A Model for Implementation and Assessment of ICT adoption by teachers in secondary schools in Kikuyu district in Kenya

By

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Declaration

I certify that this dissertation is my original work and material in this project which is not my own work has been identified. I further certify that no material has previously been submitted and approved for the award of degree by this or any other University.
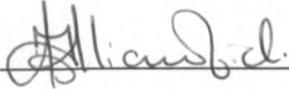
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Dedication

This project is dedicated to my beloved parents who ensured that we got proper education and inspired me into appreciating the essence of hardwork as the cause of success.

Acknowledgement

I would like to acknowledge and extend my gratitude to the following organizations and individuals who helped and contributed greatly to my study and Masters project.

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Thirdly, I would like to thank my wife, Moureen. You have been a source of warm and enthusiastic support during my whole Masters degree's study. You have stood by me through all the challenges and issues at all times.

Last, I will preserve this project as a gift to my lovely daughters, Abigail and Alaine now two years. You are the power and source of passion for my whole life.

Ahsanteni sana

Abstract

Secondary schools and teachers are under increasing pressure to use Information and Communication Technology to impart to students the knowledge, skills and attitudes they need to survive in the current century. Many schools have embarked on introducing computers and other ICT related tools for management and for teaching Computer Studies-a subject that has gained popularity among students. Despite all this effort by schools to introduce computers in their schools, it is a known fact that few teachers have taken the initiative to use and apply computers and other ICT tools in their teaching.

The purpose of this study was to establish a model that can be used by schools and teachers to adopt ICT and in particular computers in their subject areas. The design of this study was descriptive survey that was conducted in Kikuyu District of Kiambu County, Kenya. The study targeted 100 teachers in 10 secondary schools. Convenience sampling was used to select a sample of 71 teachers. Questionnaires were used to collect data. Analysis of the data was done by use of descriptive statistics as well as simple correlation.

The study found out that nearly all the schools surveyed had embraced ICT; however few teachers use the same to deliver content in class. Secondary school teachers are willing to embrace ICT in their teaching but only if there are policies that will force them to follow. Teachers are also going to embrace ICT in their teaching if there are model schools from which they can imitate.

The study therefore recommends that the government works out a policy of ICT adoption by teachers in secondary schools.

ABBREVIATION

ICT	Information and Communication Technology, these are tools which allow digital information to be created, accessed, stored, manipulated and exchanged.
E-learning	Electronic learning or digital learning. This is learning that is conducted using ICTs
E-Government	Networking of all public institutions country wide to facilitate connectivity and exchange of information via the Internet.
Kikuyu District	The area under study
KCSE	Kenya Certificate of Secondary Education
Secondary School	A school offering the 8-4-4 curriculum in Form 1 to Form 4.
IS	Information Systems
MOEST	Ministry of Education, Science and Technology
TAM	Technology Adoption Model

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CHAPTER 1

1.0 INTRODUCTION

1.1 Background of the Study

All countries face development challenges and each of these challenges holds implications for that country's human resource development strategy. Because it is not possible to build a country on basic education alone, secondary and tertiary education – which produce higher-level skills and knowledge – necessarily comprise important elements of any country's approach to development. The arrival of globally competitive knowledge-driven economy, however has further underscored the importance of these national capacities for generating social, economic, and political progress (The World Bank, 2009).

According to the Information and Communication Technology (ICT) Sector Strategy Paper of the World Bank group (Batchelor and Nocrish, 2005), ICT consists of hardware, software, networks and media for collection, storage, processing, transmission and presentation of information. The information could be in the form of text, still pictures, video etc. E-learning on the other hand can be defined as the purposeful use of electronic systems or computers in support of the learning process (Allen, 2003). Information and Communication Technologies (ICTs) are increasingly being recognized as essential tools of development – tools that can empower poor people, enhance skills, increase productivity, and improve governance at all levels (Schware , 2005). However, the application of these ICTs to education in developing countries at both the experimental and developmental levels has often been characterized, in general, by inconsistent, weak, or nonexistent evaluation methodologies, thereby increasing the risk that the role of ICTs in the improvement of education in developing countries is not sustainable (Omwenga, 2006).

The use of ICTs and e-learning potentially offers increased possibilities to positively impact teaching and learning. Without doubt, face-to-face exchange remains important in most forms of educational delivery. However, the use of new technologies increases the capacity for newer and better ways of knowledge-sharing and teamwork (Twiggs 2003 p 114).

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In Kenya, as in many countries in the region and globally, education and training is seen as the core strategy for building human capital for socio economic development, and for enhancing its ability to create employment, innovation and wealth. The Government of Kenya (GoK) is also well aware of the potential benefits of ICT use in Education. This is evident from the official statements in national plans and policy documents (Kenya Vision 2030(2007), Poverty Reduction Strategy Papers (2005), and the National ICT4D policy (2006)).

According to the 2006 Kenya ICT strategy paper, Kenya still has a low usage of ICT suggesting that information communication technologies revolution has not yet had a significant impact on the country's economy-wide productivity. The Sessional Paper No.1 of 2005 emphasizes that ICT skills play a key role in promoting the economic development of a country (MOEST, 2005). The government therefore recognizes that an ICT literate workforce is the foundation on which Kenya can acquire the status of a knowledge economy. The government as a result has made education the avenue for equipping the nation with ICT skills in order to create a vibrant and sustainable economy.

Growing evidence shows that accessing online courses and online applications can enhance student learning and interest. New technologies can also be effective in teaching specific subjects like Mathematics and sciences (Twiggs 2003, p114). Although educational inputs are closely linked to learning outcome, the other crucial factor is the process that mobilizes reports to produce the results. This explains why schools with comparable inputs produce efficient results. The process factors include effective school management, leadership, and culture; classroom time and successful students' grouping with special attention to some individual students, effective utilization of teaching methodology, collaborative lesson planning, peer support on pedagogy, and close monitoring student's achievement and sharing with parents and staff for further development. (The World Bank, 2004).

1.2 ICT integration

Historically ICT has been emerging from the concepts of IT, meaning basically computers and communication technology, and digital data networks as the latest phase of development, but also Television sets, radios, satellites, phone, etc are considered as ICT tools. Due to a trend of merging different technologies, there was a reason to start speaking of ICT as opposed to IT. ICT captures all the latest technologies used for communication, data processing and data storage

Information and Communication Technologies can be defined as *"a diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information"* (Blurton, 2002). ICT is not a new instructional strategy in the Kenyan classrooms, since the radio and television are well-known strategies to teachers. For purposes to eliminate ambiguity the definition of ICT by Blurton will be adopted for use in this research.

According to the International Society for Technology in Education's (ISTE) National Educational Technology Standards for Student (NETS-S; ISTE, 2000), curriculum integration with the use of technology involves the infusion of technology as a tool to enhance the learning in a content area or multidisciplinary setting... Earle (2002) asserts that, integrating technology is not about technology – it is primarily about content and effective instructional practices. Technology involves the tools with which content is delivered and implemented.

Concerns over the slow adoption of technology by teachers and schools are not new. Many researchers have from various angles, studied the phenomenon using different approaches, from case studies (Cuban, 2001; Schofield, 1995, Zhao, Pugh, Sheldon & Byers, 2002), historical analysis (Cuban, 1986), to large surveys (Becker, 2000, 2001). These studies offer different accounts for why teachers do not frequently use technology to its full potential and in revolutionary ways that can truly lead to qualitatively different teaching and learning experiences. Researchers have come up with different models and frameworks that look at technology adoption at both the individual and firm level. The Technology Adoption Model (TAM) (Davies, 1986, 1989) is one of the most widely used models that try to explain technology adoption by individuals.

1.3 Statement of the problem

Over the last few years, there has been a rapid growth in the range and sophistication of new I.C.T.s (such as radio, video, television and so on) in teaching and learning. The computer has been identified as the most efficient 'stand-alone' technology that is able to make teaching and learning situations more meaningful and fruitful than it has ever been before (Wabuyele, 2006; Osodo, 1999; Amory, 1997). For instance, computer technology has been used to improve the quality of Geography education in schools because of its robust nature in displaying graphics and simulations (Castleford, 1998). However, relatively few teachers use technology regularly in their teaching and the impact of computers on existing curricula is still very limited. Researchers are therefore hard pressed to find answers to the following questions:

- What lies behind this contradiction?
- Why don't teachers make wider use of instructional technologies?
- What are the good models we can learn from?

Most research about educational technology has focused on the impact of technology on learners. The lack of empirical studies notwithstanding, a set of assumptions about why teachers do not use technology does exist and is currently functioning as the theoretical base underlying many efforts to help teachers integrate technology with their teaching (Charp, 1995; Lauro, 1995; Persky, 1990; Sammons, 1995; Strudler, 1994). Lack of suitable training, technical and administrative support, and systemic incentives (e.g., tenure and promotion), traditional pedagogical beliefs, and resistance to change are among the most widely held ones. Majority of teachers are ill equipped to effectively integrate ICT in classroom. The main challenge for teachers interviewed was lack of adequate number of computers, educational applications, training, policy and strategy on how integration should be done. (Oloo, 2009, p. 3)

This research was intended to come up with a model that can be used to assess the factors that influence ICT adoption by teachers in education. The focus was in secondary schools in Kikuyu district. Despite Alliance High School (AHS) and Alliance Girls High School being two of the top performing secondary schools in the Kenya Certificate of Secondary School Examination (KCSE), other secondary schools in Kikuyu district continue returning poor grades (see appendix). The researcher has taught and lived in Kikuyu district for close to ten years.

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1.4 General Objective

The general objective of this study was to develop a model for ICT adoption by teachers in secondary schools in Kikuyu district.

1.5 Specific Objectives

1. To evaluate the overall use of ICT by schools in Kikuyu district.

2. To identify the strengths and weaknesses of various Technology Acceptance Models in influencing ICT adoption by teachers in secondary schools in Kikuyu district.

3. To develop a hybrid model for evaluating ICT adoption by teachers in Kikuyu district

1.6 Research questions

The research intended to answer the following questions

1. What are the predictors of ICT adoption in education by teachers that need to be evaluated?

2. To what extent are Technology Acceptance Models relevant in evaluating ICTs adoption by teachers in secondary schools?

3. What dimensions need to be added into the Technology Acceptance Model (TAM) to enrich it in evaluating ICTs adoption in secondary education?

1.7 Justification of the study

Kenya Certificate of Secondary School (KCSE) examination performance in many secondary schools in Kenya has been noted to be poor. KCSE results in Kikuyu district continue to cause concern to all stakeholders in the education sector. Therefore there is urgent need for intervention. Previous research has indicated that the use of ICTs and in particular the computer enhance student achievement, promotes positive attitude towards learning and improves interpersonal relations. However few studies have focused on ICT adoption in Kenya secondary schools in Kenya and Kikuyu district in particular. The purpose of this research is to evaluate the factors that influence ICT adoption by teachers in secondary schools within Kikuyu district.

1.8 Significance of the study

The research study could provide information on the current status on the use and application of ICT in secondary schools within Kikuyu district. It would be beneficial to educationists and other stakeholders by offering empirical data on the situation of ICTs in secondary schools in Kikuyu district and to those who may want to improve education standards. Outcome will provide a base for future research, theory development and empirical research for Kikuyu District. The model so developed will provide a school manager or an educator for implementing ICT adoption.

1.9 Limitations of the study

The study was limited to those secondary schools that have e-learning facilities, within Kikuyu district and therefore it was going to be hard to generalize the study findings to all schools in Kenya.

1.10 Delimitations of the Study

Delimitations of this study were schools within Kikuyu district and targeted those schools that offer computer studies at KCSE level and therefore have a computer lab.

1.11 Assumptions

The study assumed that the respondents were aware and understood what e-learning is (learning using ICT tools) and that the schools under study had embraced e-learning.

1.12 Organization of the Remainder of Dissertation

This report is structured as follows: chapter 1 is on the introduction the background of the study, statement of the problem, research objectives and questions, significance of the study, limitations and delimitations, assumptions and definition of significant terms. Chapter two is on the literature review; chapter 3 is about the methodology of the research. Chapter 4 is on the data analysis, presentation and interpretation of results while chapter 5 highlights on the summary of the findings, conclusion and recommendations.

CHAPTER 2

2.0 LITERATURE REVIEW

2.1 Introduction

The purpose of this chapter is to provide a comprehensive review of and synthesis of literature and research related to the historical framework, the problems and the research questions. The chapter consists of the following sections: Education in Kenya, ICT Integration by secondary schools in Kenya, Models of ICT adoption and the need for an improved model.

2.2 The Education System in Kenya

Kenya currently has an 8-4-4 education system. Primary schooling takes eight years, followed by four years of secondary schooling and four years of undergraduate studies at university. The country introduced universal, free, non-compulsory access to primary education in 2003 that led to an immediate increase of 1.3 million students. This growth has created an accumulating demand for access to secondary education and, predictably, to tertiary education as well, Farrell (2007).

There are currently slightly over 4,000 (MOEST, 2005) public secondary schools in Kenya and the recent massive enrolment in primary school enrolment is putting pressure on the demand for and access to secondary schools. The Ministry of Education (MOE) remains concerned with the quality of secondary education which is characterized by poor performance in core subjects such as Mathematics and Science. There are obvious benefits for integrating computers into secondary schools as students at this age need to focus on subject specific content, greater critical thinking skills, scientific inquiry, and math, science and language. Students will benefit greatly with the analytical, creative and collaborative power of computers to map out and analyze assumptions, present ideas and participate in projects with peers from around the country and around the world.

According to MOEST (2005), ICT integration will take teachers and students beyond seeing ICTs as computer students and computer literacy skills. The Government of Kenya (GOK) Sessional Paper No 1 2005 says that ICTs in education can be considered in three ways: ICT integration, ICT equipment, and ICT Foundation Skills. ICT integration is seen here as the main goal of any education intervention. When goals have been formulated, then the right type of equipment most appropriate for those goals can be considered. And when the right type of equipment to be utilized is known, then the basic skills which teachers and students require to work with can be determined towards the integration of those goals. The GOK is committed to the internationally recognized priorities of Universal Primary Education (UPC) and Education for All (EFA).

2.3 ICT Integration in Secondary Schools in Kenya

One of the goals of the Ministry of Education Science and Technology is to produce students who are ably mature with the right content after their secondary education. The Government of Kenya (GoK) recognizes that an Information and Communication Technology (ICT) literate workforce is the foundation on which Kenya can acquire the stature of a knowledge economy (MOEST, 2005).

The Government of Kenya has made education the avenue of equipping students with ICT skills in order to sustain its economic growth. This is clearly stated in the National ICT policy which was launched in 2006. Several schools have in the past couple of years purchased computers to assist in the administration and management of their offices. Of late is the trend by which secondary schools have introduced the study of computers as a separate subject in their curriculum.

The Ministry of Education Science and Technology (MOEST) is concerned with the quality of secondary education. MOEST has identified the need to integrate ICT into secondary school subjects. Integrating ICT in education will enhance the quality of teaching and learning, the research productivity of the teachers and students and the management and effectiveness of institutions (Kashorda et al, 2007).

Many studies have been done to assess the impact of ICT in secondary schools from different angles. The Education Management Information System (EMIS) survey of 2003/2004 noted that over 70% of the secondary schools in Kenya required functional telephones. 90% needed to establish Local Area Networks (LANs) in order to increase the sharing of learning. As of 2008, there were 6,566 secondary schools in Kenya, of which over 4,000 were publicly funded and the remainder 2000 plus privately funded with a total student enrolment of over 1.3 million [Kenya National Bureau of Statistics, 2009]. From the Kenya National Examinations Council (KNEC) report (2006) the number of students who enrolled for Computer Studies was approximately 4,000.

According to Ayere et al (2010), the government has made education the avenue for equipping the nation with Information & Communication Technology (ICT) skills in order to create a vibrant and economic growth. However a proper framework needs to be adopted by schools wishing to adopt and use ICT tools. In their research paper, Kiptalam and Rodrigues (2010) note that most computer studies lessons are conducted in computer labs thereby limiting the application of computers in other subjects. In other words most secondary schools have largely introduced the teaching of computer studies as a subject but there is very little use and integration of ICT in the teaching of other subjects. Internet use has remained evasive in secondary school, the cost notwithstanding. A study by New Partnership for Africa's Development (NEPAD) indicates that 90% of students from non NEPAD schools don't have access to Internet, Ayere et al (2010).

2.4 Concept of User Acceptance

User acceptance is defined as the demonstrable willingness within a user group to employ information technology for the tasks it is designed to support. Thus the concept is not being applied to situations in which users claim they will employ it without providing evidence of use, or to the use of a technology for purposes unintended by the designers or procurers (e.g. use of Internet connection for personal entertainment at work).Of course there will always be a slight deviation from idealized, planned usage but the essence of acceptance theory is that such deviations are not significant, i.e. the process of user acceptance of any ICT tool for intended purposes can be modeled and predicted (Dillon A and Morris M, 1996).

2.5 Technology Adoption

The process by which an organization adopts and implements technological innovations is influenced by the technological context, the organizational context and the environmental context (Tornatzky & Fleischer, 1990).

Tornatzky & Fleischer (1990) go on to explain that, the technological context includes the Internet and external technologies that are relevant to the firm. Technologies may include both equipment as well as processes. The organizational context refers to the characteristics and resources of the firm including the firm's size, degree of centralization, degree of formalization, managerial structure, human resources, amount of slack resource and linkages among employees. The environmental context includes the size and structure of the industry, the firm's competitors, the macroeconomic context and the regulatory environment.

These three elements present both constraints and opportunities for technological innovation (Tornatzky & Fleischer, 1990). Thus these three elements influence the way an organization sees the need for and adopts new technology. Zimmerman, Don Yohon & Teresa (2008) add that many educational institutions have been slow to adopt ICT tools and equipment for teaching and learning.

2.6 Models of ICT adoption

Certain theories and models associated with the acceptance and take-up of ICT innovations have been developed in association with commercial products and business organizations. It is possible that some of the principles involved in introducing an innovative service or product will differ in the education sector. However, the following underlying principles apply across all sectors:

- Adopter characteristics and motives for embracing innovations
- The innovation's characteristics, its benefits, costs, and associated learning curve, and
- Factors in relation to the institution, its culture and services

Oliveira & Martins (2001) note the following models of technology adoption: the technology acceptance model (TAM) (Davis 1986, Davis 1989, Davis et al, 1989), the theory of planned behavior (TPB) (Ajzen 1985, Ajzen 1991), unified theory of acceptance and use of technology (UTAUT) (Vankatesh et al, 2003), Diffusion on Innovation (DOI) (Rogers, 1995) an the technology, organization and environment (TOE) framework (Tornatzky & Fleischer 1990). The DOI and the TOE are at the firm level while the TAM, TPB and UTAUT are at the individual level. Models at the firm level tend to look at the variables that influence institutions to adopt technology while those at the individual level look at those variables that influence individuals to adopt technology.

Literature suggests that there has been (and continues to be) substantial financial investment in computer use at all educational levels (e.g. Lemke & Coughlin, 1998; Twining & McCormick, 1999). The motivation for such investment is varied, but often justified in terms of the potential impact that computer use has to enhance students' learning (Twining, 2002). This situation in which substantial amounts of money are being invested in ICT in education but are not having significant impact is not sustainable.

In order to justify continuity of investment, evidence need to be found of ICT's adoption by organizations and ways need to be found to increase the impact of such investments. There is, therefore great need to enhance the impact of investing in computer use in education at all levels (Twining, 2002).

Some of the theories and models of technology adoption are presented in the following section.

2.6.1 Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) was developed by Davis (1986) to explain computer-usage behavior. The theoretical basis of the model was Fishbein and Ajzen's (1975) Theory of Reasoned Action (TRA). The goal of TAM is "to provide an explanation of the determinants of computer acceptance that is general, capable of explaining user behavior across a broad range of end-user computer technologies and user populations, while at the same time being both prudent and theoretically justified", (Davis et al, 1989, p985).

TRA is a widely-studied model from social psychology which is concerned with the determinants of consciously intended behaviors (Ajzen & Fishbein, 1977). According to TRA, a person's performance of a specified behavior is determined by his or her behavioral intention (BI) to perform the behavior, and BI is jointly determined by the person's attitude (A) and subjective norm (SN) concerning the behavior in question.

TAM uses TRA as a theoretical basis for specifying casual linkages between two key sets of constructs: (1) Perceived Usefulness (PU) and Perceived Ease of Use (PEOU), and (2) user's attitude (A), behavioral intentions (BI) and actual computer usage behavior. PU is defined as the user's "subjective probability that using a specific application system will increase his or her job performance within an organizational context", (Davis et al, 1989, p985). PEOU refers to the "degree to which the user expects the target system to be free of effort". Both PU and PEOU predict attitude toward using the system, defined as the user's desirability of his or her using the system. Attitude and PU influence the individual's BI to use the system. Actual use of the system is predicted by BI. In addition, perceived ease of use positively affects the perceived usefulness, and both of perceived ease of use and perceived usefulness are influenced by external variables.

A review of scholarly research on information system (IS) acceptance and usage suggest that TAM has emerged as one of the most influential models in this stream of research, (Davis et al, 1989). The TAM represents an important theoretical contribution toward understanding IS usage and IS acceptance behaviors (Davis et al, 1989, Robey D, 1996). However this model does not account for organizational influence in the adoption and utilization of ICT tools.
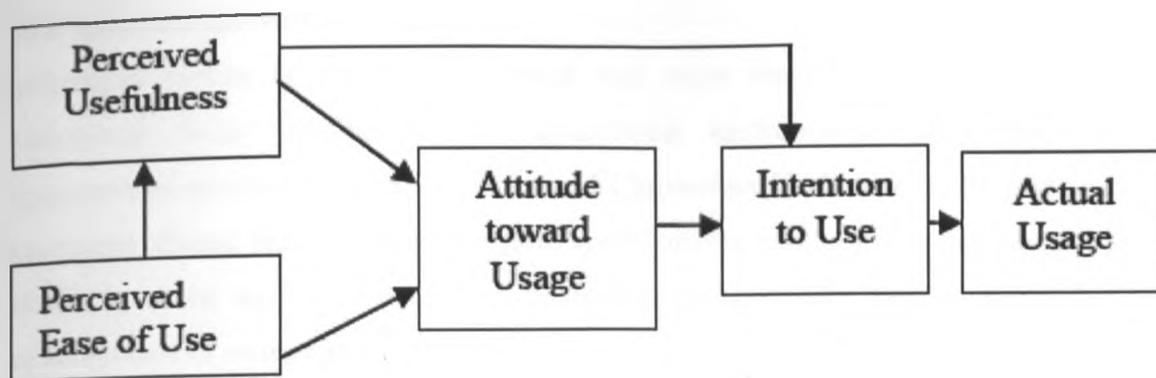
Fig 2.1 The Technology Acceptance Model (Davis, 1989)

Theoretical perspectives on technology adoption and acceptance

Two research paradigms have emerged to explain technology adoption and acceptance. Using the first paradigm, researchers focus on trait variables to explain an individual's tendency to use new technology. For example, Parasuraman's (2000) technology readiness index outlines two drivers (optimism and innovativeness) and two inhibitors (discomfort and security) of an individual's tendency to use technologies. The second paradigm focuses on how technology's attributes affect an individual's perception and, ultimately, use of that technology. Indeed the TAM is the most widely applied of the theories (Venkatesh, 2000). According to the TAM, perceived usefulness and perceived ease of use are beliefs that are presumed to (1) influence attitudes towards new technology and (2) mediate the relationship between external variables and attitude (Davies et al., 1989).

The TAM is a preferred choice of models when prudence, research costs and outcomes are considered (Mathieson, 1991). For example, the TAM explains more variance in attitude towards a technology, and a comparable percentage of variance in usage, as compared to the Theory of Planned Behavior (Mathieson, 1991; Taylor and Todd, 1995). Also the TAM constructs are more agreeable to operationalization and empirical testing than are the broad concepts of Rogers' (1995) Diffusion of Innovation (DOI) framework. While numerous extensions to the TAM have enhanced the understanding of technology acceptance (Wixom and Todd, 2005), prior studies have excluded variables that are relevant to explaining demographic differences in technology use by teachers.

2.5.2. Institutional theory

Institutional theory attends to the deeper and more resilient aspect of social structure. Institutional theory emphasizes that institutional environments are crucial in shaping organizational structure and actions (Scott and Christensen 1995, Scott 2001). According to the institutional theory, organizational decisions are not driven purely by rational goals of efficiency, but also by social and cultural factors and concerns for legitimacy. Organizational legitimacy is the acceptance of an organization by its external environment (DiMaggio & Powell, 1983; Meyer & Rowan, 1977; Meyer & Scott, 1983). Institutions are transported by cultures, structures, and routines and operate at multiple levels. The theory claims that firms become more similar due to isomorphic pressures and pressures for legitimacy (Dimaggio and Powell 1983). This means that firms in the same field tend to become homologous over time, as competitive and customer pressures motivate them to copy industry leaders. For example, rather than making a purely internally driven decision to adopt electronic commerce (e-commerce), firms are likely to be induced to adopt and use e-commerce by external isomorphic pressures from competitors, trading partners, customers, and government. This can be extended to the adoption of ICT by schools.

Organizational isomorphism refers to the assimilation of organizations that co-exist in similar environmental conditions (Dacin, 1997; Deephouse, 1996). Di Maggio and Powell (1983), identified three isomorphic processes which inspired a lot of subsequent research: Coercive, Normative and Mimetic. Coercive isomorphism is a response to pressures from other organizations the organization is dependent on, as well as the pressure to conform to expectations of society. Normative isomorphism refers to organizational change as a response to exchange with peer organizations and professional associations. Therefore, isomorphism occurring on the basis of such pressures is associated with professionalism. Mimetic isomorphism occurs if the organization is aspiring to mimic the performance, structures and practices of other organizations. This is a response to situations of uncertainty in which management is under pressure to improve performance, but does not know how to reach this objective.

By distinguishing between these processes, one will be able to ascertain if usage behavior is caused by the influence of isomorphic pressures.

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2.7 Research Gaps, Objectives, Model and Hypothesis

TAM was developed to predict individual adoption and use of new ITs. It posits that individuals' behavioral intention to use an IT is determined by two beliefs: *perceived usefulness*, defined as the extent to which a person believes that using an IT will enhance his or her job performance and *perceived ease of use*, defined as the degree to which a person believes that using an IT will be free of effort. It further theorizes that the effect of external variables (e.g., design characteristics) on behavioral intention will be mediated by perceived usefulness and perceived ease of use. Over the last two decades, there has been substantial empirical support in favor of TAM (e.g., Adams et al., 1992; Agarwal & Karahanna, 2000; Karahanna, Agarwal, &Angst, 2006; Venkatesh et al., 2003, 2007). TAM consistently explains about 40% of the variance in individuals' intention to use an IT and actual usage.

In the Information Systems field, researchers have widely used the Technology Acceptance Model to study the adoption of various technologies and TAM has arguably become the most influential theory in the IS field. Researchers have also extended TAM (Wixom and Todd, 2005). For instance, some researchers introduce many other factors to the model, such as subjective norm, perceived behavioral control, and self-efficacy (Hartwick and Barki, 1994; Mathieson et al., 2001; Taylor and Todd, 1995). Other researchers introduce additional belief factors from the diffusion of innovation literature, such as trialability, visibility, or result demonstrability (Agarwal and Prasad, 1997; Karahanna et al., 1999; Plouffe et al., 2001). Some researchers introduce external variables or moderating factors to the two major belief constructs (perceived usefulness and perceived ease of use), such as personality traits and demographic characteristics (Gefen and Straub, 1997; Venkatesh, 2000; Venkatesh and Morris, 2000).

This research attempts to introduce institutional factors into the TAM model by looking at ICT adoption by teachers in Kikuyu district.

A Critical Review of Technology Acceptance Literature

Long Li (2009) acknowledges that in the field of Information Systems, many researchers have found that information technology is underutilized in many organizations, causing huge economic loss to their businesses. As a result, many technology acceptance theories and models have been developed or used to study information technology acceptance. These models include: The Theory of Reasoned Action (Fishbein et al., 1975), the Technology Acceptance Model (Davis, 1989) and extended TAM (Venkatesh and Davis, 2000), the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003), the Motivational Model (Davis, et al, 1992), the Theory of Planned Behavior (Ajzen, 1991), the model combining TAM and the Theory of Planned Behavior (Taylor and Todd, 1995), the Model of PC Utilization (Thompson, et al, 1991), the Innovation Diffusion Theory (Rogers, 1995) and the Social Cognitive Theory (Bandura, 1986).

Evidence Inconsistent with Extant TA models

Legris et al. (2003) performed a qualitative meta-analysis on TAM and found that TAM fails to predict in many studies (shown in Table2-1). In its original version, TAM has the following components: Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Attitude (AT), Behavior Intention (BI) and Actual Use (U). Based on these five components, 10 relations were examined by Legris et al. (2003): (1) PEOU-PU; (2) PU-AT; (3) PEOU-AT; (4) PU-BI; (5) PEOU-BI; (6) AT-BI; (7) AT-U; (8) BI-U; (9) PEOU-U; and (10) PU-U.

Author	PEOU-PU	PU-AT	PEOU-AT	PU-BI	PEOU-BI	AT-BI	AT-U	BI-U	PEOU-U	PU-U
Davis et al.(1989) Post Training			No							
Subramanian(1994) Voice mail Customer dial-up	No No									
Taylor and Todd(1995a)						No				
Keil et al. (1995)									No	
Taylor and Todd (1995b) With experience Without experience						No No				
Jackson et al. (1997)	No	No		No		No				
Bajaj and Nidumolu (1998)	No	Reverse								No
Gefen and Keil(1998)									No	
Lucas and Spitler (1999)				No	No				No	No
Hu et al.(1999a)	No		No							
Szajna (1996) Pre-implementation Pos-implementation									No No	No No

Table 2-1 Situations where TAM Failed to Predict (Adapted from Legris et al., 2000)

No indicates that the relation is found to be non-significant and **reverse** indicates that the relation is found to be significant but negative.

It can be seen from table 2-1 that there are inconsistent or even contradictory empirical results for all major relations in TAM.

The following subsection discusses in detail the inconsistent evidence with regard to the major constructs in the extant Technology Acceptance (TA) models and theories. These major constructs include perceived usefulness, perceived ease of use, attitude, social influences, and facilitating factors.

Perceived Usefulness

The TAM model posits that perceived usefulness is the strongest predictor of an individual's intention to use an information technology (Davis, 1989; Venkatesh and Davis, 2000; Venkatesh et al., 2003). However, Jackson et al. (1997) found no relation between perceived usefulness and attitude. Bajaj and Nidumoulu (1998) even find evidence to the contrary- "[u]sefulness will *negatively* affect the attitude towards using the IS" (emphasized by the original authors) (p. 221).

Jackson et al. (1997) and Lucas and Spitler (1999) find no empirical evidence to support the relation between perceived usefulness and behavior intention. Jackson et al. (1997) report: "[T]he finding of a non-significant relationship between perceived usefulness and behavioral intention is surprising" (p. 379). Szajna (1996), Lucas and Spitler (1999), and Bajaj and Nidumoulu (1998) find no empirical support for the relation between perceived usefulness and actual use.

Perceived Ease of Use

The TAM model suggests that perceived ease of use has a significant influence on perceived usefulness, behavior attitude, intention, and actual use (Davis, 1989; Mathieson, 1991; Moore and Benbasat, 1991). On the relation between perceived ease of use and perceived usefulness, Davis (1989) suggests that: "from a causal perspective, the regression results suggest that ease of use may be an antecedent of usefulness, rather than a parallel, direct determinant of usage" (p. 334). In UTAUT, Venkatesh et al. (2003) use the construct of effort expectancy to capture the concepts of perceived ease of use (TAM/TAM2), complexity, and ease of use. Effort expectancy is defined as "the degree of ease associated with the use of the system"

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However, many other researchers find no empirical evidence to support the relation between perceived ease of use and perceived usefulness (Chau and Hu, 2001; Bajaj and Nidumolu, 1998; Hu et al., 1999; Jackson et al., 1997; Subramanian, 1994). For instance, Chau and Hu (2001) report that "contrary to the assertion of TAM and the findings reported by some prior research (e.g., Venkatesh, 1999), perceived ease of use was not found to have any significant effects on perceived usefulness or attitude" (p. 712).

Agarwal and Prasad (1997), Keil et al. (1995a), Gefen and Keil (1998), Lucas and Spitler (1999), and Szajna (1996) find no empirical evidence to support the relation between perceived ease of use and actual use. Agarwal and Prasad (1997) report that "ease of use, which has been observed to be a significant predictor of acceptance in a wider variety of research (Davis, 1989; Mathieson, 1991), did not appear as a significant determinant" (p.572). Keil et al. (1995a) conclude that "no amount of ease of use (EOU) will compensate for low usefulness" (p.89).

Davis et al. (1989) find no evidence to support the relation between perceived ease of use and attitude in the post training period. Hu et al. (1999) find no evidence to support the relation between PEOU and attitude either. Chau (1996), Hu et al. (1999), Lucas and Spitler (1999), Subramanian (1994) find no relation between perceived ease of use and behavior intention. Chau (1996) reports "…there is no significant, direct relationship between perceived ease of use of the technology and intention to use. In other words, whether or not the technology is easy to use influences the user's intention to use only indirectly via the perception of near-term usefulness. This finding concurs with that of the original TAM but contradicts the results obtained in many previous studies (e.g., Lu et al., 1994; Moore and Benbasat, 1991), where ease of use was a significant determinant of intention to use a computer technology"
(p. 197).

Attitude towards using technology

Attitude toward using technology refers to an individual's overall affective reaction to using a system (Venkatesh et al., 2003). In some models, such as TRA, the attitude construct is among the strongest predictors of behavior intention (Davis et al., 1989; Fishbein and Ajzen, 1975; Venkatesh et al., 2003). For instance, Chau and Hu (2002) find that attitude "appeared to be the second most important determinant of a physician's intention for accepting telemedicine technology" (p. 307). However, Taylor and Todd (1995a, b), Thompson et al. (1991), and Jackson et al. (1997) find no empirical support for the relationship between attitude and behavior intention.

In conclusion a significant body of literature reports inconsistent results with TAM.

2.7.1 Theoretical Framework

Prior research employing TAM has focused on three broad areas. First, some studies replicated TAM and focused on the psychometric aspects of TAM constructs (e.g., Adams et al., 1992; Hendrickson, Massey, & Cronan, 1993; Segars &Grover, 1993). Second, other studies provided theoretical underpinning of the relative importance of TAM constructs-that is, perceived usefulness and perceived ease of use (e.g., Karahanna, Straub, & Chervany, 1999). Finally, some studies extended TAM by adding additional constructs as determinants of TAM constructs (e.g., Karahanna & Straub, 1999; Venkatesh, 2000; Venkatesh & Davis, 2000; Koufaris, 2002).

Empirical studies have also suggested that TAM should be integrated with other acceptance and diffusion theories to improve its predictive and explanatory power (e.g. Hu et al., 1999). This research assumed that there has never been any research done on TAM with an extension on the isomorphic pressures at the individual level.

2.8 Development of an improved model

Concerns over the slow adoption of technology by teachers are not new. Many researchers have from various angles, studied the phenomenon using different approaches, from case studies (Cuban, 2001; Schofield, 1995, Zhao, Pugh, Sheldon & Byers, 2002), historical analysis (Cuban, 1986), to large surveys (Becker, 2000, 2001). These studies offer different accounts for why teachers do not frequently use technology to its full potential and in revolutionary ways that can truly lead to qualitatively different teaching and learning experiences.

According to the developers of TAM, (Davis 1989, Bagozzi, & Warshaw, 1992) they say:

> Because new technologies such as personal computers are complex and an element of uncertainty exists in the minds of decision makers with respect to the successful adoption of them, people form attitudes and intentions toward trying to learn to use the new technology prior to initiating efforts directed at using. Attitudes towards usage and intentions to use may be ill-formed or lacking in conviction or else may occur only after preliminary strivings to learn to use the technology evolve. Thus, actual usage may not be a direct or immediate consequence of such attitudes and intentions.

At the beginning of 21st century there was a growing call for a moratorium on ICT expenditure in schools (Cuban, 2001). One of the drivers underpinning this recognition that despite substantial investment (Twining 2002a) the impact of ICT on teaching and learning has been patchy at best:

> Despite the hyperbole that has continually surrounded the area of educational computing, for the last 20 years the computer has noticeably failed to permeate the school setting.

(Selwyn 1999 p.77)

The objective of this study is to enrich TAM for understanding the role of social influences in terms of Institutional Theory isomorphic pressure processes. The extension of the TAM model will attempt to enrich TAM's ability in explaining and predicting ICT use and acceptance among teachers of secondary schools. The research combined the original TAM with the new construct from the Institutional Theory to come up with an integrated model of technology acceptance.

2.9 Research Model

The research model for this study was the TAM plus an extension derived from the Institutional Theory processes of organizational influence. This extension is called the External Pressures, containing the coercive, normative and mimetic processes on user's behavioral intentions and

Independent Variables   **Dependent Variable**   **Outcome**
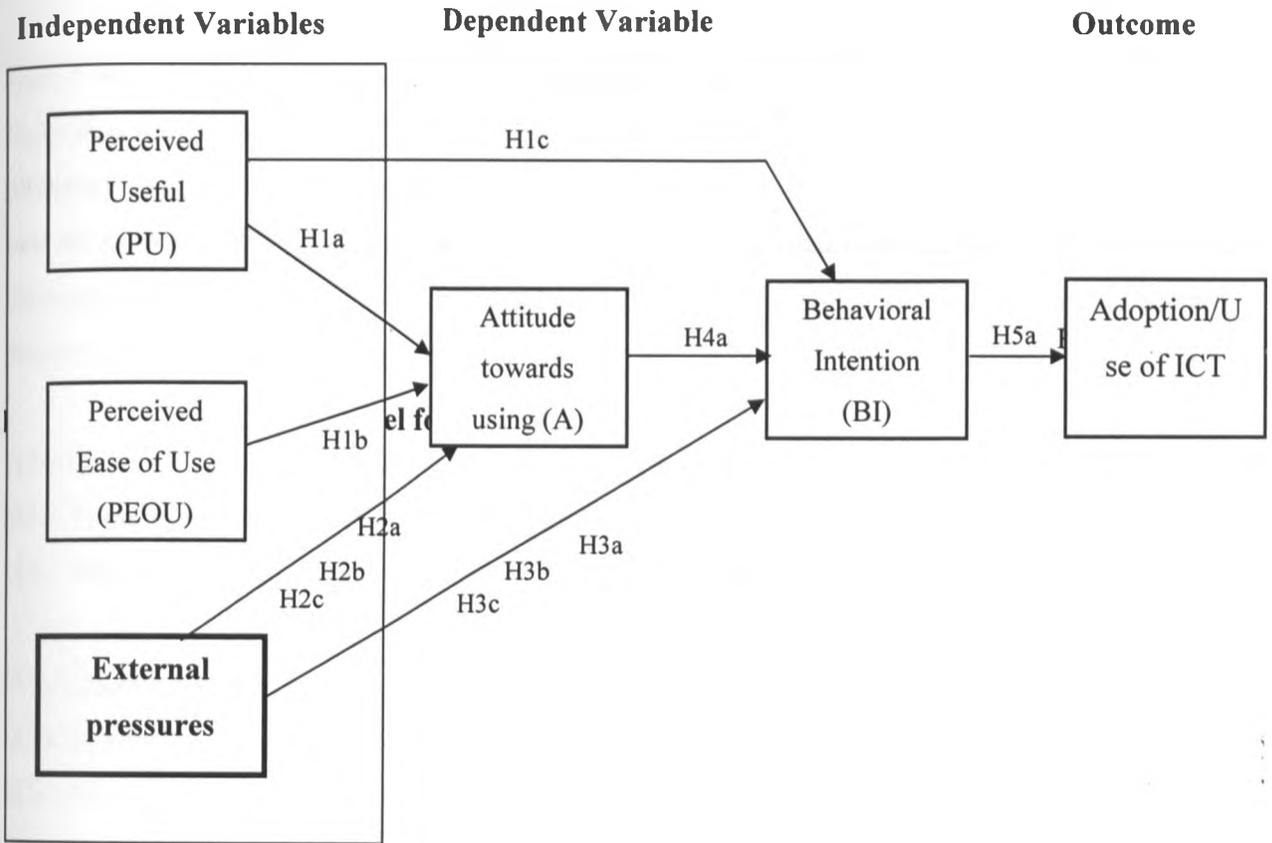
attitudes towards using ICT. The organizational influence processes affect the individual indirectly with the induced behavior.

External pressures were the construct of interest because it operationalizes how various organizational influence processes indirectly affect the person's intention to use ICT. The new model posits new relationships that were not empirically tested in Venkatesh (2000) and Venkatesh & Davis (2000). These relationships are described as hypothesis h2a, h2b, h2c and H3a, H3b, H3c.

TAM is used as the baseline and results in the following hypothesized relationships.

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H1a: Perceived Usefulness is positively related to Attitude toward Using ICT

H1b: Perceived Ease of Use is positively related to Attitude toward Using ICT

H1c: Perceived Usefulness is positively related to Behavioral Intention to use ICT

H1d: Perceived Usefulness is positively related to Perceived Ease of Use

Based on the proposed construct of Isomorphic pressures, the researcher hypothesized the following relationships. The basic assumption was that all the three processes of organizational influence were to have a positive effect on Behavioral Intention as well as Attitude, which in turn was to indirectly affect usage behavior. Empirical support of the hypothesized relationships was distinguished between the role of the three processes of organizational influences in shaping Behavior Intention and Attitude of teachers.

H2a: Coercive pressures is positively related to Attitude toward Using ICT

H2b: Normative pressures is positively related to Attitude toward Using ICT

H2c: Mimetic pressure is positively related to Attitude toward Using ICT

H3a: Coercive pressures is positively related to Behavioral Intention to use ICT

H3b: Normative pressures is positively related to Behavioral Intention to use ICT

H3c: Mimetic pressure is positively related to Behavioral Intention to use ICT

H4a: Attitude toward using is positively related to Behavioral Intention to use ICT

H5 : Behavioral Intention positively determines outcome to use ICT

CHAPTER 3

3.0 RESEARCH METHODOLOGY

3.1 Introduction

This chapter looks at the description of the research methodology that was used, the description of the target population and respondents, how sampling was done, the research instruments used, the data collection procedure and the statistical treatment that was utilized in analyzing the data that was gathered. A field study was conducted to test the new model. Data were collected from fifty five different individuals (teachers) from schools spread out across Kikuyu district. These individual working for different schools provided an opportunity to test the research model in real-world settings of IT implementations. The research sites represented different organizational contexts. Further, the types of ICTs were different across the sites. Such variability in organizational settings and types of technologies adds to the potential generalization of the research's findings.

The research used the new model which is based on TAM as the input. The new model was used to evaluate ICT use and adoption by teachers in secondary schools to enable the researcher to identify its strengths and weaknesses. The results were then used to adjust the model relative to the findings. The independent variables will be derived from computer use. However some extraneous factors may have had some impact on the results. These factors may include computer use at home or cybercafés by respondents. These factors were captured in the research instrument but it was not sufficiently possible to determine the extent to which they affected the results.

3.2 Target Population

The target population was secondary school teachers from Kikuyu district from schools that offer computer studies as a KCSE teaching subject. The justification here is that the survey was targeting schools that have teachers who are exposed to a computing environment. Therefore by extension such teachers were to be homogeneous in their knowledge and application of computers, Internet, and other ICT equipment. The assumption was that schools offering

computer studies at KCSE level could also be applying other ICT equipment like projectors and the Internet. The teachers were drawn from Kikuyu district schools. The schools were selected through convenience random sampling. The sample size included both public and private secondary schools.

3.3 Sampling & Sampling Procedure

The population of schools sampled was categorized into those that have at least a computer lab. From this category, sample units were drawn from various heads of departments in various subjects.

3.3.1 Selecting sampling technique

In probability sampling, researchers use a randomization process of element selection in order to reduce or eliminate sampling bias. But in non-probability sampling, one can use a variety of approaches to choose which persons or cases to include in the sample. With non-probability sampling, researchers use the subjective methods such as personal experience, convenience and expert judgment to select the elements in the sample. Most researches are based on non-probability sampling because of cost and time requirement. According to Malhorta and Peterson (2006), there are different types of non-probability sampling techniques:-

Snowball sampling: Here an initial group of respondents is selected, usually at random. Subsequent respondents are selected based on the referrals or information provided by the initial respondents.

Quota sampling: this is used when researcher tries to assure that the sample is representative of the population from which it is drawn.

Convenience sampling: the sample is obtained based on the convenience of the researcher.

Sample size

In order to obtain the required information with the least sampling error, the following equation was used Al Haouz (2002).

$$n = \frac{t^2 \times p(1-p)}{M^2}$$

Where

  n= required sample size

  t= confidence level at 95% (standard value of 1.96)

  p= percentage of teachers to be surveyed 95%

  M = margin of error at 5% (standard value of 0.05)

$$\therefore \quad n = \frac{1.96^2 \times 0.95(1 - 0.95)}{0.05^2}$$

$$n= 72.9$$

3.4 Research Instruments

The research used a questionnaire as the data collection instrument. A questionnaire is a printed self-report form designed to elicit information that can be obtained through the written responses of the subjects. The information obtained from a questionnaire is similar to that obtained through an interview but a questionnaire tends to have less depth (Burns & Grove, 1993). Data was collected with the aid of questionnaires to evaluate the availability and level of use of ICTs in secondary schools. Questionnaires have the following known advantages: They ensure a high response rate since they will be distributed to subjects to complete and return back personally to the researcher, They require less time and energy to administer, They offer anonymity because subject names will not required on the completed form, there will be less opportunity for bias since they will be presented in a consistent manner, most items in questionnaires are closed-ended making it easier to compare the responses to each other.

Questionnaires also have their weaknesses for example; there is the question of validity and accuracy (Burns & Grove, 1993). The subjects might not reflect their true opinions but might answer what they think will please the researcher and valuable information may then be lost as answers are usually brief.

Questionnaires were used to collect the data. One part focused on teacher use and application of ICT tools in the curriculum while the second part 1 focused on ICT use and adoption by the schools in general. The questionnaires consisted mostly of closed-ended type of questions and a

few open-ended questions which provided more diverse detail. Open-ended questions allow respondents to answer questions in their own words and provide the necessary detail required. Closed-ended constructs were measured on a five-point Likert-type scales, from 1 = strongly disagree to 5 = strongly agree. Closed-ended questions are easier to administer and analyze. They are also more efficient in the sense that a respondent is able to complete more closed-ended questions than open-ended items in a given period of time (Polit & Hungler, 1993). The questionnaires were administered in English since the mode of communication in secondary schools in Kenya is English, even though Kiswahili is Kenya's National language.

3.5 Validity & Reliability of instruments

3.5.1 Reliability

According to Polit & Hungler (1993), reliability is defined as the degree of consistency with which an instrument measures the attribute it is designed to measure. Reliability was ensured by minimizing sources of measurement error e.g. data collection bias. Data collection bias was minimized by the researcher being the only person who administered the questionnaire and standardizing conditions such as exhibiting similar personal attributes to all respondents e.g. friendliness and support.

3.5.2 Validity

The validity of an instrument is the degree to which an instrument measures what it is intended to measure, Polit & Hungler (1993). Content validity refers to the extent to which an instrument represents the factors under study. Questionnaires questions focused on the respondents' knowledge of ICT and their use in the secondary school curricula. Questions were based on the information obtained in Literature Review to ensure that they represented what the respondents should knew about ICT and ICT integration in education. The questions were formulated in simple language for clarity and ease of understanding. Clear instructions were given to the respondents.

The researcher tried his level best to ensure that the questionnaires were completed in his presence to prevent the respondents from using other persons to complete for them. External validity can be defined as the extents to which study findings can be generalized beyond the

sample used. The researcher ensured that all schools chosen in the sample, participated by completing the questionnaire. Generalizing all findings to all members of the population will hence be justified.

3.6 Data Collection Procedure

Questionnaires were personally distributed by the researcher to the respondents to complete. The data was collected over a period of two months

3.7 Data Analysis

Once data had been collected, it was organized and analyzed. For analysis of closed-ended questions, computer software, Statistical Package for Social Sciences (SPSS) was used. Data was analyzed using descriptive statistics and correlation analysis. Frequency tables were drawn and from these the data was then presented in the form of pie charts.

Open-ended questions were analyzed through quantitative content analysis with the aim of quantifying emerging characteristics and concepts. Concept analysis is the process of analyzing verbal or written communication in a systematic way to measure variables quantitatively, (Polit & Hungler, 1995).

CHAPTER 4

4.0 DATA ANALYSIS, PRESENTATION AND INTERPRETATION

This chapter deals with presentation and analysis of the findings and responses. The responses were obtained through the use of questionnaires, the research instrument in the study.

4.1 Response Rate Analysis

Response	Questionnaires	Response Rate (%)
Returned	55	77
Not Returned	16	23
Spoilt	4	5
Total	71	100

Table 4-1 Response Rate Analysis

School	Given	Received	% Received	Type of school
Alliance High	12	9	75%	Public
Alliance Girls	8	8	100%	Public
Moi Girls Kamangu	10	6	60%	Public
Rungiri Sec	6	5	83%	Public
Kirangari	9	6	67%	Public
Kikuyu Day Sec	7	5	71%	Public
Mai-a-ihii Sec	9	6	67%	Public
Kibiciku	6	6	100%	Public
Compuera Mangu	3	3	100%	Private
William Ngiru	1	1	100%	Public
Not Received		16	23%	
Spoilt		4	05%	
Useable		51	72%	
TOTAL			100	

Table 4.1.2 Response Rate from Schools in Kikuyu

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4.2 ICT Statistics in Schools

Statistics from the schools surveyed indicate that majority of schools have acquired computers and other ICT. Internet access was found to be 71.4%. the table below shows a summary of the ICT available to teachers in the schools surveyed.

		Comps in schools	Internet in schools	Radio in schools	TV in schools	Comps at home	Internet at home	Radio at home	TV at home
N	Valid	55	52	52	52	55	53	53	53
	Missing	1	4	4	4	1	3	3	3
Mean		1.0364	1.2308	1.3077	1.2692	1.1091	1.2453	1.0189	1.0189
Median		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Std. Deviation		.18892	.42544	.46604	.44789	.31463	.43437	.13736	.13736
Range		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Minimum		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Maximum		2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00

Table 4.2.1 ICT access to schools
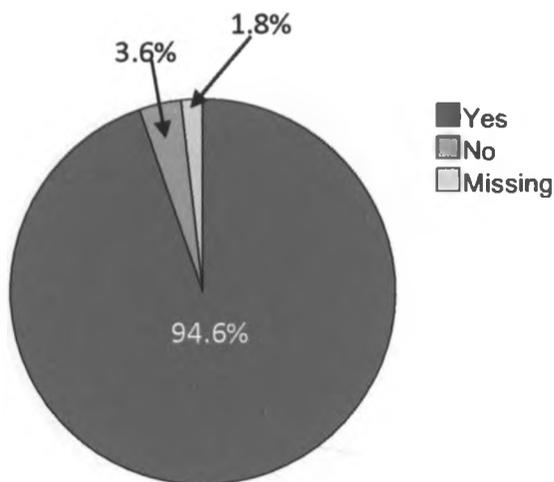
Fig 4.2.1 Access to computers by schools
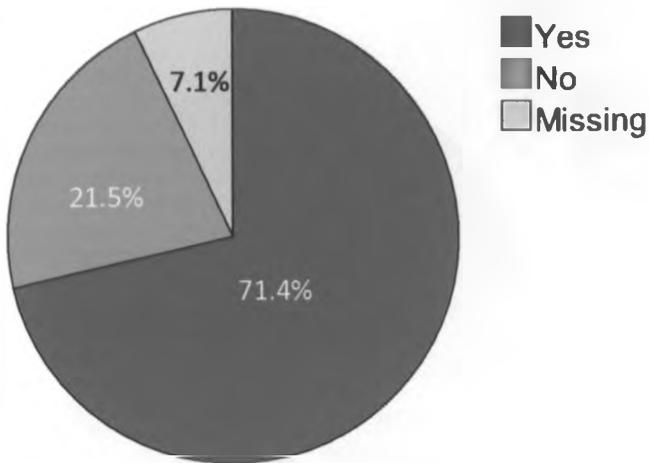
Fig 4.2.2 Access to Internet by schools

4.3 Demographic Characteristics of the Respondents

Demographic analysis shows that 46.40% of the respondents were between the age of 18 -35 while 51.8% were between the age of 36-50. 1.8% of the respondents did not indicate their age. 57.1% of the representation was from male, while 41.1 represented female. Again 1.8% of the respondents did not indicate their age group.
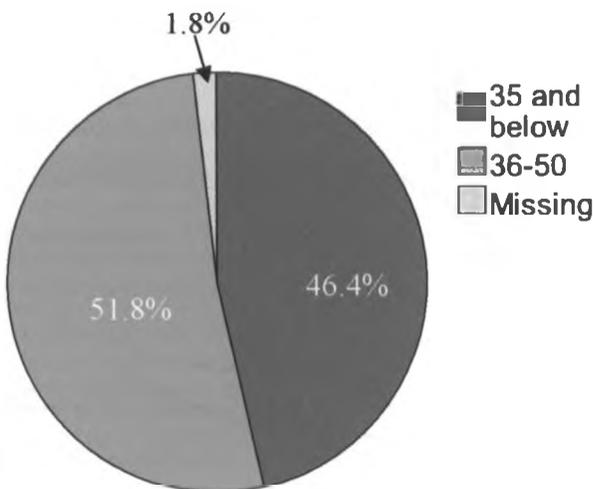
Fig 4.3.1 Age distribution of respondents
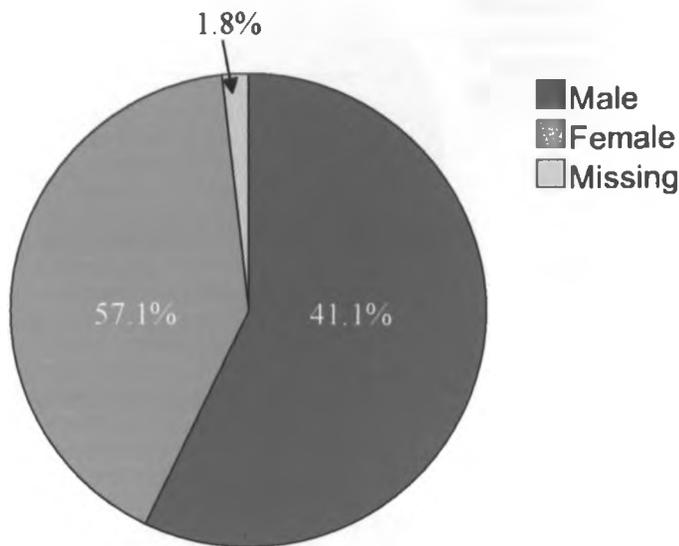
Fig 4.3.2 Gender distribution of respondents

4.3.1 Level of Education

The survey targeted the working population without discriminating their level of education. From the data collected, it was observed that most of those employed have at least a degree program and a good number are post graduates as shown in the figure below. This confirms that most of the teachers have had some formal post secondary education.

The sample studied indicated majority of the teaching force at least have a first degree. 71% had a Diploma, 78.6% had a Bachelors degree, while 12.5% indicated that they had a Masters degree. In terms of experience 37.5% had a working experience of less than 10 years, while 55.4% had a teaching experience of between 11-20 years and 5.4% had taught for 20 years and above.

In terms of subject study areas, 35.7% of the sample came from Math & sciences, 1.8% were from Math & Non-Science, 3.6% represented I.T-Alone, Languages were represented by 32.7, while Humanities by 14.5% and finally 10.9% represented other subject combinations e.g. math & Business Studies, Chemistry & Geography etc.

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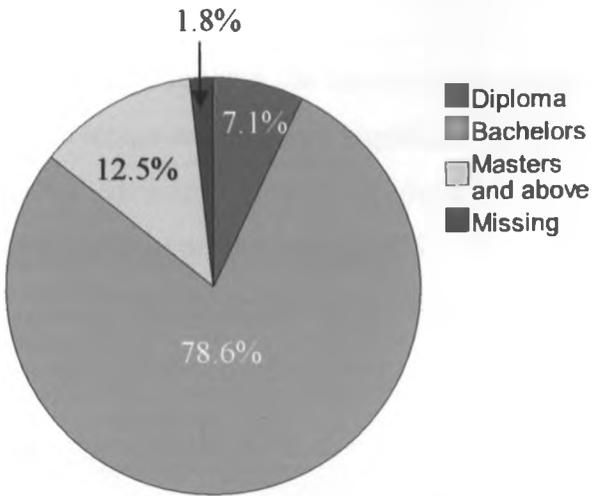
Fig 4.3.3 Education-Level distribution of respondents

Legend:
- Diploma
- Bachelors
- Masters and above
- Missing

1.8%
7.1%
12.5%
78.6%
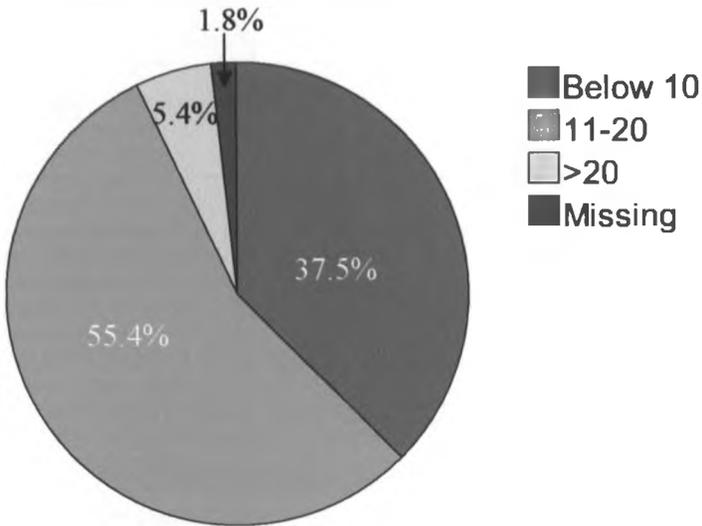
Fig 4.3.4 Teaching Experience of the respondents

Legend:
- Below 10
- 11-20
- >20
- Missing

1.8%
5.4%
37.5%
55.4%
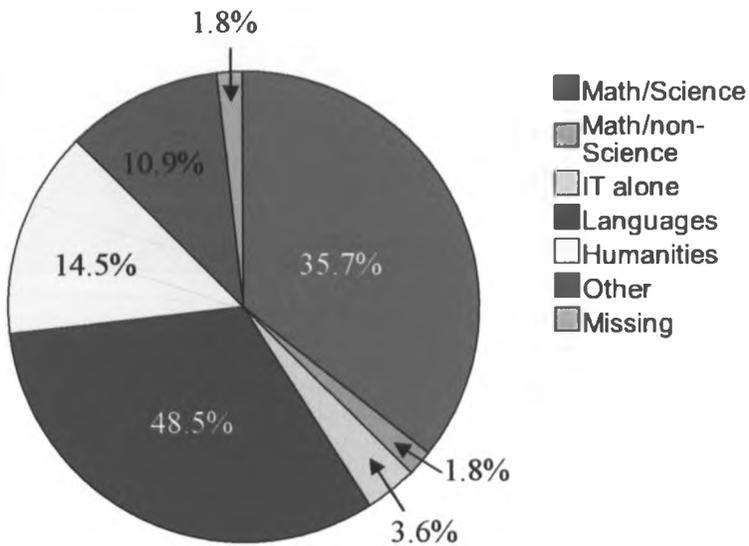
Fig 4.3.5 Teaching-subject distribution of respondents

Legend:
- Math/Science
- Math/non-Science
- IT alone
- Languages
- Humanities
- Other
- Missing

1.8%
10.9%
14.5%
35.7%
48.5%
1.8%
3.6%

From this it can be inferred that the literacy level of the teaching fraternity sampled in Kikuyu district is above average and this is a significant enabling factor that should drive adoption and acceptance of ICT. Besides the level of education, it was also observed that over 95% of the respondents are confident around the use of ICT (Computer). It is therefore safer to say that most teachers today can run applications and use the internet to download materials.

Demographic Characteristic		%
Age	18-35	46.4
	36-50	51.8
Gender	Male	57.1
	Female	41.1
Education Background	Diploma	7.1
	Bachelors	78.6
	Masters & Above	12.5
Teaching Experience	Below 10 years	37.5
	11 – 20 years	55.4
	More than 20 years	5.4
Area of Teaching	Math & Science	35.7
	Math & Non-Science	1.8
	I.T alone	3.6
	Languages	32.7
	Humanities	14.5
	Others	10.9

Table 4-2 Demographic Analysis

4.4 Analysis of Measurement Model

In the measurement model constructs were created by computing the item questions under each construct. Convergent validity and Discriminant validity were checked. Cronbach's validity testing was used to test convergent validity. Convergent validity ensures that items that should be related are in reality related. A high value for Cronbach's alpha indicates a high level of internal consistency for a construct. Cronbach's (alpha) is a coefficient of reliability. It is commonly used as a measure of the internal consistency or reliability of a psychometric test score for a sample of examinees.

Theoretically, alpha varies from zero to 1, since it is the ratio of two variances. Empirically, however, alpha can take on any value less than or equal to 1, including negative values, although only positive values make sense. Higher values of alpha are more desirable. As a rule of thumb, a reliability of 0.70 or higher is considered desirable.

Cronbach's alpha will generally increase as the inter-correlations among test items increase, and is thus known as an internal consistency estimate of reliability of test scores. Because inter-correlations among test items are maximized when all items measure the same construct, Cronbach's alpha is widely believed to indirectly indicate the degree to which a set of items measures a single unidimensional latent construct. Table 4-3 below summarizes Cronbach's alpha.

Cronbach's alpha	Internal consistency
$\alpha \geq .9$	Excellent
$.9 > \alpha \geq .8$	Good
$.8 > \alpha \geq .7$	Acceptable
$.7 > \alpha \geq .6$	Questionable
$.6 > \alpha \geq .5$	Poor
$.5 > \alpha$	Unacceptable

Table 4-3 Cronbach's Alpha

Table 4-4 below shows results of reliability test with some descriptive statistics, mean and standard deviation.

Construct	Measurement Instrument	Mean (STD)	Cronbach's Reliability (α)
Attitude	I find using computers and other ICT tools a wise idea	4.7455 (.43962)	.72
	I find using computers and other ICT tools in teaching my subjects a good idea	4.6364 (.48548)	
	I find using computers and other ICT tools in teaching my subjects a positive idea	4.6727 (.88306)	
	I find using computers and other ICT tools in teaching my subject a harmless idea	4.6182 (.91269)	
Behavioral Intention	I intend to use computers for communication with others	4.4364 (.60135)	.905
	I intend to use computers & other ICTs to teach in my subject	4.3818 (.70687)	
	I intend to use computers & other ICTs frequently to teach	4.3636 (.72937)	
	I intend to use computers for planning my work	4.3636 (.72937)	
Perceived Ease of Use	Learning to use a comp is easy for me	4.4364 (.91820)	.896
	I find Ms-Word & PowerPoint flexible to interact with	4.1818 (.86262)	
	I find it easy to use a comp	4.2000 (.96992)	
	I find it easy to get skillful help from a computer	4.1636 (.89781)	
	I find most comp programs easy to use	3.7273 (1.11313)	
	My interaction with a comp is clear & understanding	3.9273 (.92004)	

Construct	Measurement Instrument	Mean (STD)	Cronbach's Reliability (α)
Perceived Usefulness	Using Computers would improve my job performance	4.7636 (.50785)	.858
	Using Computers would enable me to accomplish tasks more quickly	4.6909 (50452)	
	I find comp useful in my job	4.7091 (.49713)	
	Using Computers would increases my productivity at work	4.7636 (.46997)	
	Using Computers would enhance my effectiveness in my subject area	4.6727 (.51116)	
	Using Computers would make it easier for me to deliver content in my subject area	4.6909 (.50452)	
Normative Pressures	I would use computers & other ICTs because of govt compliance	2.3818 (1.43360)	.830
	I would use computers & other ICTs because of pressures from other model schools	1.8727 (1.17149)	
Mimetic Pressures	I would use computers & others ICTs if my colleagues did the same	2.2364 (1.37388)	.876
	I would use computers & other ICTs if other schools were doing so	2.2182 (1.37020)	
Coercive Pressures	I would use computers & other ICT tools if there was a regulation	3.7636 (1.37388)	.562
	I would use computers & other ICT tools because of school policy	4.5273 (.92004)	

Table 4-4 Summary of means, standard deviations and construct reliabilities

4.4.1 Descriptive Analysis

Descriptive results show positive trend of each variable (Table 4-5). Almost all respondents (teachers) were found to be positive about the usefulness and ease of use of ICT tools. The highest mean value of 4.7 occurs in perceived usefulness and attitude towards ICT. The mean of 4.7 at perceived usefulness expresses the flexibility and significance of ICTs from a teacher's point of view. Also the other highest mean value in attitude towards ICT tools shows that teachers are very positive about technology use and application in their teaching. It explains the high favorable feelings and emotions of teachers towards ICT. They feel and think that using ICT tools would be both enjoyable and pleasant.

	PEOU	PU	BI	NORM	COERC	MIME	ATT
Mean	4.1	4.7	4.4	2.1	4.1	2.2	4.7
Median	4.2	5.0	4.5	2.0	4.5	2.0	5.0
Mode	5.0	5.0	5.0	1.0	5.0	1.0	5.0
Std. Dev	0.8	0.4	0.6	1.2	0.9	1.3	0.5
Sample Var	0.6	0.1	0.4	1.5	0.9	1.2	0.3
Range	3.0	1.0	2.0	4.0	4.0	4.0	2.0

Table 4-5 Descriptive Analysis

The second highest mean value of 4.4 is found in behavior intention. This figure shows that teachers highly regard the implementation of ICT in schools and subsequently in their teaching subjects. Perceived ease of use and coercive pressures each has a mean value of 4.1. Teachers find it easy to interact with ICT tools. It shows that education in an ICT environment would be easy, effortless and simple to be skillful. On coercive pressures it shows that teachers would rather obey orders from higher authorities so as to implement the usage of ICT tools in their work.

The mean values of normative pressures (at 2.1) and mimetic pressures (at 2.2) are rather low. They show a situation whereby teachers are not going to implement ICT tools in their teaching by aping their colleagues or other professional bodies.

4.4.2 Correlation Results

The Pearson Product-Moment correlation Coefficient (r), is a measure of the degree of linear relationship between two variables, usually labeled X and Y. In correlation the emphasis is on the degree to which a linear model may describe the relationship between two variables.

The correlation coefficient may take on any value between plus and minus one, i.e. $-1.00 \leq r \leq +1.00$. The sign of the correlation coefficient (+,-) defines the direction of the relationship, either positive or negative. A positive correlation coefficient means that as one variable increases, the value of the other variable increases; as one decreases the other decreases, and vice versa. Correlation values of all variables (N=55) are shown in Table 4-6.

		PEOU	PU	BI	ATT	NORM	COERC	MIMETIC
PEOU	R	1						
	Sig. (1-tailed)							
PU	R	.304*	1					
	Sig. (1-tailed)	.012						
BI	R	.524**	.615**	1				
	Sig. (1-tailed)	.000	.000					
ATT	R	.102	.397**	.363**	1			
	Sig. (1-tailed)	.230	.001	.003				
NORM	r	.065	.183	.073	-.016	1		
	Sig. (1-tailed)	.320	.090	.298	.454			
COERC	R	.240*	.271*	.276*	.164	.145	1	
	Sig. (1-tailed)	.039	.023	.021	.116	.146		
MIMETIC	R	.136	.302*	.255*	.062	.546**	.274*	1
	Sig. (1-tailed)	.161	.012	.030	.327	.000	.021	

*. Correlation is significant at the 0.05 level (1-tailed).
**. Correlation is significant at the 0.01 level (1-tailed).

Table 4-6 Correlation Analysis

The correlation between perceived ease of use (PEOU) and behavioral intention (BI), (r=.524, p=≤.001) show there is a positive and moderately strong relationship between the two variables.

The value indicates that teachers feel and believe that teaching using ICT tools would be easy and that teachers would have a positive emotional feeling about ICT tools. There was appositive correlation coefficient between behavioral intention (BI) and attitude (ATT), (r=.363, p=.003). According to the research model, attitude toward ICT use is the dependent variable while behavior intention is the outcome which leads towards the actual use of ICT. The correlation explains that if teachers have a positive emotional disposition towards ICT and if they think and believe that teaching using ICT tools is necessary, then they are practically willing to accept digital ways of imparting knowledge.

Also the correlation coefficient between perceived usefulness (**PU**) and behavior intention (**BI**), r=.615, p=≤.001, points to the fact that the relationship between independent variable and outcome. When teachers are convinced with the usefulness and importance of ICT tools in terms of efficiency and effectiveness that they bring in a teaching and learning environment, then this ultimately drives the willingness of the teachers in the practical use of ICT tools.

There is a weak positive relationship between perceived ease of use (**PEOU**) and attitude towards use of ICT (**ATT**), (r=0.102, p=.230), reflecting that according to this research teachers would not just merely adopt the use of ICT tools in their work simply because they perceive the tools to be easy to use.

The correlation coefficients between the external pressure constructs, namely Normative, Mimetic and Coercive pressures and attitude (**ATT**) were all found to weak and also not significant. Table 4-7 shows the external pressures construct relationship with attitude.

Construct	Pearson Coefficient (r)	Significance (p)	Inference
Normative pressure	-.016	.454	Weakly negative & not significant
Mimetic pressure	.062	.327	Weakly positive & not significant
Coercive pressure	.164	.116	Weakly positive & not significant

Table 4-7 Correlation between Normative, Mimetic and Coercive pressures with attitude.

This is to say that teacher's emotions to adopt ICT use will not be influenced by such external pressures.

On the other hand the correlation coefficients between the external pressures (Normative, Mimetic and Coercive) with behavior intention (BI) show mixed results as shown in Table 4-8 below.

Construct	Pearson Coefficient (r)	Significance (p)	Inference
Normative pressure	.073	.298	Weakly negative and not significant
Mimetic pressure	.255	.030	Weak positive and significant
Coercive pressure	.276	.021	Weak positive and significant

Table 4-8 Correlation analysis between Normative, Mimetic and Coercive pressures with behavior intention.

The relationship between behavior intention (**BI**) and Normative pressure (**Norm**), implies a very weak but positive relation which is also not significant. This implies that compliance to certain set bodies will not influence a teacher's intention to use ICT tools. However the relationship between mimetic pressures (**MIME**) and behavior intention (**BI**) shows a weak and positive relationship that is significant. Therefore this is to say that teachers are likely to be influenced to use ICT tools by copying what their colleagues elsewhere are doing. For example a teacher is likely to use ICT tool if their counterparts in well performing schools are using the same. And lastly the relationship between coercive pressures (**COERC**) and behavior intention (**BI**) also shows a positively weak relationship that is also significant. This indicates that teachers are likely to be influenced to adopt ICT tools through deliberate policies from higher authorities like the government and sponsors.

4.5 Results of Hypothesis

The following table summarizes the hypothesized relationship in the conceptual model.

Hypothesis path	Pearson Coefficient (Significance)	Result of Hypothesis
PU→ATT (H1a)	.397 (.001)	Supported
PEOU→ATT (H1b)	.299 (.013)	Supported
PU→BI (H1c)	.615 (.000)	Supported
COERC→ATT (H2a)	.164 (.116)	Not supported
NORM→ATT (H2b)	-.016 (.454)	Not supported
MIME→ATT (H2c)	.062 (.327)	Not supported
COERC→BI (H3a)	.276 (.021)	Supported
NORM→BI (H3b)	.073 (.298)	Not supported
MIME→BI (H3c)	.255 (.030)	Supported
ATT→BI (H4a)	.363 (.003)	Supported

Table 4-9 Results of Hypothesis

CHAPTER 5

5.0 SUMMARY OF FINDINGS, CONCLUSIONS AND RECCOMENDATIONS

5.1 Summary of Findings

Similar to earlier studies (Lee, Cheung, & Chen, 2005; Saadé, Nebebe, & Tan, 2007), this study confirms that TAM is a useful theoretical model in helping to understand and explain behavioral intention to use ICT. According to the original TAM, perceived usefulness and perceived ease of use are hypothesized to affect intention. Some parts of this research were consistent with previous research, whereas some parts were contrary to previous results.

Most schools (95%) under study indicated to having access to major ICT equipments including computers and the Internet and most teachers (90%) indicated to having access to various ICT equipments. The descriptive statistical analysis results indicate that teachers feel that teaching using ICT equipment would be simple and easy. Teachers would easily get skillful in understanding the pedagogy of teaching and learning. Teaching using ICT would be pleasant and interesting. Furthermore they feel that institutional pressures from the administration, government and other associates would go a long way in enhancing their adoption of ICTs in teaching. All these feelings develop positive emotional state of teachers' towards use of ICT, i.e. attitude towards ICT. There it can be concluded that most of the teachers have a positive attitude towards ICT and may easily accept better and advanced ways of teaching.

Of the external pressures, Coercive and Mimetic pressure are the most important constructs that affect behavioral intention. Therefore it is important that both the government of Kenya and secondary schools work together to come up with policies that will ensure that secondary schools use ICT (and in particular the computer) to teach. Even though the external pressures (coercive pressures, normative pressures and mimetic pressures) had no direct influence in teacher's attitude, these constructs were related to the behavioral intention towards adoption of ICT. These constructs should not be overlooked. It clearly demonstrates that teachers' are not ready to be forced to use, to comply with or to imitate their associates. School managers and the government

should instead come up with better ways of motivating secondary teachers on the benefits of applying ICT to teach. One possible solution is for the government and other stakeholders to develop more user-friendly and user-oriented e-learning content. Such a system will add new perception to the previous attitude and thus bring out more satisfaction. This satisfaction will in turn encourage teachers to make further use of ICT in teaching.

5.2 Answers to Research Questions

5.2.1 What are the predictors of ICT adoption by teachers that need to be evaluated?

The data collected showed that 94.6% of the respondents had ICT in their respective schools. Respondents have a positive attitude towards the use of ICT in their respective subjects. This is indicated by the high mean value of 4.7 under attitude towards use. There is equally a high mean value when it came to measuring Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) where the means were found to be 4.1 and 4.7 respectively. However when it came to measuring the new construct, External pressures, only coercive pressure reported a high mean value of 4.1. The other pressures, Normative and Mimetic means were very low at 2.2 and 2.1 respectively. This tells us that coercion should be added to the TAM model to form a complete picture for ICT evaluation in schools.

5.2.2 To what extend is the TAM relevant in evaluating ICT adoption by teachers in secondary schools?

The correlation results of the analysis based on Pearson Coefficient indicate that there were slight positive correlations between Perceived Ease of Use (PEOU) and Attitude at 0.397 and perceived Usefulness and Attitude at 0.299. The Pearson Coefficient between Attitude and Behavioral Intention was quite high at 0.615. These figures are indicative that the TAM is still relevant in evaluating technology acceptance though the low figures in the two relationships above point out to the fact that the expected norm was not fulfilled. Various reasons and theories can be used to explain this anomaly. However this is outside the scope of this study.

5.2.2.1 Strengths and Weaknesses of TAM

From the disccussions above the relationships between the constructs in TAM can be summerized by the following figure below. While TAM is still a popular model to evaluate technology acceptance, the relationships among some constructs were found to be weak or rather very weak.
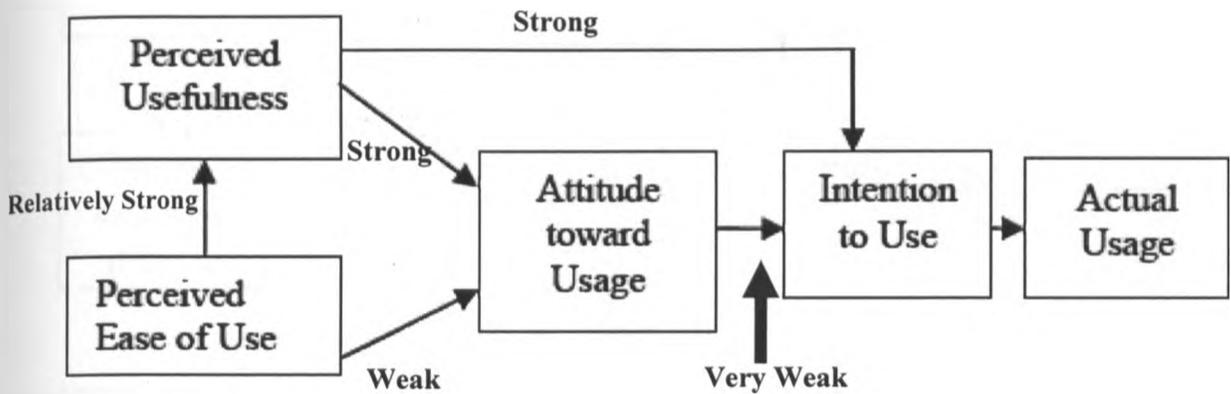
Fig 5.2.2 Strengths and Weaknesses of TAM

Source: Author

5.2.3 What dimensions need to be added to TAM to make it relevant in evaluating ICT adoption in secondary schools?

According to the results of the analysis and hypothesis discussed in section 4.5, pertaining to the new construct, only two of the External pressures are found to be relevant to be added to the TAM model - the relationship between Coercive pressures and Behavioral Intention (Pearson Coefficient, 0.275) and that between Mimetic pressure and Behavioral Intention (Pearson Coefficient, 0.258). Even though the positive relationships are weak but they provide new insights in using TAM as model in evaluating technology acceptance in schools by teachers.

5.3 The New Improved Model

Based on the discussion in section 5.2 above the improved model for evaluating ICT adoption by teachers in Kikuyu district is thus displayed below.
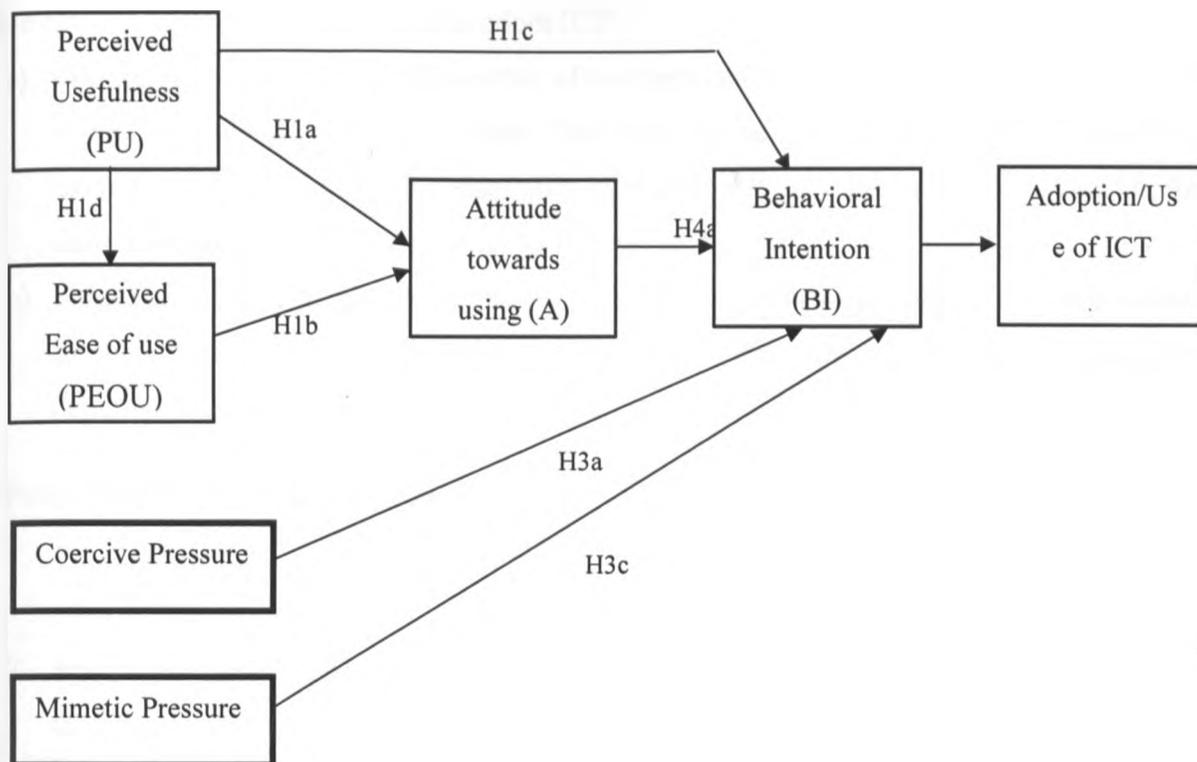
Fig. 5.3.1 New Model for Evaluating ICT adoption by teachers

Based on the research outcomes and hypothesis the above model can then be concluded to be the new improved model from the original TAM. According to the above model the following relationships can be explained as follows:

H1a: Perceived Usefulness is positively related to Attitude toward Using ICT

H1b: Perceived Ease of Use is positively related to Attitude toward Using ICT

H1c: Perceived Usefulness is positively related to Behavioral Intention to use ICT

H1d: Perceived Usefulness is positively related to Perceived Ease of Use in ICT

H3a: Coercive pressures is positively related to Behavioral Intention to use ICT

H3c: Mimetic pressure is positively related to Behavioral Intention to use ICT

H4a: Attitude toward using ICT is positively related to Behavioral Intention to use ICT

5.4 Implementation Strategy

Schools require an implementation strategy on how to roll out and adapt ICT. Below are some viable options that schools can follow to adopt ICT:

a) Pilot implementation: a small number of teachers can be enrolled to train on how to use computers and other ICT equipments. They will then be monitored closely to iron out any hitches and to conform to the feasibility of the project. Once the pilot is successful, the school can then roll out the program to the rest of the staff.

b) Phased implementation: a department can be approached to implement ICT on a subject by subject basis. Once successful in one department the same can be repeated on another department. This can go on until all teachers in the school adopt ICT in their teaching.

5.5 Preparing the Work Environment

1. Physical security: schools should check the security arrangements for computers and other ICT equipment.

2. Equipment: necessary equipment to facilitate adoption of ICT. Internet services can be tested from a school's location and reference materials with instructions availed. The ownership and/or terms of usage of equipment supplied must be specified. Schools will require to put in place a policy for determining how utility bills, licenses and insurance will be handled.

3. Support: Support teams/help desk need to put in place to respond to any problems that may be reported. If the service is to be outsourced, it is important that contractual agreements be in place before commencing on the project.

5.6 Change Management

Adopting ICT implies that it changes an organization's way of working often introducing new work flows and processes. Also affected is the style of management. Naturally some staff will try to resist due to various reasons. Proper training and effective communication mechanisms will have to be initiated.

5.7 Conclusion and Recommendations

The study discovered that 95% of schools under study had ICT facilities in place. However a small fraction (20%) of teachers in those schools actually uses ICT to teach. Most of the teachers were found to have a positive attitude as they think ICT would be easy to interact with and useful. The government of Kenya, sponsors and other stakeholders should come up with instructional policies that would see a large number of teachers adopt ICT as a teaching tool. The study showed that teachers are ready to use ICT if asked to do so by the authorities. This can only be implemented through a policy. Teachers are also likely to imitate their associates who are already using and applying ICT to teach. The government could perhaps develop model schools/institutions which can serve to strengthen the proposed model. There is a strong need to facilitate teachers by providing training and skill needed to understand and implement ICT use in teaching.

This research has some limitations that should be acknowledged. First, although Kikuyu district has many schools and therefore many teachers it was not practical to involve many members in the survey. Initially close to 100 questionnaires were given out the response rate was very slow prompting the researcher to make a thorough follow-up to get as many teachers as possible respond to the questionnaire. And even after making a personal follow-up a response rate of 70% was achieved. This raises a potential research issue in that future studies should seek ways to encourage more teachers to respond to survey questionnaires.

Second, this study focused on the context of high school teachers adopting and using ICT as a learning tool. The research did not classify their profiles in terms of subject teacher, class teacher, heads of departments, senior teachers, deputy or principal teachers. Future research should compare the different categories.

Finally there is still plenty of room for further research in this area to establish any hidden facts if any that could influence attitude towards ICT acceptance by teachers in secondary schools.

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Appendix

Appendix 1: Tentative Schedule

YEAR AND MONTH / ACTIVITY	2012 FEB	2012 MAR	2012 APR	2012 MAY	2012 JUN	2012 JUL	2012 AUG
Proposal write-up	■						
Presentation of proposal, correction and defense		■					
Pilot study and investigation			■				
Data analysis and Project write-up				■			
Progress presentation & Correction					■		
Summary & Conclusion plus final presentation						■	

Appendix 2: Budget Analysis

ACTIVITY	ITEM	QUANTITY	COST PER ITEM(Ksh)	TOTAL AMOUNT(Ksh)
Proposal Development	A4 paper	4 reams	800	3, 200
	Printing cartridge/Toner	2 Toners	7000	14,000
	Sub –total			**17,200**
	Photocopy- 40 pages	5copies	2	200
Data collection	Travelling			2,000
	Communication		10000	1, 000
	Sub-total			**3,000**
Final Presentation	Hard cover Binding	2	500	1,000
	Sub-total			**7, 000**
TOTAL				**24,200**
Contingency		10 percent		**2,420**
OVERALL TOTAL				**26,620**

Appendix 3: Map of Kenya showing location of Kikuyu
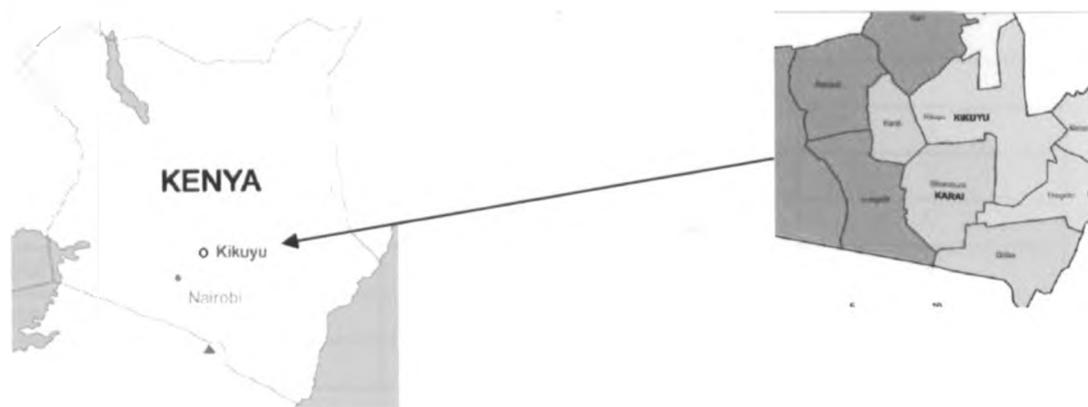
Appendix 4: Kikuyu District National Examinations performance for the last 5 years, KNEC, 2010

Year	2006	2007	2008	2009	2010
KCSE Mean	3.9504	4.4068	4.0684	4.1162	4.3852

Appendix 5: Schools within Kikuyu District

SCHOOL	CATEGORY	LOCATION	COMP LAB?
Alliance High	Public	Thogoto	Y
Alliance Girls	Public	Thogoto	Y
Mary Leakey	Public	Kabete	Y
Uthiru Girls	Public	Thogoto	Y
Moi Girls	Public	Karai	Y
Rungiri	Public	Kabete	Y
Kirangari	Public	Kabete	Y
Kahuho	Public	Muguga	Y
Musa Gitau	Public	Thogoto	Y
Kikuyu Day	Public	Thogoto	N
Mai-a-ihii St	Public	Thogoto	N
Karai	Public		N
Kabete	Public		N
Muguga Wagatonye	Public	Muguga	N
Kibiciku	Public		N
Renguti	Public		N
Gichuru Mem	Public		N
St. Kevins	Public		N
Nyathuna	Public		N
Kerwa	Public		N
Gathiga	Public		N
Muhu Sec	Public		N
Kanyariri	Public		N
Kikuyu Township	Private	Thogoto	N
Lay Canon	Private	Muguga	N
Green Garden	Private	Karai	y
Star Sheikh Academy	Private	Thogoto	N
St. Elizabeth Academy	Private	Karai	N
St. Lukes Sigona	Private	Muguga	N

Total No of Schools	**37**
Offering Computers/Have a Lab?	**10**
% of schools with Comp Labs	**27**

Source: www.kikuyu.or.ke/secondary (viewed on 7/11/2011)

District Education office, Kikuyu District (Ruth 0714265598)

Appendix 6: Research Letter

UNIVERSITY OF NAIROBI
COLLEGE OF BIOLOGICAL AND PHYSICAL SCIENCES
SCHOOL OF COMPUTING AND INFORMATICS

Telephone:	4447870/ 4444919/44446544	P. O. Box 30197 -00100
Telegrams:	"Varsity" Nairobi	Nairobi
Telefax:	254-020-4447870	Kenya
Email:	directorsci@uonbi.ac.ke	

Our Ref: UONBI/CBPS/SCI/MSC(IS)/2007   22nd June, 2012

To Whom It May Concern

Dear Sir/Madam,

RE: KIDI DAVID WILLIAM OKOTH. REG: P56/71348/2007

The above person is a Masters of Information Systems student at the University of Nairobi. His research project is on developing a framework for evaluating ICT adoption by teachers in Secondary schools in Kikuyu district. He needs to collect data in order for him to meet his research objectives. He has prepared a questionnaire to be filled by teachers.

Kindly assist him.

<div align="center">
School of Computing & Informatics
University of NAIROBI
P. O. Box 30197
NAIROBI
</div>

PROF. WILLIAM OKELO-ODONGO

DIRECTOR

SCHOOL OF COMPUTING & INFORMATICS

Appendix 8: Questionnaire

SCHOOL QUESTIONNAIRE

This questionnaire is part of a survey to investigate access, usage and application of Information and Communication Technology (ICT) by secondary schools in Kikuyu district. **The questions require you to indicate your answer by circling the applicable number.**

A. PERSONAL DETAILS

1. Name of school: ……………………………………….. Division/Location………………

2. Category of school Public = 1   Private = 2

3. Type of school: Boys = 1   Girls = 2   Mixed = 3

B. ICT ACCESS

4. Indicate the availability of the listed ICT hardware and software in your school

	1=Yes	2=No
ICT hardware		
Electricity infrastructure		
Computers		
Internet connectivity		
Radio		
Printer		
Scanner		
Television		
Projector		
ICT software		
Word Processor		
Spreadsheet		
Database Management Software		
PowerPoint		

THANK YOU FOR YOUR CO-OPERATION

TEACHER QUESTIONNAIRE

A. PERSONAL DETAILS

1. Name of school: …………………………………….. Division/Location………………

2. Gender   Male   = 1   Female = 2

3. Age 35 and below = 1   36 to 50 =2   Above 50 = 3

4. Education level Diploma = 1   Bachelors = 2   Masters and above = 3

5. Number of years in teaching below 10= 1   11-20 = 2   Above 20 = 3

6. Indicate your teaching subject(s)   Math & any science = 1   Math & Non-science = 2

    IT alone = 3   Languages = 4   Humanities = 5   Other (specify) ………… = 6

B. ICT ACCESS

7. Indicate whether you have access to the following ICT tools in the following locations

Location	Access to Computers		Access to the Internet		Access to Radio		Access to TV		Access to Others (Specify)	
	YES =1	NO=2	YES=1	NO=2	YES=1	NO=2	YES=1	NO=2	YES=1	NO=2
Institution										
Home										
Nearest Town										
Others (specify)										

C. ACTUAL USE OF ICT

8. Indicate the degree of your agreement with respect to the following statements.

Key: 1= Strongly Disagree (SD) 2 = Disagree (D) 3 = Undecided (U) 4 = Agree (A)

5 = Strongly Agree (SA)

Computer skill	1=SD	2=D	3=U	4=A	5=SA
I can start and shut down a computer					
I can use the Internet/e-mail					
I can use a word processor					
I can use spreadsheets					
I can use databases					
I can use PowerPoint					

8(b) Indicate (by ticking √ in the right space) your **frequency of use of the computer tasks** in school

Computer task	1=Never	2=Rarely	3=Occasionally	4=Frequently
Starting and shutting down				
Using Internet/e-mail				
Using a word processor				
Using spreadsheets				
Using databases				
Using PowerPoint				

8(c) Other than computer as an ICT tool, do you use any other ICT tool to teach in your subjects?

Yes   = 1   No   = 2

If yes please indicate the ICT tool(s) used...

(Television, Radio, etc)

8(d) Indicate by ticking √ in the right space) the **frequency you use the ICT tool** above for your school work with respect to the following purposes.

	Very often=1	Often=2	Rarely=3	Never=4
	e.g. everyday	Twice or more a week	Few times a month	
Teaching specific subjects				
Learning specific subject/disciplines(to stay abreast with emerging issues)				
Finding & accessing educational material				
Making presentations				
Preparing lessons				
Communicating with students				
Preparing lessons				
Others (specify)				

8(e) Have you received any training in ICT in the last three years? Yes = 1 No = 2

D. PERCEIVED EASE OF USE

9. Indicate (by ticking √ in the right space) the degree of your agreement with respect to the following statements.

Key: 1= Strongly Disagree (SD) 2 = Disagree (D) 3 = Undecided (U) 4 = Agree (A)

      5 = Strongly Agree (SA)

		SD	D	U	A	SA
1	Learning to operate a computer is easy for me					
2	I find MS Word and PowerPoint to be flexible to interact with					
3	I find it easy for me to get a computer to do what I want to do					
4	It is easy for me to get skillful help using computer programs					
5	I find most computer programs easy to use					
6	My interaction with a computer program is clear and understanding					

E. PERCEIVED USEFULNESS

10. Indicate (by ticking √ in the right space) the degree of your agreement with respect to the following statements.

Key: 1= Strongly Disagree (SD) 2 = Disagree (D) 3 = Undecided (U) 4 = Agree (A)

		SD	D	U	A	SA
1	Using computers would improve my job performance					
2	Using computers would enable me accomplish tasks more quickly					
3	I would find computers useful in my job					
4	Using computers would increase my productivity at work					
5	Using computers would enhance my effectiveness in my subject area					
6	Using computers would make it easier for me to deliver content in my subject area(s)					

F. BEHAVIORAL INTENTIONS

11. Indicate (by ticking √ in the right space) the degree of your agreement with respect to the following statements.

Key: 1= Strongly Disagree (SD) 2 = Disagree (D) 3 = Undecided (U) 4 = Agree (A)
     5 = Strongly Agree (SA)

		SD	D	U	A	SA
1	I intend to use computers for communicating with others					
2	I intend to use computers and other ICT tools in teaching my subjects					
3	I intend to use computers and other ICT tools frequently in teaching my subject					
4	I intend to use computers for planning my work					

G. ATTITUDE TOWARDS USING ICT TOOLS

12. Indicate (by ticking √ in the right space) the degree of your agreement with respect to the following statements.

Key: 1= Strongly Disagree (SD) 2 = Disagree (D) 3 = Undecided (U) 4 = Agree (A)
     5 = Strongly Agree (SA)

		SD	D	U	A	SA
1	I find using computers and other ICT tools a **wise** idea					
2	I find using computers and other ICT tools in teaching my subjects **negative** idea					
3	I find using computers and other ICT tools in teaching my subject a **harmful** idea					
4	I find using computers and other ICT tools in teaching my subject a **good** idea					

H. MEASUREMENT SCALES FOR EXTERNAL PRESSURES

13. Indicate (by ticking √ in the right space) the degree of your agreement with respect to the following statements.

Key: 1= Strongly Disagree (SD) 2 = Disagree (D) 3 = Undecided (U) 4 = Agree (A)

5 = Strongly Agree (SA)

Coercive pressures

		SD	D	U	A	SA
1	I would use computers and other ICT tools if there was a regulation by the Government or some other authority					
2	If my school (school where you work) adopted an ICT policy then I would use ICT tools to deliver content					

Normative pressures

		SD	D	U	A	SA
1	I would use computers and other ICT tools because of Government (e.g. KIE) compliance					
2	I would use computers and other ICT tools because of pressures from other model schools e.g. National schools					

Mimetic pressures

		SD	D	U	A	SA
1	I would use computers and other ICT tools because my colleagues where I work use the same					
2	I would use computers and other ICT tools because my colleagues in other neighboring and competing schools use the same					

THANK YOU FOR YOUR CO-OPERATION