

# Teacher-trainee's competency and institutional level of preparedness for adoption of e-learning in selected teacher training colleges in Kenya

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## ABSTRACT

E-Learning applications have gained recognition globally as a panacea to address the access, quality and equity challenges facing education systems. This paper reports findings of a study whose aim was to assess the level of preparedness for e-learning adoption among pre-service teacher trainees in selected Primary Teacher Training Colleges in Kenya. Specifically, the study sought to establish the level of pre-service teacher trainee skills for adoption of e-learning; assess the level of availability and accessibility to e-learning infrastructure and to assess the nature of strategies put in place to promote adoption of e-learning. Descriptive survey design was used where questionnaires were used to collect data from a sample of 287 respondents. Data was analysed by use of descriptive statistics aided by Statistical Package for Social Sciences. Despite the efforts made by the Kenya government towards technology uptake in schools, teacher training colleges are hardly prepared for e-learning as the study results showed that majority of respondents (77%) were unskilled in performing functions related to use of e-learning while a high percentage (67%) reported lack of strategies in place to promote use of e-learning.

**Keywords:** e-Learning, competencies, preparedness, survey.

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## INTRODUCTION

The global technological advancement has led to increased use of new technologies in teaching and learning. In a meeting on the adoption of the Millennium Development Goals (MDGS) in 2000, the world leaders drew attention to the urgency of the countries to enable access to ICT infrastructure of their citizens in order to reap the benefits therein. In fact, target eight of the eighth MDG states that "in co-operation with the private sector, governments shall make available the benefits of new technologies, especially information and communication technologies" (United Nations, 2000:1). The relevant indicators for tracking the progress of the two targets as endorsed by the United Nations Statistical Commission (UNSC) at its 38th Sessional meeting in 2007 included

availability of ICT infrastructure, access in terms computers, internet connectivity and individual competencies (The International Telecommunication Union (ITU), 2014). The World Summit on Information Society (WSIS) forum identified the need to measure the progress made in bridging the digital divide (ITU, 2010).

The role of Information and Communication Technology (ICT) in education has been supported as a solution to the triple challenges of quality, equity and access to education (UNESCO-UIS, 2009). The International Telecommunication Union (2014) urges countries to harness the power of ICTs for increased productivity to reach the unreached and to enhance quality of learning as it is believed that ICT can have a

monumental impact on the expansion of learning opportunities for diverse populations beyond cultural and geographical barriers (Haddad and Draxler, 2002). However, Kozma (2005) argues that simply putting computers into schools and development of plans in place does not necessarily translate to implementation and results on the ground. For effective adoption of e-learning, institutional preparedness is essential (Dutta and Bilbao-Osorio, 2012), while Farrell and Shafika (2007), and ITU (2010) asserts that adoption of e-learning requires not only development of plans, connecting schools with infrastructure and capacity building but also measuring the degree of availability and accessibility of those resources. This calls for assessment of preparedness to provide key quantifiable information indicators for a country's situation (McConnell International, 2001; ITU, 2010).

Some of the instruments developed to measure e-Learning readiness as presented by UNESCO-UIS (2009) has been indicated in Table 1.

Jones (2004) argues that for successful in adoption of new technologies, the process of adoption should focus on training of teachers, instituting educational reform activities, training of technology support staff, training of students, implementing technological resources and digital content preparation. Furthermore, the shift to e-learning strategy requires creation of clear vision and mission for the institution to align digital content with the mandated curriculum with consideration of the diversity of learner's needs. Wagner et al. (2005) recommends training for pre-service and in-service teachers as a crucial input component, pointing out that the level of e-learning adoption is determined by the percentage of trained teachers, the quality of ICT training and the technical support. Tinio (2002) asserts that for the learners to participate fully in the e-learning activities, learners should be equipped with three foundational skills. Since Technology becomes obsolete fast, there is need for planning for technological sustainability in schools (Anderson, 2010; Ministry of Education [MoE], 2009).

A survey carried out by Tinio (2002) on ICT Utilization in public high schools in Philippines recommended for comprehensive assessment of the ICT environment to be conducted to establish institutional infrastructure and competency skill inventory as pre-requisites for adoption of e-learning. In some countries such as the United States, Canada, Singapore, Sweden, Japan, Finland, Britain, Norway and Australia, heavy investment has been directed to technology in education. In Singapore for instance, teachers are required to complete over 10 core modules within 30 to 50 hours of training to enable use of e-learning in teaching process (Farrell and Shafika, 2007).

In Chile, internet connected computers serve over 90% of the school population and 80% of the teachers have been trained and acquired pedagogical skills for the

adoption of e-learning (Garrison, 2011). Teachers in at all levels in Chile received two years of face-to-face training amounting to 100 hours. Consequently, teachers regularly make use of computers for professional, managerial and out-of-classroom tasks searching for educational content on the web, lesson planning. Similarly, the Republic of Korea have shown commitment to adoption of technology in her education system. The country was ranked the highest in e-Learning adoption rate in the world, with 88 % internet connectivity in primary schools, 78% in middle schools and 68.7% in high schools, 47.1% junior-high schools, 62% junior colleges, and 78% connectivity in universities, with an average student computer ratio of 5.8 in 70.7% of schools by 2007, closely matching OECD levels of 5 students per personal computer and plans to digitize all the contents in schools by 2013 (UNESCO IITE, 2010).

In Africa, most countries have showed positive strides towards promotion of ICT as indicated in ICT policy formulation by 2011. However, e-Learning programs in African countries are still small, experimental pilot projects with little documented history of their successes (Hennessy et al., 2010). Dutta and Bilbao-Osorio (2012) points out that the level of ICT readiness in Sub Saharan Africa is still low as indicated by low internet connectivity, insufficient ICT infrastructure compounded by low levels of skills. A progress report by ITU (2010) on the achievement of the Tunis and Geneva World Summit on Information Society goals showed that over 80% of population in Africa had no access to internet, with extremely low regional household Internet access average of 5.3%, far short of developing country average of 24%. Dutta and Bilbao-Osorio (2012) observes that Sub-Saharan Africa has remained the world's least-connected region, where only 13% of individuals had the ability to use the Internet by 2012. Table 2 shows the global digital divide in terms of regional internet penetration.

Table 2 shows that Africa lags behind in terms of level of ICT readiness among world regions as measured in terms of internet connectivity and access, usage, competency development and affordability. The continent only accounts for 7% of the world internet users (Dutta and Bilbao-Osorio, (2012). Trucano (2006 cited in Farrell and Shafika, 2007) describes the status of ICT in African universities as "too little, too expensive and poorly managed" (p.3) and characterised by inadequate ICT human capacity and infrastructure and hence, high level of digital divide.

In Uganda, e-learning initiatives have focused mostly in provision of ICT infrastructure that supports e-Learning at all levels of education where little consideration has been given to e-content development and capacity building (Kahiigi, 2009). Kahiigi (2009) points out that adoption of e-learning strategies at the university level concentrates mainly on forwarding prepared notes to students through e-mail. Ethiopia set up networked computers in over 500

**Table 1.** Readiness indicators for adoption of e-learning.

Concept	Description
Infrastructure	Availability of ICT hardware (such as desktop computers, laptops, Interactive White Boards), availability of ICT software.
Vision	The vision for an institution regarding e-learning in relation to pedagogy transformation and lifelong learning.
Staff development plan	Motivating instructors/teachers to acquire ICT skills for pedagogical practices; training of instructors for skill acquisition of skills for ICT utilization in teaching and learning.
ICT Support	ICT support, vision, time and financial allocation in the institutional strategic plans, pedagogical support for instructors, technical support for both educators and students.

Source: UNESCO-UIS (2009).

**Table 2.** Regional Internet penetration and usage (2014).

World region	Population (2012 Est.)	Internet users	Penetration % population	Users (in world %)
Africa	1,073,380,925	167,335,676	15.60%	7.00%
Asia	3,922,066,987	1,076,681,059	27.50%	44.80%
Europe	820,918,446	518,512,109	63.20%	21.50%
Middle East	223,608,203	90,000,455	40.20%	3.70%
North America	348,280,154	273,785,413	78.60%	11.40%
Latin America/Caribbean	593,688,638	254,915,745	42.90%	10.60%
Oceania/Australia	35,903,569	24,287,919	67.60%	1.00%
World total	7,017,846,922	2,405,518,38	34.30%	100.00%

Source: Dutta and Bilbao-Osorio (2012).

schools through the joint initiative of SchoolNet Africa and the Ministry of Education. Through the initiative, classrooms were equipped with screens for students to access educational programs. However, limited internet connectivity for accessing e-content, low ICT skills among the students and teachers was cited as a challenge (Hare, 2007 cited in Kahiigi, 2009).

In Kenya, the ICT policy commitment is to make the country globally competitive and one of the education objectives is the adoption of new technologies as a tool for the achievement of vision 2030 (Ministry of Education, Science and Technology, 2015). The country aims at popularization of ICT as well as Open and Distance Education (ODE) at all levels of education and training (RoK, 2005) and the plan is to make education the platform to equip the Kenyan citizens with ICT skills to create a dynamic and sustainable economic growth through enhanced learning and the mission of ICT in education is "to integrate ICT in education and training in to prepare learners and staff of today for the Kenyan economy of tomorrow and enhance the nation's ICT skills" (RoK, 2006:25) and a vision to adopt ICT as a universal tool for education and training (MoE, 2006). To achieve the vision, '.....every educational institution, teachers, learners and the respective community will be

equipped with appropriate ICT infrastructure, competencies and policies for usage and progress" (MoE, 2006:14; RoK, 2005). This is further reflected in Kenya's Master plan of 2014 which lays out strategies of mainstreaming e-learning, targeting 100% use of e-learning as an alternative curriculum delivery strategy in teacher training institutions by 2017 (RoK, 2014).

From earlier research however (Kiilu et al., 2016; Kiilu and Muema, 2012; Republic of Kenya, 2010, 2012), the use of ICT and e-Learning in teaching in public institutions in Kenya is still patchy. A desk top review carried out by Kiilu and Muema (2012) on implications of e-readiness on adoption of e-learning approach in secondary schools in Kenya established that although the country advocates for use of education as a platform for the 21st century skills development, less than 10% of secondary schools in Kenya offered computer studies as a specialty subject at the time. It has been established that most higher education institutions in Africa have not yet assessed the level of preparedness as the leadership is yet to be convinced on the role of ICT in education (Kashorda and Waema, 2009). The dearth of assessment of the level of preparedness results to duplication of efforts and inefficient use of scarce resources (RoK, 2014). The study therefore set out to assess the status of

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## MATERIALS AND METHODS

The study adopted descriptive survey design using both quantitative and qualitative techniques. Survey design was preferred as it enables researchers to make description, explanation and exploration of the phenomena to establish the status quo (Saunders et al., 2007).

Purposive sampling was used to select 5 PTTCs out of the total 22 teacher training colleges. The selection of the five colleges were selected based on regional representation, where sample size will be determined by use of Krejcie and Morgan (1990). The standardized tables shows the sample sizes for different population (or proportion of it) at 95% confidence level, a sampling error of 5% is accepted by most evaluations (Krejcie and Morgan,1990). From Krejcie and Morgan's table (1990), the optimal (effective and valid) sample size to represent a population of 2217 students will be 331. According to the Krejcie and Morgan (1990) tables, the smaller the number of cases in the target population, the larger the sample proportion of that population and vice versa. To obtain sample size for each of the college, proportionate computation was carried out as indicated in Table 3.

The instruments of data collection included semi-structured questionnaire and observation checklist that were designed based on the research variables. The study employed concurrent strategy, where both qualitative and quantitative data was collected simultaneously in a single phase. The self-administered questionnaires were collected from the respondents after one week, with a return rate of 287, hence the study report was based on the information from 287 respondents. Using observation checklist, the researcher directly made observations and recorded the facts on availability of infrastructure, accessibility and strategies in place to support adoption of e-learning in PTTCs.

The collected data were analyzed by use descriptive statistics such as frequencies, mean and standard deviation aided by use of Statistical Package for Social Sciences (SPSS version 20) software programme.

## RESULTS AND DISCUSSION

The study sought to establish the institutional and teacher trainee level of preparedness for the adoption of e-learning in teacher training colleges using the UNESCO Institute of Statistics [UIS] 2009 institutional e-readiness indicators which include availability and accessibility to infrastructure, internet connectivity; competency (UNESCO-UIS, 2009). The pre-service teacher trainees responses regarding infrastructural facilities were

**Table 3.** Computed sample size for teachers and students (2014/2015) cohort.

College	Teacher trainees		
	Population	Sample size	%
Eregi	543	81	15
Machakos	529	79	15
Narok	237	35	15
Shanzu	488	73	15
Thogoto	420	63	15
Total	2217	331	

Source: Data from Ministry of Education statistics section (2014).

presented in Table 4.

The commonly available resources were desktop computers, internet connectivity and projectors. However, all the 287 respondents indicated a dearth of resources such as college website and password, database repositories, modem for internet connectivity. Although the students indicated presence of Interactive White Boards in their colleges, observation checklist indicated that such facilities were non-existent.

On accessibility to e-learning resources, the teacher trainees' who participated showed lack of accessibility to e-learning facilities. The pre-service teacher trainee responses were presented in Table 5.

From Table 5, the most accessible e-learning resources were projectors, desktop/laptop computers and interactive white boards were accessible. However, e-learning resources were inaccessible to teacher trainees. The study findings support earlier results by So (2008) who cited lack accessibility to infrastructure as among the challenges affecting adoption of e-learning in Hong Kong schools.

The teacher-trainee competency levels were measured by rating their ability to apply some of the essential ICT skills. The results were presented as shown in Table 6.

The findings in Table 6 show diversity in regard to teacher trainee skills. From the study, only a small number (17%) of teacher trainees were competent in skills such as creation of Power Point presentation. For the skill of creation of graphical illustrations, 32% of the respondents affirmatively expressed competence, 44% incompetent while 24% of were not sure. The use of search engines was a challenge as majority of them (58%) indicated incompetence, while 66% were of students expressed inability to use of IWBs, 16% were not sure. The students however demonstrated some competencies in the operating a computer (74%), use of word processor (73%), and information gathering (68%). Pernia (2008 as cited in Makhanu, 2010) observes that for effective e-learning to take place, the learners must possess technical skills and capabilities such as the ability to search, retrieve, assess, store, development of course materials, uploading lessons, and evaluation of learners, presentation and communication to learners via

**Table 4.** Availability of resources for e-learning.

<b>ICT infrastructure</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>N</b>
Internet connectivity	3.5842	1.29280	287
Desktop computers	3.8750	1.10036	287
Interactive white boards	3.801	1.48719	287
LCD projectors	3.6915	1.21110	287
Database repositories	2.768	0.34625	287
College website and password	2.6795	1.10130	287

Source: Students' questionnaire.

**Table 5.** Accessibility to e-learning resources.

<b>Accessible facilities</b>	<b>Mean</b>	<b>Standard deviation</b>	<b>N</b>
Internet connectivity everywhere	2.71	1.4620	287
Desktop/laptop computers	3.84	1.3954	287
Scanners, printers and digital cameras	2.334	1.367	287
A modem for connectivity	2.595	1.7899	287
LCD projectors on need basis	3.654	3.071	287
Interactive White Board	3.972	1.027	287
Digital storage devices	3.172	1.417	287
Specific e-books for reference	2.610	1.337	287
Database repositories	2.768	1.346	287
Digital content for all subjects	2.458	1.296	287
Technical support on 24/7 basis	2.425	1.404	287

Source: Teacher trainees' questionnaire.

**Table 6.** Competencies for e-learning in PTTCs.

<b>Competencies/Skills</b>	<b>Incompetent</b>		<b>Not sure</b>		<b>Competent</b>		<b>N</b>
	<b>F</b>	<b>%</b>	<b>F</b>	<b>%</b>	<b>F</b>	<b>%</b>	
Operating a computer	22	8	52	18	213	74	287
Use of word processor	33	11	45	16	209	73	287
Use of search engines	164	57	47	17	76	26	287
Uploading and downloading documents	44	15	49	17	194	68	287
Making of graphical illustrations	125	44	69	24	93	32	287
Use of e-mail for collaboration in learning	125	43	77	27	85	30	287
Use of Interactive White Board	188	66	46	16	53	18	287
Making of PowerPoint and presentation	179	62	59	21	49	17	287
Information gathering by searching from internet	106	37	73	26	108	37	287

Source: Students' questionnaire.

the Internet.

Regarding availability of support strategies for e-learning in PTTCs, the observation checklist showed inadequacy of computers to support the use of e-learning. The researchers observed that the available computers were being shared by seven students in 60% of the sampled colleges. The pre-service teacher trainees were asked to give their opinions on awareness of strategies in place to support adoption of e-learning

strategy in their colleges. The responses of the teacher trainees were summarized as presented in Table 7.

From Table 7, majority of the teacher trainees denied the existence of any of the highlighted strategies to support adoption of e-learning. Majority of the teacher-trainees were not sure whether the college had internet usage policy, or whether the college had subscribed to any educational digital resources or even whether strategic plan had mission and vision statement on

**Table 7.** Provision of support strategies in PTTCs.

Statement	Mean	Standard deviation	N
Internet-linked computers are provided	2.505	1.268	287
College provides students with e-content	1.834	0.873	287
College internet connectivity is available everywhere	2.187	1.186	287
Technical support provided on 24/7	2.247	1.231	287
college has subscribed to educational digital resources	2.763	2.726	287
Internet usage policy is in place	2.975	1.293	287
College strategic plan has a Vision statement on e-learning	2.837	1.221	287
e-learning Materials prepared by my college are available	2.415	1.161	287
College e-mail to communicate to students	2.768	2.356	287

Source: Teacher trainee's questionnaire.

e-learning (mean of 2.83). It is important to note that successful e-learning environments requires accessibility to digital content, user accounts, and communication tools such as e-mail and technical support (Carcary, 2008; ITU, 2010; RoK, 2014). Although The Basic Education ACT No.14 of 2013 spells out the plan to promote the use of ICT to 'support and enhance the attainment of curriculum objectives, to enhance ICT appropriate competencies, knowledge and attitudes, to manage education effectively and efficiently at all levels' (RoK, 2013:221), the study findings shows that the government intention has hardly been supported in PTTCs. By the time of the study, most of the colleges had hardly put in place strategies to promote adoption of e-learning.

## CONCLUSIONS

From the literature review and study findings, although a lot of emphasis on mainstreaming e-learning as an alternative delivery strategy and heavy financial allocations, the results from the study shows that the colleges have been left out in the MoE efforts to supply institutions with computer equipment for learning purposes as indicated by teacher trainees. From the study results, it can further be concluded that although the existing policy has highly recommended adoption of e-learning in schools and learning institutions, the policy discourses has not been backed with comprehensive action plans for the implementation and mainstream of e-learning. Based on the overall research results, the level of preparedness in PTTCs in Kenya can generally be described as low and still at a developmental stage. Although the teacher trainees would be expected to implement the current one laptop per child programme that has been initiated in primary level of education, under the current pre-service teacher trainee competency levels reflected by the findings, the objectives of the OLPC programme may just remain pipe dream.

Based on the research findings, the study recommends for more investment to be directed to the provision of the

essential e-learning facilities and internet connectivity to enable teacher trainees to access the digital materials for learning and also enable learner-tutor collaboration for effective learning. The study recommends for continuous teacher trainees' competency development for improvement of skills level to enable them to impart knowledge to their future learners using the modern technologies. Furthermore, the ministry of education needs to formulate a comprehensive teacher competency development framework with clearly set targets of knowledge to be achieved by the teacher trainees. Finally, the ministry of education and the implementers of the programme certainly need to engage in a policy dialogue to chart out the way forward and prioritise planning for competency development for sustainable e-learning adoption in Primary Teacher Training Colleges in Kenya.

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