

**ICT TRANSFORMING PEDAGOGICAL PRACTICES IN KENYA: A  
CASE OF HIGH SCHOOLTEACHERS IN KIAMBU COUNTY**

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**A RESEARCH REPORT SUBMITTED IN PARTIAL FULFILMENT OF  
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## DECLARATION


This thesis is my original work and has not been presented for award of a Degree/Research in any other University.

Signature..........Date.....2/11/2012.....

**[Kubasu Nabwire Jacqueline]**

This proposal has been submitted with our approval as university supervisors.

**[Isaac Mutwiri Mutunga]**

Signature ..........Date .....2/11/2012.....

## **DECLARATION**

**This research proposal is my original work and has not been presented for a degree in any other University.**

## **DEDICATION**

**I dedicate this work to all my siblings for being very thoughtful of me at all times.**

## **ACKNOWLEDGEMENT**

Above all, my profound gratitude and love are addressed to God Almighty for making this study a reality and for being on my side throughout the huddles I went through to make this study a reality.

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## **LIST OF ABBREVIATIONS AND ACRONYMS**

<b>FPE</b>	<b>Free Primary Education</b>
<b>ICT4ED</b>	<b>Information Communication Technology for Education</b>
<b>ICTeTD</b>	<b>Information Communication Technology Enhanced Teacher Development Model</b>
<b>ICTs</b>	<b>Information Communication Technologies</b>
<b>IICD</b>	<b>International Institute for Communication and Development</b>
<b>IICD</b>	<b>International Institute for Communication and Development</b>
<b>KENET</b>	<b>Kenya Education Network</b>
<b>KESSP</b>	<b>Kenya Education Sector Support Program</b>
<b>KIE</b>	<b>Kenya Institute of Education</b>
<b>MDGs</b>	<b>Millennium Development Goals</b>
<b>MOEST</b>	<b>Ministry Of Education Science and Technology</b>
<b>MRTTT</b>	<b>Ministry of Research, Technical Training and Technology</b>
<b>NEPAD</b>	<b>New Partnerships for Development</b>
<b>NGOs</b>	<b>Non Governmental Organizations</b>
<b>NIE</b>	<b>National Institute of Education</b>
<b>TESSA</b>	<b>Teacher Education in Sub-Saharan Africa</b>
<b>UNESCO</b>	<b>United Nations Educational, Scientific and Cultural Organization</b>

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## **ABSTRACT**

Pedagogy is a discourse and a system of order for teaching and educating a group of students. Globalization brought about by technology in the 21<sup>st</sup> Century exposes today's learner to varied technological tools. These tools allow learners to participate in information creation, sharing and build on what already exists. This means that a learner comes to a classroom with knowledge gathered from the surrounding. A teacher is therefore challenged to appreciate learner's knowledge base yet deliver content in a collaborative way. Teachers are able to transform their pedagogies to accommodate learners' needs especially through the use of Information Communication Technologies. These are technologies are able to counter the challenge of capacity and capability brought about by introduction of Free Primary Education when used effectively by teachers. Teaching practices must change in order for teachers to remain relevant in the technological age .The government of Kenya through the Ministry of Education has increased access to ICTs by introducing Centers of Excellence in all counties to act as model ICT centers. Even though there is great effort to ensure that both teachers and learners have access to ICTs, it is important to determine to what extent they are transforming pedagogy.

# **1. INTRODUCTION**

## **1.1 BACKGROUND OF THE PROBLEM**

Pedagogy is a discourse and a system of order for teaching and educating a group of students. Instructional pedagogy, at all levels, is mediated through the communication process. Successful pedagogy is thus dependent on successful communication among teachers and students. As a communication process teaching is a collection of interactions exposed through languages and symbols between educators and the educated, groupings that are more or less institutionalized, depending on the times and societies involved (Tardif et al 1999). Pedagogy involves assessing, planning, implementing, evaluating and, documenting student activities. These processes may be difficult to carry out with increased population of students in school. The teacher may be overwhelmed by the work yet some pedagogical activities may be impossible to accomplish. The varied ICTs allow the teacher to overcome challenges of accessing textbooks, involving active participation of all learners in a crowded classroom, and evaluating individual learner progress.

ICTs are defined as a diverse set of technological tools and resources used to communicate and to create, disseminate, store and manage information (Blurton,1999).ICTs can be divided into two groups namely traditional or old ICTs (radio and television) and new ICTs (internet and telecommunications).

Television broadcast helps overcome the problem of inequality and imbalance among the regions by providing equality in opportunities. Television broadcasts transfer events within a short period of time thus allow for only the crucial parts to be seen. They also attract learners' attention through various screen colors and movements of characters who can either be humans or animations (Saglik et al).This ICT tool enables students to visualize issues that were otherwise abstract.

Both satellite and terrestrial radio and television programs offer cheap access to contemporary, authentic and potentially culturally rich programs. Radio programs run current affairs programs that ensure a learner is up to date. People learn abstract, new, and novel concepts more easily when they are presented in both verbal and visual form (Salomon, 1979). Radio broadcasts in schools are more interactive today due to introduction of Interactive Radio Instruction where learners are able to voice their opinion and get instant answers to questions.

The earliest pedagogies advocated learner centered teaching but this was overlooked, probably because learners did not have suitable tools to learn under the guidance of a teacher. Learning has been taking place through lecturing showing a paradigm shift from learner centered to teacher centered. In a philosophical view point, the earliest known formal teaching method was the tutorial method. English philosopher John Locke (1632-1704) introduced the concept 'tabula rasa or blank slate' which implies that a child has a vacuum which needs to be filled with content that is provided by the teacher. This describes teacher-centered pedagogy in the modern day teaching.

Jean Jacque Rousseau in his book Emile recommended a type of education that at the time was unknown, an education that was natural, child-centered, and experience-based. The aim of this kind of learning was to give a child the freedom to explore and interact with nature. The same opinion was depicted by a soldier and teacher named Colonel Francis Parker who introduced 'The theory of Concentration' in Boston schools. This theory puts emphasis on replacing drill with inquiry activities. Parker replaced memorization of facts with understanding (Campbell, 1967).

Transition from teacher-centered learning to learner-centered learning is gaining credence in education as learners in this age are exposed to varied media and societal changes all of which are brought to a classroom. A teacher is able to deliver content after appreciating the above circumstances by changing teaching style. In Kenya, challenges of Free Primary Education have surmounted the teacher's responsibilities. ICTs are able to reverse the trend when properly used. Limited research reports that are available in developing countries and in Sub-Saharan Africa in particular, indicate that the implementation of ICT is currently increasing, and introduced in varying degrees at all levels from preschools to university (ERNWACA, 2006).

In an educational context, ICT refers to a set of combined technologies that enables not only information processing but also its transmission for purposes of teaching, learning and educational development. According to Karsenti and Larose (2005), pedagogical integration of ICT is a use that permits either enhanced teaching or enhanced learning. ICTs are tools that have enabled teachers to re-organize their lesson plans to suit the learner as opposed to the teacher. This new practice is possible by varied ICT such as radio, television, computers, and smart boards, whereby the learner has an opportunity to discover and solve problems. New pedagogy refers to a learner-centered instructional practice where the teacher is a facilitator.

According to Weimer (2003), in order for instruction to be learner-centered, instructional practice needs to change in the balance of power, the function of content, the role of the teacher, the responsibility for learning, and the purpose and processes of evaluation. The National Research Council of the U.S. defines

learner-centered environments as those that pay careful attention to the knowledge, skills, attitudes, and beliefs that learners bring with them to the classroom. The reverse is true for old pedagogy. When old pedagogical methods are used with ICT, technology overpowers content delivery. Technology can cause adverse effects on learner achievement in examinations depending on how it is used. ICTs themselves do not necessarily encourage students to be creative or to grasp the scientific approach. No matter how powerful the hardware, it serves no educational purpose when not applied appropriately (Karsenti et al 2009).

Proper use of ICTs allows teachers to communicate effectively with students in a filled to capacity classroom. Content delivery becomes the priority of the teacher rather than the tool in use. The students on the other hand are able to synthesize the subject in question and their concentration is on the subject content. How the tool works is not important at this point. With ICT, teaching involves use of new pedagogical methods that involve learner-centered learning, problem-based learning and case-based learning while the teacher guides the whole process (Marc Prensky 2008). David Thornburg says, “Any teacher that can be replaced by a machine, should be.” In this study the researcher will give out questionnaires in which teachers will identify teacher-learners interaction when they use ICTs in a lesson.

## **1.2 Statement of the problem**

Since inception of FPE (Free Primary Education) in Kenya, enrolment rate (NER) has continued to increase at all levels of schooling. At secondary school level, net enrolment rate increased by 55 percent between 2003 and 2008 (MOEST 2009/2010). Increased pupils' population in formal primary to secondary education continued to increase over time from 207,730 KCSE registered students in 2003 to 265,310 in 2007. The student teacher ratio in public secondary schools rose from 23:1 in 2007 to 28:1 in 2008. This posed a challenge in capacity and capability that could be managed in secondary schools (MOEST 2009/2010) while the children out of primary school in Kenya was 1,009,592 in 2009.

With free primary education came infrastructure challenges. The number of students surpassed available classrooms therefore learners had to share and squeeze in the few classrooms. The ratio of teachers to learners grew wider and teaching-learning materials like textbooks became scarce. Teachers started using innovative methods to save the situation by introducing ICTs. These tools were used to display class texts in large classes. Radio broadcasts to schools through the national radio station KBC ensured schools in marginalized areas were introduced to new content delivery. Teachers also used CDs and DVDs to make concepts that were obsolete a reality.

Globalization is exposing the 21<sup>st</sup> Century learner to varied channels of information. This has put pressure on the education sector to embrace ICTs in teaching and learning process as students are empowered in seeking adverse learning avenues. In 2003, the government of Kenya took up the responsibility of funding educational broadcasts due to implementation of free primary education. Other stakeholders are involved in the integration of ICTs in schools include NEPAD (New Partnerships for Development), KIE (Kenya Institute Of Education),



KENET(Kenya Education Network), IICD(International Institute for Communication and Development).This shows that there is considerable effort in ensuring ICTs integration in schools. The government has put in place measures to ensure quality of instruction through the adoption of National ICT Policy.

ICTs enhance the quality of education in several ways: by increasing learner motivation and engagement, by facilitating the acquisition of basic skills and by enhancing teacher training (Tinio 2003) .Studies show that a lot of focus has been on acquisition of ICT tools in schools yet how they are used has been ignored. Many schools have basic ICTs like television sets and radios as compared to computers and internet which are used at a very low extent in many schools. Schools with computers also reveal a high prevalence of lack of computer skills especially amongst teachers. All efforts put in by various stakeholders need not go to waste incase the ICTs are not being properly utilized. This calls for a study to find out how ICTs are being incorporated in teaching and of what influence they are to pedagogy. This study is intended to find the extent, effectiveness and challenges of using ICTs in secondary schools in Kenya.

## **Study Objectives**

### **1.3 Objectives**

#### **1.3.1 Main Objective**

To determine how ICTs have transformed pedagogical practices in secondary schools in Kenya.

### **1.3.2 Specific objectives**

The specific objectives of the study are:

1. To determine the extent to which ICTs are used to enhance teaching in public secondary schools in Kenya.
2. To determine the effectiveness of using ICTs to enhance teaching in public secondary schools in Kenya
3. To determine the commonly used ICTs to enhance teaching in secondary schools in Kenya.
4. To determine the challenges of using ICTs to enhance teaching in public secondary schools in Kenya.

### **Research Questions**

#### **General question**

1. How have ICTs transformed pedagogical practices in secondary schools in Kenya?

#### **Specific questions**

1. To what extent are ICTs used to enhance teaching in public secondary schools in Kenya?
2. How effective are ICTs in enhancing teaching in public secondary schools in Kenya?
3. Which are the commonly used ICTs to enhance teaching in secondary schools in Kenya?
4. What are the challenges of using ICTs to enhance teaching in public secondary schools in Kenya?

#### **1.4 Justification/Significance of the study**

Research studies have been done on ICTs in education but the findings show that teachers are taking up the challenge at a slow rate. This study will add on to previous studies with an aim of reinforcing the importance of ICT integration in teaching. It will push teachers to see the need to encompass ICTs in their work and thus encourage learner-centered teaching. Teachers most of the time practice old pedagogical methods that limit learner participation, this study will allow teachers to see the need to establish new pedagogy that will cater for the challenges of Free Primary Education and give learners an opportunity to discover new ideas. The theory of ICTeTD proves that teachers' enhanced ICT development which is the concern of this study is integral in teaching for learner achievement. Findings of this study will help policy makers to find standard practices of ICT integration in schools to avoid discrepancies in ICT use in schools. The findings of this study will be beneficial to school principals who have invested so much in acquisition of ICTs, in-service teacher training probably without prior knowledge of ICTs integration into teaching and learning. The recommendations will allow principals to adopt new ways of ensuring ICT integration in all the subjects taught in the various schools whilst avoiding wasting resources on activities that may be of no significance to the learner. The study will also have a positive impact on teacher attitudes towards use of ICTs in the classroom. Policy makers may find this research a means of overcoming the shortcomings of free primary education in Kenya. It will also add on to literature on ICTs integration and pedagogy.

#### **1.5 Scope of the study**

This study will cover the influence of ICTs in transforming pedagogy in secondary schools in Kenya. Pedagogy is a discourse and a system of order for teaching and educating a group of students. Pedagogy can be learner-centered or teacher-

centered. McCombs and Whisle (1997) define learner-centered teaching as the perspective that couples a focus on individual learners including their heredity, experiences, perspectives, backgrounds, talents, interests, capacities, and needs with a focus on learning and how it occurs with an aim of promoting the highest levels of motivation, learning, and achievement for all learners. Traditional and new ICTs enhance pedagogy in varying degrees depending on how they are used thus they can be used to support, enhance teaching or become the subject to teach.

### **1.6 Limitations of the study**

This study will not focus on teacher-centered pedagogy that entails lecturing with very little participation from the learner. This is an old pedagogy that is fast losing its place in teaching as today's learner is surrounded by technology that allows him or her to come to the classroom with knowledge already gathered from the environment.

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1 ICTs influence on pedagogical practices**

ICTs integration in education is contextual in its definition depending on the environment in which they are used. According to Depover, Strebelle (1996) and Isabelle (2002), pedagogical integration of ICTs means the appropriate, consistent and sufficiently regular use of ICTs that produces beneficial changes in educational practices and improves students learning. Depover et al (1996) emphasize routine use of ICTs in the teaching and learning processes. The pedagogical integration of ICTs therefore means integration whereby the student learns and socializes through a multitude of interactive communication channels. There must be continued

research on ICT integration in education to achieve quality teaching using ICTs. Chickering and Gamson (2004) identify some benefits of conducting continued research in ICT integration as providing good practice in undergraduate education, encourages contact between students and faculty, develops reciprocity and cooperation among students, gives prompt feedback, and respects diverse talents and ways of learning.

Teaching is becoming one of the most challenging professions in our society where knowledge is expanding rapidly and much of it is available to students as well as teachers at the same time (Perraton, Robinson, & Creed, 2001). Teachers come across the hard task of ensuring that learners make sense of information available to them through proper use of ICTs. These tools offer solutions to part of the challenges faced by teachers in the classroom. These challenges require teachers to continuously retrain themselves and acquire new knowledge and skills while maintaining their jobs (Carlson & Gadio, 2002).

In Singapore, the National Institute of Education (NIE) was entrusted with the responsibility of integrating ICT in teacher training institutions with the purpose of equipping teachers with necessary skills to teach using ICTs not as a subject but a means of encouraging active participation of students in the teaching and learning process. The NIE began its project by changing the curriculum to suit ICT integration as well as physical and technological infrastructure. ICT integration was encouraged in all the subjects by promoting creation of effective instructional technologies in the classroom. Using ICT as the main content focus of teacher training emphasizes the development of basic ICT skills, design and development skills, and pedagogical strategies.

David Mioduser et al (2002) in their study, *Innovative Models of Pedagogical Implementation of ICT in Israel schools* determine how learners and teachers are able to manipulate ICTs in the classroom. The findings show that the sample schools were in either transition or assimilation stages of innovation. The research indicates that school activities are affected differentially by ICT, thus creating islands of innovation that have the potential to pull forward other areas of activity and people in the school (David Mioduser et al). Innovative teaching methods were devised and these were autonomous and active learning processes using the technology where teachers' traditional roles were expanded and include personal and group tutoring and guidance functions. In some schools, students acting as computer trustees were allowed to skip regular classes to complete their computer assignments due to generation of new ICT based curricular solutions. Students' roles have changed to be website constructors, teachers' assistants in ICT-related matters, or ICT projects managers. The teacher interacts with students to develop subject-based websites that to be used in school. Such an activity allows the teacher to interact freely with students and in turn becomes familiar with the technology.

According to many documents and authors (UNESCO, 2004; Grégoire, Bracewell & Laferrière, 1996; Karsenti & Larose, 2002; Tardif, 1998), ICTs in an educational context refers to a set of combined technologies that enable not only information processing but also its transmission for purposes of learning and educational development. In Zambia, the IICD-supported project focuses on the integration of ICTs in the curriculum, content development and equipping the lecturers with the necessary teaching skills and knowledge by integrating ICTs into the Copperbelt College of Education curriculum. In the same country, Mpelembe Secondary schools and six others jointly own ENEDCO project that is influencing use of

locally made visual representation of existing teaching material content based for teaching. This project aims at disseminating information to other schools interested in the improved teaching materials. The first phase of ICT4ED project confirms that ICTs were majorly a subject for learning. (Wan Zah Wan, et al 2009).

## **2.2 ICTs integration in secondary schools**

Proper ICT integration depends on three crucial factors which are the teachers' knowledge of ICTs, accessibility and availability of ICT infrastructure and teachers' pedagogical content knowledge. Analysis by PanAf in Ghana indicates that emphasis was on student's skills in operating ICTs and not developing learners ICT literacy. Most ICT tools were available in science-oriented subjects. There were inadequate ICT laboratories, limited access, and lack of interest by HODs (Heads of Departments) in ICT integration. ICT teachers have used MS Access to design software for registration of students and management of students' assessment tests. Hennessy et al (2010) identify that when the right hands use ICTs and appropriately in specific contexts and for specific purposes they can be effective tools for effective teaching and learning. The study shows that introduction of ICTs in schools does not improve quality of education nor account for increased performance of students. Cox et al (2003) argues that teachers who use ICTs to enhance understanding of a given topic differ from those who use them to present students' work in a new way.

Digital Education Enhancement Programs carried out in South Africa show that ICT use enhances teachers' professional knowledge and capabilities by extending subject knowledge, enabling planning and preparation for teaching to be more

efficient and developing the range of teachers' existing pedagogical practices (Leach, 2008, Leach et al., 2005). In this project, teachers were provided with tools kits that had high quality multimedia materials depending on the context, geographical location and cultural practices. It is notable that teachers need to change their pedagogical practices to ensure effective ICTs integration in the classroom when ICTs are tools that enhance teaching.

Teachers face the challenge of identifying the best technological tools appropriate for specific subject content in relation to challenges of infrastructure and accessibility to electricity. Programs in Sub-Saharan Africa have been developed to ensure proper practices in ICTs integration and influence collaboration amongst teachers to share experiences and learn from one another. The study recommends development of locally produced, contextually relevant course content for both teachers and learners. Intel Teach, TESSA(Teacher Education in Sub-Saharan Africa), School Net Africa and Commonwealth of Learning are programs that have potential in providing appropriate techniques of ICTs use by teachers.

Cloke and Sabariah in their work, Smart School Initiative, a study on Malaysian teachers revolved around transforming the culture and practices of Malaysia's primary and secondary schools. According to their study teaching should move away from memory-based learning, designed for the average student, to an education that stimulates thinking, creativity, and caring in all students. This study shows that education should cater for individual abilities and learning styles, and be based on more equitable access to all teaching and learning material.



## **2. THEORETICAL FRAMEWORK**

### **2.3.1 DIFFUSION OF INNOVATION**

ICTs in teaching are an innovation because they are considered a new practice to both teachers and students. Television and radio use in schools has been there for a long time but at limited instances probably because learners were exposed to teacher-centered mode of teaching. Internet and telecommunication use are new practices as they are in the introductory stage in education and many learning institutions are yet to implement them. The rate at which teachers are integrating ICTs into education revolves around the theory of Diffusion of Innovation by Everett Rogers. The theory states that diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system. An innovation is “an idea, practice, or object that is perceived to be new by an individual or other unit of adoption.” From earlier years The Kenya Institute of Education in collaboration with The Ministry of Education has put concerted effort in developing education materials in form of radio programs and CDs to be used by teachers. The Kenya Broadcasting Corporation, KIE served as change agents towards introducing traditional ICTs to be used in teaching. The government reinforced school radio programs by offering to pay for the broadcasts. Different subject teachers took up the idea and offered radio lessons to students. The innovation theory posits that to be an innovator, one undergoes a five step process of adoption. The teacher in the first step is made aware of an ICT tool for teaching and taught how it functions through mass media and in-service training sessions. School principals act as the innovators who challenge teachers to adopt the innovation by providing infrastructure to accommodate ICTs. After this step the teacher undergoes an information stage after which a decision to adopt or not is made. When a teacher has positive attitude towards an innovation it becomes

easy to implement use of the innovation. The teacher evaluates the functioning of the innovation and confirms its benefits. Depending on how fast teachers adopt the innovation they would be branded as innovators for those who adopt it fast followed by early adopters, early majority. The slow ones are the late majority and lastly laggards.

### **2.3.2 Technology Acceptance Model**

The technology acceptance model (TAM) is an information systems theory that models how users come to accept and use a technology. According to Davis (1989) an information system of high technical performance will be good for nothing if the user, for any reason, does not adopt and does not accept the available technology. The model suggests that when users are presented with a new technology a number of factors influence their decision about how they will use it. In ICTs enhancing teaching this theory will explain how teachers decide to use old and new ICTs. Teachers will adopt a technology depending on the degree to which they believe that using a particular ICT would enhance his or her job performance as well as how easy the technology is to use. TAM posits that perceived usefulness and perceived ease of use determine an individual's intention to use a system with intention to use serving as a mediator of actual system use.

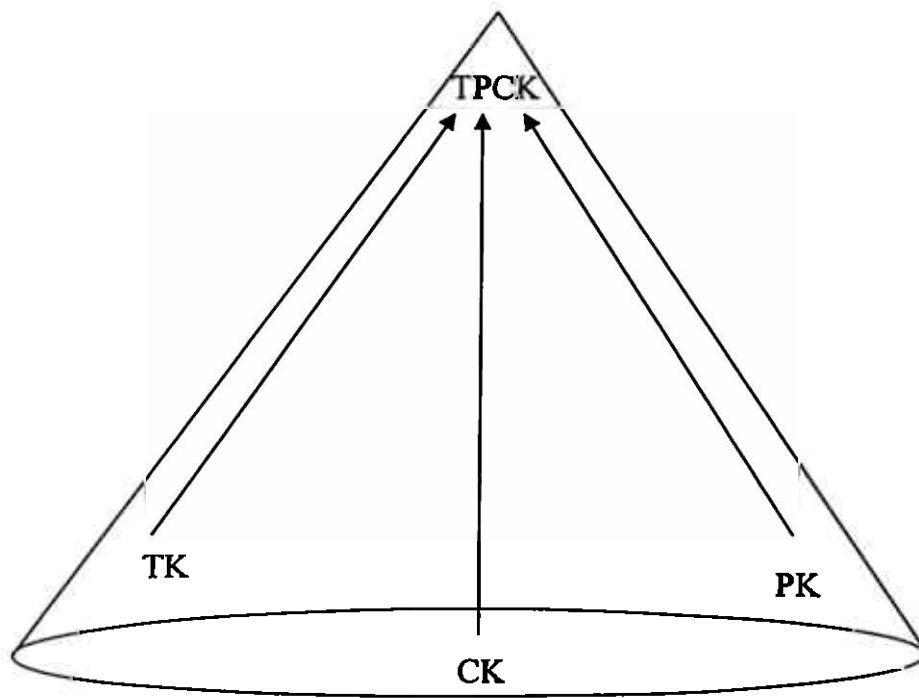
This theory acknowledges that if a user in this case a teacher perceives a specific technology as useful then they will believe in a positive use-performance relationship. If any of the following ICTs: radio, television, computer and internet are perceived as easy to use and require little effort to use, it will be implemented very fast. Teachers may have accepted that ICTs are useful and better in their teaching than mere use of blackboard and chalk, pen and paper, therefore started

using them. It could also be as a result of teachers finding out that it is easier to deliver content to learners with the use of ICTs. However, their non adoption of ICTs could be because they did not find any use or they had an easier way of teaching without ICTs.

The repetitive nature of radio will enable a teacher to rewind a lesson depending on the needs of learners. This will avoid teacher fatigue as would happen when a teacher is forced to answer the same question posed by different learners in varied ways because they did not comprehend some information. Internet use amongst teachers is considered to be difficult due to lack of computer skills amongst teachers. This technology adoption is at a low level because teachers have an easier option of recycling material and they fear that it takes a long time to organize a lesson by use of the internet. This means that it is tedious to search for content material from the internet when one can ask learners to make notes on their own from textbooks.

## **2.4 Conceptual Framework**

The ICTeTD Model (Information Communication Technology enhanced Teacher Development) is grounded in the belief that teaching has its own unique knowledge base, which, in the 21st century, is the technological pedagogical content knowledge (Engida,2011).This model identifies that teachers should not only understand how to use technology but use ICT as an effective tool to improve teaching and learning. ICTeTD regards ICT as a real opportunity for teachers of all phases and subjects to rethink fundamental pedagogical issues alongside the approaches to learning that students need to apply in classrooms (Engida 2011). ICTeTD recognizes that for teachers to use ICT effectively and innovatively, they are need to understand in greater depth the content of the subject matter they teach, the subject related pedagogy, and the interactions of all these in a given context.



In the figure above TK (Technological Knowledge), CK (Content Knowledge) and PK (Pedagogical Knowledge) are all at the same level. This means that they have equal importance in ensuring achievement of TPCK (Technological Pedagogical Content Knowledge). The lowest level of TPCK is the application level which is characterized by teachers who started to use TPCK- based programs and lessons developed by others. At infusion stage teachers modify, adapt and initiate their own TPCK-based materials, lessons and modules for diverse group of learners. Teachers at this stage are able to advise other teachers on how to use TPCK programs and what programs are effective for TCPK. They are also able to create their own programs and carry out research activities on TPCK.

Transforming TPCK is the highest stage of social, personal and professional development of 21st century teachers. Teachers at this stage are creative and innovative in that they not only develop new and appropriate TPCK programs for their institutions but also theorize about the nature and methodologies of TPCK (Engida, 2011). The cone shape of the model depicts

that TPCK is surrounded by different levels of teacher development that are influenced by cultural, political, psychological, and other related factors.

## **METHODOLOGY**

### **3.1 Research Design**

This research employed quantitative research design due to its effectiveness in securing evidence concerning all existing situations or current conditions, identifying standards or norms with which to compare present conditions in order to determine how to take the next step after determining where ,what the situation is, and where to go next. It permits for fast data collection at a comparably cheap cost. According to Cooper (1996), and Kothari (2003) a descriptive study is concerned with finding out who, what, where and how of a phenomenon. This method allows information to be collected from a sample rather than the whole population and it provides data and information about a population being studied. Descriptive design is used when the objective is to provide systematic description that is factual and as accurate as possible. This research design offers to validate already existing theories in this case, diffusion of innovation theory and the technology acceptance theory. It will be relevant in this study as the researcher will not be involved in manipulation of variables.

### **3.2 Study Area**

The study area is Kiambu West region which is in Kiambu County of central Kenya. The region has twenty seven schools with three hundred and seventy four teachers.

### **3.3 Target Population**

The study was carried out in Kiambu West region of Kiambu County. The target population was public Kiambu West secondary schools. The respondents included all principals of the schools. The principals are influential in planning, implementing and evaluation of ICTs in schools. The teachers are the implementers of school projects and they are very important in this study. Both female and male teachers were sampled.

### **3.4 Description of the sample and sampling procedures**

#### **3.4.1. Sampling**

Descriptive survey method was used in this study. Surveys are capable of obtaining information from large samples of the population. According to McIntyre, surveys are well suited for gathering demographic data that describe the composition of the sample. Public schools are preferred in this study because they are of the highest number in the region and depend on government and parents' funding for development purposes. Public schools also have the higher enrolment rate compared to private schools which have a limit.

#### **3.4.2. Determining sample size**

Six secondary schools were randomly selected through simple random sampling from the whole population of twenty seven schools found in Kiambu West region. Each school had ten respondents. The number of teachers that were sampled was shared out amongst the target schools and they were selected purposefully to ensure that all departments are represented (languages, humanities, sciences and technical). According to Mugenda and Mugenda simple random sampling gives each member of the population equal chance of being selected. All principals formed part of the target population. The sample was composed of both male and

female respondents. The subject teachers are required to identify how often they use ICTs in the classroom.

### **3. 4. 3. Description of data collection procedures**

The survey method was employed in data on ICT adoption of teachers in the sampled schools. The data collection instrument was a questionnaire. The questionnaire consisted of three sections. The first section involved demographic features such as gender, teaching experience and teaching subject. The second section was designed to learn about the extent and frequency of ICT usage among participants. Lastly, the questionnaire sort to find out the challenges of ICT integration by teachers. Items were coded then analyzed using a Statistical Package for Social Sciences (SPSS). Descriptive statistics such as frequencies were used to describe the data. The analyzed data is presented in form of frequency tables. The questionnaires were self administered by the researcher to all the respondents in case of clarification and to avoid discrepancies that may occur in the process.

### **3. 4. 4. Research instruments**

Questionnaire formed the basis of research instruments used in this study. Most of the questions were closed ended which are easier to code and analyze as opposed to open ended questions. There was only one questionnaire to be completed by the sampled teachers from each department. The questionnaire were divided into three sections; section one for demographic data, section two that identified ICTs use and the last section involving challenges of ICT use.

### **3. 4. 5. Validity and Reliability of the Instruments**

In this study, a pilot study was carried out in one school in the county which did not participate in the actual data collection. The researcher administered the instruments personally to the respondents. The feedback was used to validate the instruments in readiness for the study. The researcher's supervisor assisted the researcher to validate the instrument identified for the study.

The reliability was determined by use of Cronbach's Co-efficient Alpha Scores. During the pre-test, participants were given questionnaires which they filled out and handed over to the researcher. The data collected from the pilot study was used to determine the reliability of the instrument to be used and thus determine the co-efficient of internal consistency as well as the reliability co-efficient.



## CHAPTER FOUR: FINDINGS

### Description of data analysis and presentation

**Table 4.1 Teaching experience**

Year(s)	Frequency	Percentage
0-5	12	22.2
6-10	15	27.8
11-15	15	27.8
Over 15	12	22.2
	54	100

Table 4.1 shows that there is an almost equal distribution of teachers according to their teaching experience in Kiambu West region. This region in close proximity to the capital city, Nairobi experiences high turn-over rates of teachers seeking better job opportunities while they are replaced at almost the same rate. This could also explain why only 22.2% of teachers have more than fifteen years of experience.

**Table 4.2 Gender**

Gender	Frequency	Percentage
Male	25	46.3
Female	29	53.7
Total	54	100.0

From the Questionnaires it is clear that that there were more female teachers than male teachers in the sample frame (table 4.2). Lady teachers accounted for 53.7%

and men 46.3%.

**Table 4.3 Academic Qualification**

Education Level	Frequency	Percentage
Diploma	6	11.1
Degree	35	64.8
Maters	11	20.4
Doctorate	1	3.7
Total	54	100.0

Table 4.3 shows the highest academic qualification. Most teachers attained a bachelor of education degree in their respective teaching subjects. This accounted for 64.8%, teachers with a master's level of qualification were 20.4% and the least were those with a diploma at 11.1%. The low number of teachers with a diploma could be attributed to teachers furthering their education in the increasing number of constituent universities in the country as well as the region being in close proximity to the capital city that has many universities.

**Table 4.4 teaching subjects**

Subject	Frequency	Percentage
Science	14	25.9
Humanities	13	24.1
Languages	15	27.8
Technical	12	22.2
Total	54	100.0

The respondents were evenly distributed in all the secondary schools sampled. However six teachers did not return the questionnaires.

**Table 4.5 ICTs used**

ICT	Number
Television sets	8
Radios	3
Computers	98
Total	109

The sampled schools have a poor distribution of ICTs amongst students. It was noted that in some schools there were television sets in the teachers' staff rooms which were not used for teaching while the students' set was mainly for entertainment.

**Table 4.6 Print lesson notes for students and teacher**

	Frequency	Percentage
Occasional	33	61.1
Moderate	13	28
Extensive	8	14.8
Total	54	100

Table 4.6 displays the frequency at which teachers print their own lesson notes or

for students. It shows that teachers occasionally at 61.1 % use ICTs for that purpose. It can be explained that the high cost of printing papers and maintenance of a printer limits teachers from doing the above.

**Table 4.7 Type Examinations**

	Frequency	Percentage
Occasional	35	64.8
Moderate	8	14.8
Extensive	11	20.4
Total	54	100

A high percentage of teachers do not type examinations for themselves. Most often teachers are accused of shying away from ICTs and that could be the reason for not preparing examinations by themselves.

**Table 4.8 File handling (Creating/opening files, etc)**

	Frequency	Percentage
Occasional	35	64.8
Moderate	6	11.1
Extensive	13	24.1
Total	54	100

As shown in table 4.8, a small percentage of teachers use file handling applications extensively. The largest number 64.8 % use this application occasionally. The same can be attributed to lack of ICT skills.

**Table 4.9 Presenting teacher's and students' work**

	Frequency	Percentage
Occasional	28	51.9
Moderate	18	33.3
Extensive	8	14.8
Total	54	100

Table 4.9 shows that the largest number of teachers uses ICTs occasionally to present their work. Probably due to insufficient number of ICTs teachers are not able to use them at the required time.

**Table 4.10 Listening to pronunciation of words**

	Frequency	Percentage
Not needed	1	1.9
Of limited value	12	22.2
Valuable	28	51.9
Essential	13	24
Total	54	100

It is crucial to know how to pronounce words to be able to spell them .This may explain why teachers feel that it is valuable to listen to programs that teach learners how to pronounce words correctly as shown in table 4.10.

**Table 4.11 Type letters and other documents**

	Frequency	Percentage
Occasional	4	7.4
Moderate	42	77.8
Extensive	8	14.8
Total	54	100

Most teachers use ICTs moderately to type letters and other documents. In most schools such a responsibility is left for the secretary.

**Table 4.12 Create instructional material**

	Frequency	Percentage
Occasional	28	51.9
Moderate	14	25.9
Extensive	12	22.2
Total	54	100

Creation of instructional materials is least done by teachers according to the table above. Only 51.9 % of teachers create instructional material with the use of ICTs. However, 25.9% create instructional material and 22.2 % do the above extensively. This could be explained that teachers are slowly going through the process of Technological Content Pedagogical Knowledge.

**Table 4.13 Administrative record keeping**

	Frequency	Percentage
Occasional	29	53.7
Moderate	14	25.9
Extensive	11	20.4
Total	54	100

Use of computers to keep administrative records that is schemes of work, lesson plans, lesson notes and minutes, is done once per week or less times.

**Table 4.14 Classroom presentations (PowerPoint/CDs/ DVDs)**

	Frequency	Percentage
Not needed	2	3.7
Of limited value	15	27.8
Valuable	25	46.3
Essential	12	22.2
Total	54	100

Table 4.14 shows that a high number of teachers think that classroom presentations are valuable in teaching because they allow a large group of students to access limited class texts and they stimulate learner concentration.

**Table 4.15 Watch educational programs**

	Frequency	Percentage
Occasional	42	77.8
Moderate	6	11.1
Extensive	6	11.1
Total	54	100

Table 4.15 shows that 77.8% of teachers use ICTs occasionally for students to watch educational programs. Most ICTs in the sampled schools are fixed in one room thus limit accessibility to all teachers and students.

**Table 4.16 Word processors**

	Frequency	Percentage
Occasional	35	64.8
Moderate	6	11.1
Extensive	13	24.1
Total	54	100

Limited skill levels in ICT use as well as infrastructural challenges deny teachers exclusive access to ICTs. In table 4.16, 64.8% of teachers use word processor which is essential software for creation of information.



**Table 4.17 Print lesson notes for students and teacher**

	Frequency	Percentage
Not needed	10	18.5
Of limited value	13	24.1
Valuable	17	31.5
Essential	14	25.9
Total	54	100

The table above shows that 31.5 % of teachers think that it is valuable for teachers to print notes for themselves and their students. This reduces time used when students copy notes from the blackboard. It also reduces errors committed by students when they are asked to make their own notes

**Table 4.18 Retrieve best practices for teaching/learning**

	Frequency	Percentage
Occasional	27	50
Moderate	14	25.9
Extensive	13	24.1
Total	54	100

A high number of teachers retrieve best practices for teaching/learning occasionally. This means that most of them are trying to incorporate ICTs in teaching.

**Table 4.19 Search for information and content for lessons**

Frequency	Frequency	Percentage
Occasional	23	42.6
Moderate	16	29.6
Extensive	15	27.8
Total	54	100

Teachers occasionally use ICTs to search for information and content for lessons. Most teachers have basic ICT skills thus are not able to competently use ICT s to search for content.

**Table 4.20 Insufficient ICT infrastructure**

	Frequency	Percentage
Not at all	2	3.7
Very little	15	27.8
Somewhat	25	46.3
Very much	12	22.2
	54	100

Some teachers who account for 46.3% of the sample identify that insufficient number of ICTs play a crucial role in ICTs use by teachers.

**Table 4.21 Insecurity or privacy concerns**

	Frequency	Percentage
<b>Not at all</b>	10	18.5
<b>Very little</b>	13	24.1
<b>Somewhat</b>	17	31.5
<b>Very much</b>	14	25.9
<b>Total</b>	54	100

Teachers are wary of insecurity and privacy in using ICTs .This claim affects 31.5% of teachers sampled. Some of them (18.5%) feel that such issues do not impede ICT use.

**Table 4.22 Technology not adequate/not up-to-date**

	Frequency	Percentage
Not at all	5	9.3
Very little	14	25.9
Somewhat	15	27.8
Very much	20	37
Total	54	100

Teachers ' responses show that 37% think that inadequate number of ICTs and their not being up-to-date is very significant in determining their use by teachers. In sufficient number of ICTs discourage teachers from using them because of

decreased motivation waiting for an opportunity to use one.

**Table 4.23 Teacher's lack of ICT skills**

	Frequency	Percentage
Not at all	4	7.4
Very little	25	46.3
Somewhat	15	27.8
Very much	10	18.5
	54	100

It is interesting to note that the highest number of teachers think that teacher's lack of ICT skills has very little influence on their use.

**Table 4.24 Teacher's lack of interest in using technology in teaching and learning**

	Frequency	Percentage
Not at all	2	3.7
Very little	6	11.1
Somewhat	27	50
Very much	19	35.2
	54	100

Teacher identified that lack of interest in using technology in teaching and learning is significant in use of ICTs. Teachers may lack interest in using ICTs because of

redundancy. They may not want to acquire new teaching practices.

**Table 4.25 Teacher's lack of experience with technology instructional techniques**

	Frequency	Percentage
Not at all	3	5.6
Very little	6	11.1
Somewhat	24	44.4
Very much	21	38.9
Total	54	100

From the table above 44.4% of teachers are not sure whether lack of experience with technology instructional techniques is crucial ICT enhanced teaching. Most teachers are not aware of technology enhanced instructional materials while those who have ICT skills do not create their own materials.

**Table 4.26 Principal does not understand the potential contribution of ICTs**

	Frequency	Percentage
Not at all	6	11.1
Very little	13	24.1
Somewhat	15	27.8
Very much	20	37
Total	54	100

The table above appreciates a principal's involvement in decision making as far as ICTs use in a school is concerned. The highest number of teachers (37%) feels that the principal affects ICTs use by teachers.

**Table 4.27 Ministry does not understand the potential contribution of ICTs.**

	Frequency	Percentage
Not at all	15	5.6
Very little	10	18.5
Somewhat	29	53.7
Very much	12	22.2
	54	100

Table 4.27 shows that a high percentage of teachers think that the Ministry of Education is to blame for the low extent of ICTs integration in secondary schools. The largest number comprising of 53.7% feel that the ministry does not understand the potential contribution of ICTs.

## **CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS**

Findings of this study show that ICTs are used at a minimal level by teachers. All the teachers sampled had access to ICTs although the infrastructure was inadequate. The greatest number of teachers rarely used classroom presentations in teaching (59.3%). There were computer laboratories but these were used to conduct Computer subject lessons only. Teachers had limited access to available ICTs due to lack of infrastructure to accommodate all teachers and students when different lessons were taking place concurrently.

Teachers were given in-service training unfortunately this was to teach teachers how to support old pedagogy with the use of ICTs. There is little knowledge amongst teachers on how to integrate ICTs in education. This is pronounced in the case where teachers do not understand what it means to use ICTs to support, enhance or transform existing pedagogy. ICTs integration is therefore limited to the extent in which an individual teacher is able to operate a given tool, available infrastructure and time. It is difficult to achieve full incorporation of ICTs in education without technology pedagogical content knowledge. Teachers did not have appropriate skills in computer technology to manipulate computer applications to suit content delivery in a collaborative teaching-learning environment.

Teachers are an integral part in ICTs enhanced teaching. The teacher's competency levels in using ICTs determine how frequent they use them in teaching. The findings show that low levels of ICT skills are an impediment in the effective utilization of the same. Tables 4.18 to 4.24 show that teachers use ICTs occasionally that means less than five hours per week. Proper implementation of ICTs requires that teachers transform their teaching to challenge students and encourage a constructivist model of teaching. Teacher attitudes affecting ICTs

integration in education determine the extent to which ICTs are utilized in teaching. Positive attitude leads to continuous use however, in this study teachers are still at adoption stag of ICT integration. Teachers deny themselves opportunities to interact openly with their students through a variety of interactive, motivating and challenging activities due to limited knowledge on how to operate ICTs.

In other instances teachers are using ICTs but with the current curriculum which does not identify integration of ICTs. It is appropriate to change the curriculum to comply with ICT use to teach subject content. Lesson plan preparation complements the curriculum in practice but in the classroom lessons are taught by use of ICTs. Teachers are therefore not well informed on how to integrate technology when yet the curriculum does not provide best practices on their use.

All the sampled schools have Computer as a subject. In these schools ICTs are generally used to support old pedagogy. The teachers use computers to project lesson notes although at a minimal level. Therefore, pedagogy has not been transformed, but supported by ICTs. Radios and television sets are set aside for the languages while computers are used for the science oriented subjects. The above findings show that ICTs in these schools are tools used to support old pedagogical practices.

Few teachers utilize ready made ICT subject content material .This study found out that teachers have not yet embraced ICTs to a level that they can create their own locally made material for use. They depend on foreign items. This explains why a large population of teachers (42.9%) uses the internet only occasionally to search for information and content for lessons.



All ICTs are important tools in education when properly utilized. Best practices need to be identified to standardize ICTs use in pedagogy. This means that all stakeholders should participate in a rigorous process of ensuring proper integration of ICTs to accommodate all infrastructural challenges faced in different schools. Rules and regulations identified will be applied by all teachers depending on the subjects they teach.

Teachers should have continued in-service training so that they inculcate positive attitudes acquired through thorough training on how to operate ICTs. Most teachers shy away from using ICTs because they lack the know-how and would not want to embarrass themselves before their students. They also fear that they may lose classroom control when their students are more knowledgeable on how to operate ICTs than they are.

Curriculum developers should consider revising the curriculum to suit ICT integration. Most science subjects are associated with the computer while languages are confined to old technologies. Curriculum change will allow teachers to carry out lessons in all subjects using any technology. Through this teachers will understand that ICT integration is not about the technology but the content delivery; any technology can be used to teach any subject. It will also help overcome infrastructural and accessibility issues identified by teachers as key impediments towards ICT integration in education.

## **Conclusion**

ICT integration in education is unavoidable in the 21<sup>st</sup> century. Information can be accessed anytime anywhere. For education to remain relevant to today's learner teachers must acquire appropriate practices that will motivate as well as challenge learners without reversing roles.

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## APPENDIX 1

### QUESTIONNAIRE ON ICT TRANSFORMING PEDAGOGY IN KENYA

*Dear respondents, the following questionnaire is intended to determine how ICTs have transformed teaching in Kiambu West region. It is in partial fulfillment of a master's degree in Communication Studies from the University of Nairobi. Your feedback is highly appreciated. Thank you for your support.*

#### SECTION 1 (Personal Information)

Please answer in the spaces provided (use a tick or write down)

1. Please state the subject(s) that you teach.

a. \_\_\_\_\_ b. \_\_\_\_\_

2. Please state your gender:

(i) Male (ii) Female

3. Please indicate your academic qualifications:

Diploma Bachelors degree

Masters Degree Doctorate

4. Please state the number of years you have been teaching \_\_\_\_\_

5. How many of the following ICTs do you own in your school?

Television \_\_\_\_\_

Radio \_\_\_\_\_

Computer \_\_\_\_\_

**6. Please indicate the frequency at which you use ICTs for the following purposes**

<b>Purpose</b>	<b>(2) Occasional ( 1 hour per week or less)</b>	<b>(3) Moderate (2-5 hours per week )</b>	<b>(4) Extensive (More than 5 hours per week)</b>
a) Type letters and other documents			
b) Play computer games			
c) Create instructional material			
d) Administrative record keeping (Student grades, Students details, etc.)			
e) Classroom presentations (PowerPoint/CDs/DVDs)			
f) Listen to educational radio programs			
g) Watch educational programs			
h) Word processors			

i) Print lesson notes for students and teacher			
j) Type Examinations			

**Section 2 (Extent of ICT integration)**

**1. From your experience, please indicate the usefulness of ICTs for the following uses**

	(1) Not needed	(2) Of Limited Value	(3) Valuable	(4) Essential
a) a) Print lesson notes for students and teacher				
b) Type Examinations				
c) Classroom presentations(PowerPoint/CDs/ DVDs)				

d) File handling (Creating/opening files, etc)				
e) Presenting teacher's and students' work				
f) ) Listening to pronunciation of words				



### Section 3 (Challenge of ICTs integration)

3. To what extent do the following conditions constrain the potential contribution of information technologies at the present time at your school?

	(1)	(2)	(3)	(4)
	Not at All	Very little	Some- what	Very Much
a)Insufficient ICT infrastructure b)Insecurity or privacy concerns c)Technology not adequate/not up-to-date d)Teacher's lack of ICT skills e)Teacher's lack of interest in using technology in teaching and learning f)Teacher's lack of experience with technology oriented pedagogy or instructional techniques g) Principal does not understand the potential contribution of ICTs h) Ministry does not understand the potential contribution of ICTs				

*Thank you. Your participation in this survey is very much appreciated!*

## APPENDIX 2

Research Questions	Questionnaire questions
<p>1. To what extent are ICTs used to enhance teaching in public secondary schools in Kenya?</p> <p>2. How effective are ICTs in enhancing teaching in public secondary schools in Kenya?</p> <p>3. Which are the commonly used ICTs to enhance teaching in secondary schools in Kenya?</p>	<p>a) Print lesson notes for students and teacher</p> <p>b) Type Examinations</p> <p>c) File handling (Creating/opening files, etc)</p> <p>d) Presenting teacher's and students' work</p> <p>e) Listening to pronunciation of words</p> <p>a) Type letters and other documents</p> <p>b) Create instructional material</p> <p>c) Administrative record keeping (Student grades, Students details, etc.)</p> <p>d) Classroom presentations(PowerPoint/CDs/ DVDs)</p> <p>e) Watch educational programs</p> <p>f) Word processors</p> <p>g) Print lesson notes for students and teacher</p> <p>h) Retrieve best practices for teaching/learning</p>

4. What are the challenges of using ICTs to enhance teaching public secondary schools in Kenya?

i) Search for information and content for lessons

a)Television

b)Radio

c)Computer

a)Insufficient ICT infrastructure

b)Insecurity or privacy concerns

c)Technology not adequate/not up-to-date

d)Teacher's lack of ICT skills

e)Teacher's lack of interest in using technology in teaching and learning

f)Teacher's lack of experience with technology oriented pedagogy or instructional techniques

g) Principal does not understand the potential contribution of ICTs

h) Ministry does not understand the potential contribution of ICTs