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Influence of Teacher Competency on Integration of ICT in Teaching and Learning in Public Secondary Schools in Machakos

***Felistas Mbithe Michael*[1]**
***Redempta Maithya*[2]**
***Selpher K.Cheloti*[3]**

[1]Machakos Teachers' Training College, Kenya
[2,3]Department of Education Administration and Planning School of Education South Eastern Kenya University, Kenya

(✉ Corresponding Author)

Abstract

This study was set to investigate the influence of teachers' competency on the integration of ICT in teaching and learning in public secondary schools in Machakos County. The study hypothesis was that: There is no significant relationship between teacher competency and the integration of ICT in teaching and learning. The study used a sample of twenty one (21) secondary school head teachers and one hundred and twenty six (126) teachers. The study used questionnaires to collect data. Data was analyzed using descriptive and inferential statistics. The study established that majority of the head teachers and teachers had basic ICT literacy while only a few head teachers and teachers integrate ICT in teaching and learning due to their limited competency in ICT skills. The study findings showed a significant relationship between teacher competency and ICT integration. The study recommended that there is need for secondary school teachers to be trained in ICT integration in their subject areas in teaching and learning. The study also recommended that the Ministry of Education should ensure that all teachers train in ICT so as to acquire skills for teaching and learning.

Keywords: ICT integration, Teacher competency, Teaching, Learning.

Contents

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1. Introduction

Education is an important basis upon which development and economic growth can be built. With this realization world governments have created Millennium Development Goals (MDGs) with universal primary education (UPE) being given priority (Millennium Development Goals, 2008). Information Communication Technology (ICT) is an enabler and an enhancer of teaching and learning process in the realization of the MDGs.

Educational ICT software helps in simplifying difficult concepts, making learning fun and easy (Simkins *et al.*, 2003). It also helps learners carry out practical tasks such as experiments and presentations. With all the efficiencies of ICT and its continuous innovations for the teaching and learning process, it is expected that all learners have access to benefit from these efficiencies. Full access to the benefits of ICT for teaching and learning is limited by the unavailability and inability to purchase relevant resources particularly in developing countries.

Singapore and Finland have come up with national plans for ICT integration in their schools which specify the hardware, software, the networking to be implemented, the technical support and the training of teachers (Kozma, 2008). Efforts to achieve universal primary education (UPE) and the integration of ICT in the school curriculum have been established universally by multinational institutions and in continental structure. At multinational level the global e-school communities initiative (GeSci) emphasizes on use of ICT in schools so as to improve teaching and learning in developing countries (Global e-Schools Communities Initiative, 2009).

In Africa, New Partnership for African Development (NEPAD) has established the e-school with the objectives of providing computers to all schools in the African continent (NEPAD e-Africa Commission, 2010). Through this initiative NEPAD undertakes to advance ICT skills to primary and secondary school students and education. NEPAD as well coordinate ICT curriculum and content development in all schools in Africa which will advance teaching and learning across the African continent. Many African countries envision being industrialized by the year 2030 and Kenya is no exception. Kenya Vision 2030 states that teachers are expected to possess high technical skills so as to impact on learners if the African nations are to be industrialized .The increasing complexity of teaching methodologies and the need for creative, divergent and expected solutions to national and school situation require new profound approach to the field of education (KIE, 2009).

The regulations of the Teachers Service Commission (2007) in Kenya outline the functions of secondary school teachers in enhancing the necessary skills and training among the students. The functions of a school teacher as provider of education to students are enormous, challenging and require technology in order to operate effectively and efficiently. It is therefore important for ICT to be integrated in school teaching to improve efficiency. The Kenya government has seen the need to include technology in teaching as supported by the Kenya National ICT Strategy for Education and Training (Ministry of Education, 2008). Through this strategy, it is noted that although the impact of ICT on education goals is still inconclusive, reported observations include rapid expansion of knowledge, improved examination outcomes, enhanced communication and technical efficiency.

Davis (2002) observes that the success of ICT rests on proactive school teachers who give timely support to the integration of ICT in school operations. The Ministry of Education in Kenya has launched a national ICT policy to integrate computer in classroom instruction. The Kenya Institute of Curriculum Development (KICD) has translated the national ICT policy, prepared ICT curriculum and presented it to schools for implementation. A study by Mwunda (2014) established that the integration of ICT in teaching and learning in secondary schools is still very low in Kenya. Laaria (2013) revealed that despite government's efforts to improve quality of education through ICT adoption, the Kenya ICT4D National Policy (2006) has not been effectively implemented.

One of the most relevant barriers to the effective diffusion of ICT concerns the cultural and personal attitudes of teachers towards ICT (Afshari *et al.*, 2009). As there is a high rate of failure of ICT initiatives for the creation of development opportunities, a solid understanding of the determinants of user acceptance of ICT is crucial not only for theory building but also for effective practice (Park *et al.*, 2009). This study therefore investigated the influence of teacher competency on ICT integration in teaching and learning in public secondary schools in Machakos County. The study in particular sought to establish the relationship between teacher competency and ICT integration in teaching and learning.

1.1. Objectives of the Study

The study was guided by the following objectives:

i. To determine the influence of head teachers' competency on ICT integration in teaching and learning in secondary schools in Machakos County.
ii. To assess the relationship between teacher competency and integration of ICT in teaching and learning in public secondary schools in Machakos County.

1.2. Hypothesis of the Study

There is no significant relationship between teacher competency and the integration of ICT in teaching and learning in public secondary school in Machakos County.

2. Literature Review

Most of the ICT reforms and initiatives in schools failed due to their top-down approach that did not take into account teachers' skills, interest, and existing knowledge (Jimoyiannis and Komis, 2007). Therefore an investigation of teachers ICT skills can provide insights into their competencies in adopting and using technology in the classroom. Both policy makers and research community in world over have been pre-occupied with establishing efficient and best ways of preparing teachers to adopt and use ICT as part of their daily teaching strategy. Studies show that all over the world, different countries have consistently initiated programs that are directed in making teachers adopt and use ICT in their day-today teaching and learning practices in school. According to Jimoyiannis

and Komis (2007) countries like UK, Singapore, China, Australia and the European Union (EU), have established programs that aim at enhancing teachers' skills in adapting and using ICT during teaching and learning processes.

Kenya is currently undergoing a revolution in the ICT sector, which is destined to change the way schools conduct their business. The National ICT Policy for Education and Training aims to integrate ICT into education and training systems, and to use it to promote and enable educational reforms (MOE, 2008). Kenya Vision 2030 aims at creating an e-enabled and knowledge-based society by 2015. The government has set up ICT structures in primary, secondary and tertiary institutions in order to build an ICT-literate community. ICT has been integrated into teacher training, and regulatory obstacles to the adoption of ICT technologies have been addressed.

In Kenya, the government recognizes the positive effect of ICT in making the country a middle level economy as is envisaged in Kenya Vision 2030. Effort to implement ICT in schools was first initiated by publishing the Session Paper No.1 of 2005 where ICT was given prominence. The idea was to equip public secondary schools with ICT infrastructure and integrate it in existing school curriculum in order to meet the challenges of information society. The publication stated that in every school; teachers, students and communities around it should participate in acquiring ICT skills desirable to benefit from knowledge-based economy by year 2015. Learning and teaching in schools was to be transformed to embrace ICT skills appropriate for the twenty first century (GOK, 2005).

Despite the importance and strategies developed by the Kenyan government to implement ICT in schools, studies conducted in many schools in the country have established that most teachers are not effectively adopting and using ICT to support learning, teaching and management as intended (Manduku *et al.*, 2012). Laaria (2013) revealed that despite efforts made by various stakeholders and importance of the ICT in education sector, the National ICT policy on education of 2006 has not been effectively implemented as was intended. While many countries have reported over 41% adoption of ICT in teaching and learning in public secondary schools (Manduku *et al.*, 2012) the proportion remains considerably low in Kenya. This may be because the strategy adopted by the government did not take into consideration teachers' skills, attitudes and reactions towards these new tools. Little effort has been made to make teachers acquire skills in their subject areas to integrate ICT in teaching and learning (Otieno, 2003).

Von *et al.* (2004) argue that positive computer attitudes by teachers are expected to foster implementation of ICT in schools. Further, a study by Teo (2012) 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 computers towards teaching and learning. These studies reveal that teacher's skills, perceptions, and attitudes influence adoption and use of ICT in schools, thus prompting this study to assess the influence of teacher competency on the integration of ICT in public secondary schools in Machakos County, Kenya.

3. Methodology

The study adopted descriptive survey research design. The target population for this study was all the head teachers in the sixty seven (67) public secondary schools and the one thousand two hundred and thirty three teachers (1233) in the same schools in Machakos County. The numbers of teachers sampled from each of the three sampled categories of schools were: Twelve (12) teachers from the two (2) national schools, eighteen (18) teachers from the three (3) county schools and ninety six (96) teachers from the sixteen (16) sub county schools. Total number of one hundred and twenty six (126) teachers and twenty one (21) head teachers were sampled for the study which gave a sample size of one hundred and forty seven (147). Data was analyzed using both descriptive and inferential statistics. Chi-square and t-test were used for hypothesis testing with the help of the Statistical Package of Social Sciences (SPSS), where a level of significance at 0.05 led to acceptance of the hypothesis (Cohen *et al.*, 2007).

4. Results and Discussion

4.1. Teachers Competencies in the Integration of ICT in Teaching and Learning

The main objective of the study was to establish the extent to which teacher competency influenced ICT integration in teaching and learning. In view of this the study sought to establish if teachers had undertaken training in computer in their career and to what level of training as shown in Table 1.

Table-1. ICT Training for Head Teachers

Level of ICT	Frequency	Percent
Post graduate	0	0
Degree	0	0
Diploma	0	0
Certificate	21	100
Total	**21**	**100**

(Michael project report, 2016)

It is clear from Table 1 that all the head teachers, 21 (100%) had trained at certificate level of ICT. This implies that the head teachers have the least ICT qualifications hence limited in initiating ICT integration in teaching in their schools. Therefore there is need for training head teachers in ICT skills so as to integrate it in teaching and learning.

The study also sought to establish the level of ICT training for teachers. The responses from the teachers are shown in Table 2.

Table-2. ICT Training for Teachers

Level of ICT	Frequency	Percent
Post graduate	1	.8
Degree	5	4.2
Diploma	8	6.7
Certificate	106	88.3
Total	**120**	**100.0**

(Michael project report, 2016)

Table 2 shows that majority of the teachers had only trained at certificate level 106 (88.3%) and only 0.8% had post graduate training respectively. This indicates there is need for teachers to undergo training in ICT so that they can acquire competence to integrate ICT in teaching and learning.

The study also set to establish the computer elements covered by the head teachers and teachers in the training. Majority of the teachers (63%) and head teachers (57%) had trained in MS Word and internet browsing. Few teachers and head teachers had undertaken excel and power point packages. With regard to whether ICT training was on subject area or basic computer literacy the findings are shown on Table 3.

Table-3. Areas of ICT Training for Head Teachers

ICT areas	Frequency	Percent
subject area	1	4.8
just basic computer literacy	20	95.2
Total	**21**	**100.0**

(Michael project report, 2016)

Table 3 that shows majority of the head teachers had trained on just basic computer literacy 20(95%) while only 1(4.8%) had trained on the subject areas. These findings are in agreement with the study by Mbithi (2014) which established that knowledge and skills on part of the teachers on how to integrate computers in teaching and learning was limited. This shows that head teachers have mainly trained on basic computer literacy which is a prerequisite requirement for ICT integration. Therefore there is need for head teachers to be trained in ICT in the subject areas so as to enable them integrate it in teaching and learning. The study sought to determine the areas of ICT training of the teachers. The responses are shown on Table 4.

Table-4. Areas of ICT Training for Teachers

ICT areas	Frequency	Percent
subject area	13	10.8
just basic computer literacy	107	89.2
Total	**120**	**100.0**

(Michael project report, 2016)

Table 4 shows that majority of teachers 107(89.2%) had only trained in basic computer while only 13(10.8%) had training in the subject areas. This is an indication that there is need for teachers to be trained ICT in the subject areas to be competent to integrate ICT in teaching. The findings for teachers agree with the study by Otieno (2003) where he found that little effort had been made to make teachers acquire computer competence in the subject areas. The finding are also in line with the study by Hennesy and Oguko (2010) who established that ,most programs towards teacher training in ICT focused on basic computer literacy skills rather than adoption and use of technology in teaching.

4.2. In-Service Training for Head Teachers and Teachers

The study set to determine if head teachers had any in service training in ICT in the subject areas.
Table 5 below shows the analysis on in-service in ICT integration for head teachers.

Table-5. In-service Training in ICT in Subject Areas for Head Teachers

Responses	Frequency	Percent
Yes	9	42.9
No	12	57.1
Total	**21**	**100.0**

(Michael project report, 2016)

Table 5 show that 12(57.1%) of head teachers had not been in- serviced in ICT in the subject areas while only 9 (43%) had undertaken in- service training in their subject areas an indication that majority of the head teachers are not competent in ICT integration in their subject areas.

Table-6. In-service Training in ICT in Subject Areas for Teachers

Responses	Frequency	Percent
Yes	43	35.8
No	77	64.2
Total	**120**	**100.0**

(Michael project report, 2016)

Table 6 shows that 77(64.2%) of the teachers had not undergone in- service training in their subject areas while only 43(35.8%) had in service courses in ICT in their subject areas. These findings show that both the head teachers

and teachers have limited ICT competency in their subject areas. These finding agree with studies by Ayere *et al.* (2010) which found that many teachers had not received any training in ICT during their formative years of teacher training. This indicates the need for in service training in subject areas in order to prepare head teachers and teachers for ICT integration in teaching and learning. On how useful the ICT in-service training was to head teachers, the responses are shown on Table 7.

Table-7. Usefulness of ICT In-service Training to Head Teachers Career

Level of usefulness	Frequency	Percent
very useful	11	52.4
barely useful	9	42.9
not useful	1	4.8
Total	**21**	**100.0**

(Michael project report, 2016)

Table 7 shows that almost half of head teachers 11(52.4%) consider ICT in-service training to be very useful in their career while only 1(4.8%) of them consider it not useful. This indicates that most head teachers would be willing to undergo training in ICT to gain competency for use in their career.
The teachers' opinions on the usefulness of ICT in-service training are shown on Table 8.

Table-8. Extent of Usefulness of ICT In-service Training to Teachers

Usefulness	Frequency	Percent
very useful	72	60.0
barely useful	38	31.7
not useful	10	8.3
Total	**120**	**100.0**

(Michael project report, 2016)

Table 8 shows that majority 72(60%) of teachers considered ICT in-service training to be very useful in their career while 10(8.3%) considered it not to be useful. This implies that majority of teachers would be interested to undergo ICT training for their own benefits and still apply the skills in teaching and learning.

4.2. Years of Computer Use

There was need to find out how long head teachers and teachers had used computers as shown in Tables 9 and 10 respectively.

Table-9. Head Teachers' Average Years of Computer Use

Years of computer use	Frequency	Mean
On average how many years have you used a computer		4.07
Below 1 year	3	
Between 1to 2 years	2	
Between 2 to 3 years	4	
Between 3 to 4 years	12	
Total	**21**	4.07

(Michael project report, 2016)

From the analysis on Table 9 the head teachers had used computers for a period of 4 years (mean, 4.07) .This means head teachers have used computers long enough to be fully aware of their benefits in the field of education, and therefore would make efforts to integrate ICT in teaching and learning in their schools.

The study as well sought to establish the number of years the teachers had used computers. The responses are shown on Table 10.

Table-10. Teachers Average Years of Computer Use

Years of computer use	Frequency	Mean
On average how many years have you used a computer		4.26
Below 1 year	22	
Between 1to 2 years	26	
Between 2 to 3 years	6	
Between 3 to 4 years	66	
Total	**120**	4.26

(Michael project report, 2016)

From Table 10, it can be deduced that majority of the teachers had used computers for a period of more than 4 years (mean, 4.26).Four years of computer use by teachers would be enough experience and to make them receptive on the policy of ICT integration in teaching and learning.

Similarly the study sought to find out if the head teachers were confident in using computers. The findings showed that 12(57.1%) of the head teachers said they were fairly confident in using computers, 4(19%) were confident while only 1(4.8%) was very confident in using computers. This implies that though the head teachers had been using computers for at least 4 years, they need further training in ICT in order to build confidence in computer use which is key to effective ICT integration in teaching and learning. On if teachers were confident on use of computers, 33(27.5%) were confident, while 28(23.3%) said they were not sure of their confidence on the use of computers. Only a small minority were confident on the use of computers. This means there is need for in-depth ICT

training for teachers to develop the computer confidence which is needed for its integration in teaching and learning in schools. Extent to Which Teacher Competencies Influence Computer Use

Further the study sought to find out the extent to which teacher competencies influence the use of computers in teaching and learning. The findings are presented in Table 11.

Table-11. Head Teachers Competencies Influence on Use of Computers

Statement	SD	%	D	%	NS	%	A	%	SA	%	Mean
Teachers have basic computer training.			4	19	4	19	11	52.4	2	2.5	3.52
Teachers have adequate training.			4	19	0		12	57.1	5	23.5	3.86
Computers enhance the quality of teaching	1	4.8	1	4.8	4	19	3	14.3	12	57.1	4.14
I can teach using a computer	1	4.8	7	33.3	7	33.3	2	9.5	12	57.1	3.05
If training I would try out instructional computer technology in my subject area	2	9.5	1	4.8	1	4.8	8	38.1	9	42.9	4.00
Facilitated in my subject area	5	23.8	5	23.5	3	14.3	4	19	4	19	2.86
I can take risk of using computer in teaching	6	28.6	3	14.3	4	19	6	28.6	2	9.5	2.76

(Michael project report, 2016)

Table 11 shows that majority of the head teachers agreed that computers enhance the quality of teaching and learning (mean= 4.14). Majority of the head teachers also agreed that if given adequate training they would try out instructional computer technology in the subject areas (mean= 4.00). These findings also show that majority of head teachers said they do not use computers because they do not have adequate training. About 8(38%) of head teachers disagreed they have been trained in ICT in their subject areas. When asked if they could take the risk of teaching using ICT, 6(28.6%) head teachers disagreed that they could take risk of teaching using computer. This means the head teachers are incompetent in integrating ICT in their subject area hence there is need for in-service training so as to make them effectively integrate it in their schools.

On the extent to which teacher competencies influence computer use, the results are presented in Table 12.

Table-12. Extent to Which Teacher Competencies Influence Computer Use

Statement	SD	%	D	%	NS	%	A	%	SA	%	Mean
Teachers have basic computer training.	7	5.8	24	20	19	15.8	49	40.8	21	17.5	3.44
Don't have adequate training.	16	13.3	51	42.5	6	5	33	27.5	14	11.7	2.82
Computers enhance the quality of teaching and learning	3	2.5	4	3.3	1	0.8	45	37.5	67	55.8	4.41
Teach using a computer	6	5	18	15	19	15.8	41	34.2	36	30	3.69
If I could get adequate training I would try out instructional computer technology in my subject area	4	3.3	6	5	7	5.8	44	36.7	59	49.2	4.23
facilitated in my subject area	27	22.5	40	33.3	10	8.3	32	26.7	11	9.2	2.67
Risk of using computer in teaching	16	13.3	19	15.8	15	12.5	42	35	28	23.3	3.39

(Michael project report, 2016)

Table 12 shows that most teachers, 67(55.8%) were in agreement that computers enhance the quality of teaching and learning (mean =4.41).These findings concur with the study by Mlitwa (2011) which found that integration of ICT not only facilitate teaching and learning but also improves efficiencies in educational processes. Majority of teachers, 59(49.2%) were also in agreement that they would try out instructional computer technology in their subject areas if given some training (mean =4.23). These finding agree with the study by Mbithi (2014) which found that knowledge and skills on how to integrate computers in teaching and learning limited teachers in effecting ICT integration It is also worth noting that most teachers, 33(27.5%) said they do not use computers in teaching because they do not have inadequate training (mean= 2.82).There is therefore need for teachers to be trained in ICT in their subject areas so that they can effectively teach using computers.

4.3. Hypothesis Testing

The study hypothesis stated that there is no significant relationship between teacher competency and the integration of ICT in teaching and learning in public secondary school in Machakos County. The hypothesis presumed that integration of ICT is independent of teachers' competency. In order to prove this assertion, a correlation analysis was conducted at the .01 level of significance and the results are presented in Table 13.

Table-13. Relationship Between Teachers' Competency and ICT Integration

Variable	Correlation	Teachers competency	overall ICT integration index
Teachers competency	Pearson Correlation	1	.366**
	Sig. (2-tailed)		.000
	N	120	120

(Michael project report, 2016)

The analysis on Table 13 shows the relationship to be positive and significant; R (118) =.366, p<.001; R^2 =13.4. From the R^2 value we can deduce that teacher competency can explain about 14% of the total variance in ICT integration. This means that there is a high likelihood of schools integrating use of ICT when teachers are competent in the use of computers and other ICT skills. In view of this finding therefore the null hypothesis was rejected and conclusion made that teachers competency and ICT integration are statistically dependent.

5. Conclusion and Recommendation

The study sought to establish the influence of teacher competency on the integration of ICT in public secondary schools in Machakos County. The study established that the training in computer use was mainly done at certificate level and therefore the need for more training in ICT integration. The study findings also indicate that few head teachers were fairly confident in use of computers (11%) while 37% of the teachers were fairly confident on computer use, meaning that they cannot effectively integrate ICT in teaching and learning. Findings of the study show that majority of head teachers and teachers were not using computers in teaching and learning (mean 2.82) although they also agreed that computers enhance the quality of teaching and learning (mean 4.14 and 4.41 respectively). It can therefore be concluded that head teachers and teachers are willing to try out computer instruction technology in their subject areas if given the right skills. In view of the study findings the researchers recommend that the Ministry of Education should ensure that all teachers train in ICT skills that are necessary for ICT integration in teaching and learning. Head teachers should also encourage teachers to use ICT in teaching and learning and lead by example.

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