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INFLUENCE OF TEACHER DEMOGRAPHIC FACTORS ON INTEGRATION OF INFORMATION COMMUNICATION AND TECHNOLOGY IN TEACHING IN ICT CHAMPION SCHOOLS IN MACHAKOS SUB- COUNTY

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Abstract

Integrating Information and Communication Technology (ICT) in education is an important agenda of all countries due to the rapid changes occurring in the world. However, the teachers as the main driver of this integration should be intrinsically and extrinsically equipped. The preparedness of the teacher has incorporated in ICT success in the education system. This study investigated the influence of teacher demographic factors on ICT integration in teaching in ICT Champion schools in Machakos Sub-county, in Kenya. The independent variable was the teacher demography while the dependent variable was ICT integration. The study used quantitative and qualitative methodologies. A sample of 163 teachers and 9 principals was selected. The study used primary data which was collected using self administered structured questionnaires and interview guide to teachers and principals respectively. Data was coded and analyzed using descriptive and inferential statistics with aid of the SPSS software. The influence of teacher demographic factors on integration of ICT in teaching in public secondary schools was tested using Pearson's chi-square test at 5% level of significance. The study found out there was significant relationship between age, gender and level of education with integration of ICT in teaching.The study recommends that a compulsory computer training programme be introduced for teachers to equip and harmonize them with ICT competencies and skills. This shall be crucial in inculcating a positive ICT attitude amongst teachers.

Keywords: *Teacher Demographic factors, Integration, Information Communication, Technology, Teaching*

1.Introduction

According to The World Summit on the Information Society (2006), the main objective of introducing ICT under the Ministry of Communication and Information Technology was to fight poverty and contribute towards realization of Sustainable Development Goals. ICT has impacted on the quality and quantity of teaching and learning in that it provides opportunities for distance education where students, academic and non-academic staff can communicate with one another more effectively whether during formal or informal working. Integrating

Information and Communication Technology (ICT) in education is an important agenda of all countries due to the rapid changes occurring in the world. In fact, ICT is the tool for rapid advancement in the 21st century through which the world is connected (Alazzam, Bakar, Hamzah & Asimiran, 2012).

In the 1980s, developed countries made it compulsory for ICT to be integrated into their education system to strengthen teaching and to redress past inequalities in schools (Bransford & Brown, 2000). Global investment in ICT to improve teaching in schools has been initiated by many governments. For instance United Kingdom, the government spending on educational ICT in 2008–09 in the UK was £2.5bn (Nut, 2010), in United States, the expenditure on K-12 schools and higher education institutions was $6 billion and $4.7 billion respectively in 2009 and in New Zealand, the government spends over $ 410 million every year on schools ICT infrastructure (Nut, 2010). Despite all these investments on ICT infrastructure, equipments and professional development to improve education in many countries, Gulbahar (2007) claims that huge educational investment has produced little evidence of ICT integration in teaching. The mismatch between the level of investment on ICT infrastructure and level of implementation has been attributed to two factors, namely the external and internal factors (Tedla 2012; Tay 2012; Sang,Valcle, Van braak and Tondeur ,2010)

External factors are deemed as the key obstacles and include issues related to access to the technologies (hardware, software and integration connectivity) without which it is almost impossible to talk about ICT integration. When the external factors are in place teachers may not automatically implement ICT integration since the decision regarding whether and how to use technology rests on their shoulders (Ertmer, 2005). Chigona (2014) reiterated that the role of the teacher is of great importance in ensuring that ICT is used in an educational situation.

The inability to integrate in this context has been attributed to internal factors; teacher demographic. Several surveys have been carried out to investigate the external factors as compared to the internal factors (Baek, Jung & Kim, 2008; Norton, McRobbie, & Cooper, 2000). Ertmer (2005) asserts that teachers have a great responsibility of deciding when and how to use technologies for instruction.Baylor and Ritchie (2002) observed that few teachers integrate ICT into their teaching activities despite the increased availability of ICT hardware,school related support for ICT integration and a larger consciousness of teachers about the importance of educational ICT use. There is a clear indication that teacher related

variables are key internal predictors of technology integration (Becker,2000). The researcher consequently observed that few teachers integrate ICT into their teaching activities despite the increased availability of ICT hardware, school-related support for ICT integration, and a larger consciousness of teachers about the importance of educational ICT use. This is a clear indication that there are other factors, other than availability of technological infrastructure that seem to contribute to teachers' successful technology integration. Teacher demographics refer to data related to the population of teachers.

Teacher demographic factors in this context entails to: age, gender and level of education, The related literature reviewed depicted that age affects teachers' effective adoption and use of the new technology in teaching and learning (UNESCO, 2014). Chemwei and Koech (2014) found that young teachers in the age bracket of 25-30 years seem to have higher interest in integration of ICT in teaching. The young teachers show great enthusiasm in the adoption and use of computers in their private and in public life and this enthusiasm dwindle with age (Kamau 2014). The older generation of teachers experience challenges when using ICT in teaching (Guoyuan, 2010).

1.1 Statement of the Problem

Information from Machakos county education office (2015) state that the level of ICT integration is low. ICT integration in teaching in the schools in Machakos Sub-County has remained very low and so is the academic performance (Mwunda 2014). Despite government initiative on provision of computers through CFSK. Studies closelly related to this , were done by Atandi (2015) in Nakuru county and Sang et al (2010) who did his study on primary teachers in China which is a different context.Little has been done on the influence of the teacher demographic on integration of ICT in teaching in ICT champion schools in Machakos Sub –County. It is against this backdrop that the researcher sought to carry out this research to establish the influence of teacher demographic on ICT integration in teaching in ICT champion schools in Machakos Sub –County.

1.2 Objectives of the Research

The study was to establish the influence of teachers' age on ICT integration in teaching in ICT champion schools in Machakos sub-county. To determine the influence of teacher's gender on ICT integration in teaching in ICT champion schools in Machakos Sub County and to investigate the influence of teacher's level of education in ICT integration in teaching in ICT champion Schools in Machakos Sub- County.

2.0 Literature Reviewed

2.1 Influence of Teacher's Age on integration of ICT in teaching

Most research outcomes from developed world have reported that there is more use of ICTs by young people compared to the older people, the older feel intimidated by the new technologies than the younger generation. Makgato (2012) alludes that old teachers who are comfortable with the traditional way of teaching do not want new and innovative methods of teaching. They are stuck with the face to-face teaching and teacher centered methods which gives them the sense of power and control in front of their learners. Salhberg (2010) argues that senior Finnish teachers trained in ICT integration develop their confidence to higher levels than colleagues coming to it more recently, without training in ICT integration. UNESCO (2014) depicted that age affects teachers' adoption and use of the new technology in teaching. Young teachers in the age bracket of 25-30 years seem to have higher interest in integration of ICT in teaching (Chemwei & Koech 2014). Lentilalu (2015) in his study on teacher factors influencing integration of ICT in teaching in Samburu North Sub- County revealed that age of teachers had considerable influence on ICT integration in teaching and learning. The age bracket of teachers mostly accessing and using computers in teaching was found to be below 30 years, rated as 61.4% of the 62 total respondents.

2.2 Influence of Teacher's Gender on Integration of ICT in Teaching

World Bank (2009) defined gender as the socially constructed roles and socially learned behaviors and expectations of women and men in a particular society. In many parts of the world, there is continuing discrimination in schools in relation to access to ICT and opportunities to use ICT effectively. High school student-to-computer ratios and first come first serve policies in mixed schools do not favuor girls (Farrell & Wacholz, 2003). The gender digital divide was viewed as a globally emerging issue that could influence effective adoption and use of ICT in teaching (United Nations Conference on Trade and Development [UNCTAD], 2014). According World Summit on the Information Society (2006) serious gender divide exist which has not been given special attention .Unless it's addressed there is risk that ICT may exacerbate existing inequalities between women and men due to historical injustice

Markauskaite (2006) examined gender differences in self-reported ICT experience and ICT literacy among first year graduate trainee teachers and revealed significant differences between males and females in technical ICT capabilities, and situational and longitudinal

sustainability male teachers. Inspite of the fact that technology is growing very fast, access and gender differences have been linked to low levels of computer acceptance. In an evaluation of its programme in four African countries, World link international found that despite efforts to make ICT programme gender neutral, gender inequalities in access persist in Uganda and Ghana.

In Kenya, the ratio of men to women using ICT according to 2001 estimates stood at 70% and 30% respectively. It is also argued that the disparity was partly attributed to the perception in the country that ICT was a technical subject suitable for men, with many females shying away from it.

2.3 Influence of teacher's level of Education on Integration of ICT in teaching

The study conducted by Lau and Sim (2008) explored the extent of ICT adoption among secondary school teachers in Malaysia and revealed that level of teachers' academic qualif1.ication influences ICT integration in teaching.) From the study of Luhombo (2015) on Teacher factors influencing integration of ICT in teaching of English in public secondary schools in Mumias Sub-County, it can be revealed that age, gender, academic qualification determine the adoption of ICT for English lessons in Mumias sub-county. Clark (2000) found a strong relationship between teachers' level of education and their attitude towards adoption of information technology. It is not clear whether teachers' demographics such as age, gender and level of education influence integration of ICT in teaching in Machakos Sub-county. This study will identify the gap and fill it.

3.0 Materials and Methods:

This study used mixed methods research design which involves collecting, analyzing and integrating quantitative and qualitative research. This kind of approach to research is used when integration is perceived to provide a better understanding of the research problem than either of each alone. According to Creswell and Plano Clark (2006), explanatory sequential mixed method is best suited this design whereby collection and analysis of quantitative data was followed by the collection and analysis of qualitative data. Priority was given to quantitative data, because quantitative data collection was done first and represented the major aspect of the study, while qualitative component followed in the second phase of the study (Ivankova et al., 2006) and the findings were integrated during the interpretation phase of study.

Quantitative data in this study were closed ended questionnaires which were analyzed statistically to test hypotheses. This research was deemed to be appropriate because by mixing both quantitative and qualitative research , the researcher gained in breadth and depth of understanding while minimizing inherent weaknesses emanating from using one of them(John & Onwuegbuzie, 2004). There is also the advantage of triangulation which allows one to identify aspects of phenomena more accurately by approaching it from a different vantage point using different techniques. It also provides an approach for developing better, context specific instrument. Helps to explain the findings prudently and validate them.

Results

4.0 Influencesof Demographic Factors on ICT Integration as Reported by Teachers

2.1 Influence of Age

Out of 124 respondents, in the 51-60 years age category, 1(7.1%) was unfamiliar with ICT integration 4(28.6%) in each category were beginners and newcomers in integrating ICT in teaching while newcomers there was no teacher in the age bracket who was at an advanced and expert level. A cross tabulation of age and integration of ICT by the teacher was carried out and analyses are presented in Figure 1 below.

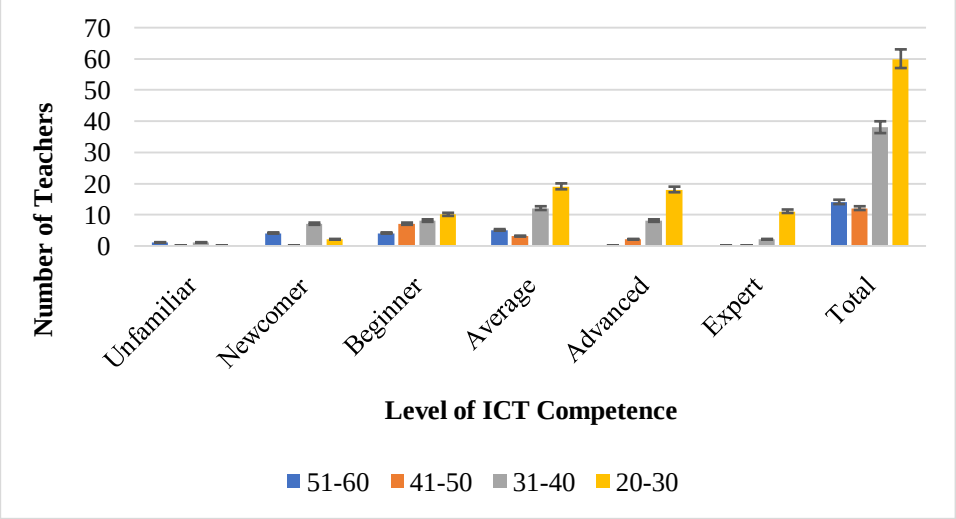

Figure. The level of ICT competence among different ages of teachers in Machakos Sub county.

In the 41-50 years age category, majority 7(58.5%) were at beginners' level in integrating ICT in teaching while 3(25.0%) and 2(16.7%) were average and at an advanced level in integrating ICT in teaching. However, there was no teacher who was at an expert level in integrating ICT in teaching.In the age category of 31-40 years, the distribution across the level of integration showed that many teachers were average 12(31.6%) compared to those at

beginners and advanced levels who were 8(21.1%) in each level of ICT integration. Only 2 (5.3%) teachers in this category were at an expert level. Further, the study reveals that teachers of the ages 20-30years had formed large proportion of those who were at least at an average level 19(31.7%), advanced level 18(30.0%) expert level 11(18.3%) in integrating ICT in teaching. None of the teachers in this age category was unfamiliar with integrating ICT. The study sought to test the statistical significance of these observations using a chi square test and findings are presented in Table 4.5.2

Table 1: Chi-Square Tests between Ages

	Value	**Df**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	34.901[a]	15	.003
Likelihood Ratio	38.904	15	.001
Linear-by-Linear Association	21.305	1	.000
No of Valid Cases	124		

a. 5 cells (16.7%) have expected count less than 5. The minimum expected count is .19.

From Table 1, the chi square test of dependence between age and integration of ICT had a significance of .003 compared to the p = 0.05. Considering that the significance was a value less than 0.05, it means that at 5% level of significance integration of ICT was dependent on age of the teachers with young teachers being more likely to adopt ICT.

Table 2. The correlation matrix showing the R pearson of the ICT competences of teachers in Machakos sub county. The results show the young teachers have a higher correction to ICT competency.

	Unfamiliar	**Newcomer**	**Beginner**	**Average**	**Advanced**	**Expert**
Unfamiliar	1					
Newcomer	0.960769	1				
Beginner	-0.18898	0.090784	1			
Average	0.071982	0.345788	0.96583	1		
Advanced	-0.14286	0.137253	0.998906	0.976893	1	
Expert	-0.34487	-0.071	0.986912	0.911393	0.978291	1

Further, the influence of Gender of teachers on ICT integration was analyzed with the summary of findings shown in Table 4.5.3.

Table 3: Influence of Gender on ICT

	Level of ICT Integration						
	Unfamiliar	**Newcomer**	**Beginner**	**Average**	**Advanced**	**Expert**	**Total**
Males	1	6	9	20	17	10	63
	1.6%	9.5%	14.3%	31.7%	27.0%	15.9%	100%
Females	2	7	20	19	11	2	61
	3.3%	11.5%	32.8%	31.1%	18.0%	3.3%	100%
	0.8%	10.7%	23.8%	32.0%	23.0%	9.8%	100%

From the findings, the proportion of male teachers who were average 31.7%, advanced 27% and expert level at 15.9% was larger than for female teachers within the similar levels. Further Chi-square analyses were conducted to test whether there was a significant difference in ICT integration based on gender. Table 4.5.4 summarizes the findings.

Table 3: Chi-Square Tests showing the influence of Gender on ICT integration

	Value	**Df**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	20.148[a]	10	.028
Likelihood Ratio	17.250	10	.069
Linear-by-Linear Association	7.942	1	.005
N of Valid Cases	124		

a. 3 cells (12.4%) have expected count less than 5. The minimum expected count is .01.

The chi square statistic, the computed value .028 is less than the p value .05. This implies that at 5% level of significance integration of ICT was dependent on gender of the teachers hence the null hypothesis is rejected. Qualitative data from principals was also analyzed and it was realized that the outcome was consistent to those of quantitative data.

It was imperative to analyze the relationship between the levels of education and integration of ICT in teaching. From Table 4.5.5, majority of teachers who participated in this study were at status ranging from the level of beginners, average to advanced level of ICT integration across all the three (Diploma, B. Ed. and M. Ed.) most observed academic qualifications.

Table 4: Influence of Level of Education on ICT Integration in teaching

	Level of ICT Integration						
	Unfamiliar	**Newcomer**	**Beginner**	**Average**	**Advanced**	**Expert**	**Total**
Diploma	0	3	4	3	1	5	16
	0.0%	18.8%	25.0%	18.8%	6.3%	31.3%	100%
B. Ed	1	9	21	32	20	8	91
	1.1%	9.9%	23.1%	35.2%	22.0%	8.8%	100%
M .Ed	1	1	4	3	5	0	14
	7.1%	7.1%	28.6%	21.4%	35.7%	0.0%	100%
BA/BSC with PGDE	0	0	0	1	0	0	1
	0%	0%	0%	100%	0%	0%	100%
Others (Specify	0	0	0	0	2	0	2
	0%	0%	0%	0%	100%	0%	100%
Totals	1.6%	10.5%	23.4%	31.5%	22.6%	10.5%	100%

A Chi-square test was conducted to test the null hypothesis that there is no statistically significant relationship between level of education and ICT integration in teaching in ICT champion schools in Machakos Sub –County. The results are presented in Table 4.5.6

Table 6: Chi-Square Testsshowing the Influence of Level of Education on ICT Integration

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	26.441[a]	20	.048
Likelihood Ratio	24.495	20	.221
Linear-by-Linear Association	.024	1	.877
N of Valid Cases	124		

a. 14 cells (24.0%) have expected count less than 5. The minimum expected count is .02.

The Pearson Chi-Square statistic, χ (2) = 26.441, and p < 0.048. Since p < 048 is less than 0.05, the null hypothesis is rejected.

1.9 Discussion

1.9.1 Influence of Age on Integration of ICT

In terms of age it was found out that there is a significant relationship between age and integration of ICT in teaching in ICT champion schools in Machakos Sub –County. Integration of ICT was found to be dependent on age of the teachers with young teachers being more likely to adopt ICT than the old teachers. The findings are consistent with the findings of the principals who alluded that young teachers integrate ICT in teaching with a lot of enthusiasm and the enthusiasm dwindles with age.The findings are consistent to the findings of Makgato(2012),UNESCO (2014) and Lentilalu (2015) who alluded that old teachers who are comfortable with the traditional way of teaching do not want new and innovative methods of teaching. Old teachers use of technology though they perceive it as useful is limited by ease of use because their experience with technology is very short, bearing in mind that most of them as evidenced by this research did not have both pre – service and in-service training in use of ICT in teaching. This can be boosted through training and constant sensitization to sustain ICT use.

1.9.2 Influence of Gender on Integration of ICT

On gender, it was established that 51% were males while female respondents were 49%.From the findings, the proportion of male teachers who were average 31.7%, advanced 27% and expert level at 15.9% was larger than for female teachers within the similar levels.These

findings are consistent with those of principals who posited that male teachers frequent in integration of ICT in teaching than the female teachers.

1.9.3 Influence of Level of Education on Integration of ICT

The level of education results indicate that majority of the teachers (73%) had bachelor of Education Degree as their highest qualification. This was followed by those with Diploma (14%) and master of education degree (11%). The study established that,Teachers at higher levels education were found to be at higher level of integration. This implies that there is a significant relationship between level of education and integration of ICT in teaching in ICT champion schools in Machakos Sub –County. There is consistency between the data from teachers and the one from principals who alluded that the rate of integration increases with the level of education. The findings are also in line with the study by Clark (2000) who argues that teachers in higher levels of qualification especially masters level used ICT in there learning. They perceived it as useful and easy to use, intended to use it and the actual ICT use was good compared to those in lower levels. Continuous training will help to make the situation sustainable since technology is dynamic and there is need to keep updating.

2.0 Conclusion

Based on the findings the study made the following conclusions guided by the study objectives; the first objective was to determine the relationship between teacher's age, and ICT integration in teaching in ICT champion schools in Machakos sub-county. In regard to age, the study found that age of teachers influences the integration of ICT in teaching. The findings indicated that teachers aged below 30 years were more willing to integrate ICT in teaching. Results from chi-square test also indicate that, χ (2) = 34.901, and $p < 0.003$; there is a significant relationship between age and integration of ICT in teaching. Thus, to bridge the difference between the age brackets, there is need for more training, increased exposure and the use of incentives. With respect to gender, female teachers lagged behind in integrating ICT in teaching and results from chi square test also indicate, χ (2) = 20.148, and $p < 0.028$; there is a significant influence of gender on integration of ICT. The study found a statistically significant relationship between the level of education and integration of ICT in teaching with χ (2) = 26.441, and $p < 0.048$. There is need for continued support for the teacher to pursue higher qualifications since it improves their use of ICT in teaching.

2.1Recommendation

Based on the study findings, the researcher makes several recommendations;Firstly, the government should introduce compulsory computer training preferably on the job training for teachers to equip them with ICT competencies and skills. This training should be done in a way to ensure teachers of the same age bracket are trained together to ensure their individual differences are met. Need for clear policy guidelines and effective commitment to training and integrating ICT in teaching. Such a policy must have clear and positive incentives for participating in ICT in-service training.

More sensitization workshops are needed to deflect the negative attitudes as well as increase the appreciation of integration of ICT in teaching by teachers. This can be organised by the Ministry of Education (MOE).

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