

## Perceptions of teachers on use of ICT infrastructure in teaching and learning in secondary schools in Meru County, Kenya

TIMOTHY BARIU NTORUKIRI

Kenyatta University, Kenya

CELESTINO MAGANA RIUNGU

Chuka University, Kenya

Dr. FRANCIS KIRIMI

Kenyatta University, Kenya

### Abstract

*ICT in education increases access, efficiency and quality of education. The study focused on the Perceptions of teachers on the use ICT Infrastructure in education in Kenya. It adopted a descriptive survey research design. Random sampling method was used to sample 12 secondary schools from the twenty in the Sub-County and study respondents from the accessible population of the study. A sample of 276 respondents comprising 12 principals and 48 teachers and 216 form 3 students was used for the study. Questionnaires, interviews and observation schedules were used to collect data from the respondents. Reliability of the instruments was established through test re-test method. A Pearson correlation coefficient ( $r = 0.75$ ) thus the instruments were internally consistent and would test what is required to be tested. The findings indicate that the teachers' perception towards ICT integration into teaching-learning process enhances efficiency, quality and accessibility.*

**Keywords:** Attitude, ICT, Integration, Perceptions, Technology.

### INTRODUCTION

Information and communication technology (ICT) has transformed the daily life by performing key roles in all disciplines. Technological development has greatly influenced the operations in the field of

tourism, manufacturing, production and financial sector. Education however has experienced minimal technological impact in comparison with the other key sectors (Pramanik, 2011). This is despite education being an impetus in developing human resource that in turn brings advancement in Technology. Further, Information Communication Technology (ICT) infrastructure transforms teaching, learning and assessment practices for teachers and students, in a high-quality 21st century education system (Tondeur, Van Keer, Van Braak, & Valcke, 2008).

Development in computers, communication electronics and other multimedia tools provide a wide range of sensory stimuli. Due to this it is said, I see and I remember, I do and I understand. The animations, simulations, software packages to teach various subjects create virtual realities and experience for the learners, which in turn, help in making learning a more direct, useful and joyful. Learners' self-engaged learning is conceived as the core of good education.

Integration of Information and Communication Technologies has tremendously improved teaching and learning (Cartwright & Hammond, 2003). Embedding ICT in teaching, learning and assessment is a complex endeavour and the mere presence of ICT in a school does not equate to its effective use (Stiglitz, 2019) In USA, Germany and Canada the 2013 ICT in Schools Census Report (PANERU & ZOUNEK, 2018) found that the ICT infrastructure has often taken the place of older technologies, such as books or whiteboards, and the role of the teacher and the learner remains unchanged.

The integration of information and communication technologies has enhanced efficiency and improved quality in education by supporting the learning curriculum (Gulbahar & Guven, 2008). The integration process can help rejuvenate teachers and students. Thus improving efficiency and quality of education by providing curricular support in challenging subjects. Teachers therefore being the key drivers are needed to engage in concerted efforts by performing various projects and development intervention to realise meaningful changes, which involves use of ICT as a learning tool. In view of this teachers' attitudes are regarded as a key predictor of implementing the new technology. This is because tutors attitude

determines their ICT experiences and that of their learners (Zhao & Cziko, 2001).

Generally, positive user attitude is a prerequisite to achieve any meaningful change in education development (Woodrow, 1990). The tutors positive attitude towards a technology is crucial for implementation of the technology and also enhances embracing of the idea with minimum resistance (Watson, 1998).

## **Problem Statement**

The integration and adoption ICT in teaching and learning is highly dependent on the teachers' knowledge and skills to use and embrace the process. This requires adequate preparation so as to attain the relevant technical knowhow. However, studies have shown that a big percentage of teachers feel they are not adequately prepared to adopt ICT in teaching and learning. The use of ICT in education is beneficial in that it enhances increased access to education, improves efficiency and also promotes quality education (Hue & Ab Jalil, 2013). Technology is deemed to be the game changer in the current global world due to its immense benefits to education ranging from being cost-effective in terms of utilizing educational resources, enhancing accessibility in remote areas that may be geographically marginalized, provision of the latest content in terms of timing, consistency and dependability and also the improvement in the general management of the office in that it can provide records of all learners and also track their progress. However, for the technology to be meaningfully implemented the input of teachers is paramount since they influence the management and also the learners on the use of the technology. Therefore, the teachers' attitude is very important for integration of ICT in teaching and learning. It is on this basis that this study investigated the teachers' perception on the use ICT Infrastructure in Teaching and learning. Thus, enhancing access to education, improving efficiency and promoting quality education.

## **LITERATURE REVIEW**

### ***Teacher's Competency in using ICT infrastructure in Schools***

Teachers need to be equipped with the necessary skills to effectively integrate ICT in the teaching methodologies. Teacher skills influence how much they integrate ICT with their pedagogical skills and effectively influence students' attainment of ICT skills and overall learner achievement. Teacher training programs can be revised to incorporate ICT programs in order to equip them with technical skills required for integration of ICT in teaching and learning in schools. The teacher training can also take the peer training approach where teachers who have received training in ICT train their peers (Lim & Khine, 2006).

For schools to benefit from use of the ICT infrastructure in teaching and learning, ICT skilled teachers are needed. A major challenge identified in many developing countries regarding adoption and use of ICT in schools is that there is no enough staff, and where there are, they are most likely IT professionals without any education experiences, skills, and/or qualifications. To effectively harness ICT for school purposes requires sustained investments in supporting teachers training in order to create new learning environment (Jimoyiannis & Komis, 2007) . Teachers play a critical role in implementation and use of ICT as they are at the centre of curriculum implementation and innovation at school level. However, many schools could be facing shortage of ICT teachers and other IT professionals that could support adoption and use of it in classroom. Many schools continue losing well-trained ICT teachers to private sector which seems to pay higher salaries (GoK, 2006).

A survey done on ICT access and use in Kenya secondary schools showed that, of 2250 ICT teachers who graduated from universities and tertiary institutions in 2010, 1350 were absorbed in industrial and/or ICT service sectors and 900 went to teach ICT in various educational institutions. Of those in teaching service, 189 were in technical institutions and 711 were in secondary schools. This displays a relatively small number of qualified ICT teachers in Kenyan schools (Kandiri, 2007)

A report by Ministry of Higher Education, Science and Technology on secondary school teachers' adoption and use of ICT also

indicated the number of teachers skilled in ICT in secondary schools was low. The study revealed that out of the number available, few had ICT training effective in adoption and use of the technology in classroom. Out of 232 teachers in the sample, majority (57%) were reported to have trained at certificate level on basic computer skills, 73% were reported to have acquired ICT training through in-service courses and private computer colleges trained 43% (GoK, 2006).

A report on e-learning in secondary Schools in Kenya, reported that a number of teachers in schools had not received any training in ICT use during their formative years at teacher training institutions before joining the profession. 55% of the sampled teachers stated that they did not receive any ICT training at all. However, the study found that 51% of the teachers had taken self-initiative to undertake ICT training during the last three years they had been employed. To successfully implement ICT in schools depends strongly on teachers' training on the technology (Simba, Agak, & Kabuka, 2016). Other observations on the level and quality of teachers training has a positive influence on how effective ICT is adopted and used in classroom (Hallissy, Butler, Hurley, & Marshall, 2013).

Research has established that most of programs towards teachers training in ICT, focused on basic literacy skills rather than on adoption and use of technology in teaching (Hennessy et al., 2010). Further, teacher training Institutions have continued to emphasis teaching about the technology rather than on how to use technology to teach. After analysing and organizing a variety of approaches found in ICT uses in teacher training institutions, studies have concluded that these institutions were not adequately prepared their teacher trainees to effectively use technology in teaching and learning (Buabeng-Andoh, 2012). A survey on the use of ICT in teachers training colleges in nine OECD countries found that ICT was considered as a transversal subject cutting across all other subjects, hence nobody felt responsible for it (Tondeur, Cooper, & Newhouse, 2010).

Bringing ICT infrastructure into the classroom can have a considerable impact on the practice of teachers, in particular when ICT is conceptualized as a tool that supports a real change in the pedagogical approach. Thus the real impact of ICT and the subsequent changes in the pedagogy, development and training on teachers is varied and idiosyncratic although some general areas of

impact maybe identified as :the balance of roles the play with a perceived risk of reduced influence, providing greater access to information, leading to increased interest and experimentation, requiring more collaboration and more communication with teachers, administrators and parents, requiring more planning and energy, requiring the development of skills and knowledge of ICT and providing more time to engage with students, leading to greater productivity (OECD, 2005).

Generally, teachers who use the ICT infrastructure in classroom have to demonstrate high level of energy, hard work and perseverance, often in the 'face of considerable odds'(OECD, 2005) . If they are early adopters, then they are required to be resourceful and overcome many barriers to make things work. Planning lessons involving computers can take considerable time and demands complex scheduling and resourcing. Therefore, teachers using computers in the classroom should not act in isolation from each other. They need to have access to resources that will supply ideas and material for different classroom applications, including peers who are also developing their own pedagogies and resources (Groff & Mouza, 2008) In Kenya most teachers joining the teaching profession have no prior training in ICT. Studies have shown that 55% of the teachers received no training computer training in universities or teachers training colleges (Kiptalam & Rodrigues, 2010). However, the same study indicates that teachers are undergoing ICT training either through self-initiatives or school supported programs. Similarly ICT competency is higher among teachers below the age of 35 years than relatively older teachers (Fam, Palmer, Riedy, & Mitchell, 2017). A fact supported by U.S National Centre for Education Statistics (2000) which indicate that younger teachers have superior ICT skills having grown up in an ICT era.

In view of the above, it is clear that ICT heralded a paradigm shift in education in that its use in schools is changing how teachers teach and how students learn. Teachers are expected to always upgrade their knowledge and acquire new skills in their pedagogical practices and curriculum development to be able to use ICT in teaching and learning. The teachers Service Commission (TSC), has also introduced the TPAD (Teachers performance appraisal and development) to enhance efficiency in operations and to ensure

services are available to the teacher and other stakeholders. The teachers are now able to access payslips, apply for registration, promotion online, appraise and be appraised online and keep track on the process of their career development.

Therefore, this study had an interest in finding out the teachers' perceptions in using ICT infrastructure in teaching and learning. The investigation indicated the need for the teachers' capacity development in ICT and also sensitizing them on the importance of adopting ICT since it will improve accessibility to education, enhance efficiency and improve quality in education.

### ***Teaching Staff Perceptions on use of the ICT infrastructure in Teaching and Learning***

Learning objects can be identified, tracked, referenced, used and re-used for variety of learning purposes. They are developed to function as discreet entities or to be linked in order to relate to explicit concepts or learning outcomes. Content requirements are determined through communication with educators across the target audience and then the learning objects are developed by independent contractors(Butler, Hallissy, & Hurley, 2018). Use of ICT in schools continues to be a distant dream. The existing shortage of quality teachers further compounds the problem(Groff & Mouza, 2008). Use of the ICT infrastructure in teaching and learning requires competent ICT trained teachers and adequate ICT infrastructure in the schools.

Research shows that if teachers perceive ICT programs are either satisfying their own needs or their students 'needs, it is likely they would implement and use it in school (Dunleavy, Dexter, & Heinecke, 2007) Research suggests that teachers' adequacy, skills, and attitudes influence successful implementation and use of ICT in schools (Keengwe, Onchwari, & Wachira, 2008). If teachers' perceptions are positive toward use of ICT, then they can easily provide useful insight about its implementation. Studies have revealed that teachers' skills, perception and attitudes were related to the use of ICT in teaching and learning in schools (Medeshova, Amanturlina, & Sumyanova, 2016). The more skilled teachers are in ICT, the more likely they are to use it in teaching and learning in classroom. Further research has proved that positive attitude, personal entrepreneurship and computer experience had a direct

positive influence on use of ICT by teachers (Drent & Meelissen, 2008). Similarly, study research reveals that teachers' skills, attitudes and perceptions influenced their acceptance of the usefulness of ICT and its use in teaching and learning in schools (Huang & Liaw, 2005). A survey by EU School net in 2010 involving teachers' use of Acer notebooks in six European Union countries, revealed that a large number of participants perceived use of notebook had positive impact on their learning, elicited interest, promoted individualized learning and helped to lengthen study beyond school day (Buabeng-Andoh, 2012).

However, there are suggestions that a small number of teachers perceived benefits of ICT in schools were not clearly identified (Tondeur et al., 2010). Teachers' attitude to change could influence their willingness to integrate technology into classroom. There are teachers who use ICT as tools to collect, analyse and present information and those who use them as a teaching machines. The former is deemed to be more innovative with technology in the classroom. Nonetheless, factors such as familiarity, anxieties and fears tend to decrease and confidence increases. The amount of confidence a teacher possesses in using ICT and related information technologies may greatly influence his/her effective implementation of technology methods in the classroom. Teachers are the main gatekeepers in allowing innovations to diffuse into the classrooms. Therefore, one of the key factors which could affect integration of computers in school curriculum is (Yelland, 2001). Adequate training of teachers in handling and managing these new tools in their daily practices.

Some teachers viewed ICT infrastructure as waste of time and an expensive venture. A report on a survey of UK teachers revealed that teachers' positivity about possible contributions of ICT in schools were moderated as they became rather unsure and sometimes doubtful about specific and current advantages of it (Luckin et al., 2008). The successful transformation of school practice; teachers need to develop positive attitudes toward innovations (Qablan, Abuloum, & Al-Ruz, 2009). Similarly, is argued that positive computer attitudes by teachers are expected to foster implementation of ICT in schools (Tondeur et al., 2010). Further studies on teachers' attitudes towards computer use in Singapore, found that teachers were more positive

about their attitude towards computers and intention to use them, than the helpfulness of computer towards teaching and learning. These studies reveal that teacher's skills, perceptions, and attitudes influence adoption and use of ICT in schools (Teo, 2008)

Content requirements are determined through communication with educators across the target audience and then the learning objects are developed by independent contractors (Harlen, 2010). Use of the ICT infrastructure in schools continues to be a distant dream. The existing shortage of quality teachers further compounds the problem (Groff & Mouza, 2008). Use of ICT in teaching and learning requires competent ICT trained teachers and adequate ICT infrastructure in the schools.

Therefore, the purpose of the study was to establish the perception of teaching staff on use of ICT infrastructure in teaching and learning in secondary schools. The study established that most teaching staff had a negative perception on ICT thus they were not using ICT infrastructure in teaching and learning in their respective schools. This was attributed most of them indicating that ICT infrastructure was difficult operate and only could be used in the office.

## **RESEARCH METHODOLOGY**

The study used both qualitative and quantitative data. The primary data source was employed to collect first-hand information to achieve the objectives of the research. Questionnaire was the main source of the primary data. There were 276(100%) questionnaires distributed to the respondents 9(75%) principals and 36(75%) teachers. Furthermore, to elucidate the problems as well as building logical frame works, Journal and research papers related to the study were analysed.

## **RESULTS AND DISCUSSIONS**

### ***Competency and the ICT Training of Teaching Staff***

The study sought information on competency and ICT training of the principals and teachers' respondents. A question item was put in the

questionnaire for the respondents to answer yes if trained and No if not trained. The findings are presented in Table 1.

**Table 1: ICT Training and Competency of Teaching Staff**

Respondents	Yes	%	No	%
Principals	2	22.2	07	77.8
Teachers	6	16.7	30	83.3
Totals	8	38.9	37	161.1

According to results in Table 4.12, 77.8% of the principal's respondents indicated not to have any training in ICT while 22.2% indicated to have trained. Among the teachers' respondents 83.3% indicated not to have any training in ICT while 16.7% indicated to have the training. Majority of the principals and teachers' respondents 37(161.1%), indicated not to have trained while a minority of 8 (38.9%) indicated to have trained. These finding suggests that most of the principals and the teacher's in secondary schools in the County are not trained in ICT use. This could have affected adoption and use of the ICT infrastructure in teaching and learning in secondary schools in the County. This is in line with other studies that established that schools were facing challenge of ICT skilled teachers as they strived to adopt and use ICT in their respective schools (Mingaine, 2013). Similarly, teachers who use ICT in classroom have to demonstrate high level of energy, hard work and perseverance. Planning lessons involving computers can take considerable time and demands complex scheduling and resourcing (Scarr & Green, 2010).

Further, the respondents who were in agreement to having been trained in ICT were requested to indicate whether they were trained to repair ICT facilities in their schools. Those trained were required to indicate yes while not trained were required to indicate no. Table 2

**Table 2: Principals Perceptions on use of the ICT infrastructure in Teaching and Learning**

Perception	SA		A		U		D		SD	
	F	%	F	%	F	%	F	%	F	%
ICT are very useful in schools	1	11.1	4	44.4	0	0.0	1	11.1	3	33.3
ICT are difficult to operate	3	33.3	1	11.1	0	0.0	3	33.3	2	22.2
Internet connection is good	1	11.1	3	33.3	0	0.0	1	11.1	5	55.6
Teaching of computer classes is good	1	11.1	4	44.4	0	0.0	1	11.1	3	33.3
Use of ICT in education is good	1	11.1	3	33.3	0	0.0	2	22.2	3	33.3
Computer lab is important in a school	1	11.1	4	44.4	0	0.0	1	11.1	2	22.2
ICT are expensive	3	33.3	1	11.1	0	0.0	3	33.3	2	22.2

According to results in Table 2, 50% of the principals' respondents who had indicated to have been trained in ICT indicated not to have been trained to repair ICT gadgets while 50% indicated to have been trained, 66.7% of the teachers' respondents indicated not to have been trained while and 33.3% indicated to have been trained to repair ICT gadgets. This suggests that there are few professionals trained to repair ICT gadgets in most secondary schools in the County.

This finding also suggests that in case of breakdown of ICTs in the school; they became obsolete thus affecting their use in teaching and learning. This is in line with previous studies that emphasizes that the use of new technologies in classrooms is essential for providing opportunities for students to learn to operate in an information age (Huang & Liaw, 2005). The teachers or the facilitators are required to be trained regularly in order to keep up with the ever-changing ICT systems globally.

***Teaching staff Perceptions on use of the ICT infrastructure in Teaching and Learning***

The study sought information on principals' perceptions on use of the ICT in teaching and learning in their respective secondary schools. A Likert scale was put in place ranging from SA=strongly agree, D= disagree, U= undecided D= disagree and SD= strongly disagree where principals were asked to tick their choices. The findings are presented in Table 3.

**Table 3: Teachers Perceptions on use of the ICT infrastructure in Teaching and Learning**

Perception	SA		A		U		D		SD	
	F	%	F	%	F	%	F	%	F	%
ICT are difficult to use	6	16.7	12	33.3	0	0.0	6	16.7	12	33.3
Using ICT is enjoyable	3	8.3	10	27.8	0	0.0	6	16.7	18	50.0
ICT make work easier.	2	5.6	14	38.9	0	0.0	4	11.1	16	44.4
Phones for communication.	3	8.3	12	33.3	1	2.8	8	22.2	12	33.3
ICTs are good for students	6	16.7	14	38.9	2	5.6	6	16.7	8	22.2
E-notes and exams are good	2	5.6	12	33.3	1	2.8	4	11.1	17	47.2
Computer records are better	4	11.1	16	44.4	0	0.0	6	16.7	10	27.8

According to the results in Table 3, 11.1% of the principals' respondents strongly agreed on the usefulness of ICT in their schools, 44.4% disagreed, 0% was undecided, 11.1% agreed while 33.3% strongly disagreed. This suggests that most of the secondary schools in Meru County were not using ICT hence their principals little or no knowledge their usefulness in school.

On ICT being difficult to operate, 33.3% strongly agreed 11.1% disagreed, 0% were undecided, 33.3% agreed while 22.2% strongly disagreed. This suggests that the principals had already made their minds against ICT which to them could pose a problem of operation. On internet connection to their schools, 11.10% strongly agreed, 33.3% disagreed, 0% were undecided, 11.1 % agreed while 55.6% strongly disagreed. This suggests that most principals were not for internet connection to their schools. Without internet use of ICT would not be possible.

On computer teaching being good, 11.1% of the principals' respondents strongly agreed, 44.4% disagreed, 0% were undecided, 11.1% agreed while 33.3% strongly disagreed. This suggests that most principals perceived computer teaching in their schools as less important. On use of ICT in teaching and learning being good, 11.1% strongly agreed, 33.3% disagreed, 0% were undecided, 22.2% agreed while 33.3% strongly disagreed. This suggests that most principals were not set for use of ICTs in teaching and learning in their respective schools. This is in line with similar research that established the positive attitude, personal entrepreneurship and computer experiences had a direct positive influence on use of ICT by teachers (Drent & Meelissen, 2008).

On the importance of computer lab in the school, 11.1% of the principals' respondents strongly agreed, 44.4% disagreed, 0% were undecided, 11.1% agreed while 22.2% strongly disagreed. This suggests that most principals did not see the importance of having computer labs in their schools. On ICTs being expensive, 33.3% of the respondents strongly agreed, 11.1% disagreed, 33.3% agreed while 22.2 strongly disagreed. This finding suggests that to most principal's ICT were expensive for them and the school to implement in the school. This suggest that the price of the ICT was a barrier to be crossed by many secondary schools in Meru County thus many were not using them. The findings are in concurrence that for a successful transformation of school practice, teachers need to develop positive attitudes towards innovation (Teo, 2008).

Further, the study sought teacher's perceptions the use of ICT infrastructure in teaching and learning in secondary schools in the county A Likert scale was put in place for them to tick. The findings are presented on Table 4.

**Table 4: Teachers Perceptions on use of the ICT infrastructure in Teaching and Learning**

Perception	SA		A		U		D		SD	
	F	%	F	%	F	%	F	%	F	%
ICT are difficult to use	6	16.7	12	33.3	0	0.0	6	16.7	12	33.3
Using ICT is enjoyable	3	8.3	10	27.8	0	0.0	6	16.7	18	50.0
ICT make work easier.	2	5.6	14	38.9	0	0.0	4	11.1	16	44.4
Phones for communication.	3	8.3	12	33.3	1	2.8	8	22.2	12	33.3
ICTs are good for students	6	16.7	14	38.9	2	5.6	6	16.7	8	22.2
E-notes and exams are good	2	5.6	12	33.3	1	2.8	4	11.1	17	47.2
Computer records are better	4	11.1	16	44.4	0	0.0	6	16.7	10	27.8

According to the results on Table 4, 16.7% of the teachers' respondents strongly agreed that use of ICT was good 33.3% disagreed, 0% were undecided 16.7% agreed while 50% strongly disagreed. This suggests that most teachers in secondary schools in Meru County did not see the goodness of using ICT in teaching and learning their schools.

On using ICT being enjoyable, 8.3% of the teachers' respondents strongly agreed, 27.8% disagreed, 0% were undecided, 16.7% agreed while 50% strongly disagreed. This suggests that most

teachers were not ready to embrace use of ICT in secondary schools in Meru County.

On ICT being good in teaching and learning, 5.6% of the teachers' respondents strongly agreed, 38.9% disagreed, 0% was undecided, 22.2% agreed while 44.4% strongly disagreed. This suggests that most teachers in secondary school Meru County were negative on the use of ICT gadgets in teaching and learning in schools.

On mobile phones being good gadgets for teacher student communication, 8.3% of the teachers' respondents strongly agreed while, 33.3% disagreed, 2.8% were undecided, 22.2% agreed while 33.3% strongly disagreed. This suggests that most of the teachers were not ready to embrace the use of mobile phone in teacher/student communication.

On encouraging students to use ICT, 16.7% of the teachers' respondents strongly agreed, 38.9% disagreed, 5.6% were undecided, 16.7% agreed while 22.2% strongly disagreed. This finding suggests that most teachers in secondary schools in Meru County were not ready to encourage students to embrace use of ICT technology.

On computer generated exams and notes being good, 5.6% of the teachers' respondents strongly agreed, 33.3% disagreed, 2.8% were undecided, 11.1% agreed while 47.2% strongly disagreed. This finding suggests that most teachers in secondary schools in Meru County viewed use of computer generated notes and exams negatively.

On the ICT infrastructure, being good for keeping records, 11.1% of the teachers' respondents strongly agreed, 11.1% of the respondents strongly agreed, 44.4% disagreed, 0% were undecided, 16.7% agreed while 27.8% strongly disagreed. This suggests that most teachers in secondary schools in Meru County viewed use of ICT in keeping records negatively. This is in concurrence with other researchers who argued that positive computer attitudes by teachers are expected to foster implication of ICT in school (Tondeur et al., 2010).

## **CONCLUSION**

Generally, the study found out that many teachers are unable to utilize ICT infrastructure in teaching and learning process due to

inadequacy of facilities. Therefore, this is a strong indicator that ICT is not utilized in secondary schools. The findings indicated that 14.3% of the principals indicated that the ICT infrastructure was not used in teaching and learning in their schools because of shortage of skilled labour, 28.6 %lack of power while 14.3 % indicated lack of internet. Teacher's respondents, 24% indicated shortage of skilled labour, 20% high cost of ICT gadgets, 16% lack of security, 16% power shortage while 24% indicated their schools were not connected to internet. This suggests that most teachers were facing many problems in their attempt of using ICT in teaching and learning in their respective secondary schools. On the Competency and ICT Training of Teaching Staff, majority of the principals and teachers' respondents 37(82.2%), indicated not to have trained while a minority of 8 (17.8%) indicated to have trained.

Further, on the status of the ICT Expertise on repair and training 50% of the Principals indicated to have been trained but not to have been trained to repair ICT gadgets while 50% indicated to have been trained, 66.7% of the teachers' respondents indicated not to have been trained while and 33.3% indicated to have been trained to repair ICT gadgets.

Moreover, on the perception of the teaching staff on the use of the ICT infrastructure in teaching and learning in secondary schools in the County. 11.1% of the Principals strongly agreed on the usefulness of ICT in their schools, 44.4% disagreed, 0% was undecided, 11.1% agreed while 33.3% strongly disagreed. !6.7% of the teachers 16.7% strongly agreed that use of ICT was good 33.3% disagreed, 0% were undecided 16.7% agreed while 50% strongly disagreed. On computer generated exams and notes being good, 5.6% of the teachers' respondents strongly agreed, 33.3% disagreed, 2.8% were undecided, 11.1% agreed while 47.2% strongly disagreed.

Further, from the findings the indication is that there is significant relationship between teaching staff perception in ICT utilization and this enhances efficiency and improves quality in teaching and learning. Therefore, adoption of ICT in education makes improves teachers' productivity in teaching and learning. Thus, to realize the full benefit of ICT integration the challenges surrounding the process should be addressed by all stakeholders since teachers are

willing to embrace the process but they are hindered by technical issue beyond their scope.

## **RECOMMENDATIONS**

### ***Policy Recommendation***

- The study recommends that all the secondary schools be connected with electricity. This would be helpful in integrating the use of the ICT infrastructure in schools.

### ***Recommendations Related to Practices***

- The researcher recommends that all teachers in the service to be taken for refresher courses in ICT. This would equip all of them with new ICT skills which would make it easier to use the ICT infrastructure in teaching and learning in secondary schools.
- The government should assist secondary schools with initial the ICT infrastructure facilities. This would ensure common take off and even use of ICT infrastructure in teaching and learning in all the secondary schools.
- The government should ensure there are enough ICT trained technicians to repair ICT infrastructure facilities when they break down. This would ensure that once ICT facility broke down they are repaired for continuous use in teaching and learning in the schools.

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

The researcher suggests further research in the following area:

- A similar research should be carried out in other areas in the country in order to establish the use of the ICT infrastructure in teaching and learning in secondary school.
- At the same time, while it has been always held true that integration of the ICT infrastructure in education can improve the quality, efficiency and accessibility of education, there is need for further studies on this projection to document the ultimate nature of effect of ICT integration on quality of education.

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