



**AN INVESTIGATION INTO THE FACTORS AFFECTING THE  
ADOPTION OF E-LEARNING IN PUBLIC SECONDARY SCHOOLS IN  
MAKADARA DISTRICT, NAIROBI COUNTY, KENYA**

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***Abstract***

*The main purpose of the study was to investigate the factors affecting adoption of e-learning in public secondary schools in Makadara District, Nairobi County. The specific objectives of the study were to establish the influence of ICT infrastructure and e-learning curricula and design on the adoption of e-learning in public schools in Makadara district, Nairobi County. It was also aimed at examining the effect of teacher's readiness and teachers' ICT skills on the adoption of e-learning in public schools in Makadara District, Nairobi County. The study adopted a survey research design. The study targeted all the head teachers, deputy head teachers and teachers of all public secondary schools in Makadara District. The target population was 195 and a sample of 98 was sampled for the study. Data was collected using a questionnaire. Descriptive and inferential statistical tools were used to analyze the study variables of ICT infrastructure, curricula, teacher readiness, teacher ICT skills and adoption of e-learning. The study established that most schools had low investment in ICT infrastructure due high costs of computer hardware, software and related accessories. The adoption of e-learning implementations has resulted in the need for development of new skills and competencies among teachers as most teachers who have been teaching in traditional manners are not technologically literate and sometimes may even resist because of the worry about losing their jobs if e-learning is implemented, because of their inadequate skills. The factors affecting the adoption of e-learning significantly influenced the adoption of e-learning and external factors such as the government policies, financial policies and human development. The study recommends that there is need for schools to have e-learning infrastructure included in the financial plans to cater for maintenance and expansion of the*

*ICT infrastructure and the acquisition and maintenance and training of teachers and technical staff, e-learning curricula may need to be designed in such a way that is relevant in the quality of information with the outside world because students will use different resources besides their instructor, teachers need to acquire necessary knowledge and skills that allows them to shift from traditional teaching experiences to an e-learning teaching style hence school official need to avail adequate technical support at the beginning of the adoption of e-learning program.*

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## **Introduction**

### ***Background of the study***

E-learning entails the provision of the course materials and teaching through web technologies. This could be a stand-alone web-based course or a combination with the traditional face-to-face mode of teaching. Stand-alone web-based course can be defined as that which "might include supplemental material but can be completed entirely without face-to-face interaction with instructor" (Aduke, 2008, p.290-295). Instead of the traditional physical classrooms e-learning offers "virtual classrooms as they are able to group students doing a particular online course from different physical locations but through the web technologies" (Adam, 2003, p.195). E-learning offers flexible access to content and resource via networked information and communication technologies at a place and time convenient to the learner in what has come to be called distributed learning (Naidu, 2003).

In USA over three million students are enrolling in web-based courses, with estimates suggesting that nearly 20 percent of courses in the USA are currently offered at a distance (Ruth, 2007). Major corporations and the military have infused their traditional training programs with e-learning initiatives, resulting in millions of dollars in annual cost savings (Salas, 2005). Given the trend toward e-learning delivery methods, it has become more critical to understand the factors which impact the effectiveness of these emerging delivery methods. E-learning can be defined as "training or educational initiatives which provide learning material in online repositories, where course interaction and communication and course delivery are technology mediated" (Johnson, Hornik, & Salas 2008, p. 357).

A recent study conducted by the Global Information Technology (2005) used the Networked Readiness Index (NRI), covering a total of 115 economies in 2005-2006, to measure the degree of preparation of a nation or community to participate in and benefit from ICT developments. Out of the 115 countries surveyed United States of America topped the list, followed by Singapore, Denmark, Iceland, Finland, Canada, Taiwan, Sweden, Switzerland and the United Kingdom etc. Similarly, a study by Nigerian Information Technology Professionals in America in 2002 indicated that given current ICT penetration it may take some African countries 50 years to catch up with America on the aspect of PC count per household (Yusuf, 2006). The domain of distance education has not been unaffected by the penetrating influence of information and communication technology. Unquestionably, ICTs have impacted the quality and quantity of teaching, learning, and research in distance education. Therefore, ICT provides opportunities for distance education students and academic and non-academic staff to communicate with one another more effectively during formal and informal teaching and learning (Yusuf, 2005).

The Global Information Technology (2005) established that the pedagogical integration of information communication technology (ICT) had a positive impact on teaching and learning. Both students and teachers reported that they used computers to access knowledge. In 60% of the institutions, off line resources such as Microsoft Encarta Encyclopedia was used, there was also restricted access to information from online resources in schools that had connectivity. Twenty percent of the institutions were using the cyber-school software to teach science subjects. In cases where the school had no connectivity students reported that they accessed the internet from cyber cafés during school holidays.

Global Information Technology (2005) study further established that teachers used ICTs for pedagogical purposes. Indeed, more than fifty percent (50%) of the courses in the institutions under study were taught using ICTs. Programmes such Microsoft excel were used for academic data analysis, 20% of the institutions used NetCen School Solution to prepare the school time tables. Some teachers reported the use of computers to present work in class using power point presentations, while 20% the institutions used smart board technology in teaching. Teachers reported use of Ms Word for their day to day and routine work such as

making of lesson plans and schemes of work. Students reported that ICTs made learning more interesting and fun, enhanced learning and made them produce better results especially in practical subjects and science congress competitions. They also used computers to write and present assignments. The students further reported that learning using ICTs enhanced retention.

Various studies have discussed some benefits of e- Learning which is first and foremost capable of reducing the challenge of capacity, equity and access due to the opportunity it provides to “educate and train anyone, anytime, and from anywhere” ; breaks the barriers of times and space; hence making it possible to enroll a large number of learners without restrictions. As explained by Schrum & Ohler (2005) e- learning significantly challenges the standard onsite educational culture; Instructions delivered are independent of time, location, pace and space; hence learners can still face other commitments and learn at their own pace; the increase in enrolment rates in a distance education system lowers the unit cost per learner; permits the achievement of individual educational objectives at affordable costs, without affecting the normal schedule of learners (Olakulehin, 2008). Nafukho (2007) argued that current developments in technology have an extraordinary potential for transforming education to meet the growing need for customized, on-demand learning.

### ***Problem statement***

One of the key components of the Government’s approach to achieving the stated goal of quality basic education is through provision of secondary education using Information and Communication Technology (ICT). The Sessional Paper No. 1 of 2005, KESSP and Vision 2030 documents underscores the importance of ICT in education in laying a firm base for skills development and innovation for enabling the country to attain a competitive edge (MoE, 2009).

Although, in Kenya, ICT has penetrated many sectors including banking, transportation, communications, and medical services, the Kenyan educational system still seems to lag behind (infoDev; 2007). Further, recent report by the National Council for Science and Technology (2010) indicated that computer use in Kenyan classrooms is still in its early

phases resulting in a situation in which many schools have missed out on the benefits of ICT such as access to educational content, information sharing and networking with other students and peers.

Whereas there are a number of researches done on the introduction, use and the potential impact of the Information and Communication Technology (ICT) on learning especially in the context of the developed countries, there is no evidence of studies done on factors affecting adoption of e-learning in public secondary schools in Kenya. Therefore this study seeks to fill this gap and examine the factors affecting adoption of e-learning in public secondary schools in Makadara District, Nairobi County

### **General objective**

The general objective of the study was to investigate the factors affecting adoption of e-learning in selected public secondary schools in Makadara District, Nairobi County

### **Specific objectives**

- i) To establish the influence of technological infrastructure on the adoption of e-learning in public secondary schools in Makadara District, Nairobi County.
- ii) To investigate the influence of e-learning curricula on the adoption of e-learning in public secondary schools in Makadara District, Nairobi County.
- iii) To examine the effect of teacher readiness on the adoption of e-learning in public secondary schools in Makadara District, Nairobi County.
- iv) To examine the effect of teacher ICT skills on the adoption of e-learning in public secondary schools in Makadara District, Nairobi County.

### **Research questions**

The study attempted to answer the following research questions:

- i) What is the influence of technological infrastructure influence the adoption of e-learning in public secondary schools in Makadara District, Nairobi County?
- ii) What is the influence of e-learning curricula and designs on the adoption of e-learning in public secondary schools in Makadara District, Nairobi County?

- iii) How does teacher readiness affect the adoption of e-learning in public secondary schools in Makadara District, Nairobi County?
- iv) How do teacher ICT skills affect the adoption of e-learning in public secondary schools in Makadara District, Nairobi County?

### **Research Methodology**

A descriptive survey research design was adopted in this study. This is because it is an attempt to collect data from members of the population in order to determine the current status of that population with respect to one or more variables in a particular study (Mugenda and Mugenda, 2003). The target population was drawn from all the head teachers, deputy head teachers and teachers of all the ten (10) public secondary schools in Makadara District, Nairobi County. Stratified simple random sampling which involves dividing the population into distinct non overlapping subgroups (strata) according to characteristics of roles (The strata was made up of Head teachers, deputy head teachers and teachers) and then a random sample was selected within each subgroup. This was used to obtain study sample, as this ensured that a representative sample is picked from each stratum thus ensuring that the research findings were able to be generalised. To this end, the study used a sample of 50% of the target population which gave a sample size of ninety eight (98) respondents consisting of principals, deputy principals and teachers.

The data collected by use of the questionnaire was first thoroughly edited and checked for completeness and comprehensibility. Quantitative data was chronologically arranged with respect to the questionnaire outline to ensure that the correct code was entered for the correct variable. Data was then cleaned, tabulated and analyzed with the aid of Statistical Package for Social Sciences (SPSS 22.0). The study used both descriptive and inferential statistics to analyze data. Regression analysis was used to determine the extent of relationship between dependent and independent variables in the study.

The regression model was therefore presented in the equation below:

$$Y = + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 +$$

Y = Adoption of e-learning in public secondary schools

= constant

$b_{1-4}$  = Regression Coefficients

$X_1$  = ICT infrastructure

$X_2$  = E-learning Curricula

$X_3$  = Teacher readiness

$X_4$  = Teacher ICT Skills

= error term

## Results

**Table 1.0:** Response rate

Response Category	Frequency	Percentage
Responded	79	80.61
Did not respond	19	19.39
Total	98	100

The study above shows the total number of the respondents who responded and those who did not respond. The total questionnaires that were distributed to the field were 98, and out of these questionnaires, 79 questionnaires were returned duly answered which represent 80.61% of the total questionnaires that were administered to the field, while 19 questionnaires which represent 19.39% were not returned. From the table above it can be concluded that the response rate was good.

**Table 2.0:** Gender of Respondents

	Frequency	Percent	Valid Percent
Valid MALE	30	38.0	38.0

FEMALE	49	62.0	62.0
Total	79	100.0	100.0

According to the above study the total number of males who responded was 30 representing 38% of total respondents while females were 62%. From Table 2 of the study it can be concluded that the majority of respondents were females.

**Table 3.0:** Level of education

	Frequency	Percent	Valid Percent
Primary level	1	1.3	1.3
Secondary level	17	21.5	21.5
Diploma level	25	31.6	31.6
Degree level	30	38.0	38.0
certificate	4	5.1	5.1
masters	2	2.5	2.5
Total	79	100.0	100.0

**Source:** Research Data (2013)

The study above shows the level of education of various respondents. According to the table, the respondents who were diploma holders representing 31.6%, secondary level 21.5%; bachelor’s degree had a total number of 30 respondents which translates to 38.0% of the total respondents while masters level, certificate level and primary level had a percentage of 2.5%, 5.1% and 1.3% respectively. From Table 3 above it can be deduced that the majority of the respondents were diploma holders.



**Table 4.0:** Respondent Categories

	Frequency	Percent	Valid Percent
Valid Head teacher	4	5.1	5.1
Deputy Head teacher	4	5.1	5.1
Teacher	71	89.9	89.9
Total	79	100.0	100.0

*Source: Research Data (2013)*

The above study shows the category of people who responded among sample category. 89.87% of teachers responded, while 5.06% responded for both principals and deputy principals. From table 4, it can be concluded that that there was a good response rate across the sample categories, hence a fairly representative response.

**Factors that affect the e-learning program in the schools**

Table 5 below gives the response on the factors that affect the adoption of e-learning programs in schools

**Table 5.0:** Factors that affect the e-learning program in the schools

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid ICT infrastructure	12	15.2	15.8	15.8

e-learning curricula and design model	11	13.9	14.5	30.3
Teacher ICT skills	10	12.7	13.2	43.4
Teacher readiness	9	11.4	11.8	55.3
All of them	34	43.0	44.7	100.0
Total	76	96.2	100.0	

The table 5 above shows the views of the respondents on the factors that affect the e-learning program in their schools. 11.8% of the respondents stated that teacher readiness affect e-learning program in their schools, 13.2% and 15.8% of the respondents stated teacher ICT skills and ICT infrastructure respectively whereas 44.7% of the respondents indicated that all of the above factors affect the e-learning program in their schools. From the study it can be deduced that all the above factors affect the e-learning program in the respondents' schools

### ***Relationship between variables***

The research sought to find the relationship between the adoption of e-learning and the variables of adoption of e-learning i.e. Adoption of e-learning, ICT infrastructure, e-learning curricula, Teacher ICT skills and teacher readiness.

**Table 6.0:** Pearson's Correlation between adoption of e-learning and the variables of adoption of e-learning

	Adoption of e-learning	ICT Infrastructure	E-learning curricula	ICT skills	Teacher readiness
Adoption of e-learning	1				
ICT Infrastructure	.409**	1			
E-learning curricula	.445**	.418**	1		
ICT skills	.293**	.428**	.573**	1	
Teacher readiness	.189	.384**	.402**	.634**	1

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

The results shown on table 6 above, show the correlation analysis on the relationship between adoption of e-learning, ICT infrastructure, e-learning curricula, ICT skills and Teacher readiness at 0.01 significance level; ICT infrastructure (r=0.409, p=0.000, N=74), E-learning

curricula ( $r=0.445$ ,  $p=0.000$ ,  $N=77$ ), ICT skills ( $r=0.293$ ,  $p=0.009$ ,  $N=78$ ) revealed a positive and significant relationship to the dependent variable whereas, Teacher readiness ( $r=0.189$ ,  $p=0.118$ ,  $N=70$ ) revealed an insignificant relationship to adoption of e-learning in public secondary schools. These results imply that ICT infrastructure, E-learning curricula and ICT skills influence the adoption of e-learning in public secondary schools.

**Regression between variables**

**Table 7.0:** Regression of the dependent variable and the independent variables

**Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.539 <sup>a</sup>	.291	.244	3.46445

		Un standardized coefficients		Standardized coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.151	1.774		1.776	.081
	ICT Infrastructure	.259	.156	.212	1.655	.103
	E-learning curricula	.497	.151	.421	3.293	.002
	ICT skills	.032	.188	.025	.169	.866
	Teacher readiness	-.040	.192	-.030	-.208	.836

a. Dependent Variable: Adoption of e-learning

**Source: Research Data (2013)**

The above table, table 7 shows the relationship between the dependent variable (adoption of e-learning) and the independent variables (ICT infrastructure, e-learning curricula, ICT skills and teacher readiness). In using the regression model  $Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + \dots$ . The following regression equation can be formulated from the above study;  $Y = 3.151 + 0.259X_1 + 0.497X_2 + 0.032X_3 - 0.040X_4 + 1.774$ . On the basis of the significance values shown on the table above, the independent variables; ICT Infrastructure (P=0.103), ICT skills (P=0.866) and Teacher readiness (P=0.836) were not found to significantly influence adoption of e-learning in public secondary schools since (P> 0.05). However, E-learning curricula (P=0.002) was found to significantly influence adoption of e-learning since (P< 0.05).

From the study above, the coefficient for ICT infrastructure is 0.259 hence for every unit increase in ICT infrastructure, a 0.259 unit increase on adoption of e-learning is predicted, the coefficients for E-learning curricula and ICT skills are 0.497 and 0.032 coefficients respectively. This shows that there is 0.497 and 0.032 predicted unit increase in adoption of e-learning holding for every unit increase in E-learning curricula and ICT skills respectively holding all other variables constant. The study used a significance level (alpha) of 0.05 (95%), Degrees of freedom (df) of 4, and two-tailed test. The degree to which independent variables (technological infrastructure, e-learning curricula, ICT skills and teacher readiness) is related to the dependent (adoption of e-learning) is expressed in the positive correlation coefficient ( $r$ ) = 0.539, coefficient of determination ( $r^2$ ) = 0.291 indicating 29.1% probability of adoption of e-learning is related to technological infrastructure, e-learning curricula, ICT skills and teacher readiness. This then indicates that there is a significant relationship between technological infrastructure, e-learning curricula and adoption of e-learning in secondary schools.

### ***Conclusion***

Most schools have low investment in ICT infrastructure due high costs of computer hardware, software and related accessories, coupled with high cost of connectivity and bandwidth, absence of electricity, lack of funding, low content development, insufficient building space, lack of available and trained staff, and poor security. Teachers are not fully familiar with e-learning content and outcomes, besides there is lack of effort among school official to guide educational institutions for a smooth transition to e-learning and to design e learning curriculum to guide instructors on how to deliver information to students with respect to the

amount of information and the time that will be required. However there are schools which have designed school e-learning curriculum that has created new learning and teaching possibilities that generate greater outcomes. The adoption of e-learning implementations has resulted in the need for development of new skills and competencies among teachers as most teachers who have been teaching in traditional manners are not technologically literate and sometimes may even resist because of the worry about losing their jobs if e-learning is implemented, because of their inadequate skills. Hence for successful adoption of e learning teachers require new kinds of skills, capabilities attitudes, and empowerment

There is need for schools to have e-learning infrastructure included in the financial plans (budget lines) to cater for maintenance and expansion of the ICT infrastructure and the acquisition and maintenance and training of teachers and technical staff. A cost sharing model can also be explored in which teachers are assisted to purchase computers through a recovery mechanism as this will facilitate computer acquisition in schools. E-learning curricula may need to be designed in such a way that is relevant in the quality of information with the outside world because students will use different resources besides their instructor. E-learning course curricula may need to be based on learning approaches other than face-to-face course curriculum, which offers students opportunities to discuss their knowledge related to a certain topic rather than only to listen to the instructor as a provider of information. To assure a smooth transition to e-learning, teachers may need to acquire necessary knowledge and skills that allows them to shift from traditional teaching experiences to an e-learning teaching style hence school official need to avail adequate technical support at the beginning of the adoption of e- learning program, and then gradually lessen that instructional structure and the support as teachers become more confident with the e-learning characteristics and skills required for teaching

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