary schools in Meru County. Kindly fill in your responses as frankly as possible to make this study a success. The data you provide will be treated in confidence. Thank you for your anticipated cooperation.

#### Section A

#### Background Information

1. Sub-County-----

2. What is your gender?

Male

Female

3. Age 20-30

31-40

41-50

51-60

4. Which of the following educational qualifications or degrees do you have?

Diploma

Bachelors Degree

Masters Degree

Other (specify) -----

5. How many years have you been teaching?

1-5 years

6-10 years

20-30 years

Over 30 years

6. What levels are you currently teaching?

Class 1-4

Class 5-8

7. How many lessons do you teach per week? -----

8. What is the average number of students per class?

Less than 30

31-40

41-50

Over 50

9. What is the location of your school?

Rural

Urban

10. Have you been trained on digital learning integration?

(a) Yes

(b) No

If the answer is no, give a reason-----

11. Have you attended any refresher courses in computer studies?

Yes

No

If the answer is no, give a reason -----

## Section B

### Teacher Preparedness on Digital Learning Integration

This section is about the preparations which were undertaken to equip teachers with knowledge and skills that would enable them implement digital learning integration in the classroom. The section aims at finding out your opinions about the statements listed below.

Please read the following statements that best describe your digital technology competence against; “Strongly Agree (SA)”, Agree (A), Disagree (D), Strongly Disagree (SD) or Neutral (N) on the corresponding box.

Digital Technology Training	SA	A	N	D	SD
	5	4	3	2	1
12. I attended a seminar or workshop on digital technology before the roll out of the program					
13. The school management organized and ensured that all teachers were trained on digital learning integration before the roll out of the program					
14. Training of teachers was organized by MoE before the roll out of digital learning integration program					
15. The in-service training was well managed and we did a lot of practical work during training sessions on digital learning integration					
16. We were satisfied and confident on the kind of training we underwent before the roll out of the program					
17. Through training I was able to effectively teach using Tablets and other digital learning integration tools					

## Section C

### Availability of Digital Learning Resources

This section is about instructional tools and materials that are needed to facilitate digital learning integration into classroom practice. Select one statement on the item column that best suits you against one of the agreement statements: Strongly agree (SA); agree (A); disagree (D); strongly disagree (SD), Neutral (N).

Items	SA	A	N	D	SD
	5	4	3	2	1
18. Tablets and other digital learning integration tools are available and enough for each learner					
19. Tablets and other digital learning integration tools are in good condition					
20. MoE and school management organized for the provision of digital learning integration resources					
21. Teachers were supplied with laptops each before the roll out of the program					
22. Pupils have improved greatly academically because of using Tablets and other digital learning integration tools					
23. Reference materials such as journals, text books for use in digital learning integration lessons were supplied					
24. Each child has his/ her desk where he/she places the tablets during lessons					
25. We have a radio Cassette Recorder for use in the classroom					

26. We have solar powered connection in case electricity supply in school is interrupted					
27. The school constructed a store to be used for safe custodian of the tablets					
28. The school management constructed a laboratory where digital learning lessons will be undertaken					
29. The school management had put measures in place that would ensure any malfunctioning tablet will be replaced immediately					

### Section D

#### Digital Learning Technical Support

This section is about technical staff availability and their effectiveness. Indicate the appropriate response about technical support in your school against the responses “strongly agree (SA)”; “agree (A)”; “disagree (D)”; “strongly disagree (SD)”, “Neutral (N)” by ticking in the appropriate box.

Statement on the availability of digital learning resources	SA	A	N	D	SD
	5	4	3	2	1
30. MoE employed technical support staff in our schools before the roll out of the program					
31. The management contracted technical support staff because it is not easy to integrate digital learning without their assistance					
32. The school management employed technical support staff to be assisting us where possible in teaching using digital technology					

33. The MoE contracted technical support staff to assist teachers before the roll out of the program					
34. Without technical support staff learners' use of Tablets and other digital learning integration tools in the classroom was not possible					
35. School's own staff who are more knowledgeable maintains and repairs computers since there is no technician					
36. The school organizes for repairs, maintenance, and teacher's assistance when need arises					
37. Ministry of education has made arrangements on how schools can access technical support staff					
38. The school shares technical staff with the neighboring schools					
39. There were technical support staff provided					

## Section E

### Involvement of Parents in DLI

This section is about involvement of parents in planning and execution of the plans in preparation for digital learning integration program. Please tick in the appropriate box.

Level of involvement	SA	A	N	D	SD
	5	4	3	2	1
40. Parents were involved on the preparations for digital learning program before integration					
41. Parents were sensitized about the digital learning program before the roll out					

42. Parents constructed the computer laboratory before the roll out of the program					
43. Parents made arrangements for the security of digital learning integration gadgets					
44. Parents supported the digital learning integration program					
45. The school management and MoE do the monitoring of digital learning integration program					



## Section F

### Digital Learning Integration in the Classroom

This section is about digital learning integration in the classroom. The statements on the item column are descriptions of integration in teaching and learning process in the classroom. Choose the appropriate statement against the responses “Strongly Agree (SA)”, “Agree (A)”, “Disagree (D)”, “Strongly Disagree SD)”, “Neutral (N)”.

Items	SA	A	N	D	SD
	5	4	3	2	1
46. Teachers’ effectiveness in the classroom increased after digital learning integration training					
47. Teachers effectively used digital learning integration tools after training in teaching and learning					
48. The classroom application of Tablets and other resources is good					
49. Teachers and pupils are assisted by technical support staff and that the tools are well maintained					
50. Parents supports digital learning integration program					

## Section G

### Open-Ended Questions as per Objectives

51. Explain whether you did or did not attend any training to acquire both digital technology skills and pedagogical skills before the roll out of the program-----

52. Was the training on digital learning integration successful or not? Explain -----

53. Comment briefly on how the training program was managed-----

54. Did you apply the learnt knowledge and skills on digital learning integration in the classroom? Explain -----
55. What were the challenges of training teachers on digital learning integration? -----
56. How can the training be improved in future? -----57.
- Was digital learning integration Tablets and other resources availed in good time before the program was rolled out? Explain -----
58. Did you confirm the workability of the digital learning integration Tablets and other resources before introducing them to learners? Explain -----
59. Explain how the digital learning integration resources were managed -----60.
- Are the learners using Tablets and other digital learning integration resources in the classroom? Explain -----
61. Explain the resource challenges that prevent you from using Tablets and other digital learning integration resources in teaching and learning -----
62. What do you think should be done to ensure that all the digital learning integration resources were provided, adequate and in good working condition? -----
63. Is the technical support staff available in the school? Explain -----
64. Does the technical support staff assist teachers, maintain and repair Tablets and other digital learning integration resources? Explain -----
65. Explain the role of the school leadership on the management of technical support staff -----
66. With the help of technical support staff on digital learning integration, explain whether teaching and learning was effective? -----
67. Explain the challenges encountered on the use of technical support staff in the school -----
68. Explain how the challenge can be addressed -----

69. Explain parents' involvement in digital learning integration program before and after the program was rolled out-----

70. Explain briefly how parents were sensitized about the digital program -----

71. Explain how the school management involved parents on the digital program -----

72. Explain how PTA supports digital learning integration program-----

73. Explain the challenges that hinder parents from being involved in digital learning integration program -----74.

How can such challenges in (68) above be addressed? -----75.

Giving reasons comment on your attitude towards digital learning integration -----

-----

76. Comment on the government policy on digital learning integration -----

-----

## Appendix IV: Questionnaire for PTA

Dear Respondent,

The researcher is a student at Kenya Methodist University undertaking a study on analysis of the preparedness of implementation of the digital learning integration in public primary schools in Meru County. You are one of the parents selected for the study. Your honest response to this questionnaire will be of great help. You are not required to write your name on this questionnaire. The data you provide will be treated as confidential and will be used only for the intended purpose. Thank you for your anticipated cooperation.

### Section A

#### Bio-Data

1. What is your gender?

Male

Female

2. What is the highest level you have attained in education?

(a) Below class 7  (b) Class 8  (c) Form 4

(d) Form 6  (e) College  (f) University

## Section B

### Teachers' Preparedness in DLI

This section is about teacher preparedness on digital learning integration in public primary schools in Meru County. Read each statement at a time and choose the corresponding appropriate response among the choices; “Strongly agree (SA)”; “Agree (A)”; “Disagree (D)”; “Strongly Disagree (SD)”, “Neutral (N)”

Statements	SA	A	N	D	SD
	5	4	3	2	1
3. Teachers were trained on how to teach (pedagogy) using Tablets and other digital learning integration tools before the roll out of the program					
4. Teachers were trained on how to use Tablets and other digital learning integration resources before the program started					
5. Parents sponsored for the training of teachers on digital learning integration program					
6. All teachers were trained before the roll out of the digital learning integration program					
7. MoE was involved in planning and ensuring that teachers were trained before the program started					
8. School management organized for the training of teachers to equip them with digital learning integration knowledge and skills					
9. Teachers were effectively using Tablets and other digital resources in the classroom because they were trained on digital learning integration					

## Section C

### Digital Learning Infrastructure

This section is about the planning and acquisition of digital learning integration resources that were available before the program was rolled out. Read each of the statements on the statement column and tick against your response among the choices “Strongly agree (SA)”; “Agree (A)”; “Disagree (D)”; “Strongly Disagree (SD)”, “Neutral (N)”.

Statements	SA	A	N	D	SD
	5	4	3	2	1
10. Parents were involved in the construction of computer laboratory for digital learning integration					
11. Parents were involved in planning and procurement of digital learning resources before the roll out of the program					
12. Parents constructed a store where Laptops/Tablets were to be stored					
13. Parents were appreciating the use of Tablets by their children in the classroom					
14. Parents were involved in the management of the digital learning integration program					
15. Parents ensured that all digital learning integration resources were available before the roll out of the program					
16. The management involved parents on how they shall be replacing, maintaining and repairing the damaged digital learning tools					
17. Tablets will not spoil our children. We were taken through the					

software by the school management					
-----------------------------------	--	--	--	--	--

### Section D

#### Availability of Technical Support

This section is about the planning and provision of Technical Support to help teachers and schools wherever they have technical issues with the computers and maintenance of the same. Please read the statements on the item column and tick against your response from the following options: “Strongly Agree (SA)”; “Agree (A)”; “Disagree (D)”; “Strongly Disagree (SD)”, “Neutral (N)”

Items	SA	A	N	D	SD
	5	4	3	2	1
18. Parents were involved by the management in planning and hiring of technical support staff before digital learning integration program started					
19. The government employed permanent technical support staff in the school without involving parents					
20. The schools management was allowed by MoE to hire technical support staff when need arises					
21. The MoE hires technical support staff when need arises					
22. We agreed with the school management before the roll out of the program that repairs and maintenance are done by more knowledgeable teachers					
23. The management of digital learning integration program was made easy when having technical support staff in school					
24. Pupils were effectively learning using Tablets and other					

digital technology tools since the school has technical support staff					
---	--	--	--	--	--

**Section E**

**Parents Involvement in DLI**

This section is about involvement of parents in digital learning integration in public primary schools in Meru County. Read each statement at a time and choose the corresponding appropriate response among the choices; “Strongly agree (SA)”; “Agree (A)”; “Disagree (D)”; “Strongly Disagree (SD)”.

Statement	SA	A	D	SD
25. Parents financed the construction of computer laboratory				
26. Parents were sensitized on digital learning integration program before the roll out				
27. The school management collaborates with the parents on digital learning integration program				
28. Parents wholly support digital learning integration program				
29. Parents appreciate the free Tablets from the government				

**Section F**

**Digital Learning Integration in the Classroom**

This section is about digital learning integration in the classroom. The statements on the item column are descriptions of integration in teaching and learning process in the classroom. Choose the appropriate statement against the responses “strongly agree (SA)”, “agree (A)”, “disagree (D)”, “strongly disagree (SD)”, “neutral (N)”.



Items	SA	A	N	D	SD
	5	4	3	2	1
30. Teachers use laptops/computer as a tool for demonstration working with power point presentation in the classroom					
31. Teachers use software from KICD in their subject area					
32. Teachers use VCD or CD Rom for educational purpose as per KICD guidelines					
33. Teachers assist pupils on how to use their tablets					
34. Teachers assist pupils to search for games in their tablets in the classroom					
35. Teachers show pupils how to do assignments using tablets					
36. Pupils appreciate the use of tablets in the classroom in teaching and learning process					
37. Teachers appreciate the use of tablets because they help them to manage time better					

### Section G

#### Open-ended Questions as per Objectives

38. What was the level of involvement as a parent on the training of teachers by the school management before the roll out of the digital integration program? -----

39. Were teachers trained to equip them with adequate computer skills to enable them use basic computer technology? Explain-----

40. Were teachers trained on teaching methods using Tablets and other digital technology tools? Explain -----

41. Do teachers attend short targeted courses regularly to update their computer skills and knowledge? Explain -----
42. Were teachers teaching using Tablets and other digital technology tools? Explain -
43. Explain how the school management involved you as a parent in planning, procurement, and receiving of digital learning resources-----44.
- Were digital learning integration resources such as Tablets and others available and adequate? Explain -----
45. Were the digital learning integration resources in good working condition? Explain --  
-----
46. Were the learners using Tablets and other digital learning resources? Explain -----
47. Explain how the school management involved you as a parent in planning and hiring of technical support staff before the roll out of digital learning integration program-----  
-----
48. Does the school have technical support staff? Explain -----
49. Was technical support staff assisting teachers, maintaining and repairing the digital learning integration tools? Explain -----
50. With the help of technical support staff, were the learners using Tablets and other digital learning integration tools in the classroom? Explain -----
51. Have parents contributed financially towards digital learning integration program? Explain -
52. Were parents sensitized on digital learning integration program before it was rolled out? Explain -----
53. The school management involved parents in all areas dealing with digital learning integration program to make a success. Explain -----
54. Were parents supporting the digital learning integration program? Explain ---

55. Were parents enrolling in computer classes so as to be able to help their children do assignments? Explain -----

56. Comment on the attitude of teachers towards digital learning integration program -

57. Comment on the national policy on digital learning integration program in schools. -

-----

## Appendix V: Resources Observational Schedule

1. Items	Available- Yes/No	Quantity	Condition- Good/Bad
2. Lap tops			
3. Tablets			
4. Desktops			
5. LCD Projector			
6. Reference books			
7. Class textbooks			
8. Computer laboratory			
9. Computer class			
10. ICT trained teachers			
11. Laboratory technician			
12. Store			
13. Electricity			
14. Internet			
15. Braille embosser			
16. Classroom set up			
17. Printer			
18. White board			

## Appendix VI: Focus Group Discussion

Dear Respondent,

The researcher is a student at Kenya Methodist University undertaking a study on analysis of the preparedness of implementation of the digital learning integration in public primary schools in Meru County. You are one of the parents selected for the study. Your honest response to this questionnaire will be of great help. You are not required to write your name on this questionnaire. The data you provide will be treated as confidential and will be used only for the intended purpose. Thank you for your anticipated cooperation.

### Section A

#### Pupils Demographic Data

##### 1. Demographic data of pupils

School	Class	Age	Number of students

##### 2. Questions on teachers' preparedness

- a. Do your teachers attend in-service courses on DLI regularly?
- b. Did your teachers attend the training on digital learning integration?
- c. Were teachers able to apply what they learnt during DLI training and using Tablets and other digital tools?

##### 3. Questions on digital learning resources

- a. Are Tablets and other digital learning resources adequate?

- b. Are the tablets in good working condition?
- c. Do MoE officials come to check on how you are learning using digital technology?
- d. Do you use tablets and other digital learning tools every lesson and on every subject?

4. Questions on availability of technical support staff

- a. Do you have technical support staff available in your school?
- b. Is TSS under the management of MoE?
- c. Does the school have TSS or staff member assisting teachers when using Tablets, maintaining or repairing tablets and other gadgets?
- d. With the help of TSS are you able to carry on with learning using tablets and other digital tools effectively?

5. Questions on parents' involvement in DLI program

- a. Are parents asked to support DLI program financially?
- b. Were parents sensitized on DLI program by MoE?
- c. Are parents involved in the management of digital learning integration program?
- d. Do parents appreciate and support the innovation?

**Thank you**

**Appendix VII: Informed Consent Cover Letter**

Informed Consent Cover Letter, June XYZ, 2018

Dear-----

I am conducting a study entitled, “Analysis of the Preparedness for Implementation of digital Learning Integration in Public Primary Schools in Meru County. Kenya”. The purpose of the study is to analyze the preparations which were undertaken with respect to: teacher preparedness, provision of resources, provision of technical support staff and involvement of stakeholders before the roll out of digital learning integration program. You are invited to participate in this research study. You are eligible since you are knowledgeable about digital learning integration. The research tools are divided into sections where interviews will take about 20 minutes, closed-ended questionnaires about 15 minutes, open-ended questions about 15 minutes and focus group discussions about 1 hour.

Participation in this study is completely voluntary and there are no known risks in participating. Your responses will be kept confidential. Data collected from this study may be published in journal or book or shared at academic forums without revealing your identity. Coding will be done to conceal your name and the name of your school. You are free to participate or not to participate. You are welcome to share your experiences with other stakeholders in education. If you agree to participate in this study, please sign one copy of the informed consent form. For any question or any additional information please feel free to ask. Thank you in advance.

Yours faithfully,

David Kaaria Kiugu (PhD Candidate)

Kenya Methodist University

Cell phone number: 0721288147, Email address: kiugu.david@yahoo.com

**Appendix VIII: Informed Consent Form**

**VOLUNTARY CONSENT FORM**

I have read and understood the information on the form and I consent to volunteer to be a participant in this study. I understand that my responses are absolutely confidential and that I have the right to withdraw at any time. I have received an unsigned copy of this informed Consent Form to sign.

Name-----

Signature-----

Date-----

Phone number-----

Best days and times to reach you-----

Address/school/sub-county-----

I certify that I have explained to the above individual the nature and purpose, the potential benefits, and potential risks associated with participating in this study and have responded to questions that have been raised.

Thank you for your permission to audiotape the interviews and participate in this research project.

Date-----Researcher's signature.



**Appendix IX: List of Public Primary Schools in the Sample, Number of Tablets, Teachers and Learners in Grades 1, 2, 3 (2018) per Sub-county**

Sub-county	Serial	School	Teachers	Tablets	G1	G2	G3
A	01	Kinyenjere	10	35	38	39	34
A	02	Mucheene	10	26	31	30	26
A	03	Mburugiti	18	44	49	47	43
A	04	Subuiga	11	37	42	39	37
B	05	Murugi	09	00	37	35	36
B	06	Muthangene	09	00	42	38	40
B	07	Gankondi	14	68	69	60	67
B	08	Mpuri	08	45	47	45	42
B	09	Karugua	08	36	40	39	36
B	10	Makundune	08	35	38	34	31
C	11	Kaaga (Pilot)	14	63	72	70	66
C	12	Kinoru	13	60	66	64	61
C	13	Meru Muslim	07	32	41	43	34
C	14	Kirogine	08	37	50	51	37
C	15	Karirwara	05	00	32	30	32
C	16	Mulathankari	09	35	38	39	35
D	17	Kigane (Pilot)	16	54	59	57	54
D	18	Kathera	09	42	47	45	43
D	19	Mikumbune	14	56	54	50	55
D	20	Nkubu	17	60	63	62	65
D	21	Marimba	11	37	36	39	37
E	22	Churuu*	14	50	58	55	54
E	23	Karirui*	09	50	55	51	50
E	24	K.K. Muuti	09	60	66	63	57
E	25	Matirine	15	90	94	102	70
E	26	Dubai*	09	46	54	52	47
E	27	Kiutine*	09	49	60	57	48
E	28	Mutuati*	08	54	59	52	54
F	29	Kibiraku	09	51	50	55	48
F	30	Liruma	09	47	49	47	46
F	31	Muriru	18	50	45	47	46
F	32	Kiegoi	16	53	54	50	53
F	33	Itumi	9	49	48	52	49
F	34	Antubociu	10	42	40	46	42
F	35	Kathiali	11	46	48	45	46
G	36	Ruuma	15	76	79	75	76
G	37	Maburua	17	93	94	92	93

G	38	Mwera O Maria	09	38	40	38	37
G	39	Lairumba	16	88	91	90	92
G	40	Ruuma**	18	91	95	93	91
H	41	ACK REI*	09	45	48	47	44
H	42	Mumui*	16	95	101	94	95
H	43	Lairaugi*	12	49	105	99	98
H	44	Thau*	16	65	82	80	83
H	45	Muramba*	17	65	82	80	83

Note: \* No electricity, \*\* No network

## Appendix X: Authorization Letter from Kenya Methodist University



### KENYA METHODIST UNIVERSITY

P. O. Box 267 Meru - 60200, Kenya  
Tel: 254-064-30301/31229/30367/31171

Fax: 254-64-30162  
Email: info@kemu.ac.ke

Our ref: NAC/PHD/7/2018/2

17<sup>th</sup> July 2018

Commission Secretary,  
National Commission for Science, Technology and Innovations,  
P.O. Box 30623-00100,  
**NAIROBI.**

Dear Sir/ Madam,

**RE: DAVID KAARIA KIUGU (EDU-4-0090-1/2015)**

This is to confirm that the above named is a bona fide student of Kenya Methodist University, undertaking Ph.D. in Leadership and Education Management. He is conducting a research titled "Analysis of the Preparedness for Implementation of Digital Learning Integration in Public Primary Schools in Meru County."

We confirm that his thesis proposal has been defended and approved by the university.

In this regard, we are requesting your office to issue a permit to enable him collect data for his Ph.D. dissertation.

Any assistance accorded to him will be appreciated.

Yours faithfully,

17 JUL 2018

**DR. JOHN MUCHIRI, PhD:**  
**DIRECTOR POSTGRADUATE STUDIES**

Encl. .

## Appendix XI: Research Authorization from National Commission for Science, Technology and Innovation



### NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: +254-20-2213471,  
2241349, 3310571, 2219420  
Fax: +254-20-318245, 318249  
Email: dg@nacosti.go.ke  
Website: www.nacosti.go.ke  
When replying please quote

NACOSTI, Upper Kabete  
Off Waiyaki Way  
P.O. Box 30623-00100  
NAIROBI-KENYA

Ref. No: **NACOSTI/P/18/6430/24242**

Date: **7<sup>th</sup> August, 2018**

David Kaaria Kiugu  
Kenya Methodist University  
P.O. Box 267 – 60200  
MERU

#### RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on “*Analysis of the preparedness for implementation of digital learning integration in public primary schools in Meru County*” I am pleased to inform you that you have been authorized to undertake research in **Meru County** for the period ending **6<sup>th</sup> August, 2019**.

You are advised to report to **the County Commissioner and the County Director of Education, Meru County** before embarking on the research project.

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit a **copy** of the final research report to the Commission within **one year** of completion. The soft copy of the same should be submitted through the Online Research Information System.

  
**DR. STEPHEN K. KIBIRU, PhD.**  
**FOR: DIRECTOR-GENERAL/CEO**

Copy to:

The County Commissioner  
Meru County.

The County Director of Education  
Meru County.

## Appendix XII: Research Authorization from County Director of Education

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REPUBLIC OF KENYA  
MINISTRY OF EDUCATION  
*State Department of Early Learning and Basic Education*

Telegrams: " ELIMU " Meru  
EMAIL: [cdemerucounty@gmail.com](mailto:cdemerucounty@gmail.com)  
When Replying please quote

County Director Of Education  
Meru County  
P.O. Box 61  
MERU

Ref: MRU/C/EDU/111/1/207

30<sup>th</sup> August, 2018

TO WHOM IT MAY CONCERN

**RE: RESEARCH AUTHORIZATON – DAVID KAARIA KIUGU**

Reference is made to letters Ref: NACOSTI/P/18/6430/24242 dated 7<sup>th</sup> August, 2018,

Authority is hereby granted to **David Kaaria Kiugu** to carry out research on "*Analysis of the preparedness for implementation of digital learning integration in public primary schools in Meru County*", for the period ending 6<sup>th</sup> August, 2019.

Kindly accord him the necessary assistance.

A handwritten signature in black ink, appearing to be 'Nkonge J. E.'.

Nkonge J. E.  
For: County Director of Education  
MERU

**Appendix XIII: Research Permit Certificate**

**THIS IS TO CERTIFY THAT:  
MR. DAVID KAARIA KIUGU  
of KENYA METHODIST UNIVERSITY,  
1314-60200 MERU, has been permitted  
to conduct research in Meru County**

**Permit No : NACOSTI/P/18/6430/24242  
Date Of Issue : 7th August,2018  
Fee Received :Ksh 2000**

**on the topic: ANALYSIS OF THE  
PREPAREDNESS FOR IMPLEMENTATION  
OF DIGITAL LEARNING INTEGRATION IN  
PUBLIC PRIMARY SCHOOLS IN MERU  
COUNTY.**



**for the period ending:  
6th August,2019**

  
.....  
**Applicant's  
Signature**

  
.....  
**Director General  
National Commission for Science,  
Technology & Innovation**

## Appendix XIV: Operationalization of Variables

**Table 3.3**  
*Operationalization of Variables*

<b>Research objectives</b>	<b>Independent Variable indicators</b>	<b>Dependent Variable indicators</b>	<b>Level of measurement</b>	<b>Approach analysis</b>
i) To analyze teachers' preparedness' for DLI programme in public primary schools in Meru County	<ul style="list-style-type: none"> <li>- Training of teachers</li> <li>- In-service courses</li> <li>- Management of entire training process</li> <li>- Classroom application of skills</li> </ul>	<ul style="list-style-type: none"> <li>- Actual pupils teaching and learning using the acquired skills (implementation)</li> <li>- Well managed training</li> <li>- Effective in-service courses</li> </ul>	Ordinal	Quantitative/ Qualitative
ii) To examine the preparedness of DLI infrastructure in public primary schools in Meru County	<ul style="list-style-type: none"> <li>- Resources available</li> <li>- Infrastructure and internet</li> <li>- Management of resources and infrastructure</li> <li>- Learners access to digital learning</li> </ul>	<ul style="list-style-type: none"> <li>- Learning while accessing tablets and other tools</li> <li>- Internet and electricity available</li> <li>- Tablets in good</li> </ul>	Ordinal	Quantitative/ Qualitative

	integration tools	working condition and ratio of tablet to pupil		
		- Management of entire process of acquisition of tools		
iii) To analyze effectiveness of technical support staff in public primary schools in Meru County	<ul style="list-style-type: none"> <li>- Technical support team available</li> <li>- Repairs and maintenance</li> <li>- Management of structures such as maintenance, repairs and assisting teachers</li> <li>- Pupils learning</li> </ul>	<ul style="list-style-type: none"> <li>- Technicians assisting teachers during implementation</li> <li>- Pupils enjoying uninterrupted learning</li> <li>- Well managed maintenance, assisting teachers and repairs structures</li> <li>- Technical support staff work</li> </ul>	Ordinal	Quantitative/ Qualitative



			significant		
iv) To examine the extent of involvement of parents in preparations for DLI programme in public primary schools in Meru County	<ul style="list-style-type: none"> <li>- Construction of classrooms/ laboratories through contributions from parents</li> <li>- Sensitization of stakeholders</li> <li>- Appreciate and support teaching and learning</li> <li>- Leadership and management of stakeholders involvement</li> </ul>	<ul style="list-style-type: none"> <li>- Learners appreciate support from parents</li> <li>- Built classrooms, stores and laboratories</li> <li>- Appreciation of quality of teaching and learning output</li> <li>- Parents support the programme</li> </ul>		Ordinal	Quantitative/ Qualitative

---

## Appendix XV: Responses of Teachers' and Head teachers on DLI Training

**Table 4.31**

***Responses of Teachers' and Head teachers on DLI Training***

Statement	Strongly agree (%)	Agree A B (%)	Combined (A+B) (%)	Neutral C (%)	Disagree D (%)	Strongly Disagree E (%)	Combine d (D+E)%
Respondents attended Digital training	101(20%)	46(10%)	147(30%)	8(2%)	100(20%)	241(49%)	341(69%)
Respondents were satisfied on digital training	30(6%)	26(5%)	56(11%)	19(4%)	95(19%)	326(66%)	421(85%)
Respondents were effective after DLI training	50(10%)	45(9%)	95(19)	6(1%)	101(20%)	294(60%)	395(80%)
Head Teachers N=45							
Head teachers acquired adequate knowledge and skills	5(11%)	6(13%)	11(24%)	4(9%)	10(22%)	20(45%)	30(67%)
Head teachers acquired teaching skills on DLI	7(15%)	5(13%)	12(28%)	3(7%)	8(18%)	22(49%)	30(67%)
Digital training was adequate and effective	7(15%)	3(7%)	10(22%)	2(4%)	15(33%)	18(40%)	33(73%)
Teachers did vigorous practical work during training	3(7%)	2(4%)	5(11%)	2(4%)	10(22%)	28(62%)	38(84%)

**Appendix VI: Teachers' application of learnt Knowledge and Skills in the Classroom**

**Table 4.32**

*Teachers' application of learnt Knowledge and Skills in the Classroom*

Statement (Head Teachers Response N = 45)	Strong ly Agree A(%)	Agree B(%)	Combi ned (A+B) %	Neutal C (%)	Disagre e D (%)	Strong ly Disagr ee E (%)	Combi ned (D+E) %
Teachers effectiveness after training increased	6 (13%)	9 (20%)	15 (33%)	0 (0%)	18 (40%)	12 (27%)	30 (67%)
Teachers' effectively used digital learning tools after training	8 (18%)	6 (13%)	14 (31%)	0 (0%)	20 (44%)	11 (24%)	31 (69%)
DLI tools application in class is good	13 (29%)	8 (18%)	21 (47%)	0 (0%)	19 (42%)	5 (11%)	24 (53%)
Teachers' Response on DLI Application (N = 496)							
Teachers' became effective after digital training	59 (12%)	50 (10%)	109 (22%)	58 (12%)	220 (44%)	109 (22%)	329 (66%)
Teachers can operate digital tools efficiently	92 (19%)	48 (10%)	160 (32%)	12 (2%)	212 (43%)	112 (23%)	324 (65%)
Digital tools application in class is good	60 (12%)	100 (20%)	160 (32%)	4 (1%)	301 (61%)	31 (6%)	332 (67%)

DLI in class was	82	61	143	25	294	34	3
done after training	(17%)	(12%)	(29%)	(5%)	(59%)	(7%)	(66%)2
							8

---

**Appendix VII: Head Teachers' and Teachers' Responses on the Adequacy of Digital Learning Resources**

**Table 4.33**

***Head Teachers' and Teachers' Responses on the Adequacy of Digital Learning Resources***

Statement	Strongly agree A (%)	Agree B (%)	Combi ned (A+B) %	Neutr al C (%)	Disagr ee D (%)	Strong ly disagr ee E (%)	Combi ned (D+E) %
(Head teachers N = 45)							
The school had adequate digital learning resources	3 (7%)	2 (4%)	5 (11%)	0 (0%)	5 (12%)	35 (78%)	40 (89%)
PTA ensured each pupil had a tablet	5 (12%)	2 (4%)	7 (16%)	0 (0%)	9 (20%)	29 (64%)	38 (84%)
MoE provided head teachers with laptops	3 (7%)	3 (7%)	6 (13%)	0 (0%)	14 (31%)	15 (33%)	39 (87%)
Teachers N = 496							
Digital learning resources are available and enough	33 (7%)	10 (2%)	43 (9%)	1 (0%)	50 (10%)	402 (81%)	452 (91%)
All digital learning resources are in good condition	325 (66%)	90 (18%)	415 (84%)	0 (0%)	70 (14%)	11 (2%)	81 (16%)
Each teacher has a laptop	21 (4%)	35 (9%)	56 (11%)	38 (8%)	161 (32%)	241 (49%)	402 (81%)
There are adequate reference materials supplied	23 (5%)	40 (8%)	63 (13%)	0 (0%)	38 (8%)	395 (79%)	433 (87%)
Digital learning rooms are adequate	93 (19%)	102 (20%)	195 (39%)	6 (1%)	123 (25%)	172 (34%)	295 (59%)
Solar power back	1 (0%)	3 (1%)	4 (1%)	2	64	403	467

ups are available						(5%)	(13%)	(81%)	(94%)
School has safe	321	47	368	53(11	54	21	75		
storage room for	(65%)	(9%)	(74%)	%)	(11%)	(4%)	(15%)		
DLI materials									
Digital learning tools	15	20	35	38	61	362	423		
are often serviced	(3%)	(4%)	(7%)	(8%)	(12%)	(73%)	(85%)		

---

**Appendix VIII: Head Teachers' and Teachers' Responses on the Adequacy of Digital Learning Resources**

**Table 4.34**

***Resource Management for Digital Learning before Program Roll out***

Statement (N = 43)	Strongly agree (A %)	Agree (B %)	Combined (A+B) %	Neutral C (%)	Disagree D (%)	Strongly disagree E (%)	Combined (D+E) %
Parents provided resources for the construction of computer lab	2 (5%)	2 (5%)	4 (9%)	0 (0%)	9 (21%)	30 (70%)	39 (91%)
Parents organized for the construction of computer store	16 (37%)	12 (28%)	28 (65%)	0 (0%)	8 (19%)	7 (16%)	15 (35%)
Parents ensured that all digital tools were ready before roll out	1 (2%)	1 (2%)	2 (5%)	0 (0%)	20 (47%)	21 (48%)	41 (95%)
Parents were involved in management of DLI programme	1 (2%)	1 (2%)	2 (5%)	0 (0%)	24 (56%)	17 (39%)	41 (95%)
Parents'	9 (21%)	6	15 (35%)	0 (0%)	19	9 (21%)	28 (65%)

---

have trust in		(14%)			(46%)		
DLI in that							
it won't							
spoil their							
children							
PTA	1 (2%)	0	1 (2%)	0 (0%)	23	21	44 (98%)
planned and		(0%)			(53%)	(45%)	
provided the							
required							
DLI							
resources							

---



**Appendix IXX: Head Teachers' and Teachers' Responses on the Adequacy of Digital Learning Resources**

**Table 4.35**

***PTA Data on Application of Digital Learning Resources***

Statement	Strongly Agree	Agree	Combined (A+B) %	Neutral	Disagree	Strongly disagree	Combined (D+E) %
N = 43	A (%)	B (%)	(A+B) %	C (%)	D (%)	E (%)	(D+E) %
Teachers use laptops as a tool for teaching in class	5 (12%)	10 (23%)	15 (35%)	4 (9%)	8 (19%)	16 (37%)	24 (56%)
Teachers use software from KICD in their subject area	5 (12%)	3 (7%)	8 (19%)	0 (0%)	19 (44%)	16 (37%)	35 (81%)
Teachers use VCD/CD ROM for education purpose	10 (23%)	10 (23%)	20 (46%)	0 (0%)	13 (30%)	10 (23%)	23 (53%)
Teachers assist pupils	23 (53%)	7 (17%)	30 (70%)	5 (12%)	6 (14%)	2 (5%)	8 (19%)

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to play								
games using								
tablets								
Teachers	11	5	16 (37%)	4 (9%)	10	13	23 (53%)	
show pupils	(26%)	(11%)			(23%)	(30%)		
how to do								
assignments								
using tablets								
Pupils	30	5	35 (81%)	3 (7%)	2 (5%)	3 (7%)	5 (12%)	
appreciate	(70%)	(11%)						
the use of								
tablets in								
class								
Teachers	7 (16%)	5	12 (28%)	9	12	10	22 (51%)	
appreciate		(12%)		(21%)	(28%)	(23%)		
the use of								
tablets in								
class since								
they aid in								
time								
management								

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**Appendix XX: Head Teachers' and Teachers' Responses on the Adequacy of Digital Learning Resources**

**Table 4.36**

***Head Teachers' Responses on Preparedness of Technical Support Staff before DLI Program Roll out***

Statement on	Strongly agree	Agree	Combine	Neutral	Disagree	Strongly disagree	Combine
TSS preparedness (N = 45)	A (%)	B (%)	d (A+B) %	l C (%)	e D (%)	y	d (D+E) %
PTA employed technicians to undertake repairs and maintenance of digital tools	1 (2%)	0 (0%)	1 (2%)	0 (0%)	17 (38%)	27 (60%)	44 (98%)
MoE mandated head teachers to contract TSS	1 (2%)	0 (0%)	1 (2%)	9 (20%)	19 (42%)	16 (36%)	35 (78%)
PTA organizes digital tools to be repaired outside the school	0 (0%)	0 (0%)	0 (0%)	5 (11%)	15 (33%)	25 (56%)	40 (89%)
Classes are uninterrupted	1 (2%)	1 (2%)	2 (4%)	5 (11%)	18 (40%)	20 (44%)	38 (84%)

d since TSS								
repairs and								
maintains								
digital								
learning								
tools								
MoE TSS	0 (0%)	0	0 (0%)	16	2 (4%)	18	20 (64%)	
responds		(0%)		(36%)		(40%)		
immediately								
during								
emergency								
PTA hires	0 (0%)	0	0 (0%)	17	13	13	28 (62%)	
TSS when		(0%)		(38%)	(29%)	(33%)		
need arises								
in school								
TSS is very	1 (2%)	1	2 (4%)	2 (4%)	11	30	41 (91%)	
useful to		(2%)			(24%)	(67%)		
teachers								
during DLI								
lessons								
The school	5 (11%)	15	20 (44%)	7	9 (20%)	9 (20%)	18 (40%)	
was unable		(33%		(16%)				
to implement		)						
DLI due to								
lack of TSS								

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**Appendix XXI: Head Teachers' and Teachers' Responses on the Adequacy of Digital Learning Resources**

**Table 4.37**

***Teachers' Responses on Preparedness of Technical Support Staff before DLI Program Roll out***

Statement (Response from teachers N = 496)	Strongly agree A (%)	Agree (B) %	Combine d (A+B) %	Neutra l C %	Disagre e D %	Strongly y disagree E %	Combine d (D+E) %
MoE employed TSS	0 (0%)	3 (1%)	3 (1%)	58 (12%)	113 (23%)	323 (65%)	436 (88%)
PTA employed TSS	5 (1%)	0 (0%)	5 (1%)	69 (14%)	403 (81%)	19 (4%)	422 (85%)
MoE contracted TSS	5 (1%)	14 (3%)	19 (4%)	8 (2%)	420 (85%)	49 (10%)	469 (95%)
PTA contracted TSS	6 (1%)	5 (1%)	11 (2%)	33 (7%)	300 (60%)	152 (31%)	452 (91%)
Neighboring schools share TSS	43 (9%)	16 (3%)	59 (12%)	20 (4%)	350 (71%)	67 (13%)	417 (84%)
Servicing of digital tools is done by knowledgeable teachers	58 (12%)	77 (15%)	135 (27%)	47 (9%)	281 (57%)	33 (6%)	314 (63%)
Lack of TSS affected DLI PTA	199 (40%)	100 (20%)	299 (60%)	18 (4%)	59 (12%)	120 (24%)	179 (36%)

responses on  
availability of  
TSS (N = 43)

PTA planned and hired TSS	0 (0%)	2 (5%)	2 (5%)	0 (0%)	30 (70%)	11 (26%)	41 (95%)
MoE hires TSS when need arises	3 (7%)	11 (26%)	14 (33%)	0 (0%)	0 (0%)	29 (67%)	29 (67%)
PTA wanted knowledgeabl e teachers to service tools	3 (7%)	5 (12)	8 (19%)	0 (0%)	5 (11%)	30 (70%)	35 (81%)

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**Appendix XXII: Head Teachers' and Teachers' Responses on the Adequacy of Digital Learning Resources**

**Table 4.38**

*Teachers' and PTA response on Repairs and Maintenance done by TSS*

Statement	Strongly agree	Agree	Combine	Neutral	Disagree	Strongly disagree	Combine
(Teachers' response N = 496)	A (%)	B (%)	d (A+B) %	C (%)	D (%)	E (%)	(D+E) %
MoE provides emergency TSS	25 (5%)	55 (11%)	80 (16%)	36 (7%)	79 (16%)	301 (61%)	380 (77%)
PTA hires TSS	59 (12%)	77 (15%)	136 (27%)	15 (3%)	220 (44%)	125 (26%)	345 (70%)
Schools share TSS	13 (3%)	46 (9%)	59 (12%)	20 (4%)	205 (41%)	212 (43%)	417 (84%)
Knowledgeable teachers act as TSS	74 (15%)	61 (12%)	135 (27%)	47 (9%)	13 (3%)	301 (61%)	314 (63%)
PTA Responses N = 43							
MoE employed TSS	0 (0%)	0 (0%)	0 (0%)	0 (0%)	21 (49%)	22 (51%)	43 (100%)

MoE allowed	0 (0%)	3	3 (7%)	0 (0%)	8 (19%)	32	40 (93%)
PTA to hire		(7%)				(74%)	
TSS							
Knowledgeabl	3 (7%)	5	8 (19%)	0 (0%)	12	23	35 (81%)
e teachers		(12%			(28%)	(53%)	
acted as TSS		)					

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**Appendix XXIII: Head Teachers' and Teachers' Responses on the Adequacy of Digital Learning Resources**

**Table 4.39**

***Management of DLI Programme by Parents***

Statement	Strongly agree (%)	Agree A B (%)	Combined (A+B)%	Neutral C (%)	Disagree D (%)	Strongly disagree E (%)	Combined (D+E)%
Parents were involved in DLI program preparations	0 (0%)	2 (5%)	2 (5%)	0 (0%)	20 (46%)	21 (49%)	41 (95%)
Parents constructed storage facility for keeping DLI tools	15 (35%)	13 (30%)	28 (65%)	0 (0%)	12 (28%)	3 (7%)	15 (35%)
School management collaborates with parents on DLI program preparations	6 (14%)	6 (14%)	12 (28%)	0 (0%)	11 (26%)	20 (46%)	31 (72%)
Well managed DLI program that won't	3 (7%)	12 (28%)	15 (35%)	0 (0%)	24 (56%)	4 (9%)	28 (65%)

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spoil pupils							
Parents	16	11	27 (63%)	0 (0%)	13	3 (7%)	16 (37%
wholly	(37%)	(26%)			(30%)		
support DLI							
programme							
Parents	8 (19%)	31	39 (91%)	0 (0%)	4 (9%)	0 (0%)	4 (9%)
appreciated		(72%)					
DLI							
program and							
offered to							
provide							
security							

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