

Determinants Of Information And Communication Technology Adoption In Teaching And Learning Among Early Childhood Development And Education Schools In Kisumu County

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Abstract: Teachers are form human resource that facilitates the acquisition of requisite skills, knowledge and attitude necessary for the fulfillment education goals. For better education delivery, competence of teachers in ICT is imperative. Adopting ICT in teaching and learning by teachers is believed to highly improve their productivity in instructional duties as well as embracing technology in education. However, studies show that little information exists on determinants of ICT adoption in ECDE centers for its effective mainstreaming in instructional process. The purpose of this study was to investigate the determinants of ICT adoption for teaching and learning among rural and urban in ECDE schools in Kenya with particular focus on Kisumu County. The study objectives included: examination of aspects of teacher training for ICT adoption in teaching and learning in ECDE schools; establishment of accessibility to ICT resources for teaching and learning in the centers; determination of the attitude of teachers towards adoption of ICT in instruction; establishing teaching strategies that embrace ICT adoption in ECDE schools and; assessment of management systems for ICT adoption in the schools. Study population was 2220 teachers in ECDE schools from which a sample size of 200 respondents was drawn. Questionnaire and interview schedule were employed to collect data. Instrument pilot testing was done among 20 teachers to determine validity and reliability. Data was analyzed both qualitatively and quantitatively. Qualitative data was sorted, transcribed and categorized into themes and sub-themes and then reported. Quantitative data was coded and processed using SPSS computer package to generate frequencies and percentages and summarized in tables. The findings of the study is hoped to establish the determinants of ICT adoption for its better implementation in teaching and learning in ECDE schools in the county.

Keywords: Determinants, ICT, adoption, ECDE

I. INTRODUCTION

A. BACKGROUND TO THE STUDY

One of the many challenges facing many developing countries today is preparing their societies and governments for globalization and the information and communication revolution. Academics are increasingly concerned with the need to make their societies competitive in the emergent information economy. For example in 1997 Uganda working with World Bank Institute initiated a programme to effectively introduce computers in secondary schools .The project was

done in phases to train teachers.Governments in developed countries have responded to the challenge by initiating national programmes to introduce computers in education (Albirini, 2004). Computers were introduced in Kenya in 1970's and the internet became available in 1993 (Ford, 2007). In a study by Wabuyete (2003) results indicated that while ICT has penetrated many sectors including banking, transportation, communications and medical services, the Kenyan educational sector seem to lag behind.

The definition of ICT tools consists of a broad range of digital devices such as computers, tablets, multi – touch screen, interactive white boards, mobile devices, cameras,

DVD and music players, audio recorders, electronic toys, games, e-books readers among others. The prevalence of electronic media in lives of young children means that they are spending an increasing number of hours in front of and engaged with screens of all kinds, including televisions, computers, smart phones, tablets, games devices (Gatuyu, 2013). With guidance, these various technological tools can be harnessed for learning and development, without guidance, usage can be inappropriate and or interfere with learning and child development.

In the 21st century technologically advances have exploded (UNESCO, 2008). Schools have not been left out in these advancements. Classroom technology has become increasingly more popular and will soon become must – haves for every teacher in classroom .Today's students are digital natives and as such the use of technology in education has proven to be an issue that cannot be wished away. Teachers must therefore be able to programme meaningful and relevant learning for children. Technology prepares students for the future. For example the modern workplace requires that one have tangible skills including the ability to collaborate with others, interpersonal skills, creativity, and problem solving skills among others. Technology, combined with a student centered constructivist mode of learning, has the potential to provide students with these higher – level cognitive and interpersonal skills (Lowther, 2007).

Use of computer in education is referred by many names; Computer Assisted Instruction(CAI),Computer Aided Instruction(CAI), Computer Assisted Learning (CAL), Computer Based Education (CBE), Computer Based Instruction (CBI) , Computer Enriched Instruction (CEI) and Computer Managed Instruction (CMI). This study will use CAI and CMI which refers to the use of the computer as a tool to manage, facilitate and improve instruction .Teachers must be trained in how to plan, create and deliver instruction within a technological setting.

Today, students who are used to searching the internet, communicating with Skype, chatting on messenger, and sharing contents on You Tube seem to have teachers who are unfamiliar with these tools (Rosenblit, 2005). Therefore, teachers being main agents of change should be able to manage change not waiting for change to change them, their professional capacities should be enhanced .Their training ought not to be merely providing additional training opportunities, but also aiding them in experimenting with ICT before being able to use them in the classroom. Regardless of technology used, unless teachers have the skills, knowledge and attitudes necessary to infuse it into the curriculum it would not add value to teaching and learning processes.

Gatuyu concluded his study by remarking that; to effectively utilize technology in classroom, teachers should be properly trained and encouraged to use technology available for use in the classroom, and it must be accompanied by a rigorous technology education for teachers (<http://gatuyu.blogspot.com/2013/02/ict-and-earlychildhood-.htm>). The researcher further highlighted the need to provide pre-service and in-service training programme to enable teachers to successfully teach using computers in the classroom. Experienced teachers also need opportunities to

learn about new technologies and always to integrate them effectively in their classroom.

For ICT to be adopted in ECDE schools successfully , there are determinants to be scrutinized and harmonized for its integration especially in the area of competencies ; teachers professional development should be addressed in pre – service teacher training and to be enhanced in in-service, the tools should be accessible to the teacher , attitude of the teacher with regard to ICT use should be addressed , applicable teaching strategies and support systems should be considered for successful integration. This makes the key variables the study is going to address.

B. STATEMENT OF THE PROBLEM

In the Kenyan scene since this year 2013, these words “ digital and analog” is common on peoples lips , a study by Wabuyete (2003) ten years ago did a study whose findings were that , ICT has penetrated many sectors including banking , transportation , communication and medical services. The big question is how about education. The President announced that in 2014, primary one pupil each will be given a laptop for school use. According to Albirini (2004) governments in developing countries have responded to the global challenge of adoption of ICT into education by initiating national programmes to introduce computers in education. The study focused on ECDE teachers because they are the ones preparing pupils to use computers in primary schools in the Kenyan context.

The study therefore is to find out the determinant of ICT adoption for teaching and learning among Rural and Urban ECDE schools in Kenya, specifically Kisumu County. Specifically it seeks the determinants of ICT adoption at the teacher's knowledge of ICT, teacher's attitudes, accessibility of the resources, teaching strategies and support systems in schools.

C. PURPOSE OF THE STUDY

The purpose of this was to investigate the determinants of Information and Communication Technology adoption for teaching and learning among rural and urban in ECDE schools in Kenya with particular focus on Kisumu.

D. STUDY OBJECTIVES

The study was to:

- ✓ Examine aspects of teacher training for ICT adoption in teaching and learning in ECDE schools;
- ✓ Establish accessibility of ICT resources for teaching and learning in ECDE schools;
- ✓ Determine the attitude of teachers towards adoption of ICT in teaching and learning among ECDE schools;
- ✓ Establish teaching strategies that embrace ICT adoption in ECDE schools and;
- ✓ Assess the management systems for ICT adoption in ECDE schools.

E. RESEARCH QUESTIONS

- The study was guided by following questions:
- ✓ Which aspects of teacher training for ICT adoption in teaching and learning in ECDE schools exist in Kisumu County?
 - ✓ Are ICT resources accessible for teaching and learning in ECDE schools in the county?
 - ✓ What is the attitude of teachers towards adoption of ICT in teaching and learning among ECDE schools in County?
 - ✓ Which teaching strategies that embrace ICT adoption are employed in ECDE schools in the County?
 - ✓ Which management systems for ICT adoption are established in ECDE schools in the County?

F. SIGNIFICANCE OF THE STUDY

The findings of the study may unravel the extent of ICT adoption in ECDE schools to enable teacher trainers identify gaps for training in ICT in education. The study may also be of significance since better use of ICT in teaching and learning may result into provision of better educational foundation and development among children who are attending ECDE programmes in the counties. Besides, the comparative analysis between rural and urban ECDE schools may enable curriculum developers observe training varied needs of teachers.

G. SCOPE OF THE STUDY

Descriptive survey design was used and only questionnaire and employed in data collection among ECDE schools in Kisumu county. The study variables were: teacher training, teacher attitude, teaching strategies, accessibility of ICT in schools and management systems. The study focus was on ECDE school teachers.

H. LIMITATIONS OF THE STUDY

The study employed a descriptive survey design which involved collection of data at a point in time. The results only describe the situation as at the time of data collection. Study employs questionnaire for data collection since a large population will be involved though the instrument does not allow for probing on respondents' opinions given.

I. STUDY ASSUMPTIONS

The study assumes that teachers of ECDE are trained on ICT use in teaching and learning. It also assumes that teachers access and use ICT in teaching and learning and that school has strong management systems in ICT for effective adoption.

J. DEFINITION OF TERMS

INFORMATION AND COMMUNICATION TECHNOLOGY: refers to use of electronic devices in teaching and learning.

ADOPTION: refers to incorporation of something.

DETERMINANT: refer to factors that influence existence of something.

EARLY CHILDHOOD DEVELOPMENT EDUCATION: all activities organized to prepare children for Primary education.

II. LITERATURE REVIEW

A. INTRODUCTION

This chapter explores existing literature on determinants of ICT adoption in teaching and learning processes among ECDE teachers and possible shortcomings of the process. An implication of literature for this study will be examined integrally.

B. ICT ADOPTION IN TEACHING AND LEARNING: AN OVERVIEW

The study focuses attention on the basic factors that would enable ICT adoption in ECDE successfully. The tools that constitute ICT are many, however, the study will focus on the tools such as; computers, tablets, multi – touch screens, interactive white boards, mobile devices, cameras, DVD and music players, audio recorders, e- games and toys, e – book readers. In order the tools listed above to be used successfully, the ECDE teacher must have the relevant knowledge of the tool and how to manage all instructional necessities to address pedagogical aspects, skills on how to operate the gadgets, and positive perception of ICT's. The researcher therefore addresses the determinants under the following variables; Pre-service and In-Service trainings for teachers, attitude of teachers towards ICT, accessibility, teaching strategies and support systems in ICT use (citation).

C. PRE –SERVICE AND IN-SERVICE TRAINING FOR TEACHERS IN ICT

In order to use technology effectively, teachers need to be trained in using technology and they need to develop a good understanding of it. Technology is used to enhance learning therefore it is important for educators to be comfortable using it to ensure that students get the full advantages of educational technology. In a study by Kinuthia (2003) the study found out that the computer use in Kenyan classrooms is still in its early phases, and concluded that the perception and experiences of teachers and administrators do play an important role in the use of computers in Kenyan classrooms. This highlighted the need to provide pre-service and in-service training programmes to enable them to successfully teach using computers in the classrooms. The study further indicated that the Government and the Ministry of Education Science and Technology needed to review both teachers' preparation and staff development programmes, as well as develop a revised national plan to implement ICT into the curriculum. By May, 2013 the fourth President of Kenya announced that by 2014 primary one children would be given computers for use at schools, however, come October, 2013 it was shelved due to inadequate funds. This is closely related to

Benzie (1995) findings which indicated that national programmes have been of limited success not only because they were formulated in non – educational realms, but also because they were not based on research. Like in Kenyans case, the announcement was on political platform fulfilling one of the presidential campaigns pledges.

The effective use of ICT would be of great value to the teacher and the child. There is need for the development of the necessary skills at all ages, in all parts of the society, to use and participate in ICT effectively. Such skills include functional and digital literacy, and the ability to be involved in creating and assessing content, as well as the ability to participate in an interactive electronic environment (www.digital/strategy.govt.nz).

Study done by (Bates, 2000) found out that the reason why ICT is either adopted or not in schools are complex. There appear to be an inter – play between individual factors such as; teachers lack of skills , insufficient training, teachers attitudes to ICT use in learning, school and national policies and the complexity of integrating ICT into the curriculum. The study further expounded that various competencies with regard to teachers professional development should be enhanced such as ;skills with particular applications, integration into existing curricula , curricular changes related to use of ICT including changes in structural design, changes in the role of the teacher and underpinning educational theories. Ideally these should be addressed in pre-service teacher training and built on and enhanced in in-Service.

Lack of skills and knowledge in the tools is a major problem especially in both rural and urban set up. Studies show that even for teachers who are positive about the potential benefit of technology in the classroom, many do not feel competent in their technical knowledge or computer literacy (Gulbaher & Guvan, 2008) Some report low level of teachers confidence , teachers reported feeling unprepared on how to use ICT in the classroom to support learning (ibid). A part from that there is lack of dedicated time to training and experimenting with ICT, insufficient class length and curricular restraints (ibid).This observation is in line with Rogers findings when he indicated that one of the main barriers to ICT implementation perceived by teachers in this study (Rogers,1995) is the mismatch between ICT and the existing curricula and the class – time frame. It is important to note that the introduction of ICT into education requires equal innovativeness in other aspects of education.

Additionally, teachers who are technically competent in ICT do not necessarily have pedagogical ICT competence. It is important to note that both teachers pedagogical and technical competence is valuable- having an on- site technical support helps foster teachers enthusiasm for the use of ICT. Baylor and Ritchie (2002), further observes that “regardless of the amount of technology and its sophistication, technology will not be used unless teachers have the skills, knowledge and attitude necessary to infuse it into the curriculum (p. 398).

Teachers who have adequate knowledge in ICT subscribe to the fact that it facilitates teaching and learning process. Balanskat *et al.* (2006) identified lesson planning as an area where ICT helped teachers to work more efficiently, particularly through its ability to support collaboration and resource sharing. Teachers can collaborate by creating

professional communities of learners where they can freely exchange ideas. Teacher's preparation necessitates not only merely providing additional training opportunities, but also aiding them in experimenting with ICT before being able to use it in their classrooms. If decision – makers want to involve teachers in the process of technology integration, they have to find ways to overcome the barriers perceived by the teachers.

D. ATTITUDE OF TEACHERS TOWARDS ICT IN INSTRUCTION

Attitude can be defined as a state of mind or feeling, a disposition, an inclination, a tendency. The way teachers perceive the computers will determine its successful implementation in schools or not because teachers are the key agents of change in schools .If teachers have positive attitude they will take away fear of the tools and apply them in teaching and learning process. Confidence also encompasses creating trust, safety and security in the use of ICT

A number of studies have shown that teachers attitudes towards computers are a major factors related to both the initial acceptance of computer technology as well as future behaviour regarding computer usage. Recent studies have shown that the successful implementation of educational technology depends largely on the attitudes of teachers, who eventually determine how they are used in the classroom (Bullock, 2004) therefore, teachers attitude are a major enabling or disabling factor in the adoption of technology. The development of teachers' positive attitude towards ICT is a factor not only for enhancing computer integration but also to avoiding teachers' resistance to computer use. Since positive attitude towards ICT usually foretell future computer use, policy makers can make use of teachers positive attitude towards ICT to better prepare them for incorporating ICT in their teaching practices.

There are some groups of teachers who will always retain the status quo, therefore before any innovation is implemented, it is advisable to carry out a research and involve the teachers with an aim to gauge their perception. Teacher's first priority is to maintain order in the classroom and to have a controlled learning environment. Any suggestion of adopting very innovative teaching techniques such as using ICT is therefore seen as threatening this orderly pattern and therefore not desirable . There is a genuine fear amongst many teachers about ICT and skepticism of its value to their pupils (<http://www.leeds.ac.uk/educal/documents/00001304.htm>).Given the recent presence of technology in their schools; developing countries have the responsibility not merely to provide computers for schools, but also to foster a culture of acceptance among the end users of these tools (Rogers, 1995).

Investment in ICT kit does not guarantee its effective use or what impact it will have. Its use weighs heavily on the teachers attitude. An empirical survey of 30, 000 head teachers and teachers across 27 countries in Europe reported that 35.0% of teachers in Latvia reported they have used ICT in the last year, compared with 96.0% of teachers in the U.K (Korte & Husing, 2007). A majority of teachers perceive ICT to offer advantages to classroom learning but many also struggle to see specific benefits and methods for use. A number of studies have identified these constructing perceptions from teachers (

Korte & Husing 2007; Becta, 2008) The empirical survey found that a fifth of European teachers felt that using computers in class did not have significant learning benefits for pupils (Korte & Husing, 2007). A survey of UK teachers also showed that teachers' positivity about the possible contribution of ICT was moderated as they became rather ambivalent and sometimes doubtful about specific, current advantages (Becta, 2008: p.45)

Regular use of technology in the classroom can relate to teachers feelings of effectiveness and the usefulness of ICT .Those teachers who used ICT in the classroom more regularly also showed higher levels of perceived self efficacy in ICT use (Gulbahar & Guvan, 2008). Innovative use of one teacher's interest or creativity, sharing practice, collaborative working and development of support systems or networks have been reported as important factors to help develop more innovative uses of ICT collaborative teacher to teacher relationships. Attitudes are formed if computers are introduced with no supplementary measures to enable educators to develop positive attitudes towards the new tools and to use them, this will result in result in ad hoc implementation. Availability is not adoption and use.

E. ACCESSIBILITY OF ICT RESOURCES FOR TEACHING AND LEARNING

The ICT resources for the study is explained above. Despite the many challenges educational technology is experiencing, there is often a difficulty for teachers who have had some training to be able to use ICT because there are insufficient ICT resources in the school or there is not enough time to review them and Plan lessons incorporating their use (Wheeler, 2006). Balanskat *et al.* (2006) found out in their study that in access to resources including hardware, broadband, updated and technical support is a barrier to ICT use in the institutions of learning. The high expenses of setting up an appropriate infrastructure for ICT, its ongoing maintenances , and its wastage management makes the poor school shy away from even dreaming of buying the tools. Stable electricity and reliable and moderately priced internet access is a necessary condition for ICT use (Bates, 2001: p.113). Until there is a basic and reliable infrastructure in place, ICT is unlikely to be a realistic or practical choice for teachers. It is important to note that in the Republic of Kenya electricity supply is sure in the urban setup but not remote rural environs.

The cost of buying the tools such as computers, smart phones and others are sold at exorbitant prices. The third world nations who are swimming in poverty cannot afford to buy the tools. Many schools especially the ones in the sub towns and rural areas are faced with many challenges such as lack of proper classrooms whereby some pupils are learning under trees. Security is another big problem both in school and at home. The electricity supply is not consistent, there are frequent black outs and lack of network experienced most of the times.

F. TEACHING STRATEGIES RELEVANT TO EDUCATIONAL ICT

With introduction of ICT in education, many things must change in the classroom instruction and management .Teaching methods must accommodate the application of the new technologies. The strategies must be innovative and creative where both pupils and teachers are actively involved in the teaching and learning processes. In terms of how ICT is used the SITES study suggests that its impact is highly dependent on the teaching approach when ICT is used. Employing a student centered focus and enquiry based group work reported greater student gains in what the report called 21st century skills like self -directed , collaborative inquiry (Momanyi, 2006). Both policy makers should provide additional planning time for teachers to experiment with new ICT based approaches. This may be achieved by reducing the teaching load for the teachers.

Technology provides individualized learning according to Koedinger (2008), Computer Aided Instruction (CAI), especially when used for drill and practice as a tool for teaching in a traditional sense allows students to take control of the rate of learning and helps them to avoid embarrassment by allowing them to learn and make mistake in a non-public manner. CAI provides feedback immediately which leads to reductions in learning time. Technology acts as a catalyst for change , study by done in Turkey found that students who learned in a classroom with a constructivist approach to learning showed greater cooperation and collaboration , higher levels of learning , more confidence , and more willingness to participate in learning activities (<http://gatuyu.blogspot.com>). CAI programmes can use teaching strategies such as; tutorials, drill and practice, simulation, problem solving and they test pupils understanding. These approaches offer varied advantages to teaching and learning process such as; one to one interaction , freedom to experiment with different options , motivates , gives immediate feedback to the answers elicited , promotes self- pacing ,helps teacher to devote more time to individual students, privacy helps the shy and slow learners to learn, multi-media helps to understand difficult concepts through multi-sensory approach and lastly self-directed learning students can decide when, where, and what to learn.

G. SUPPORT SYSTEMS IN ICT TEACHING AND LEARNING PROCESS

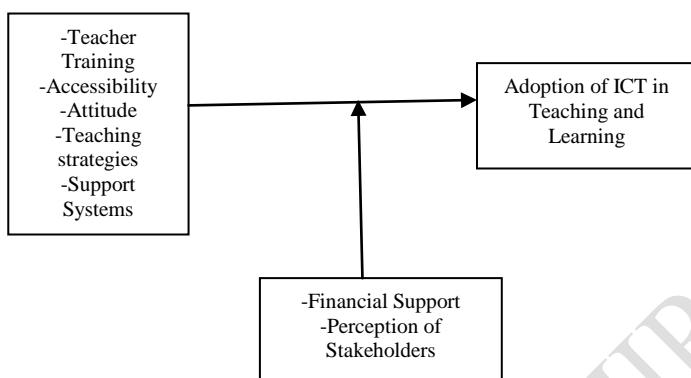
In order to offer quality education, mandatory pillars of support services must be in rightful place which include provision of: student support services; access to supplementary learning materials and library services; resources and study centres which is a service delivery point into the local area where the student go for consultation, tuition, advice, to collect learning materials and to use other facilities. Learning centre must be close to where the students live to avoid long travelling for lectures, coordinators and students (Ajuoga, 2010).

The following tools can be used in ECDE centre; smart board which is an interactive white board that allows the teacher to project an image from laptop to the front of the room , class websites and blogs where teachers can create

class blogs where they can post assignments and other instructional content for pupils to access, mobile devices including smart phones for teaching they are accessible anywhere and easy to carry and digital camera can be used in a literacy class in a role play approach. The captured scenes can be played back and pupils learn from that. Younger pupils enjoy multi- media games and fun activities in acquiring very basic literacy skills. These tools should be housed within the centre accessible to both pupils and teachers.

Tutorial support system should be put in place. Teacher must experiment with the tools and acquire skill how to use the tools to fulfill all pedagogical requirements in the classroom. The induction of the teachers into the new technologies necessitates ongoing professional and technical support and the establishment of special centres for lesson development (Bates, 2001). Ongoing support is needed for pupils, particularly weak ones.

H. CONCEPTUAL FRAMEWORK



ICT in education today is complicated by a number of factors that reveals the complexities of adopting technologies in teaching and learning. For ICT to contribute effectively in teaching and learning processes, the teacher must be knowledgeable in the tools, access the tools, look at the attitude of teachers, teaching strategies in place and ensuring support systems are availed. Those are the independent variables and the dependent variable is determinant s of ICT adoption.

Training of teachers in ICT is instrumental in the adoption of the technologies in the centres as has been shown in the literature review. Apart from pre –service training, continuous in – servicing of teachers must be enhanced to address the new trends in ICT in education. If the teacher is competent in the ICT use in education then adoption in class will be achieved. Accessibility of the tools is another hurdle. In some cases the tools may be available but they are under key and lock. Future lab (2010) observed that, investment in ICT kit does not guarantee its effective use or what impact it will have. The management body and the stakeholders plays key role in offering financial support. They must avail the tools both to the pupils and the teachers.

Teaching strategies is a key determinant factor for effective adoption of ICT in education. The teacher must be well acquainted with the modern teaching approaches that came in with the introduction of technologies in education. Teachers must make learning attractive and enjoyable to the

child. Gatuyu (2013) observed that, today's student are digital natives and as such the use of technology in education proven to be an issue that cannot be wished away. Teachers must therefore be well conversant with these technologies to be able to programme meaningful and relevant learning for children.

III. RESEARCH METHODOLOGY

A. INTRODUCTION

This chapter describes research methodology in terms of: study design; study location; population of the study; sampling technique and sample size; research instruments; pilot testing; validity of the instruments; reliability of the instruments; data collection procedures; data analysis procedures; and ethical considerations.

B. STUDY DESIGN

Study will adopt descriptive survey design. Kothari (1985) observes that a descriptive survey design enables one to gather data from relatively large number of cases at a particular time. Surveys are concerned with describing, recording analyzing and interpreting conditions that exist. Mugenda and Mugenda (2003) also are of the view that descriptive research is concerned of conditions that exist, practices that prevail, beliefs and attitude that are held, process that are on-going and trends that are developing.

C. STUDY LOCATION

Kisumu County consists of Kisumu East, Kisumu West, Kisumu Central, Nyando, Muhoroni, Seme and Nyakach sub-Counties. Population of Kisumu County is 968,909 people. Early Childhood Development Education schools comprise of 740 in number.

D. POPULATION OF THE STUDY

The study population will consist of 2220 ECDE teachers from 740 ECDE schools.

E. SAMPLING TECHNIQUE AND SAMPLE SIZE

The study employed systematic random technique to select 10% ($2220 \times 10\% = 222$) of the population to form the research sample. This gave a sample size of 222 respondents.

F. RESEARCH INSTRUMENTS

Two instruments were used in data collection: questionnaire and Interview Schedule.

a. QUESTIONNAIRE

The questionnaire was developed on the basis of study variables which include: teacher training; attitude of teachers towards ICT adoption; accessibility of ICT for teaching and learning; management systems on ICT and Strategies used in

adopting ICT in teaching and learning in ECDE schools. The instrument contained close ended items to which the respondents were expected to give their opinions. However the instrument was divided into two sections A and B. Section A which included items that sought to describe the characteristics of the respondents. Sections B was further divided into five sections based on the variables of the study. This was to allow for comprehensive coverage of each variable.

b. INTERVIEW SCHEDULE

The instrument was constructed with open ended items to give room for probing. This enabled researcher to verify opinions given by the respondents in the questionnaire. It also encompassed all the five study variables as indicated in the study objectives.

G. PILOT TESTING

Pilot study was necessary to enable the researcher to establish ambiguities; omissions and; commissions for correction. It was therefore required for both validity and reliability determination.

a. VALIDITY OF THE INSTRUMENTS

Validity of the instruments was established by creating sections in the instruments to cover each study variables. Face validity was done by discussing the items in the instruments on the basis of the study objectives by the researchers. Suggestions raised were incorporated to improve the instruments. External validity was also be established by administering the instruments on the target population and ambiguities were corrected.

b. RELIABILITY OF THE INSTRUMENTS

A test-retest technique was used to determine the reliability of the instruments. The instruments were therefore administered twice on the target population at a two week interval. A Pearson Moment Correlation was then computed on the scores obtained from the two set of questionnaire to determine the alpha level of relationship.

H. DATA COLLECTION PROCEDURES

Permit for data collection was sought from the National Council of Science and technology through Daystar University the Directorate for Research and Publication. An introduction was done by the researchers through the county directors to Area Education Office which gave access to the ECDE schools in the Counties. The researcher then made acquaintance with the respondents before making appointment on when to commence the data collection process.

I. DATA ANALYSIS PROCEDURES

The study generated both qualitative and quantitative data which were handled differently. Qualitative data were sorted,

organized and categorized into themes and sub-themes as they emerge from the data on a continuing process of analysis. The findings were then be reported. Quantitative data were also be sorted, coded, and entered into SPSS to generate frequencies and percentages to enable the researcher obtain the distribution of respondents' opinions on study variables.

J. ETHICAL CONSIDERATIONS

The researcher assured the respondents of confidentiality of the data collected except for purposes of the study. Etiquette in handling the respondents was paramount among the researchers and the assistants.

IV. RESULTS AND DISCUSSION

A. INTRODUCTION

The purpose of this was to investigate the determinants of Information and Communication Technology adoption for teaching and learning among rural and urban in ECDE schools in Kenya with particular focus on Kisumu. The study was to: examine aspects of teacher training for ICT adoption in teaching and learning in ECDE schools; establish accessibility of ICT resources for teaching and learning in ECDE schools; determine the attitude of teachers towards adoption of ICT in teaching and learning among ECDE schools; establish teaching strategies that embrace ICT adoption in ECDE schools and; assess the management systems for ICT adoption in ECDE schools. Results are therefore presented in terms of questionnaire return rate, respondents' characteristics and study objectives.

B. QUESTIONNAIRE RETURN RATE AND RESPONDENTS' CHARACTERISTICS

Questionnaire return rate is always important in order to indicate whether the number of study respondents could be considered representative of the anticipated sample. It was also imperative to gather information on respondents' characteristics since they seem to have ramifications on interpretation of the findings.

a. QUESTIONNAIRE RETURN RATE

Questionnaire return rate was 77.5%. A total of 172 teachers were involved in the study out of which 66 of them were from rural schools while 106 from schools in urban setting.

b. ACADEMIC QUALIFICATIONS OF THE RESPONDENTS

The study also involved 20(11.6%) and 152(88.4%) male and female teachers respectively. Summary was as in table 1.

Qualification	Frequency	Percentage
KCPE/CPE	40	23.3
KCSE/KCE	121	70.3
KACE	4	2.3
DEGREE	6	3.5

Non-response	1	0.6
Total	172	100.0

Table 1: Academic Qualifications of the Respondents

As shown in table 1, most (121, 70.3%) ECDE teachers involved in the study had secondary education though a good number (40, 23.3%) also had primary education. This suggests that some schools still employ anybody who knows how to read and write to teach at ECDE centers. However, managing ECDE children goes beyond merely reading and writing since it also involves identification of learning needs for effective early placement of children in relevant and appropriate education programmes. ECDE therefore is a critical level that requires highly qualified personnel to handle since it determines effective social adjustment in the lives of children. Lack of such competencies among ECDE teachers obscures provision of proper learning foundation to the children.

c. PROFESSIONAL QUALIFICATION OF THE RESPONDENTS

The researchers attempted to establish professional qualifications of the teachers since this may influence their attitude and competence towards adoption of ICT in instruction. Findings were summarized in table 2.

Qualification	Frequency	Percentage
Cert. in ECDE	73	42.4
Dip. in ECDE	83	48.3
BEd in ECDE	02	01.2
Other Qualifications	11	06.4
Non-response	03	0.6
Total	172	100.0

Table 2: Professional Qualifications of Respondents

Findings in table 2 indicate that over 90.0% of the teachers were professionally qualified to handle ECDE programmes as 73(42.4%) of them were holders of certificate in ECDE training while another 83(48.3%) had diploma level of training on the same. This is an indication that ECDE centers put emphasis on professional qualification of their teachers.

C. TEACHERS' COMPETENCE IN ICT

Competence in ICT use is quite vital in its adoption in instruction. It was therefore important for the study to establish level of teacher competence in handling ICT for instruction among the teachers. Summary was as in table 3.

Areas of Competence	Agreed	Undecided	Disagree
✓ I am knowledgeable in ICT use in Learning.	92(53.5%)	07(04.1%)	71(41.3%)
✓ I am competent in developing content by use of ICT.	68(39.6%)	11(06.4%)	91(52.9%)
✓ I am conversant with contemporary issues in use of ICT in education.	58(33.7%)	14(08.1%)	97(56.4%)
✓ ECDE pre-service training equipped me well to handle ICT in education.	49(27.9%)	09(05.2%)	113(65.7%)
✓ I have attended sufficient number of Workshops/seminars in ICT in education.	37(21.5%)	09(05.2%)	124(72.1%)
✓ I have been given sufficient induction in ICT use for instruction.	31(18.0%)	13(07.6%)	123(71.5%)
✓ We occasionally receive resource persons to update us on new			

developments in ICT. 14(08.1%) 07(04.1%) 151(87.7%)

Results in table 3 show that a slight majority (92, 53.5%) of the teachers were not knowledgeable in ICT use, however, a good number (71, 41.3%) indicated that they had knowledge in ICT use. Most (91, 52.9%) of the teachers also reported that they were not competent in developing content using ICT since only 68(39.6%) reported to be competent in this. And another large number (97, 56.4%) of teachers reported to not be conversant with contemporary issues in ICT. They (113, 65.7%) reported that they were not properly trained to handle ICT. And they (124, 72.1%) are not attending seminars and workshops to sharpen their skills in ICT use. Induction in ICT use seem to be limited in the schools as 123(71.5%) of the respondents alluded to this fact. Resource persons may be vital where effective adoption of ICT in teaching and learning is concerned, however, the respondents reported that they (151, 87.7%) were not receiving any resource persons to support them in developing skills in ICT use. The forgoing suggests that ECDE teachers in Kisumu in general seem to be incompetent in ICT use and this may be an impediment to full adoption of ICT instruction among ECDE schools in Kisumu County.

D. ACCESSIBILITY AND USE OF ICT BY TEACHERS IN ECDE SCHOOLS

The study attempted to establish if teachers were accessing ICT resources in their schools. They were therefore asked to indicate whether or not they were accessing and using ICT resources like computers, smart boards, LCD projectors among others.

ICT Resource	Yes	No
a) I use the following resources in my lessons		
✓ Computers programmes.	19(11.0%)	153(89.0%)
✓ Smart Boards.	19(11.0%)	153(89.0%)
✓ LCD Projectors.	14(08.1%)	158(91.9%)
✓ Mobile phones.	32(18.6%)	140(81.4%)
✓ Radio Programmes.	50(29.1%)	122(70.9%)
✓ Video shows.	37(21.5%)	135(78.5%)
✓ T.V. Programmes.	31(18.0%)	141(82.0%)
✓ Cassette recorders.	28(16.3%)	144(83.7%)
✓ Computer laboratory available in school.	31(18.0%)	141(82.0%)

The findings in table 4 apparently indicate that 153(89.0%) of the teachers reported that they could neither access nor use such resources in the schools. This suggests that even the resources probably are not supplied in schools for use. ICT resources seemingly cannot be accessed by the teachers in Kisumu county this may not allow them to use them in their classroom lessons.

E. TEACHERS' ATTITUDE ON ICT ADOPTION

Attitude normally influence to a greater extent acceptance of technology or not. The study therefore attempted to establish the attitude of teachers towards adoption of ICT in instruction in ECDE classrooms in Kisumu county. The findings were as summarized in table 5.

Items on Attitude Testing	Agree	Undecided	Disagree
I warmly welcome use of computer in instruction.	145(84.3%)	00(00%)	27(15.7%)

ICT use can improve my lesson preparation and delivery.	42(24.4%)	16(09.3%)	114(66.3%)
ICT use is only applicable among Children from rich families.	44(25.6%)	03(1.6%)	126(72.6%)
Keeping ICT equipment like Computers may attract thieves.	58(33.7%)	07(4.1%)	101(58.7%)
My pupils can learn better without ICT use.	44(25.4%)	08(04.7%)	120(69.7%)

Teachers seem to exhibit a positive attitude towards ICT adoption in schools in general. The study established the teachers overwhelmingly welcome use of ICT in schools as 145(84.3%) of them positively accepted this fact (see table 5). However, they disagreed that ICT use has improved their lesson preparation and delivery since 114(66.3%) of them disputed this fact. They also disagreed with the fact that keeping ICT equipment in schools may attract thieves as 101(8.7%) denied this fact. They also denied that ICT is an affair of children from rich families as 126(72.6%) disagreed with the idea. This suggests that teachers believe that ICT resources are meant to enhance understanding in teaching and learning process regardless of a pupil's background. They also refuted the fact that pupils can learn better without ICT resources since 120(69.7%) of them reported negatively on this. Teachers seem to admit the fact that ICT resources use enhances learning among ECDE pupils. This is an indication that teachers seem have positive attitude towards ICT use in instruction in ECDE schools in Kisumu county.

F. TEACHING STRATEGIES FOR ADOPTION OF ICT

Since ICT is not an end to itself in enhancing learning, strategies must be identified that may promote their use in classrooms. The study therefore explored on strategies ECDE teachers use that may enable fast-tracking ICT adoption in teaching and learning. The findings were as shown in table 6.

Teaching Strategy	Yes	No
I use the following teaching strategies in computer assisted lessons.		
✓ Drill and Practice.	22(12.8%)	150(87.2%)
✓ Discovery Technique.	32(18.6%)	140(81.4%)
✓ Simulation software.	24(14.0%)	148(86.0%)
✓ Experimental Technique.	31(18.0%)	141(82.0%)
✓ Computer based Games.	35(20.3%)	137(79.7%)
✓ Radio Programmes.	31(18.0%)	141(82.0%)
✓ Video Shows.	25(14.5%)	147(85.5%)
✓ Project based learning.	26(15.1%)	146(84.9%)

as shown in table 6, teachers were asked whether or not they use drill and practice as a strategy that may enable embracing ICT in learning: 150(87.2%) of them reported that they were not employing the strategy. They (140, 81.4%) also reported that they were not using discovery technique as well as simulation software as 140(81.4%) and 148(86.0%) denied this respectively. Experimental technique, computer based games, radio programmes, video lessons as well as project based learning were all not in use as indicated by the findings on table 6. This implies that teachers may not be competent in adopting ICT in teaching and learning ECDE centers in Kisumu County. Teachers seem not to be using such strategies in their classrooms.

G. ICT SUPPORT SYSTEM IN ECDE SCHOOLS

Technical support as well as management of ICT resources is important for effective development,

improvisation, maintenance and disposal of old ICT resources. The study therefore strived to find out if support system existed in the ECDE institutions. Findings were as in table 7.

Type of Support	Yes	No
Technical support from technicians.	22(12.8%)	149(86.6%)
Content development from experts.	27(15.7%)	144(83.7%)
Administrative support from school managers.	49(28.5%)	12(70.9%)
Examination and feedback support from resource persons.	44(25.6%)	127(73.8%)
Storage and Disposal of ICT resources.	26(15.1%)	145(84.3%)
Review of school ICT resources for improvement.	39(22.7%)	145(84.3%)

Table 7: State of ICT Support System in Schools

Results in table 7 indicate that teachers reported that they never get technical support to enable them develop ICT resources as 149(86.6%) reported support from his. Support from experts on ICT was also limited among ECDE schools as reported by 144(83.7%) teachers. Administrative supported was also found to be limited since 122(70.9%) of the teachers felt they were not being supported by the school administration on development of ICT in their institutions. No examination and feedback support from resources is ever conducted in schools as 127(73.8%) of the teachers reported on this. This implies that even with the few resources which are developed for teaching and learning in schools, teachers were not aware whether or not they were effective in enhancing learning among the learners. No proper storage and disposal for ICT resources seemingly exist in the institutions as overwhelming majority (145, 84.3%) of teachers seem to be aware of such structures. This implies that teachers seem to store their resources on their own. Besides, they could be re-using resources for a long time since no organized manner for their disposal exists in schools. Apparently, no review of resources takes place in Kisumu county ECDE institutions as 132(76.7%) of them reported that they were not reviewing the resources to embrace new technology. The findings suggest that no clear support system exists in ECDE centers in the county. This is a setback to adoption of ICT in schools. Since ICT is a dynamic field, support system is necessary especially in the technical areas to enable teachers develop and effectively use relevant and appropriate ICT resources.

V. SUMMARY CONCLUSIONS AND RECOMMENDATION

A. INTRODUCTION

This chapter presents summary of the study findings, conclusions and recommendations of the research.

B. SUMMARY OF THE FINDINGS

The following were the findings of the study:

- ✓ ECDE teachers in Kisumu County seem to be incompetent in ICT use and this may be an impediment to full adoption of ICT instruction among the schools.
- ✓ ICT resources seemingly cannot be accessed by the ECDE teachers in Kisumu County this may not allow their use in classroom lessons.

- ✓ Teachers seem have positive attitude towards ICT use in instruction in ECDE schools in Kisumu county.
- ✓ Teachers seem not to be using such strategies that may allow easy adoption of ICT in their classrooms lessons.
- ✓ No clear support system exists in ECDE centers in the county. This is a setback to adoption of ICT in schools. Since ICT is a dynamic field, support system is necessary especially in the technical areas to enable teachers develop and effectively use relevant and appropriate ICT resources.

C. CONCLUSIONS

The following conclusions were made from the findings of the study:

- ✓ ECDE teachers are incompetent in ICT use in instruction in Kisumu County.
- ✓ Teachers can neither access nor use ICT resources in the schools.
- ✓ Teachers have positive attitude towards ICT adoption for instruction in the schools.
- ✓ Teachers do not use strategies that allow easy adoption of ICT in classroom lessons.
- ✓ No clear support system exist that may allow for easy adoption of ICT among ECDE schools in the County.

D. RECOMMENDATIONS

The following recommendations were made from the conclusions of this study:

- ✓ Both pre-service and in-service training should be strengthened among ECDE teachers to boost their competence for effective adoption of ICT in instruction.
- ✓ ICT resources should be availed and made accessible to teachers in schools.
- ✓ Teachers' positive attitude should be utilized to effectively adopt ICT use in curriculum instruction in ECDE schools in the County.
- ✓ Teachers should be inducted to using those teaching strategies that embrace use of ICT like power-point, radio programmes, Computer based instruction among others.
- ✓ Effective ICT support systems should be established in schools to assist teachers in resource development as well as content uploading onto ICT media for its adoption. This may also enable teachers easily dispose of used materials as well as reviewing those in existence to embrace changes in both curriculum and technology for effective learning.

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BACKGROUND INFORMATION

1. Name of your sub county-----
2. Sex -----

3. State your academic qualification
- CPE or KCPE ()
 - KSCE ()
 - KACE ()
 - Degree ()
4. What are the highest professional qualifications you attained?
- ECDE certificate ()
 - ECDE Diploma certificate ()
 - B.Ed. (ECDE) ()
 - Any other, please specify -----

DETERMINANTS OF ICT ADOPTION FOR TEACHING AND LEARNING IN ECDE CENTRES

Supplied are five options corresponding to the statements. Please circle the option that best suits your opinion on the corresponding statements: Strongly Agree (SA), Agree (A) , Undecided (UD) , Disagree (D) ,Strongly Disagree (SD) .

TEACHER TRAINING AS A DETERMINANT

Statement	SA	A	U	D	SD
1.Am knowledgeable in ICT in education	5	4	3	2	1
2.Am competent in developing content in ICT	5	4	3	2	1
3.Am conversant with contemporary issues in teaching using ICT	5	4	3	2	1
4.ECDE pre-service training equipped me well to handle ICT in classroom	5	4	3	2	1

Key: SA-Strongly Agree, A- Agree, U- Undecided, D - Disagree, SD- Strongly Disagree

ACCESSIBILITY AND USE OF ICT IN TEACHING

Statement	SA	A	U	D	SD
1.I use the following tools in the classroom	5	4	3	2	1
-i) computers	5	4	3	2	1
-ii)smart boards	5	4	3	2	1
-iii)projectors	5	4	3	2	1
-iv)mobile phones	5	4	3	2	1
2.Our centre has a computer lab accessible to teachers and pupils					

Key: SA – Strongly Agree, A – Agree, U – Undecided, D – Disagree, SD –Strongly Disagree

ATTITUDE OF TEACHERS TO ICT ADOPTION IN SCHOOLS

Statement	SA	A	U	D	SD
1.I warmly welcome the use of computer in my classroom	5	4	3	2	1
2.Computers enhance my lesson preparation	5	4	3	2	1
3.Computers is for the rich families	5	4	3	2	1

4.Computers will attract thieves in our centre	5	4	3	2	1
5.My pupils can read and write well without the use of computers	5	4	3	2	1

Key: SA – Strongly Agree, A – Agree, U – Undecided, D – Disagree, SD –Strongly Disagree

TEACHING STRATEGIES FOR ADOPTION IN ICT

Statement	SA	A	U	D	SD
I use the following teaching strategies with a computer assisted lessons :					
1. Drill and practice	5	4	3	2	1
2. Discovery approach	5	4	3	2	1
3. Simulation software					
4. Problem solving approach and	5	4	3	2	1
5. Games	5	4	3	2	1

Key: SA – Strongly Agree, A – Agree, U – Undecided, D – Disagree, SD –Strongly Disagree

SUPPORT SYSTEMS FOR ICT ADOPTION IN EDUCATION

Statement	SA	A	U	D	SD
The following support systems are available in our centre for effective ICT use:					
1. Technical support	5	4	3	2	1
2.Content development support	5	4	3	2	1
3. Administrative support	5	4	3	2	1
4. Examination and feedback support	5	4	3	2	1

Key: SA – Strongly Agree, A – Agree, U – Undecided, D – Disagree, SD –Strongly Disagree

INTERVIEW SCHEDULE FOR ECDE TEACHERS

- ✓ What is your highest academic level of education?
- ✓ For how long have you taught?
- ✓ Did you receive any pre – service training in ICT before being deployed as a teacher?
- ✓ Have you attended a seminar or a workshop about ICT in education? if yes then it was convened by who? And what did you learn?
- ✓ How would you describe your feeling about the use of computers in the centre?
- ✓ Have you been given induction training on the current teaching methods using computers?
- ✓ Do you feel competent to use computers in the classroom for teaching?
- ✓ What are the challenges you are facing in the course of using ICT in the classroom?