

**Influence of Relevancy and Adequacy of Teachers Training on Integration of Digital Technologies in Early Years of Education in Kenya.**

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## ABSTRACT

One guiding principles of Kenyan Basic Education Act 2013 is that education should promote innovativeness, inventiveness creativity, technology transfer and an entrepreneurial culture among learners. However, report from Teacher Performance Appraisal and Development (TPAD) from the ministry of education (Kisumu Central Sub-County) shows a low level of integration of digital technologies in early years of education. The purpose of this study therefore, was to investigate the influence of relevancy and adequacy of teacher training on integration of digital technologies in early years' of education in Kisumu Central Sub- County. The study objectives was to determine the influence of relevancy and adequacy of teachers training on integration of digital technologies in early years of education in Kenya. The study adopted Concurrent triangulation design within the mixed method approach. The study was anchored on Davis (1986) Technology Acceptance Model and Preparedness Theory by Seligman (1971). The study targeted 345 teachers from Kisumu Central Sub-County. The study adopted saturated sampling to sample preschool and grade two teachers, stratified random sampling to sample head teachers and grade three teachers and purposive sampling to sample grade one teachers. The sample size comprised of 90 preschool teachers, 75 grade one teachers, 75 grade two teachers, 23 grade three teachers and 9 head teachers. The data collection instruments were structured questionnaires, interview schedules and focus group discussion. Validity was ensured by expert judgment from university supervisors. Cronbach Alpha was used establish reliability and the subscales met the recommended threshold. Trustworthiness of qualitative data was ensured by use of multiple sources of data. Descriptive statistics, Pearson correlation and linear regression were used to analyze quantitative data. The Qualitative data was analyzed using Thematic Analysis Approach. The findings also indicated a low positive correlation ( $n=202$ ;  $r =.292$ ;  $p <.05$ ) between relevancy and adequacy of teachers training and integration of digital technologies. It was also established that teachers training was not relevant and adequate enough to prepare them for integration of digital technologies in their teachings. The study recommended that the ministry of education to consider organizing refresher courses for in-service teachers on integration of digital technologies. It was recommended that KICD to re –examine the curriculum content of pre-service teachers training.

**Key Words;** Integration, Digital, technologies, Relevancy, Adequacy, Teachers' Training

## **1.0: Introduction**

### **1.1 Background to the Study**

Technology motivates learners to learn, complete tasks that might bore them with pencil and paper, provides creative ways to solve problems and offers a risk free learning environment for learners to explore the world ((Bauer & Kenton, 2011). The Institute of Medicine of the National Academies (IMNA) (2011) recommends that child care settings limit screen time for pre-schoolers. But the prevalence of electronic media in the lives of young children means that they are spending an increasing number of hours in front of and engage with screens of all kinds including televisions, computers, smart phones, tablets, hand held game devices, laptops and video games among others (Flewit, 2011). National Education for Young Children (NAEYC) (2012) asserts that technology and interactive media are tools that can promote effective learning and development when they are used intentionally by early childhood educators within the framework of developmentally appropriate practice to support learning goals established for individual children.

Hepp, Hinnostroza, Laval & Rehbein (2004) argued that ever since the inception of information technology in education, they have been used but not to its maximum. Although in the early 1980s computers were not fully integrated in the learning of traditional subjects, the commonly accepted perception that the system of education would have to prepare the students for knowledgeable society increased the interest in digital technologies (Pelgrum & Law, 2003). Moreover, Kozma & Anderson (2002) argue that for an economy to be knowledgeable, education should be its primary necessity. Simultaneously, the teaching strategies in schools are bending towards Information Communication Technology (ICT). Similarly, Kozma & Wagner (2003) agree on that idea that the ICT will enhance the basic education and is a very challenging field of development work nowadays in both poor and wealthy nations.

Research shows that crucial factor influencing teacher adoption of technology is the quantity and quality of pre-service technology experiences included in their teacher education programme (Schiller, 2007). Teachers' feelings of preparedness are one important indicator of the extent to which they are prepared to meet the challenges that characterize their profession. Research further indicates that teacher preparation knowledge of teaching and learning, subject matter, experience and combined set of qualifications are all leading factors in teacher effectiveness (Sieborger & Terzoli, 2014).

The education system across the globe has undergone major transformation with the exceptionally fast paced change in technological domain of knowledge. Thakur(2014) in India established that even though computer education was introduced twenty to twenty five years back in some urban schools in the country, most schools in rural areas and sub urban India especially government schools still do not have adequate teachers let alone computer laboratories.

According to Krumsvik, (2008), teachers' ICT competence is a very trendy theme and in some countries' national curriculum, digital competence is one of the core pillars which are mandatory to take care of in schools. Bukaliya & Mubika (2011) in Zimbabwe established that teachers lack necessary skills and knowledge of computer. In terms of applicability of the packages, teachers' weak knowledge levels showed that their competence in ICT for classroom use still lags behind.

Osodo, Indoshi & Ongati (2010) in Kisumu district Kenya established that majority of geography teachers and students had a positive attitude towards the use of computer technology in teaching and learning and hence favoured the integration of computer simulations into the geography curriculum. Education and training is fundamental to the social transformation envisaged under the social pillar of Kenyan vision 2030. In order to stay on course in the attainment of the desire the sector has planned to integrate information communication technology and training in Kenyan learning institutions.

Teacher training remains a critical component of integrating ICT in education and the ministry of education science and technology (MOEST) has been mandated to develop a skilled and innovative manpower and works towards the integration of ICT at all levels of learning. As a country, Kenya has worked towards developing capacities and competencies in order to participate at the global level. Thus the country has prioritized ICT through strategic plan namely 'vision 2030'. ICT is a fundamental component of the education reforms and thus ICT's integration in Kenyan education system has been largely supported by the Ministry of Education Science and Technology (MOEST 2012). However, report from Teacher Performance Appraisal and Development (TPAD) from the ministry of education (Kisumu Central Sub-County) shows a low level of integration of digital technologies in early years of education. It is against this background that the study sought to investigate influence of relevancy and adequacy of teachers training on integration of digital technologies in early years of education in Kenya.

## **1.2 Statement of the Problem**

Young children today are growing up at ease with digital devices that are rapidly becoming tools of the culture at home, school and in the community. These digital devices when built upon solid developmentally appropriate foundations can improve education quality at this early stage of learning. Kenyan vision 2030 recognizes the importance of integrating technology into education curriculum. Kenyan Basic Education Act 2013 guiding principle on ICT integration in teaching and learning states that ICT should promote innovativeness, inventiveness creativity, technology transfer and an entrepreneurial culture among learners. The Kenyan National ICT Policy (2006) recognizes the fact that there is need to strengthen and streamline the training through promoting ICT in education at all levels by developing ICT curricula and ensuring that teachers/trainers possess the requisite skills. The policy further stipulates that ICT should promote the growth and implementation of e-learning and integrate e-learning resources with other existing resources. However, report from Teacher Performance Appraisal and Development (TPAD) from the ministry of education (Kisumu Central Sub-County) on integration of digital technologies in early years of education shows very low levels of integration of digital technologies in early years of education. And with more and more children encountering digital technologies before going to school, research on influence of teachers' preparedness for the integration of these digital technologies into classroom teaching remains crucial. Surveys reveal that most researches on technology integration into curriculum within Kisumu County have focused on secondary schools with scant attention given to early years of education. This study therefore addressed this gap in literature by focusing on the influence of teachers' preparedness on integration of digital technologies in early years' of education in Kisumu Central Sub- County.

## **1.3: Theoretical Framework**

This study was anchored on Preparedness theory, proposed by Seligman (1971). Preparedness theory attempts to explain why fears and phobias are so much more likely to occur with biological stimuli than non-biological stimuli (Davey, 1995). When confronted with a phobia object or a situation, an individual appears to have little control or no alternative but to avoid the feared object or situation (Ohman and Soares, 1993). Consequently, individuals with a phobia can be vulnerable to anxiety induced automatic reactions to an object or situation which in turn can place major restrictions on everyday life (Ohman and Soares, 1993). Phobias are characterized as a condition that is specific persistent intense and irrational with a compelling need to avoid the phobia or

situation (Reber, 1995).

Preparedness theory was found appropriate for this study because it emphasizes that response of an organism (individual) is associated with an unconditioned stimulus, an event that automatically or naturally causes a response (Bourne & Russo, 1998). This association causes the response to an unconditioned stimulus the unconditioned response to transfer to the neutral stimulus. The unconditioned stimulus no longer needs to be there for the response to occur in the presence of the former neutral stimulus. Similar to the study, the response of teachers towards the integration of digital technologies in early years of education may as well succeed when teachers are all prepared for its introduction. The idea that high quality teacher preparation is important cannot be over emphasized. Well prepared teachers automatically or naturally perform better than those who are not prepared. Preparedness theory was found relevant for this study because it captures the variables. The theory is concerned with individual or an organism being assisted to operate within the neutral stimulus. Teachers' feelings of preparedness may provide insight into the extent to which they are ready to integrate digital technologies in their teaching.

## **2.0: Literature Review**

Teachers' level of preparedness remains crucial if integration of digital technologies has to succeed. Wright (2016) investigated influence of integration of ICT in pre-service teacher education in Australian university. Through observation, pre and post-test questionnaires were given to students and informal interview conducted with lecturing staff. The findings showed that there was a statistically significant positive relationship between ICT integration and teacher education. In addition, descriptive statistics revealed that ICT tools are useful tools for future teaching career. The above reviewed study focused on teachers training at university, who have no teaching experience unlike the current study where the participants are in-service teachers who practice teaching. The present study bridged this gap in literature to the existing body of knowledge.

In Taiwan, Al-Awidi and Aldhafeeri (2016) investigated teachers' readiness to implement digital curriculum in schools. Using a mixed method research methodology, a random of 532 teachers participated in an online survey. Semi structured interviews were also used to collect qualitative data. The findings showed that teachers are moderately ready for implementation of digital curriculum. The above reviewed study collected data through online survey hence it lacked face to face interaction which could have allowed for clarification and provided participants feelings and

experiences. The current study bridged this gap in literature by conducting a face to face interview with head teachers and a focus group discussion with standard one teachers thereby adding literature to the existing body of knowledge.

In South Africa, Ng'ambi, Brown, Bozalek, Gachago and Wood (2016) investigated technology enhanced teaching and learning in higher education. The study was a review of 20 years journey of technology enhanced teaching and learning in South Africa. Analysis of literature review was presented chronologically in four phases. The study established that higher education institutions have moved from being solely responsible for both their own relatively poor ICT infrastructure and education provision to cloud-based ICT infrastructure with unlimited educational resources that are freely openly and easily available within and beyond the institutions. The above reviewed study was a review of other studies and not empirical study. The current study bridged this gap in literature by conducted a fresh investigation thereby adding literature to the existing body knowledge.

In Uganda, Taban, Abdullah and Che (2012) investigated difficulties faced by teachers in using ICT in teaching-learning at technical and higher educational institutions. A sample of 150 teachers was used to participate in the study. Chi square test and weighted averages using statistical package for social sciences software were used to analyze and interpret data. The findings revealed that there was a significant positive relationship between teachers' desire and integration of ICT into teaching and learning process. Farther findings showed that there were a lot of difficulties teachers face in integrating ICT into teaching and learning. One of the difficulties was lack of proper training skills. The above reviewed study focused on technical and higher educational institutions where students are young adults unlike the current study where learners are predominantly young children. The current bridged this gap in literature by focusing on preschool and lower primary schools.

Muya (2016) investigated curriculum content relevancy in integration of ICTs in Kenyan TVET institutions in readiness to industrial needs. The research adopted quantitative approach and use probability sampling. Structured questionnaires was the main data collection instrument. Descriptive statistics, correlation and regression analysis were used to test the relationship and association between curriculum content and integration of ICT in TVET colleges in Kenya. The study established that the relationship between curriculum content and effective integration of ICT is significant. The above reviewed study focused on TVET colleges where students are mature people unlike the current study where learners are preadolescents. The study also adopted quantitative approach and hence it lacked the in-depth information from qualitative data. The

current study bridged these gaps in literature by focusing on early years of education school and employing both quantitative and qualitative approaches thereby filling gap in literature.

Another study in Kenya by Chao, (2015) investigated impacts of teacher training on ICT integration in public secondary schools in Mombasa. 88% of the respondents indicated that they have computers in schools. The study showed that there is no statistically significant relationship between teacher training and ICT integration in secondary schools. The study revealed that teacher ICT training is haphazardly done due to lack of policy and standards. The above reviewed study was conducted in secondary schools where students are at adolescent stage unlike the current study where most learners are young children. The current study bridged this gap in literature by focusing on preschool and lower primary schools thereby filling gap in literature.

In a number of ways most of studies that were reviewed targeted high levels of education ranging from secondary schools to universities. In this institutions that students are a bit mature and have had a lot of exposure with digital technologies unlike the current study where learners are predominantly young children with limited exposure. Most of the studies were also either quantitative or qualitative hence the findings might have not been very comprehensive. The current study adopted a mixed method approach where both quantitative and qualitative approaches were involved.

### **3.0: Research Methodology**

A research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure (Kothari, 2011). It is a plan, structure and strategy of investigation conceived so as to obtain answers to research questions. The study adopted Concurrent triangulation design within the mixed method approach. The design converges or merges quantitative and qualitative data in order to provide a comprehensive analysis of the research problem. In this design, the investigator typically collects both forms of data at roughly the same time and then integrates the information in the interpretation of the overall results (Creswell, 2014). The study was anchored on Davis (1986) Technology Acceptance Model and Preparedness Theory by Seligman (1971). The study targeted 345 teachers from Kisumu Central Sub-County Kenya. The study adopted saturated sampling to sample preschool, grade one and grade two teachers, stratified random sampling to sample head teachers and grade three teachers. The sample size comprised of 90 preschool teachers, 75 grade one



teachers, 75 grade two teachers, 23 grade three teachers and 9 head teachers. The data collection instruments were structured questionnaires, which generated quantitative data and interview schedules and focus group discussion which elicited in-depth information for qualitative data. Items to measure the influence of relevancy and adequacy of teacher training on integration of digital technologies was adapted from relevancy and adequacy of teacher training questionnaire (RATQ) previously used by Wright (2016). It was suitable because it was previously adopted to study relevant and adequate teacher training on ICT integration.

In using the RATQ for this study, the items from the relevancy and adequacy of teacher training to be studied were rephrased to specifically align to Kenyan educational context to ensure that the teachers in Early Years of Education understand the survey item and respond appropriately and also to suit early years digital technologies integration for it was previously used in universities. Using the teachers responses based on a five point scales of ; Strongly Agree (5), Agree (4), Undecided (3), Disagree (2) or Strongly Disagree (1), A twelve itemed Likert-scaled questionnaire which explored the teachers' views on the influence of relevancy and adequacy of teacher training on integration of digital technologies in early years' education was adopted. The scale ranged between 1 to 5 with 1 depicting the lowest level of relevancy and adequacy of teacher training on integration while 5 indicated the highest level of relevancy and adequacy of teacher training on integration. Validity was ensured by expert judgment from university supervisors from Jaramogi Oginga Odinga University of Science and Technology. Cronbach Alpha was used establish reliability and all the subscales met the recommended threshold. Trustworthiness of qualitative data was ensured by use of multiple sources of data. Descriptive statistics, Pearson correlation and linear regression were used to analyze quantitative data. The Qualitative data was analyzed using Thematic Analysis Approach.

#### **4.0: Findings and Discussion**

The study used inferential statistics to establish whether there was any statistical significant influence between the predictor variable (relevancy and adequacy of teachers' training) and explanatory variable, integration of digital technology in early years' education. Further, multiple regression was used to provide information about the relative contribution of each of the predictor variables on the dependent variable and to develop a model to describe the optimal level of

integration of digital technologies in early years' education. To establish whether there was any statistical significant influence of relevancy and adequacy of teachers training on integration of digital technologies in preschool and lower primary schools, a bivariate Pearson's Product-Moment Coefficient of Correlation analysis between the scores of the two variables was computed. The SPSS output Table 4.8 shows the correlation results.

**Table 4.8:** *Correlation between Relevancy and Adequacy of Teachers Training, and Integration of Digital Technologies*

		Relevance and Adequacy of Teacher	Integration of Digital Technology
Relevance and Adequacy of Teacher Training	Pearson Correlation	1	.292**
	Sig. (2-tailed)		.000
	N	202	202
Integration of Digital Technology	Pearson Correlation	.292**	1
	Sig. (2-tailed)	.000	
	N	202	202

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

From Table 4.8, it is evident that although there was a low positive correlation ( $n=202$ ;  $r = .292$ ;  $p < .05$ ) between relevancy and adequacy of teachers training and integration of digital technologies in preschool and lower primary schools, it was statistically significant. Given that the p-value was less than .05, the null hypothesis which stated that “*There is no statistically significant influence of relevancy and adequacy of teachers training on integration of digital technologies in preschool and lower primary schools*” was rejected. It is therefore acceptable to conclude that there is statistically significant positive relationship between relevancy and adequacy of teachers training and integration of digital technologies in preschool and lower primary schools. This finding concurs with Wright (2016) in Australia whose finding showed that there was a statistically significant positive relationship between ICT integration and teacher education. The finding is contrary to Maruti (2010) in Kenya whose findings established that there was no statistical significant relationship between tutors ICT skills and use of technology in learning in colleges. This implies that ICT content covered in teachers training colleges should be made relevant and adequate enough, and with high improved relevancy and adequacy of teachers training among the teachers is likely to trigger higher integration of digital technologies in teaching. However, to estimate the level

of influence of relevancy and adequacy of teachers training on integration of digital technologies, a coefficient of determination was computed. This was done using regression analysis and the results were as shown in Table 4.9.

Table 4.9: *Model Summary on Regression Analysis of Relevancy and Adequacy of Teachers Training on Integration of Digital Technologies*

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.292 <sup>a</sup>	.085	.081	.72788	1.960

a. Predictors: (Constant), Relevance and Adequacy of Teacher Training

b. Dependent Variable: Integration of Digital Technology

From the model, only 8.5% of the variation in Integration of Digital Technologies in early years of education in Kisumu Central Sub-County was explained by relevancy and adequacy of teachers training, as signified by R Square of .085. This was fairly small amount of effect a predictor on the dependent variable. Further, to determine whether relevancy and adequacy of teachers training was a significant predictor of integration of digital technology, Analysis of Variance (ANOVA) was computed as shown in Table 4.10.

Table 4.10: *ANOVA –Influence of Relevancy and Adequacy of Teachers Training on Integration of Digital Technology*

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	9.891	1	9.891	18.670	.000 <sup>b</sup>
	Residual	105.961	200	.530		
	Total	115.852	201			

a. Dependent Variable: Integration of Digital Technology

b. Predictors: (Constant), Relevance and Adequacy of Teacher Training

Table 4.10 is ANOVA results output. *F*-ratio in the table tests whether the overall regression model is a good fit for the data. The finding of the study reveals that, despite the minimal effect, relevancy and adequacy of teachers training statistically significantly predict the integration of digital technology,  $F(1, 200) = 18.670, p < .05$ . This implies that the regression model is a good fit of the

data, meaning that information on relevancy and adequacy of teachers training could be used to significantly predict of integration of digital technology in early years education.

Finding of this study agrees many studies in literature, for instance Illingworth (2012) in Canada whose study established that there is a significant difference between teacher training and use of information communication technology. Similarly, Wright (2016) in Australian university showed that there was a statistically significant positive relationship between ICT integration and teacher education. In addition, Abu, Abraham, Rohana and Asmiran (2012) in Malaysia indicated that there were significant correlation between ICT skills and ICT integration in classroom. On the contrary, the study finding disagrees with Art-in (2014) in Thailand whose results showed that teacher training has no statistical significant relationship with development of students ICT skills. Similarly, the finding is in disagreement with Agyei and Voogt (2010) in Ghana whose results showed that there is no statistically relationship between ICT use and the teaching of mathematics in senior secondary schools.

In several ways qualitative data revealed the extent to which relevancy and adequacy of teachers training influence integration of digital technologies in early years of education. Through expressions of standard one and head teachers who were interviewed, one standard one teacher remarked the following during focus group discussion;

*“ teacher training colleges at every level whether it is certificate, diploma or degree, there is need for the curriculum to be technologically relevant to enable teachers to graduate with adequate skills for the integration of digital technologies in teaching”..( FGD 1)*

One of the head teacher had this to say;

*“In teachers training college, there was nothing like digital technologies, it therefore becomes almost impossible to integrate technologies which you were not trained on”.....(HT, 7)*

The above excerpts show that relevancy and adequacy of teachers training have great influence on integration of digital technologies in early years of education. Teachers who are adequately prepared on the concept of digital technology integration have higher chances of integrating the same in their everyday teaching unlike teachers who are ill prepared technologically. This finding is supported by Jung (2015) in Japan which showed a statistically significant positive relationship between a well-designed teacher training program and essential demands of today's teacher on how

use ICT effectively for their teachings. Similarly, Shelanee (2012) study in United States of America reported that perceived skill level is a significant predictor of ICT integration which supports the findings of this study. In addition, Orit & Irit (2014) in Israel revealed the same finding with this study as it showed positive relationship between basic level, the focused level and the creative level of ICT integration and implementation, adoption and integration of innovative pedagogy. Studies by Taban, Abdullah and Che (2012), Muya (2016), Ndiritu, Mburu and Kimani (2013) and Ndebu (2011) all showed that training on ICT is significantly related to ICT integration in the classroom situation.

On the contrary, this finding disagree with Maruti (2010) whose study established that there was no statistical significant relationship between tutors ICT skills and use of technology in learning in colleges. Similar to Wambiri and Ndani (2016) in Kenya whose study established that there is no statistically significant relationship between teachers' preparation and ICT teaching in primary schools. In addition, Mwangi (2015) in Kenya disagrees with study finding, as it revealed that; there no statistical significant relationship between access of digital technologies and use of ICT to teach other subjects matter apart from computing itself.

### **5.0: Concluding and Recommendation**

The study investigated the influence of relevancy and adequacy of teachers' training on integration of digital technologies in early years of education. The study concluded that digital literacy content covered in teacher training colleges is not relevant and adequate enough to produce teachers with relevant digital skills. But relevancy and adequacy of teachers training has significant, though weak influence on integration of digital technologies in early years of education. On the basis of this finding, the study recommended that; The Kenya Institute of Curriculum Development (KICD) should beef up the content of teachers training colleges' curriculum with more of digital literacy concepts so as to produce teachers who are technologically complaint. This is because relevancy and adequacy of teachers training was reported to have some influence on integration of digital technologies.

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