Impact of Teachers’ Level of Education and Locality on Implementation of Information Communication Technology in Public Secondary Schools in Nyeri, Central District, Kenya

Reuben Nguyo Wachiuri
Department Of Educational, Administration And Planning University Of Nairobi
P.O. Box 4815-00100 Nairobi

Correspondence Author: jedidahkimathi121@gmail.com

ABSTRACT

The purpose of the study was to investigate the impact of teachers’ and locality on implementation of Information Communication Technology in public secondary schools in Nyeri Central district, Kenya. The dependent variable was implementation of ICT and the independent variables were teachers’ level of education and teachers’ locality. The research design used was descriptive survey design. The target population was 275 teachers working in 15 public secondary schools in Nyeri Central district. The sampling design was stratified random sampling and sample size was 82 teachers. The study targeted 15 principals of the schools in Nyeri Central district. The data collection tools were questionnaires, interview schedule and observation schedule. Data were analyzed quantitatively and qualitatively.

The research study revealed that teachers’ demographic variables affected ICT implementation in public secondary schools. Teachers’ education level and locality are not consistent in affecting ICT implementation. Many schools especially in rural areas had not embraced ICT mainly because teachers lacked adequate training, had lower levels of education, and negative attitude towards ICT implementation. This has led to schools facing major challenges in ICT implementation.

The researcher recommends that the government should find a way to provide more ICT facilities and support teachers’ training on the use of ICT as part of the pre service training. The government needs to give more financial support through free education programme and donations to enhance ICT implementation in public
secondary schools. The teachers should change their attitude towards the use and implementation of ICT in the schools so as to create information technology culture in all aspects of teaching and learning

Key words:
Teachers’ Educational level, Teachers’ locality, Information Communication Technology & Curriculum Implementation

INTRODUCTION

Information Communication Technologies (ICT) are defined as a diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information. Thus, ICT is an umbrella term that includes any communication device or application, encompassing; projector, radio, television, cellular phones, computer, internet network hardware and software, satellite systems and various services associated with them for example video conferencing and distance learning (Tinio, 2003). According to Mingaine (2013) the implementation of ICT in schools in developing countries remains very limited despite a decade of considerable large investments in the technology.

Information Communication Technology dates back in 1936. Countries like United States of America (USA), Britain, Russia and Germany started to include ICT in the education sector mostly for administrative purposes (Mioduser, Turksapa & Leitner, 2000). However, in mid 1970s America, Canada and Britain started piloting ICT in their schools as part of teaching learning resource (Mioduser, et al 2000).

Information Communication Technology was first integrated in education in 1980 and made compulsory in the developed nations (Tinio, 2003). It was assumed that the integration of ICT into education would revolutionize outdated or old ICTs in education systems (Waema, 2002). Phipps and Merisotis, (1999) state that when ICT integration in education was pointed out, educators embraced it, in spite of their demographic differences and declared it a new educational technology. They stated that such hype is typical for new technologies, and in no areas is this seen more keenly than in education.

Compared with developed countries such as United States of America (USA), Britain, Russia and Germany, the use of ICT in education programs in developing nations is
more recent, small scale and experimental (Oliveira, 1989). Oliveira further states that ICT in developing nations is still evolving from the traditional ICTs, for example, the printed books, postal services, the printed press, film, radio broadcast and television. According to Waema (2002) several African countries like Egypt, Mauritius, Rwanda, and South Africa have developed comprehensive national policies and strategies to fully implement Information Technologies in education. Oliveira (1989) states that Egypt and South Africa are at par with developed countries like the UK.

Kenya is one of the few developing countries where ICT implementation in education is considerably more recent in that, the integration of ICT to education was done in 2005 in line with Sessional Paper No.1 of 2005 (Republic of Kenya, 2005). This was shortly after the Ministry of Education Science and Technology (MoEST) came up with education ICT policy drawn from the larger national ICT policy. To implement the policies embodied in the education ICT policy, the Kenya government employed the following strategies; facilitating universal access to ICT infrastructure, that is, electrical power, computers and improved internet connectivity in all institutions of learning in both the formal and non-formal education sectors including affirmation action of gender, ASAL areas, rural-urban poor schools and those with special needs. Building capacity to enable the use of ICT in teaching and learning has been a key task that the government of Kenya through Ministry of Education Science and Technology has laid emphasis on (Okanda, 2005).

Kenya recognizes the many ways in which Information and Communication Technologies (ICTs) can be leveraged to support and improve the delivery of quality education for all Kenyans. These options are as per the educational priorities outlined in Sessional paper No.1 of 2005 (Republic of Kenya, 2005) and the Kenya Education Sector Support Programme (KESSP) document (Republic of Kenya, 2005). These options include: quality teaching and learning through ICT. Kenya Institute of Education (KIE), an arm of the Ministry of Education which is tasked with formulation and implementation of education curriculum has gone ahead to develop an online course for orientation of both primary and secondary school teachers. It has also developed an ICT syllabus for primary
school teachers (Kenya Institute of Education, 2004).

According to Ornstein and Hunkins (1998) the hardest part of any curriculum change and innovation is the implementation. This is dependent on how change agents perceive the innovation. The change agents’ statistical and socio-economic characteristics may mean its success or failure. Gichoya (2005) reported that the greatest barrier that impedes the implementation of ICT in any government institution in Kenya lies heavily with the key implementers and that their demographic factors might positively or negatively influence ICT implementation on the ground. According to a survey by Makau (1998) majority of teachers tended to be passive in any modern ICT oriented lesson and opted for a lecture based teaching method rather than use of any modern ICT.

Hennesy, David and Wamakote (2010) observed that despite the efforts by the government offering its full support to the implementation of ICT in teaching and learning in public schools in Kenya, low optimum use of the ICT by teachers is evident on the ground. According to Unwin (2004), there is a gap between those advocating for the use of ICT in teacher education and the classroom practice. The Republic of Kenya (2005) also notes that most schools use less than 40 per cent of the available ICT infrastructure.

Kenya continues to struggle with high levels of poverty that has affected implementation of the technology in schools (Ncunge et al, 2012). According to Jimoyiannis, & Komis, (2007) countries like UK, Singapore, China, Australia, European Union (EU), have established programs that aim at enhancing teachers’ skills important in adapting and using ICT during teaching and learning processes. Many researchers consider designing and integrating efficient ICT teacher preparation programs as a key aspect to essential and successful, wide-ranging school reforms (Khan et al, 2012).

**Influence of teachers level of education on ICT implementation**

Level of education contributed greatly towards integration of e-learning in schools where teachers who had previous knowledge on computer and had bachelor degree of education qualification were always using e-learning in their class teaching daily. Sia (2000) conducted a study among urban
secondary school teachers in Miri, Sarawak to determine the levels of computer literacy and computer anxiety. The study found out that the computer literacy levels among secondary school teachers were low, and there were significant differences in computer literacy levels between teachers of different age groups, and teachers with different years of computer experience with different software.

The finding of Kiptalam agrees with the study carried out by David et.al. (2003) on three Kenyan secondary schools, that showed that newly recruited teachers were trained on use of word processing, spread sheets, email and Internet. Teachers’ training colleges (TTCs) in Kenya have also incorporated into the curricula the aspect of relevant and appropriate ICT training at pre-service training, and the trend should be reversed in the near future. He also found that majority of the teachers did not receive ICT training at the teachers’ training colleges or universities where they trained, with 55% getting into the teaching profession with no experience of using computers and its related technologies. This indicates more than 50% of the teachers employed irrespective of their level of education had no knowledge on ICT implementation. In 2002, Kenya Science Teachers College (KSTC) currently Kenya Science campus introduced Computer Science as a main teaching subject alongside the Sciences but ICT integration in the training of teachers started in 2005 in line with Sessional Paper No.1 of 2005 (Republic of Kenya, 2005).

Mioduser, Turksapa and Leitner (2000) reported that demographic factors such as age, gender, teachers’ experience and teachers’ level of education greatly affected the speed at which ICT was conceived and implemented at Greece. However they state that teachers had already received training on ICT before the actual implementation began citing it as the only teacher demographic factor considered by Greece Ministry of Education.

William, Cole and Wilson (2000) found that teachers failed to exploit the new powerful technologies due to lack of skills and meaningful application of ICT in classroom and a good percentage of teachers literally discouraged students to use computers during their free time. If ICT in teaching and learning process is fully introduced in schools it will act as an integral tool to engage students in understanding concepts
and processes in more depth and enable them to demonstrate their understanding, fit classroom learning to particular student needs and interests, and to extend the reach of the classroom across space and time.

Mingaine (2013) study established that there was limited supply of qualified ICT teachers in Kenya. Mioduser, Turksapa and Leitner (2000) reported that demographic factors such as age, gender, teachers’ experience and teachers’ level of education greatly affected the speed at which ICT was conceived and implemented at Greece.

**Influence of locality of the teacher on ICT implementation**

The place where a teacher lives affects the implementation of ICT. Teachers who live in urban areas are more responsive to the use of ICT in teaching and learning due to exposure unlike the teachers who stay in the rural areas where the resources are limited (Kambua, 2008). According to a study done by Kiptalam on’ *Accessibility and Utilization of ICTs among Secondary School Teachers in Kenya*’ showed that the level of access to locally relevant content by the teachers was low as only 18.4% said they had access to local web-based training programmes and only 24.5% teachers gave indication that they visited local web portals. It appeared that the issue of availability of locally relevant content still ranked low.

This is similar to the findings of the Kenya ICT Board (KICTB) and TNS Research International (2010), where Kenyan internet users were surveyed, 29% said they had visited Kenyan websites. The top four suggested Kenyan sites were educational information and eLearning (38%); business related and e-commerce (28%); entertainment (16%) and social networking (10%). Using the Pearson correlation statistical analysis for a 0.05 one-tailed significance test, it was seen that teachers’ levels of access to the schools computers is positively linked to their basic ICT literacy skills as reported by the school heads. It was also noted that (43.9%) teachers had for more than 6 years been using computers, while 11 (11.2%) teachers had less than a year of experience on use of computers. However, there was no statistically significant difference amongst teachers based on accessibility of ICT. Therefore these study are inconsistent with Kambua(2008) findings.

According to Murphy and Greenwood (1998), ICT is significantly under-utilized
by teachers. The problem is worldwide and many explanations were offered for it, among them being factors like the experience of the teacher on ICT, gender in terms of marginalization and allotment of ICT leadership, age that could influence the perception of ICT as a whole, teachers’ location and the qualifications of the teachers on use of the modern ICTs (Dearing, 1997). Lack of experience and training at the pre-service and also exposure in the field is a key factor that inhibits the implementation of ICT in schools (Kigwilu, 2005).

Statement of the problem

According to Gathano (2009) demographic factors such as teachers’ level of education, teachers’ training on ICT and age are important in the implementation of ICT in Thika district. Gichoya (2005) study in Nyeri Central district reported that the greatest barrier that impedes the implementation of ICT in any government institution in Kenya lies heavily with the key implementers and that their demographic variables might positively or negatively influence ICT implementation on the ground. According to Kigwilu (2005) lack of experience and training at the pre-service and also exposure in the field is a key factor that inhibits the implementation of ICT in schools.

Records from the District Education Office in Nyeri Central District show that out of 275 teachers only nine are fully conversant with ICT. Although the Ministry of Education ICT section has been involved in the training of at least three teachers in use of ICT in every district the number of teachers who are knowledgeable in new ICT is minimal. This is the reason why many teachers avoid using computers for recording information and in case they do it they do it wrongly. Consequently this hinders the implementation of ICT. Through SMASSE teachers are supposed to be taught how to use ICT. However, it is only the science teachers who are taught but only on how to use the projector (MoEST, 2010). When teachers are being recruited it is done on the basis of when one finished college and whether the teacher comes from the locality and not on ICT knowledge.

Gathano (2009) study on the impact of age, experience and training in ICT implementation was confined to Thika district. Therefore this study seeks to
investigate effect of teachers’ demographic variables on ICT implementation in a different context in Nyeri Central district. Kigwilu (2005) states that lack of experience and pre service training inhibits implementation of ICT in schools. This study did not address public secondary schools in Nyeri Central district in particular and thus this study seeks to determine the influence teachers’ level of education and locality on ICT implementation. It is also noteworthy that there is limited literature on the impact of teachers’ level of education and locality in particular on ICT implementation in Kenya and therefore a need for this study. Therefore the study seeks to establish how the teachers ‘level of education and locality (where they live) affect ICT implementation.

**Purpose of the study**

The purpose of the study was to investigate the impact of teachers’ education level and locality on implementation of ICT in public secondary schools in Nyeri Central district.

**Objective of the study**

To identify the impact of teachers’ level of education and locality on the implementation of ICT in Public secondary schools

**Research question**

What is the influence of teachers’ education level and locality on ICT implementation in Public Secondary schools?

**RESEARCH METHODOLOGY**

The study used descriptive survey research design which according to Kothari (2011) is a method of collecting information by interviewing or administering a questionnaire to a sample of individuals. According to Kothari (2011) descriptive research design is used because accurate information can be obtained for large number of people with a small sample. It is used to explore relationship between variables and allows generalizations across populations. The design is suitable for this study because it is used to explore and evaluate in details the teachers’ gender influencing ICT implementation.

Kombo and Tromp (2006), state that population refers to the larger group from which a sample is taken. According to Nyeri County Education Offices (2011) statistics section there were a total of 15 public
secondary schools. The 26 target population for this study was 275 teachers and principals from the 15 public secondary schools. Stratified random sampling was used in selecting one teacher from every department. Purposive sampling was done to select 15 computer teachers.

FINDINGS AND DISCUSSIONS

Table 1 Teachers’ Residential Area

<table>
<thead>
<tr>
<th>Residential area</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural</td>
<td>26</td>
<td>38</td>
</tr>
<tr>
<td>Semi urban</td>
<td>25</td>
<td>36</td>
</tr>
<tr>
<td>Urban</td>
<td>18</td>
<td>26</td>
</tr>
<tr>
<td>Total</td>
<td>69</td>
<td>100</td>
</tr>
</tbody>
</table>

Majority (38%) of the teachers respondents live in rural areas and 36 % live in semi-urban areas while 26 % live in urban areas. Majority of the teachers were living in rural areas where the cost of living is low.

Teachers’ highest level of education

The findings on the highest educational level are presented in the figure 1.

Figure 1 . Teachers’ Highest Level of Education

The study found out the following:

Teachers’ residential area

The researcher sought to find out the influence of teachers’ residential area on ICT implementation in public secondary schools.
From the findings, majority (44%) of the teachers were diploma holders while 36% were at undergraduate level of education and the other smaller proportion 20% had masters’ degree in education. This information shows that majority of the teachers who are in charge of ICT implementation were diploma holders, since most of the computer related courses have been introduced as early as 2002 in Kenya institute of science and technology currently Kenya science Campus and in the universities recently.

Table 2 Teachers’ residential area and forms of ICT used in teaching

<table>
<thead>
<tr>
<th>Residential area</th>
<th>Laptop F%</th>
<th>Desktop F%</th>
<th>Internet F%</th>
<th>Extranet F%</th>
<th>Intranet F%</th>
<th>Projector F%</th>
<th>None F%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural</td>
<td>40</td>
<td>43</td>
<td>20</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>18</td>
</tr>
<tr>
<td>Semi urban</td>
<td>20</td>
<td>57</td>
<td>80</td>
<td>100</td>
<td>100</td>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td>Urban</td>
<td>40</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>100</td>
<td>13</td>
</tr>
</tbody>
</table>

Note. N = 69. F = frequency.

Teachers who reside in the semi urban areas least use the laptops (20.0%). For the other forms of ICT they use more as indicated, desktop (57%), internet (80%) and (100.0%) extranet. Teachers in urban areas mostly use laptops as indicated by (40.0%) teachers in the rural areas have the same percentage (40.0%) as those in urban areas.'
### Table 3

**Teachers’ residential area and other forms of ICT used in Teaching**

<table>
<thead>
<tr>
<th>Residential area</th>
<th>Radio</th>
<th>Television</th>
<th>Phones</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>21</td>
</tr>
<tr>
<td>Semi urban</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>15</td>
</tr>
<tr>
<td>Urban</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>12</td>
</tr>
</tbody>
</table>

Note. N = 69. F = frequency.

The table 3 shows that the teachers who reside in the semi urban areas use radio (57 %), television (44 %) and cellular phones (40%) more in teaching as compared to those residing in the rural and urban areas. Teachers residing in the rural areas use cellular phones more in teaching as indicated by (40.0%) unlike the radio (14 %) and television (22 ). This could be attributed to the availability of cellular phones unlike other forms of ICT. These findings are inconsistent with studies done by Kambua (2008) which indicated that teachers in urban areas are more responsive in the use of ICT in teaching and learning due to exposure unlike the teachers who reside in rural and semi urban areas.

### Table 4

**Teachers’ highest education level and use of ICT in preparing lessons**

<table>
<thead>
<tr>
<th>Highest education level</th>
<th>Use of ICT in preparing lessons</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Research</td>
</tr>
<tr>
<td>Diploma</td>
<td>F  %</td>
</tr>
<tr>
<td>Undergraduate</td>
<td>6  37</td>
</tr>
<tr>
<td>Masters</td>
<td>7  44</td>
</tr>
<tr>
<td></td>
<td>3  19</td>
</tr>
</tbody>
</table>

Note. N = 69. F = frequency.
The table 4 indicates that Diploma teachers use ICT for assessment to a larger extent (75%), research for a lesser extent (37%) and photocopying examination material (20%). The graduate used ICT more for research (44%), photocopying examination materials at (40 %) and for assessment at a less extent of (25 %). For masters degree holders, they used ICT to a great extent for photocopying examination materials (40 %) and to a less extent in research (19%) and did not use ICT for assessment. This shows inconsistent relationship between teachers’ level of education and ICT usage. This is consistent with study done by Sia 2000) who conducted a study among urban secondary school teachers in Miri, Sarawak to determine the level of computer literacy and computer anxiety. The study findings indicated that computer literacy levels among secondary school teachers were low and there was no significant difference in computer literacy levels between teachers of different age groups, and teachers with different years of computer experience with different software.

**Conclusion and Recommendation**

Teachers appear to have little understanding of the range of the uses of ICT in school (William et al 2000). The MoEST needs to improve the learning and teaching materials. Teachers need to be trained on how to integrate ICT in their teaching while pursuing their course. Mechanisms should also be put in place where teacher should practice on how to integrate ICT in teaching while on teaching practice. According to what was found out by the above mentioned researchers, ICT is a useful tool for both teachers and students. Through supervision, challenges of implementing ICT in secondary schools can be identified pointing towards a need to up-date or revise the existing problem.

Findings from the reviewed literature showed that very minimal supervision if any is done in Kenya, the MOE, though has given out some computers to secondary schools; there is laxity in supervision so follow-ups should be encouraged. Supervision is also a vital aspect in effective implementation of any program if well carried out, as it is likely to improve teachers’ and student's literacy in ICT, strategies of teaching and learning. From the reviewed literature again, the researcher found out there is limited research done on this field and there recommends similar
studies to be carried out in other parts of the country.

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