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Influence of Information Communication and Technology Project Implementation on Academic Performance in Public Secondary Schools in Taita Taveta County, Kenya

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Abstract

This study sought to untangle why, despite the implementation of ICT projects, schools have not improved academic performance. The objectives of the study were; to determine the influence of ICT infrastructural implementation on academic performance in public secondary schools, assess the influence of ICT staff training implementation on academic performance in public secondary schools, establish the influence of ICT technical support implementation on academic performance in public secondary schools, find the influence of ICT financing implementation on academic performance in public secondary schools and to determine the influence of ICT policies implementation on academic performance in public secondary schools. A descriptive survey design was applied for the study. The targeted population was 520 out of which a sample size of 84 was used through a simple random sampling method. Questionnaires were used to collect primary data while the interview was used to collect secondary data from the principals and education officers. Data were analyzed through the use of MS Excel and Statistical Package for Social Science. The presentation was done using tables and frequencies. Mean, standard deviation and study hypothesis were processed through the use of descriptive statistics and inferential were used. On findings, hypotheses were tested on 0.05 level of significance and it showed that both ICT infrastructure and ICT staff training were significant at p=0.001 and p=0.047 respectively. The rest of the factors were not significant. Spearman's correlation was also used to find the relationship between the dependent variable of academic performance and factors of ICT infrastructure, staff training, technical support, financing, and policies. Only ICT infrastructure and staff training at r=0.891 and r=0.672 respectively were strongly correlated to academic performance. The conclusion was that there exists a significant relationship between ICT infrastructures and ICT staff training on academic performance. There was no significant relationship between ICT technical support, financing and policy implementation on school academic performance. Recommendations were that more ICT

infrastructural resources still needed in schools. Teachers, students, non-teaching and school administrators should be trained better on using ICT. Schools to prioritize ICT budgets in their plans, all students need to be introduced to basic ICT skills in the lower classes, the school's administration needs to embrace ICT as a key resource for modern teaching and learning.

Keywords: *School academic performance, ICT infrastructural implementation, ICT staff training implementation, ICT financing implementation, ICT policy implementation.*

1.1 Background of the study

The education segment of a country is one of the key priority areas for any nation for promoting and advancing development. Over the years its improvement has given rise to a high quality to human capital where its effects trickle down to the other sectors of the economy such as infrastructure, commerce, health, environment, and natural resources, transport and communication, security, public service among others. This is the reason why governments spent a sizable amount of funds in their budgets to fund education. Ministries of Education of various nations keep on raising the levels of education to boost human capital skills and improve the productivity of its labour force. One strategy of improving education in the 21st century is the use of Information Communication and Technology (ICT) in schools for classroom learning, teaching, and management. Kommers and Simmerling (2005) agree with this assertion that teachers' desire to utilize ICTs in their classroom teaching to improve student performance.

The government of Kenya (GoK), rolled out ICT projects in schools to give a back-up to Free Primary Education (FPE) implementation and address emerging challenges such as; over enrolment in classes, high teacher-pupil ratios especially in more populous and semi-arid areas, inadequate teachers on certain subjects and reduce high cost of learning and teaching resources, MOE ICT Strategy for Education and Training (2006). It is believed that with the use of ICT by teachers, they could reach more students and therefore increase teacher-learner contact hours and hence better learning. Learners would get access to learning resources more using computers and that the teaching and learning resources would be affordable.

At the global scene and Byker (2014) reports that currently, India aspires to be a leading ICT nation among the knowledge-based societies by use of education among the young school-going children. Its policymakers expect ICT to bring in education improvements, though they are still working on how to use technology effectively in the classroom to improve learning in lower classes. However, most investment in technology in India's schools is still wasted, for instance in cases where computers have been installed in schools without electricity, (Byker, 2014). Chile, one of the countries doing well in ICT in school education, implemented some ICT projects intending to boost its quality of education. One of the projects implemented since 1992 was Enlaces (Links) ICT initiative, (Hinostroza, Hepp, Cox, & Guzmán, 2003). It was aimed at integrating ICTs in the classroom in all public secondary schools. Each school was given computers, local networks, education software, unlimited free internet access and educational content on the Chilean curriculum. Also, the government in partnership with local universities provided technical and pedagogical support to each school for a long period to ensure success. Over 80 % of teachers were trained in ICT proficiency (Hepp, Hinostroza, & Laval, 2004; Potashnik, 1996). This is a good case study of an ICT project that was implemented successfully in schools and clearly describes what to be done to ensure schools succeed.

According to Trucano, (2012) ICT has revolutionized the development of education in China. Many developed nations recognize the great importance ICT has in education and they developed many national strategic plans to spur the development of ICT in education. For instance, the Chinese government is implementing a national ICT plan in education (2011–2020) aimed at improving school ICT infrastructure. China has also made a plan to modernize her schools through ICT in education. In the present times, China has made good progress in ICT school infrastructure, the use of digital materials, new methods of teaching and ICT aided educational administration. Though, there still exist some challenges Trucano (2012). These inform that even developed nations such as China are still developing school ICT facilities to better teaching and improve school performance and effectiveness in management.

ICT was introduced in Malaysian schools as early as 1970 and it has been in use to date. ICT teaching began in 1999 where 322 schools were selected as pioneers in ICT integration. Besides, training of teachers was done as an in-service program aimed at enabling teachers to apply ICT in their usual work of teaching, (Lateha & Muniandy, 2010). This implies that ICT is a game-changer strategy applied by governments to shift teaching approaches to improve learning, make teaching practical and relevant to modern times that promote industrial development. However, still, a lot remains to be done for schools to be equipped with ICT resources. Like the case of the Dominica Republic, the government upgraded over 19 computer labs in schools, where over 450 computers, printers, servers were deployed. With the new project, digital lessons would be streamed and projected into the classroom, using a laptop, wireless connection, and a projector. The government launched the ICT project and informed that it was going to facilitate ICT in the 21st century," Dominica News Online, (2010).

According to Padayachee (2017), ICT integration in teaching and learning is taken as an ultimate solution towards resolving South Africa's education challenges. Secondary school systems world-wide face a mired of challenges such as low achievement particularly in STEM subjects, wide syllabus, few teachers, inadequate teaching resources, less motivated teachers and indiscipline students. Governments embraced the use of ICT to supplement traditional teaching resources, albeit its challenges such as low teacher ICT skills. According to Ngeze (2015) up to recently, Tanzanian teachers have been using books and other static learning materials with little success on learner's outcomes, before the Ministry of Education trained educational administrators and teachers on the application of ICT in the classrooms. This was aimed at improving dwindling student performance. The students would be able to learn on their own, using the developed digital content that would be interactive and engaging.

According to Sara and Onguko (2009), policies in ICT in education have increased and led to more investments in ICT in many countries, particularly in Rwanda where pioneering ICT use is well established. This is evidence that governments have realized the role of ICT in the improvement of education standards and its linkage to national development. It is important to note that the East African Community, except for Burundi, has made good progress incorporating ICTs education, (Sara & Onguko 2009). Nonetheless, it's now a known fact that providing ICT equipment alone does not promote educational change needed to improve schools. More still need to be done particularly in basic ICT skills among the students, teachers, and management to improve buy-in, capacity building, and motivation.

ICT infrastructure in many public educational institutions has been a big hindrance to the implementation of ICT programs in many upcoming nations, Kenya included. The facilitation

by non-governmental organizations (NGOs), public and private companies to purchase ICT equipment for schools have been forthcoming occasionally. However, of late the Kenya government has been increasing ICT budget for schools and colleges by equipping model secondary schools in each constituency and through the digital learning program (DLP) targeting class/grade 1 school-going child. The children are provided with ICT tablets aimed at introducing them to early use of ICT tools to acquire skills, Wainaina (2016). All these efforts are aimed at improving school learning outcomes and developing ICT skills among the children and youth in the world of the 21st century.

Kenyan ICT projects in secondary schools have been supported by the government, well-wishers, donors, and NGOs. Taita Taveta County has benefited from ICT projects sponsorship courtesy of MOE that has sponsored over 10 secondary schools and NGOs such as African Digital Schools Initiative (ADSI) that covers 20 secondary schools, SOTE Hub covers 12 schools, Seavuria 10 schools, Camara 5 secondary school and of course the schools themselves through the BOM school management. Based on these number of ICT projects that the government, development partners and stakeholders have implemented and invested, it's important to assess their contributions to school performance and improvement in education in Taita Taveta public secondary schools.

1.2 Statement of the Problem

Recently, many Kenyan secondary schools have been involved in ICT project implementation through the acquisition of ICT resources and using them for learning, teaching, and school management purposes. Stakeholders expect that the use of ICT tools in schools would help develop and make them better, particularly in raising the standards of education and student academic performance. However, this has not been the case for Taita Taveta County where 45 public secondary schools that have implemented ICT projects, still their education standards and academic performance are low (MOE report on KCSE results, 2019).

In support of the Taita Taveta case, research conducted by Organization for Economic Cooperation and Development (OECD) found out that technology alone does not improve the academic results of learners although most students use computers at school to do their homework and other projects, Veveta (2011). According to the OECD team, technology can influence good teaching, but good technology cannot replace poor teaching. In this reference, ICT tools alone cannot replace the teacher but rather facilitate teaching and learning. This study would also focus on how the use of computers in schools would improve the management and quality of services offered by schools in attempts to address issues of inefficiencies.

ICT project's successful implementation in schools could depend on the following key factors; availability of infrastructure, staff training, technical support, financial support, and ICT school policy. School academic performance outcomes would entirely depend on how these factors or variables are handled by a school. Secondary school success indicators on the utilization of ICT resources include better curriculum delivery, teacher and student ability on the use of ICT, efficient management, improved ICT culture, and good academic performance. Therefore, this research was conducted on some secondary schools in Taita Taveta County to assess ICT project implementation on academic performance.

In this context, it was evident that there could be some underlying factors that could have worked against the plan and implementation of ICT use in Taita Taveta. Consequently, the research was aimed at unraveling these factors so that ICT projects could be well planned and

implemented properly to address the challenges of low academic performance that were intended to resolve.

1.3 Objectives of the Study

This study was directed by the following objectives;

- **i.** To determine the influence of ICT infrastructural implementation on academic performance in public secondary schools in Taita Taveta County.
- **ii.** To assess the influence of ICT staff training implementation on academic performance in public secondary schools in Taita Taveta County.
- **iii.** To establish the influence of ICT technical support implementation on academic performance in public secondary schools in Taita Taveta County.
- **iv.** To find the influence of ICT financing implementation on academic performance in public secondary schools in Taita Taveta County.
- **v.** To determine the influence of ICT policy implementation on academic performance in public secondary schools in Taita Taveta County.

1.4 Research hypothesis

i. H_1:There exists a relationship between ICT infrastructural implementation and academic performance in public secondary schools in Taita Taveta County
ii. H_2: There exists a relationship between ICT staff training implementation and academic performance in the selected schools
iii. H_3: There is a less significant relationship between ICT technical supports Implementation and academic performance in the target schools
iv. H_4: There is a moderate significant relation between ICT financing implementation and academic performance in target schools
v. H_5: There is a less significant relationship between ICT policy implementation and academic performance in public secondary schools in Taita Taveta County

2.0 Literature Review

2.1 Empirical Review

2.1.1 School ICT infrastructure on academic performance

ICT infrastructure forms a major component of the ICT project. It comprises of ICT equipment and tools which can be categorized as hardware and software. ICT hardware includes desktop computers, laptops, printers, projectors, speakers, Wi-Fi, microphones among others. Computer laboratory, electricity supply, and whiteboards form a key support component of ICT projects. ICT software includes programs such as MS Windows 2007, XP, and Windows 2010, etc. Application programs include MS office suite, examinations analysis software, Bulk SMS system, finance accounts program and other utility programs such as antivirus. Electricity access is a major enabler of ICT use in schools. Many schools are yet to be connected to electricity since the government is still in the process of connecting them to the national grid. Consequently, those schools not yet supplied with electricity are disadvantaged and would not offer ICT (Mungai, 2011). For an ICT project to be established, ICT infrastructure has to be provided in a school. According to Lockwood and Cornell (2013), schools acquire ICT infrastructure in many ways, after the procurement process, followed by the implementation.

Sara and Onguko (2009) assert that projects are funded through many options under public and private partnerships. Sponsors include governments, commercial organizations, philanthropic individuals/ charities, and NGOs. Schools also fund their ICT projects through boards of management and parents' associations' contributions.

The implementation of several ICT projects in Kenya, such as the Rotary project by Forssa Rotary Club in Cheplaskei and Anin secondary schools in both in the North Rift are geared towards government plans to introduce ICT in schools and colleges. The project aimed to utilize Public-Private Partnerships (PPP) to supplement ICT resources to Kenyan public schools, particularly the two schools that benefited, John Boit, David Menjo and James Kimutai (2012). ICT infrastructure in secondary schools has been a challenge to even developed nations such as China. According to Trucano (2012) China's ICT in Education Plan, 2011-2020, the focus is on ICT use, infrastructure development in rural areas, disadvantaged areas, and ethical issues in ICT. Its objective is to narrow the digital divide among regions and schools. This means even developed countries are still grabbling with ICT infrastructure for schools. ICT infrastructure that is adequate to serve all students in a school is not a mean task. It requires more resources to obtain the required ICT resources.

A South African study done by Meyer & Gent (2016) showed that 15% of schools accessed computers for teaching and learning (KPMG, 2009) and another similar study done after some time showed that more than 20% of schools had access to ICT resources such as computers (Ostrowick, 2016). The two studies showed an incremental development of computer use in South African schools. Also, 80% of Gauteng schools have a computer laboratory (Saide, 2010), 1-lesson-per week learner access (Saide, 2010), relatively high learner - computer ratio in Gauteng (Amory, 2012). Regarding access to computers for administration, 50.8% of schools have access to computers for administration (Ostrowick, 2016). Further, this research reveals the developed nature of the South African schools on student computer access compared to Kenya and other African countries. Still, many schools are yet to use computers effectively in teaching and management. Padayachee (2017) in his study found that lack of support both in terms of infrastructure, policy and the lack of skills has hindered the progress of ICT implementation in secondary schools. Sufficient ICT project implementation cannot take place without good infrastructure, policy on how to operationalize ICT implementation in schools and inadequate ICT skill competency has hindered its progress in schools. In several schools, it's common to find computers stored in a room gathering dust and ironically students are in dire need to learn the use of computers.

In Egypt, a study conducted by Hamdy (2007) revealed that of Egyptian schools (39,926) only 69.7% have computers with the internet. This is one country that has invested in ICT school infrastructure. Meaning, the quality of education corresponds to infrastructure resources invested. Egyptian education is comparatively better in quality among the Middle East and North Africa nations, Smith (2016).

A research by Wakhu (2013) on ICT in Kenya secondary schools revealed several challenges; limited infrastructure such as computers and projectors, lack of electricity, no alternative sources of power in the event of power blackouts. Access to the internet is still very limited. Still, many schools lack computer laboratories. Similar findings were realized by Ogutu (2011) that other challenges include inadequate funding to improve access. Also, Kamau (2012) also showed that where ICT resources are available then there is an improper use of resources since there no skilled staff. Also, there was no educational program nor the

internet. According to Mungai (2011), many schools are still in need of computers in Kenya despite efforts done by the government and donors to have more computers to schools. Also, the Kenya government has not been to connect all schools with electricity. As a result, schools not connected are not able to offer computer lessons to learners. It is important to note that the Kenya government initiated an ICT program to set up one model ICT school in each constituency. This was done by providing funds to set up computer centers in schools. Funds were meant for putting up a computer laboratory, supplying schools with computers, a projector, a laptop, and an internet supply. Another key ICT infrastructure is the internet. Many regions of Kenya where schools are located still experience poor internet. According to Mungai (2011), many schools have no internet because of the high cost. On average, the cost of the internet per month is approximately $120 to serve 15 computers of size 128/64kbps of bandwidth, which is very high considering its low speed. MOE's ICT policy paper (2006), noted that the Education Policy Framework (EPF) revealed quite many challenges on the school's access and use of ICT in Kenya. For instance, poverty level that hinders ICT facilities access, frequent power disruptions and minimal rural electrification. Despite challenges, success has been recorded, since facilities have been improved, schools have better ICT resources for learning, teaching, and administration, students are also enthusiastic using computers in class (Sara & Onguko, 2009).

2.1.2 Staff training and skills on academic performance

The use of ICT by teachers, students forms a successful aspect of ICT school project. The use of ICT by them means acceptance, ability and good attitude on the use of ICT in schools. Though, still, a good number of secondary teachers are yet to embrace ICT in the classroom because of lack of policy, digital content and limited ICT tools such as computers and limited basic ICT skills. Mungai (2011) also observed that the appetite for ICT use in schools has been increasing and the few teachers trained cannot meet the demand. Fear from teachers, that they could lose their jobs at the introduction of computers in classrooms also affected the process. Also, teachers fear losing to some few students who are good in the use of ICT in class while they are beginners. This has greatly affected the acceptance of ICT use by teachers in teaching and learning. Teachers are still struggling to be competent in the use of ICT in teaching as outlined by UK report, 'Digital Skills for Tomorrow World' (2014) that lack of understanding of the changes in a digital workplace by teachers, pupils and parents has led to this ICT skills shortage. A study conducted in Malaysia by Ghazali, et al. (2009) and reported by Yunus and Suliman (2014) on the teaching of English literature, revealed that teachers use more time discussing literature components in class, a method student said it was boring. As a result of using this approach, students would lose interest in learning literature. In this respect, ICT resources are considered as more resources in learning and teaching of literature as it makes learning interesting and captivating among the learners.

In South Africa, according to Tamim et al. (2015, p. 2) that a misconception exists that by simply accessing ICT to students, educational challenges would have been resolved and educational transformation would happen. The major challenge, as identified by Tamim et al. (Tamim et al., 2015), is that the attention is on technical components instead of pedagogical methods. Player- Coro (2012) in her study on how positive attitudes relate to ICT resources in classroom teaching and learning and a strong sense of individual confidence in the use of computers in education influence ICT use. It's interesting to note that positive attitudes on ICT seems not to influence the use of ICT in teaching. In South Africa, Padayachee (2017) observes that teachers are not sure about ICT enforcement in schools while being encumbered by poor infrastructure and lack of skills.

In East African countries, governments are emphasizing improving teacher skills and pedagogy as important aspects in implementing curricula to the use of ICT to enhance educational standards (Sara & Onguko, 2009).A study conducted by Wakhu (2013) on ICT integration in education in Kajiado County secondary schools revealed that it still faces challenges among them negative perception from teachers who are still contented with the traditional ways of teaching or because of perceived workload and length of syllabus. The study also identified the problem of the lack of ICT skills among the teachers. Issues affecting teachers on ICT use in the classroom poses the most serious challenges facing the transformation of schools using it. This is because teachers are people who implement the curriculum and mentors for learners. There is a need to train teachers on the basic ICT skills to be competent and confident in using technology in class and also motivate the learners to use in school. The induction of teachers on using ICT would also improve the change of attitudes on technology.

According to Mungai (2011), school administrators particularly the older generation have a strong perception that computers need skilled people to use them. Which may not be the case. School administrators also worry that students may access unwanted content and other wrong sites on the internet. Wakhu's (2013) study revealed that learners have very limited ICT skills to use ICTs in and learning. Despite some schools having computer laboratories and ICT tools such as desktop computers, students have no basic ICT skills. In most of the school's computer laboratories remain closed and computers remain covered. Students have limited access to ICT equipment for use. This negates the purpose of ICT projects in schools. Some of the reasons why teachers don't use ICT include; no personnel to help the teachers, rigid teaching time table (Cabero, 1998), which are organizational and can be done easily with a good attitude.

There is also the need to engage teachers on continuous teacher professional development not only on technologies but also more importantly on pedagogical aspects, (Morueta, Igado, and Gómez, 2010). According to Sara and Onguko (2009), exposure to ICT in public schools remains negligible, especially in poorer, rural schools. When a school community members possess a positive ICT attitude, have basic ICT skills, and have embraced the use of ICT, then it's easy for them to make it part of their daily life and culture. Frequently and regular use of ICT in the school community for instance teaching and learning, entertainment, communication, research, management and administration, and use by non-teaching staff makes a daily culture. Some of these school activities include making teaching and examinations timetables, financial records, communication with parents and outside world, library work and assignments for students, project work, teaching and learning among others.

It's important to know that ICTs cause changes in the educational organizations themselves. For instance, it enhances the school community's inter-relations. According to Morueta, Igado and Gómez (2010) where ICT facilities were available, there was no proper use because of the lack of skilled personnel. Computers are used by students mainly for entertainment when given access, rather than using them to learn. In schools with ICT resources, there are no programs nor skilled personnel. School managers use ICT to run the school effectively and efficiently to save on resources, efforts, and time. ICT is used to run school programs such as teaching and learning, financial records and communication. ICT plays an important role in a school because it enhances the quality of education. ICT applications and use in school administration are currently popular because of their capabilities of administration activities to improve efficiency on data storage, skills

management to making decisions, (Ghavifekr et al, 2013). Schools infrastructural projects have faced challenges in their implementation as revealed by Macharia (2016). In her study, she found that many public schools have incomplete buildings, inadequate equipment and materials, school laboratories with little or no equipment and so on.

Macharia (2016) on his study concerning factors influencing the implementation of infrastructure projects in public secondary schools. Her study findings showed that; the principals' management skills on projects, stakeholder participation, and availability of funds were major factors that influence the implementation of school infrastructure projects. It also revealed that a gap existed between project funds and the size of school infrastructure projects to be implemented. The project component of sustainability was so uncertain with the pulling of sponsors and perhaps local capacity could resolve this (Sara & Onguko, 2009).

2.1.3 Technical Support and ICT Maintenance on academic performance

According to Mungai (2011), many schools have received sponsorship on used computers and have not been given the capacity to undertake maintenance and repair and as a result, it's common to find hipped computers in school laboratories. This is supported by Wahku (2013) apart from financial support challenges, schools also lack technical and basic maintenance of computers and render functional computers faulty and out of use. ICT basic maintenance has been a challenge to many schools in small countries, Trucano, (2011). Keeping computers in good shape while in use is a challenge in many developing countries. Many schools have computers in their laboratories that are no longer functional. Some have no mouse, dysfunctional keyboard, virus-infected software that keeps on hanging computers, windows that don't boot computers among others. These would leave a few computers like ten out of twenty computers working. This scenario reduces the number of computers students would access. Maintenance of computers includes installation, repair, upkeep and security, computer.com (2016).

Faulty and unreliable ICT resources could be a nightmare for the organization's success. For, instance a failing printer in a school set up could mean no report forms and handouts for students or no staff meetings minutes and memos. Lack of internet could mean no; sending and receiving school emails, downloading of learning materials nor student and staff online research. This explains the need for a warranty for new ICT resources. According to Google dictionary, a warranty is a document given to the purchaser of an item by the manufacturer committing to repair or replace within a specified period. These ensure that the new ICT resource functions well and the business owner doesn't suffer from poor service delivery to his/her customers. Ordinarily, schools do not have a full time IT specialist who repairs and maintains ICT resources but contract one on a need basis. However, some schools employ a full-time technician to operate ICT resources and maintain the laboratories. Technicians can also troubleshoot simple ICT problems.

According to Trucano (2011) another approach of computer maintenance in Eritrean rural schools would be to lock computers in the headmaster's office to ensure that they do not get damaged. This is also what happens in many Kenya schools. This way, computers would remain good but no learning takes place because there is minimal or no use of them, unfortunately. Schools need to maintain both hardware and software of computers to ensure the efficiency of computers. Akusa (2017) enumerates several ways of computer maintenance and keeping them running in good conditions; One is dust prevention, covering them with

covers and having the floor with carpets. Two, improving speed, scanning disks, disk portioning to increase space, use of RAM with good memory size. Three, installing antivirus, install good antivirus, update often, always scan and clean components. Four, update software often. Five, use rooms with fans for cooling. Six, ensure the battery is in good condition always. Seven, use UPS (uninterrupted power supply for power stability). One key strategy to address project sustainability challenges is to consider the life span of the item and budgeting for technical maintenance and assistance (Sara & Onguko, 2009).

2.1.4 ICT Financing in Schools on Academic Performance

ICT funding for schools remains a challenge as the budget is usually constrained by other competing priorities. Most at times, ICT budget in schools is reduced or funds diverted to other more pressing issues such as boarding, tuition and other infrastructure. In Ireland, according to McHugh (2019), the government plans to spend €50 Million in schools under the digital plan for schools (2018-2019). Major funding for ICT infrastructure for schools to enable them to integrate digital technology in teaching and learning. Today schools operate with tight budgets audit may be difficult for schools to afford new ICT equipment, Maxxia ICT journal (2019). Some would opt to lease while others would purchase second hand or rely on aid assistance. With the increasing importance of ICT in schools comes the importance of having up-to-date, reliable computer equipment for students. This explains why governments would support computer funding for schools. In the UK, according to Education Business Report (2019*),* its CEO, Valerie Thompson argues that schools are hit by capital spending making it hard for them to both maintain their existing infrastructure and acquire new technology-based resources.

In Africa, UNESCO with Korean partnership is introducing the use of mobile phones in teaching and learning in Mozambique, Rwanda, and Zimbabwe. The idea is to have a cheaper and innovative ICT tool for learning in a modern world where many people own mobile phones. The project is also meant to benefit higher education institutions, policy-makers, educational administrators and leaders as well, ICT Transforming Education in Africa, 2019.

In Kenya, the government through MOE has been leading in funding computers for schools. In 2005, MOE established the Kenya Education Sector Support Program (KESSP) indicating ICT as an important area to streamline ICTs into the classroom activities. Since then, the government has been establishing a computer laboratory fully furnished with computers, internet, and printers in each constituency, (KESSP report, 2005). NGO organizations too have played a key role in financing schools to equip them with computers. For instance, in the ten years that Computers for Schools Kenya (CFSK)have sourced over 50,000 desktop computers that were given to over 3,500 public secondary and primary schools, training colleges and institutes and several universities (CFSK, 2019). This is not a mean achievement. Another factor affecting ICT financing is the high cost of computers in Kenya. According to Mungai (2011), many people and schools are not able to buy a computer as it is considered its not basic equipment. The cost has been a big obstacle to the acquisition of computers in Kenya schools.

2.1.5 School ICT Policies on academic performance

A policy is a document that provides guidelines for action, and highlight the interventions that a school wants to take on a certain issue in a school setup. The guidelines help the school in day to day operations including fixing some challenges. Once school ICT policies have been formulated, communicated and adopted, they become grounded school rules and

guidelines of ICT use. The Kenya government has developed ICT policy that aims to raise the livelihoods of Kenyans by ensuring efficient, accessible, affordable and reliable ICT services (Mungai, 2011). The national ICT policy on education recognizes that ICT use in teaching and learning is crucial in developing the country through the provision of quality education, National ICT policy, (2006). According to the Kibabii University College ICT policy (2014) document, there are many reasons for formulating ICT policy; for planning, purposes to address fast-changing technologies to ensure compatibility and accessibility. To increase the number of trained and experienced analysts, software experts, systems and network administrators. To solve the problem of scarcity of managerial and financial resources. The develop organizations ICT resources and ensure an increase in the number of students and faculty, will greatly rely on the availability of ICT services. Lastly, to align the University college ICT policy to the National ICT Policy.

Padayachee (2017) ICT integration in education in South Africa has been hampered by operational, strategic and pedagogical challenges. ICT policy can help overcome some of these challenges. One of the identified challenges in ICT use in schools identified by (Sara & Onguko, 2009) is the students have no access to ICT equipment as the rooms remain locked. In several school's computers are usually covered and dusty, an indicator of idle use. In certain schools the computer laboratory is located away from the rest of the classrooms, making a deterrent. Besides, in schools where computers are rarely used, they remain objects of curiosity, fear, and mystery, rather than useful (Sara Onguko, 2009). According to Wakhu's (2013) study, headteachers and school managers have no clear policy on ICTs in their schools. This means many school managers are not yet conversant with the role of ICT in teaching and administration of schools.

A project team should ensure and maintain participation on an ongoing basis to come up with collective solutions that will work best in the local situations through strategy formulation and evaluating the effectiveness of each since the local community is the project main beneficiary and should be allowed to participate in the decision making process.

Ownership should be a principle to which organizations and individuals work in development with the local people just like the concept of sustainable development. Though sustainable development is imperfectly realized, it is through this that practical efforts used to be measured against. Community participation should be achieved through empowering local people by making them be in control of their lives and making them able to mobilizing sufficient development resources. Anderson and McFarlane, 2010 stated in their report that, for desired outcomes to be achieved community participation should always be practiced, which requires a do it with people's attitude; meaning doing things collectively with the local community and not doing for them. Anderson and McFarlane argued that, when the community is not involved to participate in decision making concerning their lives, emotional commitment for locals will be limited which is an importance to participatory development.

Boyes and Melvin, 2010 listed factors determining community participation to include; the economic level of community which is dependent on the scarcity of resources and their unlimited wants. This argument concluded that, when the community is poor, they will be more willing to participate in donor-funded projects due to personal interest hence high ownership level to projects.

World Bank, 2010 study was in the argument that a community's level of participation is determined by the community’s geographical location irrespective of whether they lived in

the urban or rural area. Since the urban population is more exposed, it will make them learn very fast. However, the rural being slow learners will participate less since they are suspicious at development projects. The socio-cultural and political context of the community will determine effective leadership and culture that is open and ready to embrace development. A community having good leadership and governance will always look out for transparency and honesty bringing about a sense of ownership and community will demand democracy through empowerment (Stanfield, 2009). Lemeshow (2011) in his study concluded that, how integrated the community is, will determine community participation. Management of the project should ensure a well laid down strategy when the population coverage grows beyond or is below the expected figure.

3.1 Research Methodology

The study used a descriptive survey design model. Data of statistics available at the County Director of Education (CDE Taita Taveta) office showed that 45 public secondary schools had implemented ICT projects in the county. The study respondents were drawn from the school's principals, teachers, and education officers. The breakdown of the target population was as follows; Principals 45, Teachers 450 and 25 education officers all totaling to 520. Due time constraint the study used a simple random and selected acceptable sample size of 84 respondents. Thus the study used as a sample size of 84.

4. 1. Research Findings and Discussion

4.1.1 Descriptive Statistics for ICT Infrastructural Implementation

The researcher embarked on carrying out data analysis for the first objective, whether ICT Infrastructural implementation would influence academic performance in the schools under study. Descriptive statistics were developed by the researcher from the respondents' responses on dependent variables. The findings were as shown in Table 1

Table 1: Descriptive statistics for ICT infrastructural implementation

	N	Mean	Standard deviation
The availability of ICT resources (including computer laboratory and computers for students) affects the implementation of ICT projects in schools.	66	3.94	0.990
The functioning of school ICT tools influences the implementation of ICT projects in schools.	66	4.15	0.808
The ratio of school ICT resources to the population of students, staff, and administration affects the implementation of ICT projects in schools	66	3.55	1.055
Teachers, students and administration access to ICT resources affect the roll-out of ICT projects in schools?	66	3.67	1.219
Composite Mean	**66**	**3.827**	**1.018**

Findings, as presented in Table 1, described that a composite mean of 3.827, about 4. This implies that many respondents' responses centered on the value of 3.827. This implied most of the respondents agreed that ICT infrastructural implementation would affect academic performance in target schools of study. Further, the standard deviation of this variable was 1.018, more than 1. Meaning some respondents were not in agreement. However, some of the principals interviewed explained that ICT infrastructural implementation would affect academic performance, even though the users are more than available resources.

Consequently, the desired achievement isn't realized. Another principal added that though the school has a small computer laboratory that can accommodate 15 students, it doesn't have adequate ICT resources such as computers for learners and projectors. Students share computers. Teachers and students have minimal access to ICT resources too. This has impacted negatively on project implementation.

Table 2 presents KCSE Results for academic performance

Table 2: KCSE Results for Academic Performance (Dependent Variable)

SCHOOL	MS 2014	MS 2015	MS 2016	MS 2017	MS 2018	Average MS
CANON KITURI	5.63	5.5	3.92	3.59	3.916	**4.511**
DR AGGREY	7.45	7.47	6.14	7.06	6.743	**6.972**
MWATATE	3.67	2.943	2.145	2.847	3.155	**2.952**
NGAMI	4.528	4.050	3.287	3.2	3.374	**3.687**
OLOPS	5.119	5.173	3.354	2.972	3.419	**4.007**
SHIMBO	4.038	3.945	2.511	3.169	3.126	**3.357**
CHALA	3.09	3.12	2.23	2	2.44	**2.576**
BUGUTA	2.061	2.593	1.908	2.447	2.42	**2.285**
MURRAY GIRLS	7.128	8.3	7.493	6.485	6.303	**7.141**
Average MS	**4.746**	**4.788**	**3.665**	**3.752**	**3.877**	**4.165**
Average MG	**C-**	**C-**	**D+**	**D+**	**D+**	**D+**

Findings, as prescribed in Table 2, indicated that KCSE results, a measure of academic performance and a dependent variable for this study, has not been good as expected. A good number of schools over the past years have realized a mean score of between 2.0 and 4.0 except 2 schools with an average mean score of 6.0 to 7.1 within the same period. This phenomenon could be attributed to teachers' strikes that affected learning in most public secondary schools and the reforms relating to strict enforcement on administration of examinations carried out by the government between 2016-2016, KNEC report (2017). Respondents also give some reasons for low performance such as more students than available computers and small computer laboratory spaces. This makes student access to ICT resources minimal than anticipated. Hence, it can be concluded that ICT infrastructural implementation affects the academic performance of learners in the target schools. From these discussions, it can be concluded that ICT infrastructural implementation influence academic performance in schools under study.

Further analyses were done to find out whether there are correlations between the following factors; ICT infrastructure, ICT training of staff, ICT technical support, ICT financing and ICT policy with the dependent variable school academic performance. Table 3 presents the correlations results

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Table 3: Correlation: Spearman's Correlation between ICT Project Implementation Factors and Dependent Variable Academic Performance of schools.

		(Student performance)	ICT infrastructure	ICT staff training	ICT technical support	ICT financing	ICT policies
(Student performance)	Correlation Coefficient	1.000					
	Sig. (2-tailed)						
ICT infrastructure	Correlation Coefficient	.891**	1.000				
	Sig. (2-tailed)	.001					
ICT staff training	Correlation Coefficient	.672*	.883**	1.000			
	Sig. (2-tailed)	.047	.002				
ICT technical support	Correlation Coefficient	.286	.483	.367	1.000		
	Sig. (2-tailed)	.456	.187	.332			
ICT financing	Correlation Coefficient	.511	.628	.695*	.628	1.000	
	Sig. (2-tailed)	.160	.070	.038	.070		
ICT policies	Correlation Coefficient	.286	.400	.283	.583	.351	1.000
	Sig. (2-tailed)	.456	.286	.460	.099	.354	

**. Correlation is significant at the 0.01 level (2-tailed)
*. Correlation is significant at the 0.05 level (2-tailed).

Findings from Table 3 revealed that there is a strong positive correlation of 0.891 between ICT infrastructure implementation and dependent variable school academic performance. Implying a change in ICT infrastructure has a significant effect on school academic performance. Spearman's correlation was also used to test the hypothesis for the stated objective at .05 level significance.

H_1: There exists a relationship between ICT infrastructural implementation and academic performance in public secondary schools in Taita Taveta County. From Table 3 Spearman's correlation p= 0.001 is less than 0.05 level of significance, then the conclusion is that there is a high statistical association between ICT infrastructural implementation and academic performance in the target schools. The study, therefore, rejects the null hypothesis that therefore, ICT infrastructural implementation has no significant influence on academic performance in target schools.

4.1.2 Descriptive Statistics for ICT Staff Training Implementation

The findings for the second objective, whether ICT staff training implementation would influence academic performance in school understudy. Descriptive statistics for ICT staff training implementation are as presented in Table 4

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Table 4: Descriptive statistics for ICT staff training implementation

	N	Mean	Standard deviation
Training of staff and students on ICT use has an effect on ICT project implementation in schools.	66	4.06	0.959
The use of ICT by school administration has an effect on ICT project implementation in schools.	66	3.92	0.950
The use of ICT resources has an effect on ICT project implementation in schools.	66	3.94	0.990
Attitude change on the use of ICT resources by school stakeholders has an effect on ICT project implementation in schools.	66	3.73	1.144
Composite Mean	**66**	**3.912**	**1.011**

Data presented in Table 4 displayed findings of mean and standard deviation for ICT staff training implementation. The composite mean is 3.912 about 4, means that many of the respondents concurred that ICT staff training implementation influences academic performance. However, the standard deviation was 1.011, more than 1, implying that some responses were varied away from the mean or disagreed. Some of the school leaders' comments include; teachers can do more research and ICT phobia has diminished. Students are also able to use ICT more effectively. According to principals, the use of ICT resources makes the implementation of ICT projects in schools a lot easier. Meaning, the understanding of school management goes along in making it easy for ICT project implementation to be done. Education officer also affirmed that teachers have been trained on ICT integration since 2017 which have resulted in sciences and mathematics improvement. These assertions by respondents all indicate that for proper implementation of ICT projects, the training of stakeholders is key. Regarding Table 2 on KCSE results, academic performance has not been good as it was expected when the ICT project was rolled out. Respondents confirmed that, teachers and school administrators were trained on ICT use and that the low KCSE performance may not be attributed to this factor of ICT staff training implementation. From there, it can be concluded that ICT staff training implementation influence academic performance in the selected schools.

Table 3 indicated Spearman's correlation of a strong positive correlation of 0.672 between ICT staff training implementation and the dependent variable of academic performance. This implies that an alteration of ICT staff training has an effect on school academic performance. Spearman's correlation was also used to test the hypothesis for the stated objective at 0.05 level significance.

H_2: There exists a relationship between ICT staff training implementation and academic performance in the selected schools. From Table 3 Spearman’s correlation p= 0.047 is less than 0.05 level of significance. Therefore, the conclusion is that there is a high statistical association between ICT staff training and academic in the target schools. The study, therefore, rejects the null hypothesis that ICT staff training implementation has no significant influence on academic performance in the target schools.

4.1.3 Descriptive Statistics for ICT Technical Support Implementation

The study descriptive statistics on ICT technical support implementation on academic performance. Findings were presented in the form of average response, mean and standard deviation and were tabulated as shown in Table 5

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Table 5: Descriptive statistics for ICT Technical Support Implementation

	N	Mean	Standard deviation
All ICT resources functioning well in your school would affect the implementation of ICT projects in schools.	66	3.86	1.162
Regular repairs and maintenance of ICT resources by schools could have an effect on ICT projects in schools.	66	3.94	0.975
A school with an appointed contractor to carry out regular repairs and maintenance of ICT resources would affect the implementation of ICT projects in schools.	66	3.61	1.094
A school with a schedule of repairs and maintenance of ICT resources would influence the implementation of ICT projects in schools.	66	3.95	0.919
The availability of an employed ICT technician influences the role-out of ICT projects in schools.	66	3.86	1.162
Composite Mean	**66**	**3.844**	**1.0624**

Finding in Table 5 on descriptive statistics for ICT technical support implementation indicated composite mean was 3.844 meaning many responses were around this value. The standard deviation was 1.0624, slightly more than 1, showing variation of the response from the mean. This indicates some respondents differed on the statement that ICT technical support implementation influences academic performance. On KCSE as indicated in Table 2, results on the academic performance show that a good number of schools over the past years have realized a low mean score of between 2.0 and 4.0 except 2 schools with an average mean score of 6.0 to 7.1. within the same period. Which was not as expected. This shows a mismatch. The majority of respondents agreed that ICT technical support implementation influences academic performance. This means teachers were not supported on ICT technical skills to be able to use ICT resources well. If there is a technical problem with computers, they can't troubleshoot and use them in their teaching to improve learning. From there, it can be concluded that ICT technical support implementation influence academic performance in public secondary schools in Taita Taveta County. Table 4.8 shows Spearman's correlation of a weak positive correlation of 0.286 between ICT technical support implementation and the dependent variable of academic performance. This means that the implementation of ICT technical support given to schools has a less significant influence on school academic performance. The Spearman's correlation was also used to test the hypothesis for the stated objective at 0.05 level of significance;

H_3: There is a less significant relationship between ICT technical supports Implementation and academic performance in the target schools. From Table 3 Spearman's correlation p=0.456is more than 0.05 level of significance. Therefore, the conclusion is that there is a low statistical association between ICT technical support and academic performance in schools under study. The research, therefore, accepts the null hypothesis that ICT technical support implementation does not affect the academic performance in the schools under research.

4.1.4 Descriptive Statistics for ICT Financing Implementation

The study focused on descriptive statistics ICT financing implementation on academic performance. Findings were presented in the form of average response, mean, and standard deviation and were tabulated as shown in Table 6

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Table 6: Descriptive Statistics for ICT financing implementation

	N	Mean	Standard deviation
Additional procured ICT resources affect the implementation of ICT projects in schools.	66	3.86	1.175
Availability of ICT resource budget influence the role-out of ICT projects in target schools	66	3.76	1.138
Availability of ICT strategic plan influences the role-out of ICT projects in schools.	66	4	1.095
Composite Mean	**66**	**3.873**	**3.408**

Findings in Table 6 for ICT financing implementation indicated the composite mean was 3.873 and a standard deviation of 3.408. It shows that some responses were far from the mean but insignificant compared to the majority.

The dependent variable of academic performance for the study is shown by KCSE results in Table 2. Many schools over the past years have realized a low mean score of between 2.0 and 4.0 except 2 schools with an average mean score of 6.0 to 7.1 within the same period. Some principals observed that additional procured ICT resources widen both staff and students' access rather than depending on donations. According to educational officers, ICT budget helps to repair and maintain resources as well as increase ICT resources every year. From there, it can be concluded that ICT financing implementation influence academic performance in schools under study. Findings from Table 3 shows Spearman's correlation of some positive correlation 0.511 between ICT financing implementation and the dependent variable of academic performance. This means that the implementation of ICT financing given to schools has a fair significant influence on school academic performance. The Spearman's correlation was also used to test the hypothesis for the stated objective at 0.05 level significance;

H_4: There is a moderate significant relation between ICT financing implementation and academic performance in target schools. The extent of how ICT financing implementation influence academic performance was tested using the Spearman's correlation. Findings from Table 3, on Spearman's correlation p=0.160, is more than 0.05 level of significance. Therefore, the conclusion is that there is a low statistical association between ICT financing implementation and academic performance in the schools under study. The research, therefore, accepts the null hypothesis that ICT financing implementation has no significant influence on the academic performance in public secondary schools in Taita Taveta.

4.1.5 Descriptive Statistics for ICT Policies Implementation

The study lastly focused on descriptive statistics for ICT policy implementation. The findings are as shown in Table 7.

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Table 7: Descriptive statistics for ICT policies implementation

	N	Mean	Standard deviation
ICT school policy has an effect on ICT projects in schools.	66	3.91	1.092
ICT teaching time table has an effect on ICT projects in schools.	66	4.05	1.014
Stakeholder sensitization influences the implementation of ICT projects in schools.	66	3.92	1.042
The use of ICT by administration influence the implementation of ICT projects in schools	66	4.03	1.052
Composite Mean	**66**	**3.977**	**1.05**

Findings from Table 7 on ICT policy implementation indicated composite mean was 3.977 with a standard deviation of 1.05. Majority of responses centered around 3.977 with some away from the mean, indicating some respondents were not in agreement. The dependent variable of academic performance for the study is shown by KCSE results in table 4.7. Many schools in the study period 2014-2018 had a low mean score of between 2.0 and 4.0 with exception 2 schools. ICT policies implementation spells out how ICT program is run in a school to benefit the school community. Nevertheless, many respondents agreed that ICT policies implementation influence academic performance, the school performance was contrary. This suggests that schools may have not been implementing the set ICT policies as required as indicated by some principals, that without time table, ICT is taken as a by the way project and yet it is the new in thing at the moment in Kenya. From there, it can be concluded that ICT policy implementation influence academic performance in the target schools. Table 3 shows Spearman's correlation of a low positive correlation of 0.286 between ICT policies implementation and the dependent variable of academic performance. This means that the implementation of ICT policies given to schools has a less significant influence on school academic performance. The Spearman's correlation was also used to test the hypothesis for the stated objective at 0.05 level significant;

H_5: There is a less significant relationship between ICT policy implementation and academic performance in public secondary schools in Taita Taveta County.

The extent of how ICT policy implementation influences academic performance was tested using Spearman's correlation. Data from Table 3 of Spearman's correlation p=0.456 is more than 0.05 level of significance. Therefore, the conclusion is that there is a low statistical association between ICT financing implementation and academic performance in the schools under research. The study, therefore, accepts the null hypothesis that ICT policy implementation has no significant influence on academic performance in the schools under study.

5.1 Conclusion

According to study objectives, it was evident from the alternative hypothesis that there is some relationship between ICT infrastructural implementation and school academic performance in the target schools. That, with adequate computers for learners, for instance, students would be able to learn computer skills and use them in research and learning as well. It will also increase access for students, teachers, administration and even non-teaching staff. It was also found that there exists a relationship between ICT staff training and academic performance from the alternative hypothesis. Training of the school community would enable the effective use of computers and other ICT resources for learning and management.

These would raise the standards of education in a school. The study found that there was no significant relationship between ICT technical support implementation and academic performance from the alternative hypothesis. In a real sense, there was minimal relationship between the two. Implying, ICT technical support does not directly influence academic performance or standards of education. Also, from the alternative hypothesis, the research showed that there is no significant relationship between ICT financing implementation and academic performance. The same applied to the last objective, that there was no significant relationship between ICT policy implementation and academic performance. Therefore, for the last three factors, the null hypothesis was accepted.

6.1 Recommendations

The researcher made the following recommendations;

1. More ICT infrastructural resources still needed in Taita Taveta public secondary schools. The resources currently available do not adequately enable good implementation of ICT projects. Particularly the number of student computers.
2. There is a need to adequately train all the students, teachers, non-teaching and school administrators on basics and methods of using ICT to ensure good implementation of ICT school projects.
3. There is a need for schools to prioritize ICT in their strategic plans and increase ICT budgets. This will enable the schools to maintain ICT resources even when the partners have left.
4. All students need to be introduced to basic ICT skills in the lower classes as a 21st century skill to acquire computer literacy skills. This will enable students to access ICT and use them effectively.
5. The school's administration needs to embrace ICT as an essential resource for modern teaching and learning, communication and school management.
6. There is a need for schools to plan for ICT resources repair and maintenance to be able to maintain the performance of functional computers and other ICT resources.

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