DETERMINANTS OF DIGITAL LEARNING IMPLEMENTATION IN PUBLIC PRIMARY SCHOOLS,

A CASE OF NAIROBI COUNTY SCHOOLS

QAMAR HUSSEIN

A Research Dissertation Submitted to Faculty of Business, Computer Science and Communication Studies in Partial Fulfilment of the requirements for the Award of Master of Business Administration Degree of St. Paul's University

2019

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DECLARATION

This research dissertation is my original work and has not been presented for any academic award to any other institution. Materials from other sources have been duly referenced.

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DEDICATION

This dissertation is dedicated to my dear parent Mr Hussein Mohamed, and Nathifa Nur, and my husband Mr Abdilatif Adow and children Asiya and Abdulmajiid.

ACKNOWLEDGEMENT

I wish to acknowledge the contributions of my supervisors; Dr. Hellen Mugambi and Mr. Robert Abayo who guided me through the entire process of writing this dissertation. I also acknowledge my colleagues and friends who read the drafts and made many valuable suggestions. This helped to make the research more accurate and complete.

Above all, the whole dissertation would have been difficult to complete without a supportive household. My husband and children, they remained both encouraging and supportive throughout the time of writing this dissertation.

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ABBREVIATIONS AND ACRONYMS

ASTD	American Society of Training and Education
DLM	Digital Learning Material
DOI Theory	Diffusion of Innovation Theory
FDSE	Free Day Secondary Education
FPE	Free Primary Education
ICT	Information Communication Technology
IT	Information Technology
JICA	Japan International Coropation Agency
KCPE	Kenya Certificate of Primary Education
KICD	Kenya Institute of Curriculum Development
MDGs	Millennium Development Goals
MOOCs	Massive Open Online Courses
SSA	Sub Saharan Africa
TAM	Technology Acceptance Model
TV	Television
UNESCO	United Nations Educational, Scientific and Cultural Organization

DEFINITION OF TERMS

Digital Content In this study, digital content is utilized to mean existence of the learning syllabus and curriculum in form of digital data stored in digital media(Biswas, 2014).

Digital Infrastructure These are the equipment necessary for the implementation of digital learning. These include computers, ICT laboratories, internet connection and power supply among others(Afande, 2015).

Digital Learning In this study, digital learning refers to applying digital media including computers, tablets, projectors, internet, and TV among others, to teaching and learning process(Ambaa, 2013).

Resource In this study, resources refer to the requirements for implementation of digital learning strategy including funds, competent teachers and other physical resources such as class rooms(Habler, Major, Warwick, Watson, Hennessy, & Nicholl, 2016).

Security Security in this study is used to refer to cyber security in relation to e-learning systems as well as safety of digital infrastructurefrom theft, vandalism and burglary(Bandara, Ioras, & Maher, 2014)

Strategy Implementation The execution of plans and strategies so as to accomplish the long term goals of an organisation(Gioko, 2011)

Public Primary School Schools sponsored by the government through the ministry of education(Bekele, 2017).

ABSTRACT

In spite of the critical role of ICT in improving learning, its adoption in education in Kenya has been limited. Multiple impediments to the implementation of digital learning in Kenya have been reported. This study sought to assess the Digital Learning Strategy Implementation in public primary schools in Nairobi County. Records in the County Education Office indicate that there are 196 public primary schools within Nairobi County that have implemented the digital learning strategy. Specifically the study sought to assess and determine the influence of digital content, digital infrastructure, security of Information Communication Technology infrastructure and equipment and resource allocation on the digital learning implementation strategy. To achieve these objectives the study adopted a descriptive research design. The target population were the users of the digital learning system in these schools. Three users from each school were identified from the stakeholders who interact with the platform on a regular basis by the nature of their jobs. These were the Information Communication Technology Teachers the Deputy Head Teacher and Head teachers. The data collection instrument of choice used to collect primary data was questionnaires. These were administered through a drop and pick methodology because of it was convenient for the respondents to complete at their pace. The data collected was analysed using descriptive statistics, correlation and regression analysis. The results of the correlation analysis indicated that there was a weak correlation between the digital content and ICT infrastructure, but a stronger correlation between the others, it was also done to establish the relationship between the implementation strategy as the dependent variable and digital content, ICT infrastructure, Security and Resources as the independent variables. Results of the study gave a strong positive correlation between the independent and dependent variables. The study recommended that the government should facilitate digital learning implementation by providing the necessary resources as well as proper training of the teachers.

CHAPTER ONE

INTRODUCTION

1.1.Background

Technology has totally transformed our way of life; from how we communicate to how we conduct business and now it is changing how we learn. All aspects of our lives involve the use of technology in one way or another (Brynjolfsson, 2017). According toHolzberger (2013) digital learning involves the use of technology in the teaching and learning process. It involves the application of digital infrastructure such as computers and the internet in delivery of education to overcome barriers of learning such as location and time to achieve learning that revolves more around the leaner than the teacher, that is, student-centred(Lin, Chen, & Liu, 2017).

Digital learning has become one of the fastest-moving trends in education and poses a promising alternative to traditional learning. Studies have shown that people learn considerably better from a combination of both digitally enabled words and images than merely from words alone (Brinaur, 2016). Under digital learning, students are allowed to actively participate in learning; therefore, the ease of use of the digital learning system is a critical determinant on the learning outcome by the students(International Forum of Educational Technology & Society, 2016).

Since the adoption of Free Primary Education (FPE) and free tuition in secondary schools the enrolled figures have more than doubled. Despite having the highest percentage of budgetary allocation over the last decade, especially since the launch of FPE andFree Day Secondary Education(FDSE), quality remains a major issue across the entire spectrum of the education and training sector (Japan International Coropation Agency (JICA), 2012). ICT(Information Communication Technology) has the potential to bridge the knowledge gap in terms of improving quality of education, increasing the quantity of quality educational opportunities, making knowledge building possible through borderless and boundless accessibility to basic right to education(Lewis & Thacker, 2016).

Integration of ICT in learning is however facing some challenges including lack of funding to support the purchase of the infrastructure to improve access to educational materials, lack of training for teachers to adopt ICT as a teaching tool and unavailability of computers are of the challenges that hinder full integration of ICTs in education. Due to the overwhelming some

bias in developing ICT based content this may be a challenge towards digital integration. In Nairobi, for instance, 71% of schools have a computer but in the former Eastern province less than 20% do(Gioko, 2011).Digital learning has become a widely accepted learning module in recent years and has been linked with positive, cumulatively progressive gains in learning outcomes. This research sought to assess the implementation of digital learning strategy on the performance of public primary schools in Nairobi County.

1.1.1. Digital Learning

According to the American Society of Training and Education (ASTD) (2014),digital learning refers to a process whereby learners use technological media such as videos, audio, computers and the internet for learning. Digital learning involves learning materials delivered electronically, in part or wholly via a Web browser, through the Internet or an intranet, or through multimedia platforms such CD-ROM or DVD. It involves the use of a computer or electronic device to provide training, educational or learning material (Lin, Chen, & Liu, 2017).Digital learning uses ICT for course delivery, interaction, evaluation and facilitation with all information and learning content stored electronically for multiple usages.This allows learners usage for several times and learning repeatedly(Groff, 2013).The use of ICT in education sector is currently the lowest in Africa, and dire in Sub Saharan Africa (SSA), where it lag behinds most of the countries in the developed world (Bekele, 2017).

In January 2006, Kenya put in place a National ICT Policy, whose aim was to advance the livelihoods of Kenyans by ensuring the availability of accessible, efficient, reliable and reasonably priced ICT services. Many education institutions in Kenya have started to leverage the Internet to improve their programme's reach and quality Kenya (Ministry of Education, 2014). Kenya has developed policies to guide the integration of ICT into economic, social and educational programmes. In 2006, an ICT policy document was published through the Kenya Government Gazette notice of number 24. The main theme of this policy was to develop a "prosperous ICT driven society" that recognizes and puts ICT at the Centre of economic development(Nyakowa, 2014).

The process of integration of ICT in Kenyan schools has previously been painfully slow, however, the situation has been improving in the last few years. Schools are increasingly being equipped with computers for teaching, learning and administrative purposes, connectivity is improving and students are enthusiastic about using computers for learning, despite the lack of equipment available (Ngugi, 2012).

1.1.2. Global View of Digital Learning

Education has changed tremendously over the years. While some aspects may always stay the same, students are learning in ways few thought possible not long ago thanks to the exploration of many creative education professionals around the world and rapid technological development. Many teachers have stepped down from the stage to instead be a guide as their students discover, and create on their own. The age of digital learning is here(Glatter, Deruy, & Wong, 2016).Since the early 1980s, schools, colleges and universities have experimented with technology for learning. Today, however, educational technology initiatives are still being launched with little regard for the classroom practices employed by teachers to support learning.Recently, countries across the world have begun to consider how their education systems can promote twenty-first century skills (Habler, Major, Warwick, Watson, Hennessy, & Nicholl, 2016).

In developing countries, challenges to providing quality Education for all are exacerbated by the prevalent low-resource contexts, and raising quality in primary education is a key concern for the post-2015 development agenda. Education programmes are often developed in isolation, without drawing on established evidence for educational effectiveness (Selwyn, 2012). Digital technology use in schools, often considered a solution, is thus having limited impact. However, there is a growing desire from Ministries of Education in Sub-Saharan Africa (SSA) to utilise technology to promote quality learning, as well as a growing awareness in the mobile technology sector, and appropriate strategies are emerging. However, the existing solutions cannot begin to deal with the issues germane to universal and global scalability of education infrastructure, thus the technologies will in all likelihood fail to reach, and will likely fail (again) to improve learning, in the global view(Hennessy, *et al.*, 2010).

1.1.3. African View of Digital Learning

Everyone has a right to education as it plays a critical role in socio-economic development of countries, especially in developing countries. However, other than access to education, Millennium Development Goals recognize that quality and equity of education is equally important (UNESCO, 2015).The quality of education provided in African schools will determine the future development of the continent. In the sub-Saharan alone, countries allocate about 18% of the annual budget to education while the rest of the world stand at an average budgetary spending on education of 15%(Ngugi, Mumiukha, Fedha, & Ndiga, 2016).

Despite the significance attached to adoption of ICT in learning, countries in Africa are still held back by constraints that are preventing them from reaping fruits from ICT learning programmes. Thus, these countries have resorted to establishing policies and initiatives to support effort to adopt ICT in education(Selwyn, 2012). The rapid changes in technology, infrastructural requirement, market structures, and lack of complimentary structures such as telecommunication policies and finally shortage of proper implementation plans or government support are sabotaging digital learning in Africa (Habler, Major, Warwick, Watson, Hennessy, & Nicholl, 2016).

1.1.4. Education System in Kenya

In 1985 the 8-4-4 system replaced the previous 7-4-2-3 education system (Wanjohi, 2011). This system is made up of eight years in primary education, four years in secondary education and another four in tertiary education. The syllabus has mathematics, languages, sciences and social studies in the primary level for which the pupils take a national examination (Kenya Certificate of Primary Education (KCPE)) in the eighth year (Ambaa, 2013).

The 8-4-4 education system has however attracted significant level of criticism for its bulky content, lack of practicality and being too focussed on examination. Therefore, to address these concerns, the Kenya Institute of Curriculum Development developed the 2-6-6-3 education system made up of three learning stages; early years, middle school and senior school education. Subjects under the new curriculum include mathematical activities, language activities, environmental activities, creative activities and religious education activities under the early year's level. For the lower primary stage, subjects under study are mathematical activities, language activities, environmental activities, creative activities, religious education activitiesand hygiene and nutrition. Middle school will run for 6 years made up of upper primary and lower secondary whereas senior school will run for 3 years. Primary school ends at grade six and instead of taking the national examination like in the Grade six will be the final year in primary school but instead of administering a KCPE-like 8-4-4 system, pupils are instead evaluated continuously while on course (Kaviti, 2018).

After the primary level, pupils graduate to the lower secondary schools for three years where they commence their specializations in areas of their interests. This stage also involves continuous assessments which eventually contribute 70% to the final grade. Students thenproceed to senior school level where they get exposure to concepts of science, technical,

engineering and mathematics fields. At this stage, students can divert to other fields such as languages, humanities, arts and sports science. The final stage is the tertiary stage that takes three years (Mukoya, 2017).

1.2.Problem Statement

In spite of the critical role of ICT in improving learning, its adoption in education in Kenya has been limited. Multiple impediments to the implementation of digital learning in Kenya have been reported. First, shortage of qualified teachers to teach ICT in schools with schools that have received the equipment but not using them because they are not conversant with the technology(Wanjiru, 2013).Second,burglary withmore than 16,000 tablets distributed to primary schools under the Digital Learning Programme being stolen since the initiative started(Andanyi, 2018).Third, lack of infrastructure with schools in rural areas such as Baringo County and Pokot County reporting not using the equipment because of lack of classrooms with pupils forced to sit on stones in the open and the few classrooms present being in very squalid conditions(Wanzala, 2018). Fourth, some schools in Trans Nzoia County are reporting that instead of becoming a learning tool, the devices seem to be a source of entertainment for the pupils.Fifth, some parents are complaining that the programme is a misplaced priority with many counties grappling with more burning issues like insecurity, poverty and drought(Nyamai, 2018).

Digital learning continues to gain momentum in Kenya with the project rolled out in academic institutions from primary, secondary and Tertiary levels embracing the strategy. There are however clear indications that the implementation of the digital learning is facing some significant challenges that must be addressed if the programme is to be effective.This study sought to assessthe determinants of digital strategy learning implementation in public primary schools in Nairobi County, Kenya.

1.3.Research Objectives

1.3.1. General Objective

The main objective of this study was to find the determinants of digital learning implementation in public primary schools within Nairobi County, Kenya.

1.3.2. Specific objectives

i. To assess the influence of digital content on digital learning implementation
ii. To examine the influence of digital infrastructure on digital learning implementation

iii. To determine the influence of security of ICT infrastructure and equipment in digital learning implementation
iv. To assess the influence of resources allocation on digital learning implementation

1.4. Research Questions

i. What is the influence of digital content on digital learning strategy implementation in public primary schools with digital learning in Nairobi County?
ii. How does ICT infrastructure influence digital learning strategy implementation in public primary schools with digital learning in Nairobi County?
iii. What is the influence of security of ICT infrastructure on digital learning strategy implementation in public primary schools with digital learning in Nairobi County?
iv. What is the influence of resource allocation on digital learning strategy implementation in public primary schools with digital learning in Nairobi County?

1.5. Significance of the Study

This study will prove valuable to different users of the generated information:

Policy Makers

The study will enable government to evaluate the effectiveness of the digital learning systems on performance. The research will also help identify challenges that could be hindering the realization the full potential of the digital learning. Mitigating strategies will also be recommended.The ministry of education can use the findings this study to develop strategies and policies to ensure successful implementation of digital learning in other regions.

Academia

The primary schools as the main stakeholders in digital strategy will benefit from this study as findings will inform them on how best to implement digital strategy in their schools.

Researchers

The study will provide rich information that can form a basis for further research.The information can also be valuable reference material for future researchers.

1.6. Scope

The research focused on the subject topic, assessment of digital learning strategy implementation inpublic primary schools with in Nairobi County, Kenya. This research targeted teachers and ICT staff of public primary schools in Nairobi County. Primary data

was collected through questionnaires and focused group discussions. Secondary information on the country's digital learning strategy was retrieved from the Ministry of Education website and other published materials.

1.7. Limitations and Delimitation of the Study

The study limited itself to digital strategy implementation in public primary schools in Nairobi County. The main concern for this study was willingness of respondents to openly disclose information. To overcome this, participants were assured of complete confidentiality and privacy of all information disclosed. To overcome the issue of biasness, responses were checked for reliability and supported with information from secondary sources.

CHAPTER TWO

LITERATURE REVIEW

2.1.Introduction

The literature review will provide a review of previous studies along discussion topic that is E-learning and its impact on performance of primary schools with digital learning in Nairobi County. It will cover theories underlying the study, empirical review of previous studies and the conceptual framework.

2.2. Theoretical Review

The study was based on the diffusion of innovation theory, technology disruption theory and disruptive innovation theory.

2.2.1. Diffusion of Innovation Theory

Diffusion of Innovation (DOI) Theory developed by Rogers (1962) originated in communication to explain how, over time, an idea or product gains momentum and diffuses (or spreads) through a specific population or social system. The end result of this diffusion is that people, as part of a social system, adopt a new idea, behaviour, or product(Rogers, 2003).It was further proposed by Medlin (2001) who suggested that diffusion of innovations theory is the most appropriate for investigating the adoption of technology in institutions and businesses. According to Rogers (2003), a technology is a design for instrumental action that reduces the uncertainty in the cause-effect relationships involved in achieving a desired outcome.

Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system. An innovation is an idea or object that is perceived to be new (Rogers, 1985). According to this theory the rate of diffusion is affected by an innovation's relative advantage, complexity, compatibility, trial-ability and observe-ability.

While the model provides a much-needed integration of the highly dispersed knowledge on the subject of technology adoption, we must also acknowledge some limitations of our approach. Majority of research on diffusion of innovation has assumed that for rational or utility maximising consumers eventually new technology will replace old. But market history has shown that it does not do so easily, automatically, or even completely. Conversely, the sociology literature argues that consumers may adopt a new technology, for instance, by following a temporary fashion. In this case the user is not maximising their utility, but rather

maximising their social orientation. The resulting conflict of assumptions, means that the model is context dependent rather than generally predictive

The diffusion of innovation theory was relevant because it explained the schools in Kenya are adopting technological innovations in the teaching and learning process.

2.2.2. Technology Acceptance Theory

A number of theoretical models have been proposed to facilitate the understanding of factors impacting the acceptance of information technologies. Among these studies, the Technology Acceptance Model -TAM- (Davis, 1989).TAM assumes that beliefs about usefulness and ease of use are always the primary determinants of information technologies adoption in organizations. According to TAM, these factors provide a basis for perception towards the adoption of a specific system which then determines the actual usage of the system. However, the original TAM model was created to examine Information Technology adoption in business organizations. The model's suitability for predicting general individual acceptance, especially in education, needs to be explored (Saveri & Chwierut, 2018).

The original TAM predicts acceptance based on the end-user's perception on the usefulness as well as ease of use of a technology to achieve an objective. The founder of TAM integrated the model in an institutional set-up and discovered that adoption of a system is greatly dependent on the perception of employees about how it will affect performance. He defined ease of use as hoe an individual believes the adoption of a certain technology would not require strenuous effort from them.

TAM has proven to be a useful theoretical model in helping to understand and explain use behaviour in technology implementation, and it has been tested in many empirical studies. The tools used with the model haveproven to be of quality and to yield statistically reliable results. TAM is widely used and accepted to explain the relationship between perceptions and the use of technology and the two main constructs that influence behavioural intention are PU and PEU; PU is defined as the user's perception of the degree to which using the system will improve his or her performance in the workplace and PEU is defined as the user's perception of the amount of effort they need to use the system. TAM being the most influential information systems theory and the Technology Acceptance Model (TAM) is generally referred to as the most influential and commonly employed theory in information system which is also considered to be the only well-recognised theory in information systems field(Dudu, 2014).

Shah, Bhatti, Iftikhar, Qureshi and Zaman (2013) used Technology Acceptance Model (TMA) for the assessment of student behaviour using E-learning in rural and Urban Area of Pakistan. Result indicated infrastructure of e-learning environment (information quality, service quality and system quality) has a direct effect with perceived usefulness of e-learning and ease to use which lead to positive intentions towards use of E-learning. This theory was relevant to this study as it provided a framework for digital learning acceptance by the users, both teachers and pupils.

2.2.3. Disruptive Innovation Theory

Disruptive innovation theory was first introduced by Bower and Christensen in 1995 (Bower & Christensen, 1995). Disruptive innovation is defined as an innovation that attacks an existing business, and offer great opportunities for new profit growth. Disruptive innovation is also defined as something that changes social practices, the way we live, work and learn(Assink, 2006).There are two key elements of disruptive innovation which are important to the education sector. The elements are technology enabler, and business model innovation (Christensen et al., 2011). Digital learning is considered as a technology driver that is capable of disruptively changing the teaching learning process and jeopardizes the existence of the traditional learning models.

Hilmi (2016) used the disruptive innovation theory to explain the dynamic changes in learning with the recent introduction of massive open online courses (MOOCs) which is seen as a strong technological force influencing the education landscape meant to give readers, especially practitioners in education sector a way of understanding the nature of disruptive innovation and how disruptive innovation is influencing the education landscape.

The theory of disruptive innovation explained how digital learning in Kenya is revolutionizing education through the use of innovative technological innovations.

2.3. Empirical Review

Empirical review looks into previous studies conducted by different researches taking into consideration the objective, concept, context, methods and the findings in order to identify research gap and to compare results of current study to those of previous ones.

2.3.1. Digital Content and Digital Learning Strategy Implementation

Gioko (2011) assessed the effect of digital content utilization in teaching and learning in Kenyan secondary schools that have embraced e-learning. The study focused on teachers and

students who form the nerve centre of teaching and learning process. The findings revealed some positives and negative impacts on teaching and learning accruing from use of digital content. Learner participation, motivation, stimulating content, self- directed discovery and enhanced understanding of concept came out as the positive effects while inadequate content, shallow coverage of concepts and lack of infrastructure were the negatives. From the research training of both teachers and students was recommended to capacitate them in utilization of available open resources for building custom digital learning resources to fill in the huge need.

The use of technology teaching and learning process is believed to affect the attitude and performance of students today. A study by Eyyam and Yaratan (2014) identified challenges facing implementation of digital strategy in schools. Major constraints identified included, shortage of equipment in schools and inadequately trained teachers on use of ICT in teaching. As measures against these issues, the study recommended that ICT training be a part of teacher training and to equip them with skills and knowledge to enhance service delivery in ICT integrated learning.

Zwart, Luit, Noroozi and Goei(2017) conducted a study to investigate the relationship between digital learning material (DLM) and students' mathematics learning in Dutch vocational education. A pre-test–post-test design was used. Apprenticeship students were asked to complete assignments and to discuss them with their peers and the online teacher. The results showed that DLM can enhance students' mathematics learning in vocational education. The learning enhancement was mostly due to the use of instructional clips and structuring of the content of the mathematics tasks.

2.3.2. Digital infrastructure and Digital Learning Strategy Implementation

Njuguna (2013) assessed determinants of use of e-learning within universities in Kenya. The study targeted 19,205 employees sought from public universities in Kenya. The findings of the study indicated how the employees perceived the usefulness of e-learning had a significant affected its adoption. The findings also indicated that availability of the proper infrastructure to support implementation of e-learning was a significant determinant in the adoption of e-learning in Universities in Kenya.

Mulwa, Kalui and Makori (2014) investigated the determinants of adoption of e-learning in public secondary schools in Nairobi County. The factors under study were e-learning, ICT infrastructure and design. The target population was all public secondary schools in Nairobi

County targeting head teachers, deputy head teachers and teachers as the respondents. Thefindings of the study identified cost of computer hardware and other accessories as the main cause for the low level adoption of e-learning.The study therefore made recommendation that proper financial plans should be made for purchase and maintenance of ICT infrastructure to facilitate implementation of e-learning.

Natia and Al-hassan (2015) investigated the extent to which school administration, and teaching and learning are promoted through the use of ICT in Ghanaian Basic Schools. The study found out that the ability of teachers to use computer to teach and research was weak due to lack of access to internet, electricity/power problem, inadequate number of computers and technical know-how. The study recommended a strong and sustainable Public-Private-Partnership between the government, private sector and civil society organizations to map out plans and strategies in order to minimize the problems associated with the integration of ICT in the education system.

Heinz (2016) examined the implementation of ICT in German elementary schools. The results indicated that teachers teaching models took into consideration students' knowledge of digital media, interests, class and ethnic background as well as with school-specific curricula. Gaining digital competencies, however, was greatly influenced by other competencies and learning strategies, in particular literacy. While low achieving students seem to benefit from digital learning programmes that can be adapted to their individual prior knowledge, in many ICT-based learning environments they need extra support and guidance. Furthermore, teachers needed support for using ICT in their classrooms and to meet the needs of their student.

2.3.3. Security and Digital Learning Strategy Implementation

There are concerns that evolved from the use of modern technologies for learning that may affect their adoption negatively, the important ones being the security risks and vulnerability attack issues on learning contents and private information on digital learning devices (Kambourakis, 2013). Security issues in learning platforms that have been exploited are related to vulnerabilities in the operating system and flaws in the application software or network facilities (Jang-Jaccard & Nepal, 2014).

Many institutions are rushing into adopting ICT without cautiously planning or putting in place measures against security risks. The Internet attracts illegal activities ande-learning is no exception. Hayaati and Fan (2010) discussed the security factors that need to be

considered when implementing e-learning within an educational institutions. The study identified information security management as a critical measure against cyber threats.

Internet threat against e-learning systems is a real challenge considering the multitude of individuals and networks accessing the internet every day. Bandara, Ioras and Maher (2014) attempted to understand the concept of monitoring, measuring and managing cyber security in relation to e-learning systems. The study demonstrated the e-learning systems under study had a high prevalence of internal cyber-attack and there lacked proper IT policies and procedures in e-Learning systems to meet the security requirement required to protect the systems from cyber-attacks. Since e-learning systems are open, interconnected and distributed, it is important to ensure that users only have access to the right information at the appropriate time.

2.3.4. Resources and Digital Learning Strategy Implementation

Digital learning refers to the use of ICT in teaching and learning, e-learning enhance the learning process by offering an innovative way of delivering education. Teaching and learning technology is enormously resource-exhaustive. Resources considered critical for implementation of digital learning include finances, human resources and physical classrooms(Bekele, 2017).

Khashkhush (2011) attempted to identify determinants of the implementation of e-learning in Higher Education in Libya. The findings of the study revealed that absence of strategy, poor communications skills among staff members and lack of computer literacy especially were the main obstacles against implementation of e-learning.Sharma (2011) on the other hand found financial implications as the most important factor when implementing e-learning. Among cost implications identified include digital content expenses, maintenance expenses, distribution expenses, learning management systems expenses and staff expenses.

Mulwa, Kalui and Makori (2014) attempted to examine teacher's competence and adoption of e-learning in public schools in Makadara District, Nairobi County. The study adopted descriptive and inferential statistical tools to analyse ICT infrastructure, teacher readiness, teacher ICT skills and adoption of e-learning. The study results indicated that adoption of e-learning implementation was significantly influenced by teachers'skills and competencies and ICT literacy since many teachers fear losing their jobs due to e-learning and therefore resist its adoption.There is therefore need for teachers on e-learning teaching style to enhance adoption of e-learning program.

Tarus, Gichoya and Muumbo (2015) discussed implementation of e-learning in public universities as well asthe challenges experienced and possible solutions. The study presented the findings from a survey of 148 staff of three Kenyan public universities who are currently using e-learning in blended mode approach. The findings revealed that e-learning comes with some challenges that must be addressed by Kenyan public universities before successful implementation can be realized with 87% of the respondents' considering financial constraints as a challenge hindering the implementation of e-learning.

Griggs (2016) evaluated the influence of digital gap between teachers and students on use of ICT in teaching and learning in Western Australian secondary school. Using construct analysis, the study assessed ICT skills, application and attitude for each of the students and teachers. The finding of the study revealed that when the student possessed more knowledge on ICT, there was limited evidence of use of ICT and vice versa. The study concluded that digital divide had a significant influence on meaningful use of ICT in the classroom. Therefore, the study suggested that there was need for proper policies in schools to increase the ICT competence of teachers.

2.3.5. Impact of Digital Learning on Performance of Public Primary Schools

ICThas for the last two decades changed the all aspects of life, from governance to business and now education. ICT integrated learning is more student-centred unlike traditional learning where the teacher had high personal contact with the student. With the world rapidly transforming towards digital era, ICT plays a critical role in education and is growing fast especially in developing countries (Aloraini, 2012).

In many countries, information and communication technology (ICT) has a lucid impact on the development of educational curriculum. ICT helps the students to augment their knowledge skills as well as to improve their learning skills. To know with reference to the usage and impact of ICT in Education sector of Pakistan. Nisar, Munir and Shad (2012) accumulated data from a sample population of 429 respondents from 5 colleges and universities data from district Rawalpindi of Pakistan. The results of the study indicated thatusage and availability of ICT improves the knowledge and learning skills of students. Since ICT is improving the educational efficiency, it is important to make proper supporting policies regarding education sector.

Wajszczyk (2014) conducted a research with the purpose to analyse the current state of the use of ICT and its impact on pupils in their early stages of education. The aim was to find out

how, when and in what context ICT is used in the work with students by collecting teachers views on ICT and their opinion on how ICT does affects pupils - positively or negatively. The findings revealed thataccess to technology and abilities of the students as well as the teachershas the highest degree of influence on how ICT affects pupils. It was therefore concluded that ICT has positive effect on students.

2.4. Summary of Literature Review

From the above literature review, it is clear that integration of ICT into learning is facing a number of challenges that vary from country to county or the level of education in which it is implemented. These include: providing the required institute-wide infrastructure (in terms of both hardware and software)(Eyyam & Yaratan, 2014); designing and implementing an e-learning platform, which involved substantial initial expenditure and a dedicated team to maintain and upgrade it; providing support to both faculty and students; and managing bandwidth to avoid network congestion and allocate resources in line with Institute priorities(Gioko, 2011).

Learner participation, motivation, stimulating content, self- directed discovery and enhanced understanding of concept came out as the positive effects while inadequate content, shallow coverage of concepts and lack of infrastructure were the negatives(Mulwa, Kalui, & Makori, 2014). Digital learning material (DLM) can enhance students' mathematics learning in vocational education. The learning enhancement was mostly due to the use of instructional clips and structuring of the content of the mathematics tasks. (Heinz, 2016)From the empirical review, training of both teachers and students was recommended to capacitate them in utilization of available open resources for building custom digital learning resources to fill in the huge need.

The review also revealed that how the employees perceived the usefulness of e-learning had a significant affected its adoption(Natia & Al-hassan, 2015). Availability of the proper infrastructure to support implementation of e-learning was a determinant in the adoption of e-learning. The researchersidentified cost of computer hardware and other accessories as the main cause for the low level adoption of e-learning(Khashkhush, 2011).Absence of strategy, poor communications skills among staff members and lack of computer literacy especially were also identified as obstacles against implementation of e-learning.Financial implications are an important factor when implementing e-learning.(Tarus, Gichoya, & Muumbo, 2015) Among cost implications identified include digital content expenses, maintenance expenses, distribution expenses, learning management systems expenses and staff expenses(Grigg,

2016). Limited researches have been conducted on security and digital learning implementation.

2.5. Research Gap

Table 2.1: Research Gap

Author	Objective	Gap	How gap was filled
Gioko (2011)	Effect of digital content utilization in teaching and learning in Kenyan secondary schools that have embraced e-learning	Contextual gap	While Gioko (2011) conducted the study among secondary schools this study was done in public primary schools
Zwart, Luit, Noroozi and Goei (2017)	The relationship between digital learning material (DLM) and students' mathematics learning in Dutch vocational education	Methodological gap	Whereas the study used investigative design targeting students, this study used descriptive research design with teachers as the target respondents
Natia and Al-hassan (2015)	The extent to which school administration, and teaching and learning are promoted through the use of ICT in Ghanaian basic schools	Contextual gap	The research was conducted in Ghana while this study took place in Kenya
Heinz (2016)	The implementation of ICT in German elementary schools.	Conceptual gap	Heinz (2016) had specific interest in ICT while this study looked into digital learning strategy implementattion
Mulwa, Kalui and Makori (2014)	Examine teacher's competence and	Contextual gap	While the researchers focused on Makadara

	adoption of e-learning in public schools in Makadara district, Nairobi county		district, this study covered the entire Nairobi County
Nisar, Munir and Shad (2012)	The usage and impact of ict in education sector of Pakistan.	Conceptual gap	The study had interest on impact while this one studied strategy implementation

Source: Author

2.6. Conceptual Framework

Independent Variables **Dependent Variables**

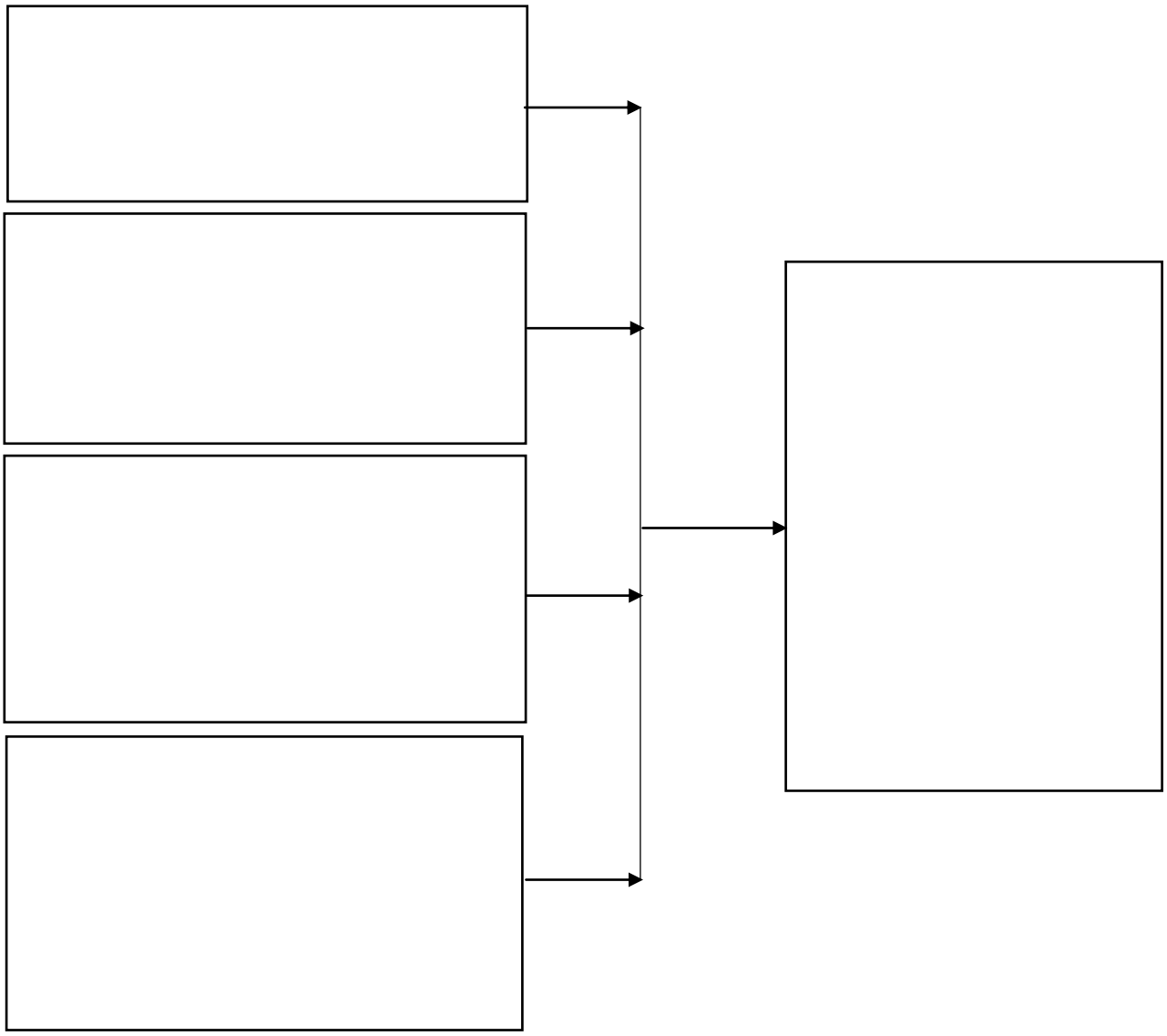


Figure 2.1: Conceptual Framework

Source: Research Data (2019)

CHAPTER THREE

RESEARCH METHODOLOGY

3.1.Introduction

The research methodologyoutlines the practices, procedures and techniques that were used in the collection, processing and analysis of data for this research. It discusses the research design, target population, sample design, data collection methods, and data analysis techniques that will be employed in this study.

3.2.Research Design

Research design refers tological process used to carry out a study (Kothari, 2008). This research used descriptive design to assess the determinants of digital learning strategy implementation in public primary schools within Nairobi County. This design was appropriate as it enabled the researcher to gather practical and clearly defined information from experienced respondents its findings are conclusive. It enabled the study to answer the questions who, what and how thus allowing the researcher to answer the research questions.

3.3.Target Population

The target population can be defined as the totality of cases of people, organization, or institutions which pose certain commonalities that are relevant to the study (Mugenda and Mugenda 2008). This study targetedthe personnel that interact with digital learning process in public primary schools within Nairobi County. These personnel comprise the head teachers, teachers and ICT staff in the respective schools. The study focussed on the schools that have implemented the digital learning strategy. There are 205 public primary schools in Nairobi County. However, the digital learning strategy has been implemented in only 196 public primary schools with installation in 9 schools still pending (ICT Authority, 2018). Therefore, the target population of this study is 196 public primary schools in Nairobi County that have implemented digital learning strategy.

3.4.Sampling Procedure and Sample Size

Sampling is the selection of some part of an aggregate or totality on the basis of which an inference about an aggregate to a totality is made (Frankel & Wallen, 2000).This study was conducted on all the 196 public primary schools that have implemented the digital learning strategy in Nairobi County.Three questionnaires were sent to each of the 196 primary schools giving a total of 588 questionnaires dropped in each of the schools to be completed by the head teacher, a teacher and ICT personnel to get the perspective of the management, teaching

and the ICT department. As such no sample was collected as the technique adopted was complete enumeration. The teachers were selected based on availability, convenience and willingness to respond to the questionnaires.

3.5.Data Source and Collection Instruments

This study used questionnairesthat were administered using the drop and pick method to all the 196 primary schools in Nairobi county identified as having implemented the digital learning strategy. The questionnaire wasideal for this study because it allowed the researcher to reach a large number of respondents; it also gave the respondents sufficient time to consider their responses in an objective way (Okenda, Thuo & Kithinji, 2017). References to journals, reports and websites to support, verify and validate the primary data obtained from the respondents.

3.6.Data Validity and Reliability

Validity measure show the degree to which data instruments succeed in getting the details that it was designed to achieve. For this study the measure is to ensure that the correct data has been collected. Reliability measures show the degree to which a measurement instrument can be relied upon to relay consistent result if the procedure are repeated over and over again.

Validity is the extent to which a test measures what it claims to measure (Kombo & Tromp, 2006).To enhance validity, the researcher conducted a pilot study at three randomly select schools to identify items in the questionnaire that are ambiguous or inappropriate to ensure validity of the data collection instrument.Data reliability is the ability of an instrument to produce similar results at different times with the same group of respondents (Shaughnessy & Zechmeister, 1997).

Table 3.1: Cronbach Alpha

Variables	Cronbach's Alpha	Interpretation
Digital Content	0.663	Reliable
Infrastructure	0.661	Reliable
Security	0.708	Reliable
Resource Allocation	0.654	Reliable
Strategy implementation	0.701	Reliable

Total	**0.677**

Source: Research Data (2019)

Cronbach's alpha correlation coefficient was used to test the reliability of the questionnaire. A coefficient of 0.7 that was obtained was considered appropriate for the study since the higher the score the more reliable the generated data.

3.7.Data Analysis Methods

The returned questionnaires were checked for completeness, uniformity, accuracy and consistency. The data was then be coded and cross tabulated to classify responses into meaningful categories to enable data analysis. Using SPSS, descriptive analysis was conducted. This involved the use of frequencies, measures of central tendencies and simple percentages. Regression analysis was be conducted to determine the relationship between the dependent and the independent variables.

The following model will be adopted by the study;

$$ESI = \alpha + \beta_1 DC + \beta_2 IN + \beta_3 SC + \beta_4 RS + \varepsilon$$

Where

ESI= E-Learning Strategy Implementation

DC= Digital Content

IN= ICT Infrastructure

SC= Security

RS= Resource

α =Constant

$\beta_1,\ \beta_2,\ \beta_3,\ \beta_4$= regression coefficients

ε= Error term

3.8.Ethical Issues

Confidentiality and anonymity was assured to all participants before the start of data collection process. An introductory letter from the university accompanied by research permit

was obtained from the relevant authorizing body (NACOSTI) and participants received explanation of the purpose and process of the research before any further engagement. Personal or privileged participants' information details were not displayed at any point, the privacy of the respondents was respected at all times.

CHAPTER FOUR

RESEARCH FINDINGS AND DATA ANALYSIS

4.1.Introduction

This study sought to examine determinants of digital implementation in public primary schools in Nairobi County. This chapter presents the research findings. It is structured beginning with the response rate and results from demographic data collected. It further examines the descriptive statistics of Digital Content, Infrastructure, Security Considerations and Resource Allocations with the Implementation Strategy of Digital Learning.

4.2.Response Rate

A total of 420 completed and useable questionnaires out of 588 were obtained from respondents for the study. This represented a 71% response rate and a non-response rate of 29%. According to Mugenda and Mugenda (2003) a sample of 70% and above is rated as excellent, 60% and above rated as good while 50% and above is considered sufficient for doing analysis. This study considered the response rate of 71% adequate for analysis. The non-response rate was attributed to non-cooperation in some primary schools in filling the questionnaire notwithstanding that it was accompanied by an official communication from the University on the purpose of the study.

Table 4.1: Response Rate

Response Rate	
Questionnaire administered	588
Questionnaire returned	420
Response rate (%)	**71%**

Source: Research Data (2019)

4.3.Descriptive Analysis of Demographic Characteristics

This section provides a descriptive analysis on various aspects of respondents; background information such as gender, age, academic qualification, job position and work experience. Demographic information is important in establishing the appropriateness of the respondents in providing accurate and meaningful answers regarding digital learning strategy implementation in public primary schools. These variables have been analysed by use of averages, proportions and presented in tables for ease of reference.

4.3.1. Gender Distribution of the Respondents

The study sought to establish the gender of the respondents. This is important in ensuring the inclusion and fair representation of both genders in the study. The results indicated in Table4.2 indicate that majority of the respondents were female (57.14%) while male represented 42.86% of the respondent. The study concluded that most primary schools in Nairobi County have higher ratio of female staff to male staff.

Table 4.2 Gender Distribution

	Frequency	Percent
Male	180	42.9
Female	240	57.1
Total	420	100.0

Source: Research Data (2019)

4.3.2. Age Distribution of the Respondent

The study required the respondent to indicate their age category. The results as indicated in Table 4.3 below show that majority of the respondents (38.6%) were in the age bracket 31-40 years, 32.9% were aged between 41-50 years while 17.1% were aged 50 years and above. 11.43% of the respondents were aged between 20-30 years. This means that majority of the respondents were between ages 30 years to 50 years. This is indicative of a normally distributed population where the majority are in the middle age bracket with few at the extremities.

Table4.2: Age Distribution of the Respondents

Age	Frequency	Percent
20-30 years	48	11.4
31-40 years	162	38.6
41-50 years	138	32.9
51 years and above	72	17.1
Total	**420**	**100.0**

Source: Research Data (2019)

4.3.3. Education Level of the Respondent

The researcher sought to find out the highest academic level of the respondents by requesting them to indicate their highest level of education. Successful digital learning strategy implementation process requires employees with high academic qualifications and skills. The findings presented in Table 4.3 below indicate that majority of the respondents (63.6%), had attained college diplomas, 27.9% had Bachelor's degrees while 5% had Master's degree. Based these results, the researcher concluded that all the respondents had adequate level of education to understand issue to do with digital learning and strategy implementation. The respondents were also able to understand and answer the questionnaire properly.

Table 4.4: Distribution of Respondent Level of Education

Level of Education	Frequency	Percent
Certificate	15	3.6
Diploma	267	63.6
Bachelor's degree	117	27.9
Masters	21	5.0
Total	**420**	**100.0**

Source: Research Data (2019)

4.3.4. Job Position of the Respondents

The researcher sought to establish the designation of the respondents. This information was critical because, the questionnaire target all the relevant internal stakeholders involved in the strategic implementation of digital learning in Primary school. The results as presented in Table 4.4 below shows that majority of the respondents (72.86%) were teachers, 20.00% were deputy head teachers while 7.14% were head teachers

Table 4.5: Distribution of Job Positions

Job Position	Frequency	Percent
Head Teacher	30	7.1
Deputy H/Teacher	84	20.0
Teacher	306	72.9
Total	**420**	**100.0**

Source: Research Data (2019)

4.3.5. Number of Years Working in the Current Role

The study sought to establish the number of years the respondents have been working with the organization. Table 4.6 below indicate the analysis of the relevant work experience of the respondents. The study conclude that majority of the respondents have worked for the school for ten years or more. This is relatively enough time for the respondents to understand the sector and more so important aspect of learning that can be implemented using digital technologies.

Table 4.3.5: Number of years' experience

Number of Years	Frequency	Percent
2-5 years	36	8.6
6-9 years	147	35.0
10 years and above	237	56.4
Total	**420**	**100.0**

Source: Research Data (2019)

4.4.Descriptive Statistics of Dependent Variables

4.4.1. Implementation of Digital Learning Strategy

The study set out to assess digital learning strategy implementation in Nairobi County Schools. This information is crucial and will provide an insight into the state of actualization of the digital learning strategy in public schools in Nairobi County, thus giving empirical evidence whether there is an issue with the implementation of the digital learning strategy. The respondents were asked to rate the implementation of strategy in their school

Table 4.7: Digital Implementation Strategy

	Poor	Fair	Moderate	Good	Excellent	Mean	Std. Dev.
Syllabus completion	6.40	1.40	20.70	19.30	52.10	4.09	1.169
Student performance	0.00	6.40	20.70	23.60	49.30	4.16	0.969
Students participation	0.00	8.60	27.10	44.30	20.00	3.76	0.872
Teachers/students attitude towards digital learning	0.00	10.00	16.40	33.60	40.00	4.04	0.985
Aggregate						**4.01**	**0.998**

Source: Research Data (2019)

From the findings in the Table 4.7, the respondents agreed that the completion of the syllabus, student performance, student participation and the attitudes of both the teachers and staffs are vital components of the strategy in the implementation of digital learning.

The results show that, 61.3% of the respondents agreed that the syllabus completion consequent upon the implementation of digital learning, with only 6.4% feeling that it was poor. 63.3% of the respondents believed that the Student Performance is a good indicator of digital learning implementation. Student participation was generally good and excellent with digital learning as agreed to by 64.30%. 27.10% of the respondents believe that student participation was moderate with digital learning while 8.60% felt that student participation was fair. The study also revealed that teachers/students attitude towards digital learning was good as agreed by 73.6% of the respondents and mean of 4.04 and a standard deviation of 0.985. However, 10.0% of the respondents felt that the attitude of teachers/student toward digital learning was fair.

4.5.Descriptive Statistics of Independent Variables

4.5.1. Digital Content and Digital Strategy Implementation

The study set out to determine if digital content affects digital learning strategy implementation in Nairobi County primary schools. The respondents were asked to indicate

their rating on several factors of digital content that affected the digital learning strategy using the key (1=Strongly Disagree, 2=Disagree, 3=Don't know, 4=Agree, 5=Strongly Agree).

Table 4.8: Impact of Digital Content on Digital Learning Strategy Implementation

	1	2	3	4	5	Mean	Std. Dev
Digital content is readily available for use	0.00	8.60	3.60	30.70	57.10	4.36	0.907
The digital content is comprehensive and relevant	3.60	21.40	33.60	29.30	12.10	3.25	1.040
Students are positively embracing digital content	2.90	13.60	9.30	47.10	27.10	3.82	1.068
Digital content makes delivery interactive	0.00	22.90	27.90	41.40	7.90	3.34	0.920
The learning contents covers the syllabus well	10.70	15.00	19.30	42.10	12.90	3.31	1.194
Students are participating in self-learning	11.40	20.00	20.70	27.10	20.70	3.26	1.305
Use of digital content has an impact on syllabus coverage	5.70	9.30	10.00	37.10	27.90	3.72	1.138
Use of digital content has an impact on learning outcome	2.90	13.60	15.00	43.60	25.00	3.74	1.069
The teacher has access to the most current information	9.30	17.10	13.60	44.30	15.70	3.40	1.210
Pupils can access learning materials away from school	12.90	10.00	4.30	40.00	32.90	3.70	1.361
Aggregate						**3.59**	**1.121**

Source: Research Data (2019)

The findings from Table 4.9 above shows that 87.0% of the respondents agreed that digital content is readily available for use by teachers and learners with a mean of 4.36 and a standard deviation of 0.907. With a mean of 3.25 and a standard deviation of 1.040, the respondents were divided whether digital content is comprehensive and relevant, 21.40%

disagreed, 33.60% did not know while 29.30% agreed. 74.20% of the respondents agreed that students are positively embracing the use of digital content compared to traditional learning materials with a mean of 3.82 and a standard deviation of 1.068. The results also show that majority of the respondents were not sure whether digital content makes delivery innovative, interactive.

22.90% of the respondents disagreed that digital content makes delivery innovative, interactive while 27.90% indicated that they did not know. 41.40% of the respondents agreed that digital content makes delivery innovative and interactive. With a mean of 3.25 and a standard deviation of 1.040, the respondents had divided views with 41.40% agreeing that learning contents provided by digital content covers the syllabus. 22.90% of the respondent disagreed with the views while 27.90% of the respondents were not sure.

The respondents were also divided on the level of students' participation in self-learning through direct access to digital content. 20% of the respondents felt that students are participating in self-learning through direct access to digital content. 40.70% of the respondents disagreed and were of the view that students are not participating in self-learning through direct access to digital content. 65% and 68.6% of the respondents agreed that the use of digital content has a positive impact on performance in terms of syllabus coverage and student learning outcome with means of 3.72 and 3.74 and standard deviations of 1.138 and 1.069 respectively.However, 15% of the respondents felt that the use of digital content did not have a positive impact on performance in terms of syllabus coverage while another 16.5% of the respondents were of the view that the use of digital content did not have a positive impact on performance student learning outcome.

The respondents were divided whether digital content allow teachers to be innovate and get access to the most current information with a mean of 3.40 and a standard deviation of 1.210. However a standard deviation of 1.210 shows that there was wide disparity in the opinions of the respondents. 19.1% of the respondents agreed that digital content allow teachers to be innovative and get access to the most current information while 26.4% of the respondents felt that digital content does not allow teachers to be innovative and get access to the most current information. The findings also revealed that 72% of the respondents agreed that pupils can access learning materials away from school with a mean of 3.70 and standard deviation of 1.361, while 22.90% of the respondents felt that with digital learning, pupils cannot access learning materials away from school.

4.5.2. Infrastructure and Digital Strategy Implementation

The study set out to determine how infrastructure affects digital learning strategy implementation in Nairobi County Schools. The respondents were asked to indicate their rating on several factors of infrastructure that affected the digital learning strategy implementation

Table 4.9: Impact of Infrastructure on Digital Learning Strategy Implementation

	1	2	3	4	5	Mean	Std. dev
The school has access to a stable power supply	10.7	5.0	0	27.9	56.4	4.14	1.312
The school has a well-equipped computer laboratory	0	8.6	2.9	43.6	45	4.25	0.874
The classrooms are in a decent state to support digital learning	26.4	27.1	0	23.6	22.9	2.89	1.576
The pupil/computer ratio in my school is sufficient	17.90	42.10	15.70	13.60	10.70	2.57	1.236
My school has a secure internet connection	0	11.40	15.00	22.90	50.70	4.13	1.052
There is sufficient equipment to facilitate the delivery of digital learning	17.10	25.70	25.70	30.70	0.70	2.72	1.100
Aggregate						**3.45**	**1.191**

Source: Research Data (2019)

The findings in Table 4.9 above indicate that majority of the public schools in Nairobi County have access to a stable power supply as reported by 84.3% of the respondents. 15.7% of the respondents believe that their schools do not have access to stable power supply. 49.25 % of the respondents indicated that the school has a well-equipped computer laboratory for digital learning while 11.5% of the respondents felt that the school did not have a well-equipped computer laboratory for digital learning. 43.6% of the respondents were not sure of the availability of a well-equipped computer laboratory for digital learning in their schools. 46% of the respondents believed that the classrooms are in decent states to support digital learning while 53.5% of the respondents indicated that the classrooms are not in decent states

to support digital learning. 60% of the respondents believed that pupil/computer in schoolsare sufficient while 24.3% of the respondents were of the opinion that the pupil/computer ratio in my schools is sufficient. Most of the public schools in Nairobi County have secure internet connection as agreed by 73.6% of the respondents.

Only 11.40% of the respondents indicated that the schools don't have secure internet connection. 42.8% of the respondents were of the opinion that schools don not have sufficient equipment to facilitate the delivery of digital learning. Only 0.70% of the respondents agreed that schools have sufficient equipment to facilitate the delivery of digital learning. The high standard deviations indicated in Table 4.10 imply there was more variation in the views and opinion of the respondents.

4.5.3. Security and Digital Strategy Implementation

The study set out to determine how security affects digital learning strategy implementation in Nairobi County Schools. The respondents were asked to indicate their rating on several factors of security that affected the digital learning strategy implementation using the key (1=Strongly Disagree, 2=Disagree, 3=don't know, 4=Agree, 5=Strongly Agree).

Table 4.10: Impact of Security on Digital Learning Strategy Implementation

	1	2	3	4	5	Mean	Std. Deviation
There are well secured storage rooms for digital infrastructure	0.00	7.10	7.10	37.90	47.90	4.26	0.878
There have been cases of theft of digital infrastructure from the school	35.00	26.40	7.10	21.40	10.00	2.45	1.411
The digital content is well protected from cybercrimes and cyber bullying through cyber security systems	4.30	2.90	42.10	24.30	26.40	3.66	1.037
The community is positively embracing the digital learning strategy	2.90	30.70	30.70	23.60	12.10	3.11	1.067
Some parents prefer to sell of digital infrastructure used by the pupils to cater for other needs	41.40	35.00	19.30	4.30	0.00	1.86	0.875
There have been reports of parents and pupils misusing digital equipment for non-learning purposes	27.10	22.90	27.10	9.30	13.60	2.59	1.341
Aggregate						**2.99**	**1.102**

Source: Research Data (2019)

The findings in Table 4.10 above show most public schools in Nairobi have that have well secured storage rooms for digital infrastructure as reported by 85.5% of the respondents.31.4% of the respondents indicated that there have been cases of theft of digital infrastructure from the school while 61.4% of the respondent denied cases of theft of digital infrastructure from the school. Cyber security is an important element of digital learning and 50.7% of the respondents believe that the digital content is well protected from cybercrimes and cyber bullying through cyber security systems. However, 7.2% of the respondents felt that the digital content is not well protected from cybercrimes and cyber bullying through cyber security systems.

The results revealed that the community is positively embracing the digital learning strategy as reported by 35.1% of the respondents. However, 33.6% of the respondents felt that the community is not positively embracing the digital learning strategy. . The results also show

that 76.4% of the respondents believe parents are not selling digital infrastructure used by the pupils to cater for other needs while other respondents (4.3%) felt that some parents prefer to sell of digital infrastructure used by the pupils to cater for other needs. 50% of the respondents indicated that there have been no reports of parents and pupils misusing digital equipment for non-learning purposes while 22.9% of the respondents agreed that some parents and pupils were misusing digital equipment for non-learning purposes.

4.5.4. Resource Allocation and Digital Strategy Implementation

The study set out to determine how resource allocation affects digital learning strategy implementation in Nairobi County Schools. The respondents were asked to indicate their rating on several factors of resource allocation that affected the digital learning strategy using the key (1=Strongly Disagree, 2=Disagree, 3=don't know, 4=Agree, 5=Strongly Agree).

Table 4.11: Impact of Resource Allocation on Digital Learning Strategy Implementation

	1	2	3	4	5	Mean	Std. dev
There is adequate training of ICT skills to teachers in my school	9.3	20.00	0	47.90	22.90	3.55	1.294
My school supports me in ICT training with relevant and sufficient resources	0	15.00	0.00	57.90	27.10	3.97	0.936
There get adequate financial support for digital learning implementation in my school	2.90	25.00	25.00	36.40	10.70	3.27	1.045
Teachers in my school know how to teach using digital equipment	4.30	25.70	0	34.30	35.70	3.71	1.305
There is sufficient finance for repair and maintenance of digital equipment	16.40	31.40	12.90	15.70	23.60	2.99	1.444
Aggregate						**3.50**	**1.205**

Source: Research Data (2019)

The results indicated in Table 4.11 above show that 70.8% of the respondents reported that teachers receive adequate training of ICT skills. Only 29.3% of the respondents reported

absence of adequate training of ICT skills for teachers. Most public schools in Nairobi County support their staffs in ICT training with relevant and sufficient resources as reported by 85% of the respondents. 15% of the respondents indicated that the school does not provide the relevant and sufficient resources to supports their staffs in ICT training. 47.1% of the respondents indicated that the school provides adequate financial support for digital learning implementation while 27.9% of the respondents believe that the school does not provide adequate financial support for digital learning implementation.

The study also revealed that majority (70%) of teachers in public schools in Nairobi County were familiar with utilization of digital equipment in their teaching while 30% of the respondents were of the contrary opinion. Majority of the respondents (46.80%) indicated that there is no sufficient finance for repair and maintenance of digital equipment. However 39.3% of the respondents believed that there is sufficient finance for repair and maintenance of digital equipment.

4.6.Correlation Analysis

Correlation refers to the statistical relationship between two variables. A strong or high correlation means that two or more variables have a strong relationship with each other while a weak or low correlation means that the variables are hardly related. The value of -1.00 represents a perfect negative correlation while a value of +1.00 represents a perfect positive correlation. A value of 0.00 means that there is no statistical relationship between the variables being investigated.

The Pearson correlation test was conducted on the digital content, infrastructure, security and resource allocation (the independent variables) to determine their statistical relationship digital learning strategy implementation (the dependent variable). Using Pearson correlation coefficient (r) and p-value analysis, a correlation is considered significant when the probability value is below 0.05 ($p\text{-value} \leq 0.05$).

Table 4.12: Pearson Correlation

		Implementation of digital learning strategy
(1) Digital content	Pearson Correlation	.424** (Sig)
	Sig. (2-tailed)	.000
	N	420
(2) Infrastructure	Pearson Correlation	.250** (Sig)
	Sig. (2-tailed)	.003
	N	420
(3) Security	Pearson Correlation	.128
	Sig. (2-tailed)	.133
	N	420
(4) Resource	Pearson Correlation	.492** (Sig)
	Sig. (2-tailed)	.000
	N	420

Source: Research Data

From table 4.12 above, there is a positive correlation between digital content, infrastructure, security, resource allocation and the implementation digital learning strategy with R correlation coefficients of 0.424, 0.250, 0.128, and 0.492 respectively. This means that an increase in digital content, infrastructure, security and resource allocation would increase digital learning strategy implementation. The level of significance for digital content, infrastructure, security and resource allocation is 0.000, 0.003, 0.133 and 0.000 respectively. This means that digital content, infrastructure, and resource allocation have a significant correlation with digital learning strategy implementation. The study concludes that there is a positive relationship between the independent variable (digital content, infrastructure, security, resource allocation) and dependent variables (digital learning strategy implementation).

4.7.Multiple Regression Analysis

The study sought to establish the influence of each of the independent variables (Digital content, infrastructure, security and resource allocation) on digital learning strategy implementation in public primary schools with digital learning in Nairobi County.

Table 4.13: Model Summary for Multiple Regression

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.669[a]	.448	.383	.65489

a. Predictors: (Constant), Resource, Digital content, Security, Infrastructure

The findings in Table 4.14 above indicate that the value of R is 0.669 while the value of R square is 0.448. R of 0.669 indicates that there is a strong positive relationship between the independent variables and the dependent variable while R Square of 0.448 shows that the four independent variables (digital content, infrastructure, security and resource allocation) will result in a variation of 44.8% in digital learning strategy implementation in public school Nairobi County. 55.2% of the variation in digital learning strategy implantation can be explained by other variables not presented in this study.

Table 4.14: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	29.731	4	7.433	18.538	.000[b](Sig)
	Residual	54.128	135	.401		
	Total	83.859	139			

a. Dependent Variable: Implementation of digital learning strategy

b. Predictors: (Constant), Resource, Digital content, Security, Infrastructure

Source: Research Data

Table 4.14 present the results of the ANOVA test for multiple regression. The f-value for regression is 18.538 which is significant at p value 0.000. Therefore, at 95% confidence level, the regression model is significant in predicting the relationship between independent variables and dependent variable.

Table 4.15 Multiple Regression Coefficients

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	.421	.622		.676	.500
	Digital content	.700	.159	.341	4.397	.000(Sig)
	Infrastructure	.689	.159	.336	4.328	.000(Sig)
	Security	.368	.131	.420	2.817	.008(Sig)
	Resource	.471	.080	.455	5.869	.000(Sig)

a. Dependent Variable: Implementation of digital learning strategy

Table 4.15 above present the results of the coefficients analysis of determinants of digital learning strategy implementation in public schools in Nairobi County. The study adopted a regression model below to determine the relationship between the dependent and the independent variables

$$ESI = \alpha + \beta 1DC + \beta 2IN + \beta 3SC + \beta 4RS + \varepsilon$$

Where

ESI= E-Learning Strategy Implementation

DC= Digital Content

IN= ICT Infrastructure

SC= Security

RS= Resource

α =Constant

$\beta 1$; $\beta 2$; $\beta 3$ = regression coefficients

ε= Error term

From the results presented in Table 4.15 above, the regression equation therefore becomes:

ESI = 0.421 + 0.700Digital Content + 0.689ICT Infrastructure + 0.368Security+0.471Resource + ε

According to the findings, digital content practices (β=0.700, p-value=0.00), infrastructure (β=0.689, p-value=0.00), security (1=0.368 p-value=0.08) and resource allocation (β=0.471, p-value=0.000) were significant in predicting the digital learning strategy implementation since their p-values were less than 0.05.

The model revealed thatdigital content, infrastructure, security and resources allocation have positive effects on digital learning strategy implementation in public schools in Nairobi County by factors of 0.700, and 0.471 respectively. This means that a unit change in digital content and resource allocation would lead to changes in digital learning strategy implementation by factors of 0.700 and 0.471respectively. The model also revealed that infrastructure and security have positive effects on digital learning strategy implementation in public schools in Nairobi County by factors of 0.689 and 0.368 respectively. This means that a unit change in infrastructure and security would lead to changes in digital learning strategy implementation by factors of 0.689 and 0.368 respectively.

4.8.Discussion

4.8.1. Digital Content and Implementation of Digital Learning Strategy

The first specific objective of this study was to examine the effect of digital content on the implementation of digital learning strategy in public schools in Nairobi County. Theregression analysis revealed that digital content has a significant positive effect on the implementation of digital learning strategy in public primary schools in Nairobi County. This

means that an increase in digital content increases the implementation of digital learning strategy in public primary schools in Nairobi County. A unit increase in digital content would lead to an increase in digital learning strategy implementation by a factor of 0.700.

The findings of the study are in line with Zwart, Luit, Noroozi and Goei (2017) who found out that use of instructional clips and structuring of the content of the mathematics tasks on digital learning material (DLM) improved the students' mathematics learning inDutch vocational education.

Gioko (2011) investigated how the use of digital content influenced teaching and learning in secondary schools that have embraced e-learning in Kenya. The result revealed that there is a significant positive correlation between digital content and learners' participation, motivation and self- directed discovery. The study concluded that the use of digital content enhances the understanding of concepts by students. The findings of the current study support this observation that digital content positively affects the implementation of digital learning strategy in public schools in Kenya.

4.8.2. Infrastructure and Implementation of Digital Learning Strategy

The second specific objective of this study was to examine the effect of infrastructure on the implementation of digital learning strategy in public schools in Nairobi County. To achieve this objective, the study used a descriptiveresearch design to examine the effect of digital infrastructure aspects such as stable power supply, well equipped computer laboratory, pupil to computer ratio secure internet connection and support equipment. Theregression analysis revealed that infrastructure has a significant positive effect on the implementation of digital learning strategy in public primary schools in Nairobi County. This means that an increase in digital infrastructure increases the implementation of digital learning strategy in public primary schools in Nairobi County.The findings of the study reveal that a unit increase in digital infrastructure would lead to an increase in digital learning strategy implementation by a factor of 0.689. The findings are in line with Njuguna (2013); Mulwa, Kalui and Makori (2014) and Tonui, Kerich, and Koross, (2016) who observed that availability of digital infrastructure is a key determinant in the implementations of digital learning strategies in academic institutions in Kenya.

Tarus, Gichoya and Muumbo, (2015) investigated on the challenges facing the implementation of E-Learning in Kenyan public universities. The researchers collected

information from 148 public universities staff using questionnaires, in-depth interviews and document analysis. The study revealed that Inadequate ICT and e-learning infrastructure, lack of affordable and adequate Internet bandwidth and Lack of technical skills on e-learning and e-content development by the teaching staff hinders the implementation of e-learning in Kenyan public universities.The findings of the current study support this observation that digital content positively affects the implementation of digital learning strategy in public schools in Kenya.

The effective use of ICT would require the availability of equipment, supplies of computers and their proper maintenance including other accessories. Digital learning also requires a stable supply of electricity to power the computers and reliable source of internet to access the digital content. Al-Azawei, Parslow, and Lundqvist, (2016) examined the barriers and opportunities of e-learning implementation in Iraq public universities. The findings revealed that lack of ICT infrastructure, inadequate internet access and lack of funding affected the implementation of e-learning at the universities. The findings of the current study also revealed that digital infrastructure is important in the implementation of digital learning strategy in public schools in Nairobi County.

Suhail, & Mugisa, (2007) investigated factors that influence the implementation of E-learning in Higher Education Institutions in Low Bandwidth Environment. The main findings from the study were that lack of internet connectivity (low bandwidth) and accessibility, inadequate telecommunications infrastructure and lack of reliable power supply impaired the implementation process of e-leaning.

4.8.3. Security and Implementation of Digital Learning Strategy

The third specific objective of this study was to examine the effect of security on the implementation of digital learning strategy in public schools in Nairobi County. To achieve this objective, the study used a descriptiveresearch design to examine the effect of security aspects such as storage rooms, theft, cybercrimes and cyber bullying, and misuse of digital equipment. Theregression analysis revealed that security has a significant positive effect on the implementation of digital learning strategy in public primary schools in Nairobi County. This means that an increase in security increases the implementation of digital learning strategy in public primary schools in Nairobi County. A unit increase in security would lead to an increase in digital learning strategy implementation by a factor of 0.368. The findings of the study are in line with Hayaati and Fan (2010) who emphasized that appropriate security

management is critical for the implementation of digital learning strategy. The e-learning programme is highly susceptible to cyber security concerns such as cyber-attacks and cyber bullying which can leave learners vulnerable to malicious internet users. Therefore, it is important to have a strong and reliable network that will protect the users of e-learning programs form cyber-attacks while protein their confidentiality and privacy.

Physical protection of the digital infrastructure is also important to prevent theft and damage of digital equipment. Tsindoli and William (2018) conducted a study to assess teacher preparedness for the implementation of e – learning programmes in public primary schools in Emuhaya Sub-county in Kenya with a focus on ICT knowledge, attitudes and skills. The study targeted 200 class teachers from 25 public primary schools in the study area. The findings revealed that lack of computers and e – learning classrooms, lack of electricity,security for e-learning equipment and inadequate financing of e – learning programmes, impaired the implementation of e-learning programmes at the schools. Computers are highly valuable and the risk involved in installing the equipment and other learning resources is high. Therefore, primary schools require computer laboratories and storage facilities to ensure that the equipment is safe.

Barik, & Karforma, (2012) assessed the risks and remedies the implementation of e-learning system. He observed that student, teacher and controlling authorities of e-learning are exposed to different level of security risks. Since the internet is the backbone of the entire e-learning, hackers can used different loopholes of technology to attack the system, manipulation the learning content, alter the teaching, examination, evaluation and grading system, steal personal information or prevent authorised learner from accessing the e-learning system. Therefore, effective implementation of digital learning system requires a strong and reliable security measures from both physical and electronic threats.

Awidi, (2013) examined the policy and strategy issues that have influenced the process of e-learning implementation at the University of Ghana. Using a sample of 270 students and 80 lecturers, the study revealed that unreliable power supply, lack of adequate security for the protection of available infrastructure and e-resources and periodic theft of routers, and computer accessories from the laboratories were the main challenges facing the implementation of e-learning strategy at the university. The findings of the current study also revealed that security is important in the implementation of digital learning strategy in public schools in Nairobi County.

4.8.4. Resources Allocation and Implementation of Digital Learning Strategy

The forth specific objective of this study was to examine the effect of resource allocation on the implementation of digital learning strategy in public schools in Nairobi County. To achieve this objective, the study used a descriptiveresearch design to examine the effect of resource allocation aspects such as ICT training, relevant ICT resources, financial support for ICT training, ICT skills and repairs and maintenance. Theregression analysis revealed that resource allocation has a significant positive effect on the implementation of digital learning strategy in public primary schools in Nairobi County. This means that an increase in resource allocation increases the implementation of digital learning strategy in public primary schools in Nairobi County. A unit increase in resource allocation would lead to an increase in digital learning strategy implementation by a factor of 0.471.

The findings are in line with Ghavifekr, and Rosdy, (2015) who analysed the perceptions of teachers on effectiveness of ICT integration to support teaching and learning process in classroom. The researchers analysed the responses of 101 teachers from 10 public secondary schools in Kuala Lumpur, Malaysia. The findings form the study revealed that equipping teachers with ICT tools and facilities is one the main factors that can promote successful implementation of e-learning strategy. The results also indicate that professional development training programs for teachers is also key role enhancing students' quality learning. The result concluded that teachers need sufficient ICT skills to effectively implement digital learning strategy in public secondary school.

Teachers are the foundation of teaching and learning in school. For effective implementation of digital learning strategy, it is critical for the teachers to get adequate ICT training so that they can prepare the student on how to use digital content for learning. Stephen, (2014), used a descriptive design to assess the preparedness of 45 public primary schools in the implementation of laptops project in Bungoma County Kenya. The findings revealed that lack of adequate training in ICT for teachers and administrators; limited computer hardware dedicated to administrative work, lack of time and absence of appropriate administrative software impaired the implementation of digital learning in the target population. The findings of the current study support this observation that resource allocation positively affects the implementation of digital learning strategy in public schools in Nairobi County.

Sule-Saa, (2018) examined the factors influencing the implementation of ICT projects in Ghanaian senior secondary schools. The findings revealed that finance and availability of funds were the major challenges facing the implementation of ICT projects in the schools

Implementation of the e-learning programme in public primary schools depends on the training capacity of teachers and how they are readily prepared to receive the new programme. It also depends on the provision of quality learning resources and facilities. The process of implementing digital learning strategy is costly and needs more effort to ensure funds are available. Public primary schools do not have adequate financial resources to shoulder the cost of implementing an expensive programme such as e-learning.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1.Introduction

This chapter summarizes the main findings of the study and the statistical analysis. The presentation is organized around specific objectives and research questions to assess the results by evaluating and interpreting them. The conclusions are in tandem with the specific objectives and research questions.The section also covers the recommendations and suggestions for further research.

5.2.Summary of the Main Findings

The first objective of the study was to assess the influence of digital content on digital learning strategy implementation. The study revealed that digital content has an effect on the implantation of digital learning strategy. According to the findings, digital content which was measured in terms of comprehensiveness, availability, accessibility and syllabus coverage has a significant positive effect on the implementation of digital learning strategy. The findings revealed that the overall measure of digital content has a positive coefficient of 0.700 and a p value of 0.000. This means that a unit increase in digital content will cause an increase in strategy implementation by 0.700.

The second objective of the study was to assess the influence of infrastructure on digital learning strategy implementation. The study revealed that infrastructure has an effect on the implantation of digital learning strategy. According to the findings, infrastructure which was measured in terms of stable power supply, well equipped computer laboratory, pupil to computer ratio secure internet connection and support equipment has a significant positive effect on the implementation of digital learning strategy. The findings revealed that the overall measure of infrastructure has a positive coefficient of 0.689 and a p value of 0.000. This means that a unit increase in infrastructure will cause an increase in strategy implementation by 0.689.

The third objective of the study was to assess the influence of security on digital learning strategy implementation. The study revealed that security has an effect on the implantation of digital learning strategy. According to the findings, security which was measured in terms of storage rooms, theft, cybercrimes and cyber bullying, and misuse of digital equipment has a significant positive effect on the implementation of digital learning strategy. The findings revealed that the overall measure of security has a positive coefficient of 0.368 and a p value of

0.008. This means that a unit increase in security will cause an increase in strategy implementation by 0.368.

The fourth objective of the study was to assess the influence of resource allocation on digital learning strategy implementation. The study revealed that resource allocation has an effect on the implantation of digital learning strategy. According to the findings, resource allocation which was measured in terms ICT training, relevant ICT resources, financial support for ICT training, ICT skills and repairs and maintenance has a significant positive effect on the implementation of digital learning strategy. The findings revealed that the overall measure of resource allocation has a positive coefficient of 0.471 and a p value of 0.000. This means that a unit increase in resource allocation will cause an increase in strategy implementation by 0.471.

5.3.Conclusion

The study sought to assess digital learning strategy implementation in public primary schools within Nairobi County, Kenya and made the following conclusions;

5.3.1. Digital Content on the Implementation of Digital Learning Strategy

The study sought to determine the influence of digital content on the implementation of digital learning strategy in public primary schools in Nairobi County. From the results of the analysis, the study concluded that digital content has a significant positive influence on the implementation of digital learning strategy.

5.3.2. Infrastructure on the Implementation of Digital Learning Strategy

The study sought to determine the influence ofinfrastructure on the implementation of digital learning strategy in public schools in Nairobi County. From the results of the analysis, the study concluded that infrastructure has a significant positive influence on the implementation of digital learning strategy in public schools in Nairobi County.

5.3.3. Security on the Implementation of Digital Learning Strategy

The study sought to determine the influence of security on the implementation of digital learning strategy in public schools in Nairobi County. From the results of the analysis, the study concluded that security has a significant positive influence on the implementation of digital learning strategy in public schools in Nairobi County.

5.3.4. Resource Allocation on the Implementation of Digital Learning Strategy

The study sought to determine the influence of resource allocation on the implementation of digital learning strategy in public schools in Nairobi County. From the results of the analysis, the study concluded that resource allocation has a significant positive influence on the implementation of digital learning strategy in public schools in Nairobi County.

5.4.Recommendations, Policy and Practice

The following recommendations were made based on the research findings;

5.4.1. Digital Content on the Implementation of Digital Learning Strategy

Regulators of digital learning program should ensure that the digital content is comprehensive, relevant, and interactive and covers the syllabus well. All stakeholders in the e-learning program should work together need to be prepared which involves training schedules and even public awareness through media, seminars and workshops Strategically involving headmasters and parents is necessary for the institutionalisation and longer-term sustainability management of the laptop project.Provision of relevant, comprehensive, readily available digital contents that covers the syllabus will increase students' participation in learning and positively contribute to the performance of the students in public schools in Nairobi

5.4.2. Infrastructure on the Implementation of Digital Learning Strategy

Public primary school should have appropriate infrastructure such as computer hardware and software, well equipped computer laboratories, stable powers supply and secure internet connection for proper implementation of the digital learning strategy. The government should provide adequate funds for purchase and maintenance of the necessary digital learning infrastructure and the renovation of the existing physical facilities to facilitate the implementation and sustainability of the e-learning programme.The government should make efforts to ensure that primary schools have reliable internet access for digital learning. The government should ensure that primary schools have stable power supply installed in schools for digital learning.

5.4.3. Security on the Implementation of Digital Learning Strategy

Government should also put in place adequate measures to ensure security of network and information systems to prevent cyber-crimes and cyber-bullying and guarantee safety of person information.

5.4.4. Resource allocation on the Implementation of Digital Learning Strategy

Teachers and instructors should be trained in basic ICT skills and ICT-based teaching methods to feel comfortable about using the materials. It is also important to train teachers how to integrate ICT in their teaching methods.It is critical for teachers to have adequate training on ICT so that they can be able to use digital equipment to teach. Primary schools should also have enough financial resources to purchase digital equipment and also maintain them to prevent frequent breakdowns

5.5.Suggestions for Further Research

This study examined the factors affecting the implementation of digital learning strategy in public schools in Nairobi County. However, not all the factors were studied. Therefore, further study should be carried out on other factors such as student attitude towards digital learning which can affect the implementation of digital learning strategy. A similar study can also be conducted in other counties that have adopted the digital learning strategy.

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APPENDICES

APPENDIX I: QUESTIONNAIRE

My name is Qamar Hussein a student pursuing MBA-Strategic Management at St Paul's University. This study seeks your views on digital learning strategy implementation in public schools in Kenya. I appreciate your acceptance to participate in this research. All information provided will be treated with utmost confidentiality and for purposes of academic research only. Kindly respond to the questions as truthfully as possible, do not indicate your name on any part of this questionnaire. Thank you for your time

Sign……

Qamar Hussein

MBANRB403417

Email: mbanrb403417@spu.ac.ke

Number: 0720913711

SECTION ONE: BACKGROUND INFORMATION

1. Gender

Male [ ] Female [ ]

2. Age

20-30 [ ]

31-40 [ ]

41-50 [ ]

51 and above [ ]

3. Education Level

Certificate [ ]

Diploma [ ]

Degree [ ]

Masters [ ]

Other (Specify) ……

4. Job Position

Head teacher [ ]

Deputy Head teacher [ ]

Teacher [ ]

ICT Staff [ ]

Other (Specify) …….

5. Years of Work Experience in Current Role

1 year and below [ ]

2-5 years [ ]

5-10 years [ ]

Above 10 years [ ]

SECTION TWO: DIGITAL CONTENT AND DIGITAL LEARNING STRATEGY IMPLEMENTATION

What is your level of agreement/disagreement with the following statements? Use a tick to indicate your response: 1: Strongly disagree 2: Disagree 3: Don't Know 4: Agree 5: Strongly agree

	1	2	3	4	5
1) Digital content is readily available for use by teachers and learners					
2) The digital content is comprehensive and relevant					
3) Students are positively embracing the use of digital content compared to traditional learning materials					
4) Digital content makes delivery innovative, interactive					
5) The learning contents provided covers the syllabus well					
6) Students are participating in self-learning through direct access to digital content					
7) Use of digital content has a positive impact on performance in terms of syllabus coverage					
8) Use of digital content has a positive impact on performance in terms of student learning outcome					
9) The teacher is allowed to innovate and has access to the most current information through digital content					
10) Pupils can access learning materials away from the school					

SECTION THREE: INFRASTRUCTURE AND DIGITAL LEARNING STRATEGY IMPLEMENTATION

What is your level of agreement/disagreement with the following statements? Use a tick to indicate your response: 1: Strongly disagree 2: Disagree 3: Don't Know 4: Agree 5: Strongly agree

	1	2	3	4	5
1) The school has access to a stable power supply					
2) The school has a well-equipped computer laboratory					
3) The classrooms are in a decent state to support digital learning					
4) The pupil/computer ration in my school is sufficient					
5) My school has a secure internet connection					
6) There is sufficient equipment to facilitate the delivery of digital content					

SECTION FOUR: SECURITY AND DIGITAL LEARNING STRATEGY IMPLEMENTATION

What is your level of agreement/disagreement with the following statements: Use a tick to indicate your response: 1: Strongly disagree 2: Disagree 3: Don't Know 4: Agree 5: Strongly agree

	1	2	3	4	5
1) There are well secured storage rooms for digital infrastructure					
2) There have been cases of theft of digital infrastructure from the school					
3) The digital content is well protected from cybercrimes and cyber bullying through cyber security systems					
4) The community is positively embracing the digital learning strategy					
5) Some parents prefer to sell of digital infrastructure used by the pupils to cater for other needs					
6) There have been reports of parent and students misusing digital equipment for non-learning purposes					

SECTION FIVE: RESOURCE ALLOCATION AND DIGITAL LEARNING STRATEGY IMPLEMENTATION

What is your level of agreement/disagreement with the following statements: Use a tick to indicate your response: 1: Strongly disagree 2: Disagree 3: Don't Know 4: Agree 5: Strongly agree

	1	2	3	4	5
1) There is adequate training of ICT skills to teachers in my school					
2) My school supports me in ICT training with relevant and sufficient resources					
3) There get adequate financial support for digital learning implementation in my school					
4) Teachers in my school know how to teach using digital equipment					
5) The ratio of computers to number of students is adequate					
6) There is sufficient finances for repair and maintenance of digital equipment					

SECTION SIX: IMPLEMENTATION OF DIGITAL LEARNING STRATEGY

How can you rate the implementation of digital learning strategy in your school?

Use this scale: 1: Poor 2: Fair3: Moderate 4: Good 5: Excellent

	1	2	3	4	5
1) Syllabus completion					
2) Student performance					
3) Student participation					
4) Teacher/student attitude towards digital learning					

THANK YOU FOR PARTICIPATING

APPENDIX II: LIST OF PRIMARY SCHOOLS THAT HAVE IMPLEMENTED DIGITAL LEARNING

S.NO	COUNTY	SUBCOUNTY	SCHOOL NAME

S.NO	COUNTY	SUBCOUNTY	SCHOOL NAME
1	NAIROBI	WESTLANDS	MUGUGA GREEN PRY
2	NAIROBI	WESTLANDS	KABETE REHAB SCHOOL
3	NAIROBI	WESTLANDS	VISA OSHWAL PRIMARY
4	NAIROBI	WESTLANDS	CHELETA PRIMARY
5	NAIROBI	WESTLANDS	LORESHO PRIMARY
6	NAIROBI	WESTLANDS	NORTH HIGHRIDGE PRY
7	NAIROBI	WESTLANDS	BOHRA PRIMARY
8	NAIROBI	WESTLANDS	HIGHRIDGE PRIMARY
9	NAIROBI	WESTLANDS	AGA KHAN PRIMARY
10	NAIROBI	WESTLANDS	KILIMANI PRIMARY
11	NAIROBI	WESTLANDS	ST. GEORGE`S PRY
12	NAIROBI	WESTLANDS	AGA KHAN DEAF UNIT
13	NAIROBI	WESTLANDS	STATE HOUSE PRY
14	NAIROBI	WESTLANDS	NAIROBI PRIMARY
15	NAIROBI	WESTLANDS	LAVINGTON PRIMARY
16	NAIROBI	WESTLANDS	KILELESHWA PRIMARY
17	NAIROBI	WESTLANDS	KANGEMI PRIMARY
18	NAIROBI	WESTLANDS	KIHUMBUINI PRIMARY
19	NAIROBI	WESTLANDS	MUTHANGARI PRY
20	NAIROBI	WESTLANDS	KABETE VET PRIMARY
21	NAIROBI	WESTLANDS	NEW KIHUMBUINI PRY
22	NAIROBI	WESTLANDS	JACARANDA SPECIAL
23	NAIROBI	WESTLANDS	FARASI LANE PRIMARY
24	NAIROBI	WESTLANDS	HOSPITAL HILL PRY
25	NAIROBI	WESTLANDS	LOWER KABETE PRY
26	NAIROBI	WESTLANDS	MILIMANI PRIMARY
27	NAIROBI	WESTLANDS	WESTLANDS PRIMARY
28	NAIROBI	WESTLANDS	KARURA FOREST PRY
29	NAIROBI	LANGATA	NGEI
30	NAIROBI	LANGATA	LANGATAWEST
31	NAIROBI	LANGATA	UHURU GARDENS
32	NAIROBI	LANGATA	LANGATA ROAD
33	NAIROBI	LANGATA	MADARAKA
34	NAIROBI	LANGATA	KONGIONI
35	NAIROBI	LANGATA	ST. MARY KAREN
36	NAIROBI	LANGATA	KAREN C
37	NAIROBI	LANGATA	NGONG FOREST
38	NAIROBI	LANGATA	LANGATA BARRACKS
39	NAIROBI	MAKADARA	DR. KRAPF
40	NAIROBI	MAKADARA	JOGOO ROAD
41	NAIROBI	MAKADARA	PLAINSVIEW PRY
42	NAIROBI	MAKADARA	MUKURU PRY
43	NAIROBI	MAKADARA	JOSEPH APUNDO
44	NAIROBI	MAKADARA	MAKONGENI

S.NO	COUNTY	SUBCOUNTY	SCHOOL NAME
45	NAIROBI	MAKADARA	ST.ANNES PRI
46	NAIROBI	MAKADARA	BIDII
47	NAIROBI	MAKADARA	HARAMBEE
48	NAIROBI	MAKADARA	BARAKA
49	NAIROBI	MAKADARA	ST.PATRICKS
50	NAIROBI	MAKADARA	OLM NRB
51	NAIROBI	MAKADARA	NAIROBI SOUTH
52	NAIROBI	MAKADARA	MATHIN LUTHER
53	NAIROBI	MAKADARA	CANON APOLLO
54	NAIROBI	MAKADARA	ST. PAULS
55	NAIROBI	MAKADARA	ST. MICHAEL
56	NAIROBI	MAKADARA	MARIAKANI
57	NAIROBI	MAKADARA	NILE ROAD
58	NAIROBI	MAKADARA	ST.ELIZABETH
59	NAIROBI	MAKADARA	ST. BAKHITA
60	NAIROBI	MAKADARA	ST. CATHERINES
61	NAIROBI	MAKADARA	RABAI ROAD
62	NAIROBI	MAKADARA	ST. JOHNS
63	NAIROBI	MAKADARA	KALOLENI PRY
64	NAIROBI	MAKADARA	STAR OF HOPE
65	NAIROBI	MAKADARA	OFAFA JERICHO
66	NAIROBI	MATHARE	HURUMA
67	NAIROBI	MATHARE	MATHARI
68	NAIROBI	MATHARE	NDURURUNO
69	NAIROBI	MATHARE	DAIMA
70	NAIROBI	MATHARE	KIBORO
71	NAIROBI	MATHARE	SALAMA
72	NAIROBI	MATHARE	VALLEY BRIDGE
73	NAIROBI	MATHARE	MATHARE SPECIAL
74	NAIROBI	MATHARE	ST. TERESAS
75	NAIROBI	NJIRU	DANDORA
76	NAIROBI	NJIRU	ATHI
77	NAIROBI	NJIRU	TOM MBOYA
78	NAIROBI	NJIRU	NJIRU
79	NAIROBI	NJIRU	RONALD NGALA
80	NAIROBI	NJIRU	JEHOVA JIRE
81	NAIROBI	NJIRU	USHIRIKA
82	NAIROBI	NJIRU	RUAI
83	NAIROBI	NJIRU	DRUM VALE
84	NAIROBI	NJIRU	GITUAMBA
85	NAIROBI	NJIRU	JAMES GICHURU
86	NAIROBI	NJIRU	K.SOUTH
87	NAIROBI	NJIRU	KAYOLE NORTH
88	NAIROBI	NJIRU	MAUA

S.NO	COUNTY	SUBCOUNTY	SCHOOL NAME
89	NAIROBI	NJIRU	MIHANGO
90	NAIROBI	NJIRU	WANGU
91	NAIROBI	NJIRU	NGUNDU
92	NAIROBI	NJIRU	ST. DOMINIC
93	NAIROBI	NJIRU	HIGH WAY
94	NAIROBI	NJIRU	SUPA LOAF
95	NAIROBI	STAREHE	ISLAMIA PRIMARY
96	NAIROBI	STAREHE	AINSWORTH PRIMARY
97	NAIROBI	STAREHE	MOI AVENUE PRIMARY
98	NAIROBI	STAREHE	CGHU PRIMARY
99	NAIROBI	STAREHE	MUSLIM PRIMARY
100	NAIROBI	STAREHE	RACECOURSE
101	NAIROBI	STAREHE	ST. PETERS CLAVERS
102	NAIROBI	STAREHE	PARKROAD
103	NAIROBI	STAREHE	NGETHU WATER WORKS
104	NAIROBI	STAREHE	ST. BRIGIDS
105	NAIROBI	STAREHE	PUMWANI
106	NAIROBI	STAREHE	JUJA ROAD
107	NAIROBI	STAREHE	ARYA
108	NAIROBI	STAREHE	RIVER BANK
109	NAIROBI	STAREHE	DR. AGGREY
110	NAIROBI	STAREHE	MURANGA ROAD
111	NAIROBI	STAREHE	CITY PRIMARY
112	NAIROBI	STAREHE	PANGANI PRI
113	NAIROBI	STAREHE	DR RIBEIRO PARKLANDS
114	NAIROBI	STAREHE	SSD PRIMARY
115	NAIROBI	EMBAKASI	PETER KIBUKOSYA
116	NAIROBI	EMBAKASI	AEF REEUBEN
117	NAIROBI	EMBAKASI	DONHOLM
118	NAIROBI	EMBAKASI	TUMAINI PRIMARY
119	NAIROBI	EMBAKASI	EDELVALE
120	NAIROBI	EMBAKASI	BUSARA
121	NAIROBI	EMBAKASI	EMBAKASI GARISSON
122	NAIROBI	EMBAKASI	KWA NJENGA PRIMARY
123	NAIROBI	EMBAKASI	EMBAKASI PRIMARY
124	NAIROBI	EMBAKASI	THAWABU PRIMARY
125	NAIROBI	EMBAKASI	OLN PRIMARY
126	NAIROBI	EMBAKASI	KIFARU
127	NAIROBI	EMBAKASI	BONDENI
128	NAIROBI	EMBAKASI	IMARA
129	NAIROBI	EMBAKASI	UNITY
130	NAIROBI	EMBAKASI	MWANGAZA
131	NAIROBI	EMBAKASI	KOMAROCK
132	NAIROBI	EMBAKASI	UMOJA PRIMARY

S.NO	COUNTY	SUBCOUNTY	SCHOOL NAME
133	NAIROBI	EMBAKASI	KAYOLE 1
134	NAIROBI	EMBAKASI	UTAWALA ACADEMY
135	NAIROBI	KIBRA	OLYMPIC PRIMARY
136	NAIROBI	KIBRA	AYANY PRIMARY
137	NAIROBI	KIBRA	TOI PRIMARY
138	NAIROBI	KIBRA	KIBERA PRIMARY
139	NAIROBI	KIBRA	MBAGATHI ROAD PRIMARY
140	NAIROBI	KIBRA	JOSEPH KANGETHE PRIMARY
141	NAIROBI	KIBRA	SHADRACK KIMALEL PRIMARY
142	NAIROBI	KIBRA	RAILA EDUCATIONAL CENTRE
143	NAIROBI	KIBRA	JAMHURI PRIMARY
144	NAIROBI	DAGORETTI	RIRUTA SATELITE
145	NAIROBI	DAGORETTI	RUTHIMITU
146	NAIROBI	DAGORETTI	NEMBU
147	NAIROBI	DAGORETTI	KIRIGU
148	NAIROBI	DAGORETTI	MUTUINI
149	NAIROBI	DAGORETTI	KAGIRA
150	NAIROBI	DAGORETTI	MUKARARA
151	NAIROBI	DAGORETTI	GITIBA
152	NAIROBI	DAGORETTI	DAGORETII REHAB
153	NAIROBI	DAGORETTI	DR. MUTHIORA
154	NAIROBI	DAGORETTI	GATINA
155	NAIROBI	DAGORETTI	NDURARUA
156	NAIROBI	DAGORETTI	KINYANJUI RD
157	NAIROBI	DAGORETTI	KABIRIA
158	NAIROBI	DAGORETTI	KAWANGWARE
159	NAIROBI	DAGORETTI	DAGORETTI MUSLIM
160	NAIROBI	DAGORETTI	RIRUTA HGM
161	NAIROBI	DAGORETTI	WAITHAKA SPECIAL
162	NAIROBI	DAGORETTI	DAGORETTI SPECIAL
163	NAIROBI	KAMUKUNJI	BURUBURU
164	NAIROBI	KAMUKUNJI	MO FORCES
165	NAIROBI	KAMUKUNJI	HESHIMA
166	NAIROBI	KAMUKUNJI	DR LIVINGSTONE
167	NAIROBI	KAMUKUNJI	KIMATHI
168	NAIROBI	KAMUKUNJI	UHURU
169	NAIROBI	KAMUKUNJI	BAHATI
170	NAIROBI	KAMUKUNJI	NAIROBI RIVER
171	NAIROBI	KAMUKUNJI	OLM
172	NAIROBI	KAMUKUNJI	MAB
173	NAIROBI	KAMUKUNJI	EASLEIGH AIRPORT
174	NAIROBI	KAMUKUNJI	NEW EASTLEIGH
175	NAIROBI	KAMUKUNJI	NEW PUMWANI
176	NAIROBI	KAMUKUNJI	ST TERESAS

S.NO	COUNTY	SUBCOUNTY	SCHOOL NAME
177	NAIROBI	KAMUKUNJI	MORRISON
178	NAIROBI	KAMUKUNJI	ZAWADI
179	NAIROBI	KAMUKUNJI	MUTHURWA
180	NAIROBI	KASARANI	KAMITI
181	NAIROBI	KASARANI	M. M. CHANDARIA
182	NAIROBI	KASARANI	DANIEL COMBONI
183	NAIROBI	KASARANI	ROYSAMBU
184	NAIROBI	KASARANI	GITHURAI
185	NAIROBI	KASARANI	NJATHAINI
186	NAIROBI	KASARANI	BABA DOGO
187	NAIROBI	KASARANI	MUREMA
188	NAIROBI	KASARANI	MATHARE NORTH
189	NAIROBI	KASARANI	KAHAWA GARRISON
190	NAIROBI	KASARANI	KIWANJA
191	NAIROBI	KASARANI	THIKA ROAD
192	NAIROBI	KASARANI	MARURA
193	NAIROBI	KASARANI	NGUNYUMU
194	NAIROBI	KASARANI	MATHARE 4A
195	NAIROBI	KASARANI	DRIVE-IN
196	NAIROBI	KASARANI	MUTHAIGA
197	NAIROBI	KASARANI	KASARANI
198	NAIROBI	KASARANI	KARIOBANGI NORTH
199	NAIROBI	KASARANI	KAHAWA
200	NAIROBI	KASARANI	MAHIGA
201	NAIROBI	KASARANI	MARARUI
202	NAIROBI	KASARANI	G.S.U.
203	NAIROBI	KASARANI	GARDEN ESTATE
204	NAIROBI	KASARANI	K.U
205	NAIROBI	KASARANI	TREESIDE

APPENDIX III: PERCENTAGE TABLES

Impact of Digital Content on Digital Learning Strategy Implementation

	1	2	3	4	5	Mean	Std. dev
Digital content is readily available for use by teachers and learners	0.00	8.60	3.60	30.70	57.10	4.36	0.907
The digital content is comprehensive and relevant	3.60	21.40	33.60	29.30	12.10	3.25	1.040
Students are positively embracing the use of digital content compared to traditional learning materials	2.90	13.60	9.30	47.10	27.10	3.82	1.068
Digital content makes delivery innovative, interactive	0.00	22.90	27.90	41.40	7.90	3.34	0.920
The learning contents provided covers the syllabus well	10.70	15.00	19.30	42.10	12.90	3.31	1.194
Students are participating in self-learning through direct access to digital content	11.40	20.00	20.70	27.10	20.70	3.26	1.305
Use of digital content has a positive impact on performance in terms of syllabus coverage	5.70	9.30	10.00	37.10	27.90	3.72	1.138
Use of digital content has a positive impact on performance in terms of student learning outcome	2.90	13.60	15.00	43.60	25.00	3.74	1.069
The teacher is allowed to innovate and has access to the most current information through digital content	9.30	17.10	13.60	44.30	15.70	3.40	1.210
Pupils can access learning materials away from school	12.90	10.00	4.30	40.00	32.90	3.70	1.361

Impact of Infrastructure on Digital Learning Strategy Implementation

	1	2	3	4	5	Mean	Std. dev
The school has access to a stable power supply	10.7	5.0	0	27.9	56.4	4.14	1.312
The school has a well-equipped computer laboratory	0	8.6	2.9	43.6	45	4.25	0.874
The classrooms are in a decent state to support digital learning	26.4	27.1	0	23.6	22.9	2.89	1.576
The pupil/computer ratio in my school is sufficient	17.90	42.10	15.70	13.60	10.70	2.57	1.236
My school has a secure internet connection	0	11.40	15.00	22.90	50.70	4.13	1.052
There is sufficient equipment to facilitate the delivery of digital learning	17.10	25.70	25.70	30.70	0.70	2.72	1.100

Impact of Security on Digital Learning Strategy Implementation

	1	2	3	4	5	Mean	Std. Deviation
There are well secured storage rooms for digital infrastructure	0.00	7.10	7.10	37.90	47.90	4.26	0.878
There have been cases of theft of digital infrastructure from the school	35.00	26.40	7.10	21.40	10.00	2.45	1.411
The digital content is well protected from cybercrimes and cyber bullying through cyber security systems	4.30	2.90	42.10	24.30	26.40	3.66	1.037
The community is positively embracing the digital learning strategy	2.90	30.70	30.70	23.60	12.10	3.11	1.067
Some parents prefer to sell of digital infrastructure used by the	41.40	35.00	19.30	4.30	0.00	1.86	0.875

pupils to cater for other needs							
There have been reports of parents and pupils misusing digital equipment for non-learning purposes	27.10	22.90	27.10	9.30	13.60	2.59	1.341

Table 4.4 Impact of Resource Allocation on Digital Learning Strategy Implementation

	1	**2**	**3**	**4**	**5**	**Mean**	**Std. dev**
There is adequate training of ICT skills to teachers in my school	9.3	20.00	0	47.90	22.90	3.55	1.294
My school supports me in ICT training with relevant and sufficient resources	0	15.00	0.00	57.90	27.10	3.97	0.936
There get adequate financial support for digital learning implementation in my school	2.90	25.00	25.00	36.40	10.70	3.27	1.045
Teachers in my school know how to teach using digital equipment	4.30	25.70	0	34.30	35.70	3.71	1.305
There is sufficient finance for repair and maintenance of digital equipment	16.40	31.40	12.90	15.70	23.60	2.99	1.444