

# Assessing the influence of the PTTC Principal's competency in ICT on the teachers' integration of ICT in teaching Science in PTTCs in Nyanza Region, Kenya.

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## Abstract

The study was conducted to assess the influence of Primary Teacher Training College (PTTC) principal's competency in ICT on the teacher's integration of ICT in teaching science in PTTC's in Nyanza region in Kenya. The one research question and one research hypothesis guided the study. The population comprised of 21 principals and 159 tutors. Data from the college principals and tutors was collected by use of interview schedule and a questionnaire. Cronbach alpha reliability computation was done to determine the overall reliability of the instrument. Cronbach alpha coefficient of 0.90 and higher was considered as reliable. The mean, standard deviation and Pearson correlation coefficient was used to analyze the data collected and the hypothesis tested at 0.01 alpha level. The results from the data indicated that the Principal who is competent in Information Communication Technology (ICT) favored the tutor's ICT integration in teaching science. Results of the hypothesis testing further revealed that there was a significant liner relationship between the principal's competency in ICT and teacher's integration of ICT in the teaching of science in PTTC's. Based on the findings of the study it was recommended that the Kenya government should make it a priority to develop a policy to guide leaders in ICT integration, in teaching science, and Teacher's Service Commission, Kenya Institute of Curriculum Development, Kenya Education Staff Institute and Ministry of Education and Science Technology should develop packages in ICT integration in teaching science for in servicing Principals prior to appointment.

**Key words:** Competency, ICT Integration, Principal, Information Communication Technology

## 1. Introduction

### *Background of the study*

Information communication Technology (ICT) has influenced politics, business, communication, economic development and basically all areas of life. As noted by Kozma (2005) ICT is a principal driver of economic development and social change worldwide. It is rapidly and consistently transforming the way people interact in their everyday activities. It is therefore crucial that Principals of academic institutions, especially Primary Teacher Training Colleges (PTTCs) should be competent in the integration of ICT and must have broad understanding of curricular, technological, financial, social and administrative dimension of ICT use in Education. The government of Kenya is making frantic efforts to ensure that it provides basic facilities to implement ICT integration in the Kenyan Primary Schools after two unsuccessful attempts. In bid to equip each Primary school to embrace ICT use in teaching and learning, equip the populace with skills and knowledge and provide the necessary infrastructure the School principal has a major role to play. It is therefore important that leaders of various organizations should be competent in the integration of ICT. For ICT integration to be effective and sustainable, administrators must be competent in the use of technology and must have a broad understanding of the technical, curricular, administrative, financial and social dimension of ICT use in Education. In technical support, general competencies that are required would be in the installation, operation and maintenance of technical equipment (including software), network administration and network security. Without on-site technical support much time and money may be lost due to technical breakdowns. The other area of competency is in content development. This is a critical area, there is need to develop original educational content, radio programmes and interactive multimedia learning materials. A study by Afshari (2010) indicates that it is only a minority of Principals who consider themselves competent in ICT. The Principal's personal unfamiliarity with ICT is another reason why integration of ICT in teaching Science in PTTCs is seldom done. Afshari .et al. (2012) showed that in this age of ICT development, Principals should become competent in using ICT; they should use computers effectively to perform their daily responsibilities. Literature indicates that some secondary school Principals' are lacking proficiency in database, spread sheet, presentation/multimedia software, the internet and information seeking as compared with other technology competencies. Principals should display sincerity and confidence and demonstrate excellent communication skills and motivate their teachers. It is important they have a clear vision about the goals of ICT that teachers relate to culture and teaching environments in their schools. They should strive for excellence; encourage teachers to learn more about ICT integration as well as providing the necessary on-going support

(Vallance 2008, P. 290). To facilitate the implementation of integration of ICT in teaching science in PTTCs, the Options paper (Kenya MOEST, 2005) in large-scale capacity building workshops for teachers suggests further that the Teacher Education should be built on existing structures that support quality on-going professional development for teachers. The programme should be consistent with the workshops for lecturers and pre-service teachers at teacher training colleges. From a survey done in Kenya by Oloo (2009) it is clear that majority of teachers were ill equipped to effectively integrate ICT in the classroom. Wamakote, et.al. (2010), citing Farrell 2007, asserts that while technicians can be employed to fix and maintain computers, teachers and educators must know how to exploit ICT for what it does best; opening learners up to the world of knowledge. The author also notes that investment into upgrading computer labs and building ICT capacity at the Teacher Training Colleges (PTTCs) is an intervention which can quickly yield high returns. By providing adequate access to ICT, the PTTCs can use it to achieve learning objectives at various levels. This point is also noted in the ICT in Education options paper Kenya, MOEST, 2005).

From the above discussion, it's evident that the principal should exhibit effective leadership and managerial skills. By providing adequate access to ICT, the teachers training colleges can use ICT to achieve learning objectives at various levels. At simplest level, ICTs allow for storage and display of information. However, using ICTs also fosters exploration of materials and ideas. ICTs allow learners to apply a concept or understanding to new situations (Len. Garfield 2003). Anecdotal evidence suggests, however that teachers experiencing national and international training programs falter after their initial learning success if they do not receive follow up and support in schools. Follow up and support can be provided with the principal who is the change agent (Hennesy, Harrison and Wamakote, 2010). Principals' interest and involvement in ICT integration is the key in determining how ICTs will be used in schools by teachers and learners (Han, 2002, p 295-296; Johnson, 2004, p xvii). For Principals to influence teachers' sustainable and effective ICT integration, it is necessary that they themselves realise the impact of ICT in education.

If Principals do not have enough competence in computer use, they may not integrate ICT into their instructional and administrative tasks (Afshari et. al. 2008). Without the knowledge and skill of ICT, principals might have high level of uncertainty that influence their opinions and beliefs (Rogers 2003). In the same thought, Felton (2006) explains that competency is key in the use of ICT by principals on daily basis. Competence in operating a computer and in utilizing software may improve the quality and efficiency of administrative performance in schools. Improved quality could lead to improvement in decision making. If training is inadequate or inappropriate, the Principals will not be sufficiently prepared and perhaps not sufficiently confident to make full use of ICT. Hence lack of principal's competence and lack of quality training for principals can be barriers to principal's use of ICT. Pollizi (2011) quoting Dawson and Rakes (2003), found evidence that technology integration into the classroom is influenced by the type and the amount of technology training received by the principals.

If principals do not use ICT on consistent basis, they should not expect the teachers to use ICT regularly. Modelling the use of technology provides an effective method for exposing teachers to the new strategies and demonstrating to the staff that it is acceptable to take risks and make mistakes without fear of retribution (Dawson & Rakes, 2003). However, although school leaders may be formally mandated technology leadership responsibilities, this can be problematic since they often do not have the training or background to feel confident in dealing with the technology

Bernard (1996) states that the more experienced one is with technology, the more he will appreciate and implement it in his school. When the principal is familiar with the technology, he will be employing the same in lesson preparation, record keeping, school administration and instructional activities. Principals constitute the role model in a school. It is therefore necessary for them to practice what they preach. Gibson (2002, p 321-322) point out that due to continuous education change, it is essential for the principals to regularly update their own ICT knowledge and skills to ensure that appropriate changes are implemented.

It is therefore important to find out the effect of the principal's competencies on the integration of ICT in teaching science in primary teachers training colleges in Nyanza region. (Akbulut, et al 2007) indicates the attributes required for principals leading successful ICT integration in teaching and learning. Principals themselves should use ICT. They should attend training opportunities and be competent about every aspect of ICT integration. They should respond to specific issues in their PTTCs and to the constant change that ICT integration demands. ICT in itself, if carefully integrated in education, has a potential to facilitate the acquisition of relevant life skills that buttress the development process in the prevailing economic and information order (Were, Rubagiza, Denley, and Sutherland. 2007, p.18). It seems that using ICT in education seeks fundamental reform and change in instructional programs. Change is constant and inevitable; in terms of ICT one cannot lock himself/herself into too much of technology or it will get stale very quickly. ICT resources of notebook, computers with a accompanying software and technological hardware such as interactive whiteboards, data projectors, digital cameras and scanners are now part of the teachers' professional tool box (Gronov, 2007, p.3).

Len and Garfield (2003, p 2000 ;) citing Fullan (2001) says, leaders in a school have a strong influence in how this shift is occurring. Leaders are the ones who create a culture where teachers can grow and learn. Visionary principals will play a great role in the integration of ICT in teaching science (Afshari et al 2008, p. 645). Leadership learning is necessary because creating learning schools rest in large measure on the quality of the Leadership (Southworth, 2005, p.88). However, it is noted that the literature on technology leadership is scarce, fragmented, limited in scope and more likely to be prescriptive in nature (Ho. 2006, p. 6). Kalake (2006) says research on what enables principals to effectively lead the implementation of ICT in teaching Science in PTTCs and principals' perception on the challenges and preferences of training was not found. So this study is to fill this gap of the lack or dismal ICT leadership.

## **2. Statement of the Problem**

In Kenya, the vision of the MOEST is to facilitate ICT integration as a universal tool for education and training. In order to achieve this vision, every educational institution, teacher, learner and the respective Community should be equipped with appropriate ICT infrastructure, competencies and policies for use and progress. The PTTC principals play a key role in the implementation of integration of ICT in teaching of the subjects in pre-service training curriculum (Fullan, 1988). In particular, the Kenya Government underscores the importance of ICT and related infrastructure in attaining vision 2030. Present communication technologies require that ICT be integrated in all fields and areas of life. To successfully implement a reform such as ICT integration, it requires that leaders actively participate in dynamic changing environments. Therefore educational leaders such as college principals can have a major impact on the success, coherence and sustainability of the change process. They must manage issues related to technology and educational community. Despite significant political good will and spending by the Kenya government on ICT policies, technical equipment and training, levels of ICT integration in PTTCs are still poor, leading to the low use of ICT in teaching and learning in Schools. The PTTCs therefore stand at this critical position to achieve this training and use ICT in teaching and learning. For the PTTCs to do so the principals must actively be involved. This study therefore seeks to find out how the PTTC Principal's competency in ICT favour the teachers' integration of ICT in teaching Science in Nyanza

### **2.1 Purpose of the Study**

The purpose of the study was to investigate how the principal's competency in the integration of Information Communication Technology in teaching in the Primary Teachers' Training Colleges in Nyanza favour teacher's ICT integration in teaching of science

### **2.2 Research Objective**

To determine the extent to which principal's competency in ICT favours the teachers' integration of ICT in teaching science in PTTCs in Nyanza region?

### **2.3 Hypothesis**

Ho1: There is no statistically significant relationship between the principal's

ICT competency and the teachers' integration of ICT in teaching Science in PTTCs in Nyanza region

## **3 Methodology**

This research utilized the Positivist paradigm of exploring social reality. This Philosophy emphasizes observation and reason as a means understanding human behaviour. Positivist paradigm thus systematizes the knowledge generation process with the help of quantification, which is essential to enhance precision in the description of parameters and the discernment of the relationship among them. The study utilized mixed methods approach: both qualitative and quantitative approaches in combination provide a better understanding in the research problems than either approaches alone (Creswell and Plano Clark, 2011). The descriptive design recorded perceptions of the respondents' background information by calculating frequency distribution tables, percentages, means and standard deviations while considering each variable involved. The multiple regression analysis explained the relationship between the teachers' integration of ICT in teaching science as it is influenced by the principals' competency in ICT.

The study targeted all the Principals (21) and teachers (159) drawn from the PTTCs spread throughout the Nyanza region. There were twenty one teachers' training colleges in Nyanza region. All the Principals and all the teachers who teach science from the twenty one PTTCs in Nyanza region were sampled. The target population numbered one hundred and fifty nine Teachers and twenty one principals. The population was accessible to the researcher and it had knowledge or ideas on the subject investigated.

#### 4 Results

### Principal's Competency in ICT and its influence on ICT integration in teaching of Science.

**Table 1. Evaluation of Principal's Competency in ICT**

Aspects that portray Principal's competency in ICT.	Mean	Std. Deviation
1. Use internet in his/her lessons to meet certain learning goals.	3.06	1.23
2. Use word processing for preparing administrative basic documents.	3.09	1.33
3. Use spread sheets for documents that require number processing.	3.06	1.22
4. Use power point to support presentation reports and talks to gathering.	3.00	1.30
5. Use e-mails to communicate with staff and students.	2.82	1.27
6. Use web search techniques.	2.93	1.22
7. Assist tutors and students to select appropriate software to use in their projects	2.78	1.23
8. Use the ICT to support administrative record keeping, analysis and reporting.	3.31	1.27
9. Can entertain himself/herself using ICT	3.04	1.23
10. Program computer	2.93	1.21
Overall Principal's Competency in ICT	3.00	1.00

The overall mean for the characteristic principal's competency in ICT is 3.0 with SD=1.00 and it is rated as above average. This supports the view that the Principal's competency in ICT favoured the teachers' ICT integration in the teaching of science in PTTCs in the Nyanza region. The principal's competency in ICT is generally above average in a number of subscales such as use of internet in lessons to meet certain learning goals, mean=3.05, SD= 1.23, use of word processing for preparing administrative basic documents mean =3.09, SD= 1.32, use of spreadsheets for documents that require number processing, mean=3.06, SD=1.22, use of power point to support presentation reports, mean =3.00, SD=1.30; and the use of ICT to support administrative record keeping, mean=3.31, SD=1.27. Analysis and reporting was observed to have a mean that is above average. This often is true. It is in the principal's office where one may find the best computers that are found within the schools. Use of computers by principals has been motivated by the MOEST requirements that most of the reports must be done online. In the subscales that principals use e-mails to communicate with staff and students, with a mean = 2.18, SD =1.27, use web search techniques has a mean = 2.93, SD=1.22; assist tutors and students to select appropriate software to use in the projects has a mean = 2.78, SD = 1.23; can entertain himself/herself using ICT mean 3.03, SD=1.23 and program computer has a mean=2.92, SD=1.21; which were all rated as average. See table above.

#### 5.0 Discussion

There are a number of factors that may contribute to the principals being average based on the teachers' evaluation. Some PTTCs have enrolled 600-1000 students, with 20-70 staff with only 20 functioning computers. In a number of PTTCs, there seems to be a contrast between what was expected and what was observed and what happens in those institutions in terms of teacher education. The teacher educators have to continuously embrace and adjust to the continuous change that was observed in the realm of technology in teaching and learning and the ICT competency of the leadership in PTTCs. This is in agreement with the observation made by Inan and Lewther (2010) p. 37.

“ It is often argued that technology integration in schools is common place, so much so that the Educators often ignore what is thrown at them, hoping that it will disappear as many technology integrations often do. Unfortunately, the increased availability of technology in schools does not necessarily lead to improvement in classroom teaching practices.”

Even though the number of computers has increased in schools, still some Principals do not know the basic computer operation skills and the older teachers fear using technology which they imagine is for the younger teachers who are referred to as 'digital'. The older teachers comfortably refer to themselves as 'analog'.

Despite these enormous challenges, the county and the national governments are providing funds to implement educational policies and the new technology in counties. Therefore effective leadership during implementation is vital because how Principals perceive their role and ability to listen to the teachers' needs, frequently impacts on the implementation process (Anderson and Dexter, 2005).

The government is determined to provide class one pupils with laptops after the national treasury set aside sh.17.4 billion to finance the project in the budget estimates. Besides lap tops, part of the money will be used to

finance digital content, train teachers and roll out computer laboratories in all public schools (Daily Nation of 02/05/2014).

### 5.1 *The relationship between Principal's competency in ICT and teachers' integration of ICT in teaching of Science*

The researcher hypothesized ( $H^0$  null hypothesis) that there was no significant relationship between the principal's competency in ICT and teachers' integration of ICT in teaching science. The association between principals competency in ICT and teachers integration of ICT in teaching science was explored by using Pearson correlation analysis. Correlation was used to describe the strength and direction of a linear relationship between the two variables. The Pearson correlation coefficient was calculated for a relationship between principal's competence in ICT and teachers' integration of ICT in teaching of science. A moderate positive correlation was found ( $r(139/141) = .458$   $p < 0.01$  indicating a significant proportional linear relationship between principal's competency and teachers' integration of ICT in teaching science.

**Table 2**

Correlation between Principal's competency in ICT and teachers' integration of ICT in teaching science

Aspect	Analysis	Integration of ICT in teaching science and science related disciplines.
Principal's competency in ICT	Pearson correlation Sig, (2-tailed) N	<b>.458**</b> <b>.000</b> <b>141</b>

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

The findings indicate that the Principal who is competent in ICT favoured the teachers ICT integration in teaching of Science. This is in agreement with the findings of Albirini (2006) and Schiller (2003) that pointed out that Principals with limited knowledge and background in ICT integration and can use ICT efficiently are able to encourage their schools to ride the wave of technology.

### 5.2 *The Principal's ICT Competency and its influence on the teachers' ICT integration in the teaching of Science*

The objective of the study investigated the Principal's ICT competency as a characteristic that affected the teachers ICT integration in teaching science. Using thematic and descriptive analyses, the study found that principal's ICT competency influenced the teachers' ICT integration in teaching science. Using correlation analysis the study established that principal's ICT competency affected teachers' ICT integration in teaching. Results of the hypothesis testing further revealed there was a significant linear relationship between the Principal's competency in ICT and the teachers' ICT integration in the teaching of science.

### 6. *Conclusion*

In view of the above findings, the following conclusions were drawn.

Even though the roles of the PTTC principals are many and varied, the successive implementations of ICT integration on teaching of Science in PTTCs largely depends on the characteristics of the principal who is the on-site leader and overseer. Principals' competency in ICT is one of this factors. The teachers' integration of ICT in teaching science in PTTCs is significantly influenced by the Principals competency in ICT. To bridge this gap and motivate the teachers to integrate ICT in teaching the government should equip PTTCs, and the principal should motivate the teachers to integrate ICT in teaching of Science.

Through hypothesis testing, it was established that the Principals competency in ICT had linear significant relationship when correlated with teachers' integration of ICT in teaching science in PTTCs in Nyanza region in Kenya

### 7.0. *Recommendations*

The government should make it a priority to develop a policy to guide the PTTC leaders in ICT integration in teaching of science since it is tipped to play a leading role in attaining Kenya's vision 2030.

The TSC which identifies and appoints teachers as PTTC principals in consultation with KICD, KESI and the MOEST, should develop packages on ICT integration in teaching science for in-serving Principals prior to appointment.

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