Recent Research on Teachers' Preparedness in Integrating Information Communication Technologies in Public Primary Teacher Training Colleges in Kenya

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ABSTRACT

This study investigated teachers' preparedness in integrating ICTs in public primary teacher training colleges in Kenya. Integration of ICTs brings revolutionary changes in teaching methodologies. The innovation lies not per se in the introduction and use of ICTs, but in its role as a contributor towards students-centered form of teaching and learning. Teachers' preparedness was measured in; types of ICTs available, teacher's training levels, teacher attitudes towards ICTs and challenges faced on ICTs integration. A descriptive survey design was used in the study which was conducted in four (4) public primary teacher training colleges in Central region of Kenya. These provided an ideal population for the study. The obtained data was analyzed systematically using descriptive statistics and presented with the help of frequency tables, figures and percentages. The study findings revealed that the types of ICTs available were inadequate; there was lack of proper training in the use of ICTs and preparedness on integration of ICTs was at an infant stage with several challenges on attempts to integration.

Keywords: Preparedness; integrating information communication technology; training.

1. BACKGROUND OF THE STUDY

The rapid growth in Information Communication technology (ICT) has brought remarkable changes in the twenty-first century especially in the education system. This is because Education in the world over has been recognized as an important means for promoting economic and social development both at individual and national levels. The growth of the global economy and the information based society has pressured education systems around the world to use technology to teach students the knowledge and skills they need [1,2]. Integration of ICTs brings revolutionary changes in teaching methodologies. The innovation lies not per se in the introduction and use of ICTs, but in its role as a contributor towards students-centered form of teaching and learning [3,4]. It provides the tool needed by the'' information knowledge society''. Thus, teachers are inevitably presented with the demand to integrate ICTs into teaching and learning to empower learners in this digital era. ICT allows us to collaborate, create, collect, store, disseminate, knowledge and resources all over the world [4,5,6,7]. With skills in ICT becoming a necessity that individuals have to acquire, educational institutions are left with the burden to provide a conducive environment to help the learners in the pivotal roles they are going to play in the knowledge and digital economy [8].

The fast development of ICT therefore necessitates a growing demand on educational institutions to use ICT to teach the skills and knowledge learners need in the 21st century era to fit in the global job market. Realizing the effect of ICT on the workplace and everyday life, today's educational institutions try to restructure their educational curricula and classroom facilities in order to bridge the existing technology gap in teaching and learning. This restructuring process requires effective

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integration of technologies into the existing environment in order to provide learners with knowledge in specific subject areas to promote meaningful learning and to enhance productivity [9]. Teachers therefore need to embrace the integration of ICT to empower learners to robust into the global world [10]. This is because teachers in many countries in the world are working with learners who are growing up with ICT as a non-remarkable feature of their world [11,12] as many of the fundamental assumptions that guided and shaped past thinking about modes of learning are inappropriate as the world is in the 21st Century.

Global investment in ICTs to improve teaching and learning in schools have been initiated by many governments. For instance, in the United Kingdom, the government spending on Educational ICT in 2008-09 was 2.5b pounds, United States expenditure on K-12 schools and higher education institutions was $6 billion and 4.7 billion respectively [13] and in New Zealand, the government spends over $410 million every year on schools ICT infrastructure [14]. Despite all these investment on ICT infrastructure, equipment and professional development to improve education in many countries [15] observe that huge educational investments have placed little evidence on integration of ICTs in teaching and learning. Evidence suggests that education sector is investing heavily on ICTs but its integration is yet to impact on teaching and learning which has lagged behind the business sector [16], which is a similar case to the Kenyan scenario. Several surveys are carried out to investigate factors that are related to the use of computer technology in teaching and learning by teachers [17,18] however, this is not on how teachers are prepared to integrate these technologies in teaching and learning in primary teacher training which the current study sought to investigate.

By integrating ICT during regular classroom instruction, tutors demonstrate to the student teacher trainees the innovative ways of teaching and learning [19]. Countries like United States, Australia, Japan, Malaysia and Philippines have ongoing initiatives on ICT integration in education [13]. Some have even created competency standards for technological use as observed by [20]. However, integrating ICT in education is a complex process of educational change and the extent of integration in many countries Kenya inclusive; is extremely varied and in most cases very limited [18,21,16,22].

The challenge in integration of ICT in teaching and learning has been the lack of technical support [23]. The availability of technical support in institutions means the use of ICT in teaching without losing time especially in having to fix software and hardware problems. Computer breakdowns leads to learning interruptions and without computer technicians who can give technical assistance, it is likely that the regular repairs of the computer will not be carried out which discourages teachers to integrate computers. Other than equipment breakdown, sometimes teachers' fear of equipment failure restricts their integration. Thus, without technical support for teachers, they become frustrated resulting in their unwillingness to integrate ICT to teach [24,23,25].

In most parts of Africa, the purpose has been to catalyze a pattern shift towards "21st century learning" and support Education for All goals at various levels throughout the regions education system [1]. However, there is no basic infrastructure to enable the integration of ICTs even to provide basic access to digital information [4,26]. In the present scenario, Africa is excluded from integration of ICT revolution except for a few financial and international business nodes that are in any case directly linked to global networks and completely by pass African economies and societies [27]. This has led to what is generally referred in ICT as the "digital divide" especially in education; a term used to denote the discrepancy between countries and people who can benefit from the progress of integrating ICT in order to develop their socio-economic structures and on the other hand those who are excluded from the process[1].

Several International agencies are now focusing their attention on the issue of the digital divide in education [10]. African governments, non-governmental and corporate organizations have also started initiating projects dealing with inclusion of ICT in primary and secondary curriculum but not integrating ICT in primary teacher training curriculum. Although countries are at the beginning of using new technology, its future use in education cannot be understood [28,29]. This includes New Partnership for Africa Development (NEPAD) that focuses on ICT for e-colleges as one of its projects. [30] observes that:

For many years, the focus of this investment was on making successive waves of new technology work in resource-poor education environments. This emphasis tended to promote a techno-centric approach to education reform. The emphases were viewed as layering new technology on top of social problems at the college level but not in pre-service primary teacher training colleges.

The dominant view seemed to be that ICT itself would catalyze the much-needed changes in the education system. Its aim is to impact ICT skills to learners in primary, secondary and colleges, harness ICT technology to improve and expand education in African countries but not in teachers training colleges [31]. So far computers have not transformed teaching practices [32]. [33] urges that lack of computers and software can seriously limit what teachers can do in classroom work with regards to integration of ICT.

It is becoming evident that the present educational systems are ill equipped for meeting the challenges to meet the demands for conventional education by the populace. This necessitates alternative solutions such as seizing opportunities around us and such catalyst for change lies in the integration of ICTs as a force that will change our primary teacher training and the education system [34]. Further, the absence of large-scale roll-outs following the NEPAD e-college demonstration project and the decline of the Khanya project, Egypt's Smart College network, the JEI, College Net Namibia, World links and College Net Africa, illustrates how many ICT in education initiatives were unsustainable in spite of significant investments.

In Kenya, learning institutions are under increasing pressure to integrate ICT in teaching and learning given the knowledge and skills needed in the 21stcentury [35]. In spite of this, the challenge confronting our educational system is how to transform the curriculum, teaching and learning process to provide student teacher trainees with the skills to function effectively in this digital era [35]. Even if after the teachers' initial anxiety of getting involved with technology has been overcome, serious challenges still remain in terms of providing enough technical support. However, teachers will not be discouraged by equipment failure that they do not understand [37].

The field of education has tried to exploit the web as a communication channel to connect distant learners with instructors [38] but [39] has argued that though e-learning, learning has become an activity that is no longer set within programmed schedules and slots. It is embedded because the education systems in Africa region face endemic crises under the influence of widespread poverty, inequality, political regimes that range from dictatorships to democracies all of which toll on national education system [1]. According to [40], integration of ICT will assist tutors to provide a variety whereas [26] observes that in Kenya, integration of ICT in education is still at limited stage and the NEPAD initiated pilot projects on ICT usage in Kenya is only in primary and secondary schools. [41] studied the framework of evaluating ICT use in primary teacher education in Kenya.

This is evident that researchers have noted that Kenyan government is keen in rolling out integration of ICT into institutions [42,43] and [44]. At the Ministry level, the government adopted its implementation framework on ICT integration in education, which was categorized into two portions. First, efforts of ICT policy review at a cost of 6.3 billion and provision of ICT infrastructure to institutions at a cost of 7.8 billion [45].

Integration of ICTs has seen the government look at the various levels of education in the country differently in terms of policy formulation and implementation. Consequently, there has been a commitment by the MOE to provide the necessary ICT infrastructure to Primary Teachers Colleges (PTCs). Strategies and initiatives to realize the commitment are many even though not harmonized into a one unified government document. Most of these can be found in a number of documents including: National ICT Policy of 2006, the National ICT Strategy for Education and Training document, Kenya Educational Sector Support Programme document, Kenya ICT Trust Fund and the 2007 revised Primary Teacher Education (PTE) ICT syllabus prepared by Kenya Institute of Education (KIE). In appreciation of the need for Public Private Partnerships (PPPs) in equipping the PTCs with ICT infrastructure, the government has had a number of collaborations such as the New Partnership for Africa Development (NEPAD) e-schools programme and the World Summit on the Information Society (WSIS) whose objective was to integrate ICT in the delivery of education

curriculum [45]. Specific targets that were to be achieved by 2015 were linking colleges with ICTs and adapting curricula to meet the challenges of the information society [45]. An important step is an agreement to digitalize the curriculum under the KICD and NEPAD implementing connectivity to institutions [42]. In addition, [45] outlines specific e-learning resources that are to address the educational needs of primary and tertiary institutions.

The Kenya ICT Trust Fund was established to mobilize and provide ICT resources to facilitate education and training through integration and innovation. Its general objective is to facilitate Public Private Partnerships (PPP) to mobilize and provide ICT resources to Kenyan public schools, community resource and learning centers. Integration of ICT is well captured in Kenya's Visio 2030 [46]. Kenya Vision 2030 wishes to see Kenya embrace technology and produce citizens that have skill and levels that are globally competitive [47] (Rotich, 2013). The same is highlighted in the Kenya Constitution 2010 article numbers 43, 53, 54, 55 and 56. The Kenya Institute of Curriculum Development (KICD) have developed an online teacher orientation courses using Elimika Learning Management Systems (LMS) whose main aim is to increase access to information on issues relating to the curriculum and curriculum delivery [48]. However, there are no clear guides on how integration of should done and whether teachers are prepared to integrate ICTs in primary teacher training colleges to roll out the same in Kenya primary schools.

Although these initiatives were set up as early as the year 2000, they have not addressed teachers' preparedness to integrate ICTs in the Kenyan PTCs. The pertinent question one would ask at this point is; is integration of ICT benefiting both the tutors and student teacher trainees in PTCs in Kenya? This is because teachers are implored to integrate ICT into teaching and learning activities, but teachers' preparedness to integrate the technologies into teaching determines the effectiveness of the technology and not by its shear existence in the classroom [49,50] whereas [51] noted that there is a gap in the ability to integrate ICT effectively in teaching and learning process in primary schools. Therefore, this study sought to establish teachers' preparedness in integrating information communication technology in teaching and learning in primary teacher training colleges in Kenya.

2. METHODOLOGY

The study was conducted by using a descriptive survey design. The target population comprised of both (a) tutors and (b) student teacher trainees. Proportionate sampling technique was used and Yamane formula for the sample size. Both quantitative and qualitative techniques were used to collect and analyse data.

3. FINDINGS OF THE STUDY

Data were analyzed using the SPSS programme and findings reported as follows.

3.1 Types of Information Communication Technology Available

The findings of the study established the mean value of types of ICTs available therefore ranged from 1.00 – 2.00 whereby the most available ICT reported were computers with a mean of 1.01 with a standard deviation of 0.10 and text books with a mean of 1.05 with a standard deviation of 0.23.

The researchers viewed that types of ICTs available were inadequate for teaching and learning purposes. That access to the computers in colleges was poor with limited Internet connectivity even though Internet connectivity avails academic materials across the globe thus making ICT lecturers to use modems to download mapping information. Moreover, poor accessories in colleges impede use. Even the tutors with personal computers/laptops do not use them for college work. This hinders the rolling out on integration of ICT. This study concurs with [26] study that revealed that in as much as internet connectivity is vital in promoting e-learning, teacher training colleges have very poor internet connectivity which implies that the colleges in Kenya are not prepared to reap from emerging technology to harness quality learning/education.

New Horizons in Education and Social Studies Vol. 2
Recent Research on Teachers' Preparedness in Integrating Information Communication Technologies in Public Primary
Teacher Training Colleges in Kenya

Table 1. Types of ICTs available in the colleges by the student teacher trainees

Type of ICT available	f (N = 297)	%	Mean	Std
Text books	281	94.6	1.05	0.23
Overhead projectors	215	72.4	1.28	0.45
Black boards	271	91.2	1.09	0.28
White boards	255	85.9	1.14	0.35
Radio	79	26.6	1.73	0.44
Television	245	82.5	1.18	0.38
LCD	109	36.7	1.63	0.48
Computers	294	99.0	1.01	0.10
Tablets	57	19.2	1.81	0.39
Mobile phones	228	76.8	1.23	0.42
Charts	143	48.1	1.52	0.50

Further, the findings revealed that the available computer versus student teacher trainees' population leads into poor student computer ratio leading to sharing. This finding concurs with [23]'s study that established that ICT infrastructure in training colleges were not adequate. In addition, the study revealed that even the few ICTs available, there were no qualified technicians to help the tutors and student teacher trainees when ineed. This study findings concurs with [4]'s study on an analysis of ICT policy development and practice in teacher education in Kenya which revealed the lack of ICT technological infrastructure, and [25]'s study on ICT infrastructure and teacher preparation in the integration of ICT in teaching and learning in primary teacher training college which established inadequate access to the few ICT infrastructure available. The researchers are justified to conclude that there is lack of preparedness on integration of ICT to teaching and learning since the ICTs available in PTTCs are inadequate.

3.2 Extent to Which Tutors Integrated Some Specific ICTs

The study findings revealed that most of the computers available were not functional, tutors were not competent in integration as they were not fully trained on computer and other ICTs, some had left integration to the ICT department, some tutors were not computer literate at all, tutors noted they lacked time to practice yet their departments had only one computer whereas the classrooms were not ICT friendly to enhance integration.

Table 2. How often the tutors use computers and other ICT tools to present a lesson

	Every time	Once a week	Once a month	Once a year	Never
Number of Tutors (N = 43)	10	1	4	3	25
%	23.3	2.3	9.3	7.0	58.1

3.3 Tutors' Skill Levels on Integration of ICTs

The study revealed that tutors were not competent on integration as they were not fully trained on computer and other ICTs. The rating of the skills by the tutors was based on their ability to; get information and apply in context, guide student teacher trainees to get the context well and enable the student teacher trainees be able to integrate ICTs in their teaching career.

Table 3. Tutor rating of their skills levels on integration of ICT as they prepare teacher trainees

Rating of skill	No. of tutors (N = 43)	%
No skill at all	7	16.3
Fair	19	44.2
Good	15	34.9
Very good	2	4.7
Total	43	100

New Horizons in Education and Social Studies Vol. 2
Recent Research on Teachers' Preparedness in Integrating Information Communication Technologies in Public Primary
Teacher Training Colleges in Kenya

3.4 Preparedness of Tutors in Integrating ICTs

The study revealed that there was no significant relationship between training on use of ICTs and tutors rating on skill level on integration of ICTs as they prepare teacher trainees in their teaching career.

Table 4. Correlation results between tutors training on ICT use and skill level on integration of ICTs

		Skill level on integration of ICTs to prepare teacher trainees in their teaching career	Training on ICT use
Skill level on integration of ICTs to prepare teacher trainees in their teaching career	Pearson Correlation	1	-267
	Sig. (2-tailed)		.092
	N	43	41
Training on ICT use	Pearson Correlation	-267	1
	Sig. (2-tailed)	.092	
	N	41	41

The negative correlation implied that those who were trained on use of ICTs tended to rate their skill as fair compared to those who were not trained. The overall statistics showed that there was no significant difference between training and the tutors rating on skill level on integration of ICTs. The study therefore views that computers have not transformed practice and that access to ICT is the foremost and necessary step in the integration process even though mere access will not automatically lead to integration of ICT for teaching and learning. The study established further that there was lack of proper training in the use of ICTs and that preparedness on integration is at an infant stage. Similarly, [52] 's study on factors influencing integration of ICT in Higher Education in Vietnam revealed that there was a poorly slow uptake of ICT in education. According to [53] teachers are more likely to integrate ICTs into the classroom if they have access to adequate equipment and a solid technology infrastructure.

The study viewed therefore that both the tutors and student teacher trainees were not prepared to befit from integration of ICT to harness quality learning. This concurs with [26]'s study on e-readiness. Moreover, the training programme does not currently provide prospective student teacher trainees with the necessary skills, competencies and experiences to prepare them to integrate ICTs effectively in their teaching profession. The study concurs [54] 's study which revealed that teachers lacked proper training in the use of ICT as they were not exposed in the use of ICT as a teaching resource in teaching in their teaching career despite the fact they had ICT qualifications which does not help them in lesson delivery.

The study also concurs with [55]'s study on preparing technology- proficient teachers. Further, the study also concurs with [25]'s study which revealed that student teacher trainees lacked an allocated time within the college timetable when they could freely access computer labs to enforce practice as they were expected to have free time when they could access the facilities and put to practice what they had learned if integration of ICTs has to be realized in Kenyan PTTCs. According to [56], to use these tools effectively and efficiently, teachers need visions of technologies' potential, opportunities to apply them, training, and just-in-time support and time to experiment only can then teachers be informed and confident in their use of ICTs whereas [57] observe ICT can be used as a core or complementary to the teacher training process if integration has to be realized.

3.5 Challenges Faced by Student Teacher Trainees while Integrating ICT into the Curriculum

The findings of the study revealed a myriad of challenges among which included: inadequate facilities, lack of competence, knowledge and skills in ICT integrations, limited time for accessing the computer in the college, Power blackout, lack of support from college administration and government, college systems do not embrace integration in all subjects, inadequate training, lack of enough ICTs and negative attitude of students, low levels of ICT literacy among tutors especially on use of modern ICTs, lack of appropriate and relevant content from publishers and the ministry, apathy on usage of ICT in teaching learning process, some tutorial ignore using the ICT facilities available and initial preparation time is too long. These findings concurs earlier studies on ICT infrastructure in PTTCs [45] and [46]. [25] observes that it is evident that the presence or absence of ICT infrastructure is becoming a crucial factor in teachers' decision to use ICT in teaching. According to [58], lack of technical support on integration affects to a great extent the use of ICTs in teaching whereas [59] notes that lack of quality teachers to apply ICT to the existing education systems to poor policy framework for integration of ICT. [37] observes that without technical support for teachers, they become frustrated resulting in their unwillingness to integrate ICT to teach.

4. CONCLUSION

The main question that this study endeavored to find was an answer to the teachers' preparedness to integrate information communication technology in teaching and learning. Based on the findings of the study, this study has resulted in the following main conclusions:

Firstly, based on the findings that types of ICTs available were inadequate for teaching and learning purposes the researcher concluded that even the few ICTs available, there were no qualified technicians to help the tutors and student teacher trainees when ineed. Further, a large numbers of tutors do not access to computers and other ICT tools to enable them integrate in teaching and learning process. This implies that tutors did not have access to the Internet, which means that rolling out on integration is impeded to a large extent by inadequate facilities/infrastructure.

Secondly, that tutors in the PTTCs were either average or below average in terms of handling Computers due to little exposure with computers and computer related technologies. Provision of adequate ICTs will ensure that computer and other ICTs and training of personnel on how to use ICT thus addressing technophobia which causes tutors and student teacher trainees to fail to take up tasks that require integration of ICT. The researcher viewed therefore that both the tutors and student teacher trainees were not prepared to benefit from integration of ICT to harness quality learning.

Thirdly, given that curriculum delivery was done in classrooms, which were not ICT friendly, the study views that ICTs were to a large extent not aiding curriculum delivery in PTTCs and therefore the student teacher trainees lacked exposure on integration as they are being prepared in their teaching career.

5. RECOMMENDATIONS

The following recommendations were made based on the findings of the study.

1. The study established inadequate facilities in the colleges. The study recommends the MoEST to initiate partnership with private sectors to equip PTTCs with facilities/ infrastructure such as providing ICT friendly classrooms and e-rate installation of Internet to PTTCs through partnership with private sectors to pay for the substantial costs to ensure secure and continual Internet connectivity. This will ensure that PTTCs are supplied with an extra resource base other than books for teaching and learning. Further, PTTCs should source for partners, well-wishers, stakeholders and sponsors to finance the acquisition of

New Horizons in Education and Social Studies Vol. 2
Recent Research on Teachers' Preparedness in Integrating Information Communication Technologies in Public Primary
Teacher Training Colleges in Kenya

more ICT facilities/infrastructure. This will ensure that the adequacy of ICTs in the colleges so as to improve their use/integration in the process of teaching and learning.

2. Kenyan PTTCs curriculum should train teacher trainees on how to use ICT in their classrooms by being engaged in the process of ICT-integrated training. Further, develop tutors' ICT skills and promote ICT-pedagogy integration in their teaching by providing ICT-based training environments where on-demand access to materials; peers, and networks of experts where expertise and advices can be obtained and active discussion can take place in relation to technology and pedagogy. (This approach of using ICT to support teachers' on-going professional development and networking can be very effective as long as organized support is provided, [60].

3. PTTCs should establish strategies to identify strengths and weaknesses of various ICTs with a view to adapt embrace and integrate them in the process of teaching and learning.

4. Kenya Institute of Curriculum Development (KICD), the body responsible for developing curriculum materials should develop and supply the primary teacher training colleges with relevant e-content in all subject areas to ensure delivery of the curriculum is integrated with ICTs. When planning the curriculum, KICD should ensure that it is in harmony with the educational vision, the culture and context of learning. In this case the e-content should be locally manufactured to be responsive to the needs of the PTTCs and in harmony with the current syllabus. This will avoid provision of an irrelevant e-content or those that do not support the curriculum as observed in the "Tafakari Project."

5. College administration should have an ICT policy to guide tutors and student teacher trainees on integration. It should also embrace and support integration of ICT in teaching and learning.

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COMPETING INTERESTS

Author has declared that no competing interests exist.

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