DETERMINANTS OF ADOPTION OF INFORMATION AND COMMUNICATION TECHNOLOGY IN THE LEARNING PROCESS AMONG COLLEGE STUDENTS; A CASE OF KIBABII DIPLOMA TEACHERS' TRAINING COLLEGE KENYA.

BY

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A RESEARCH PROJECT REPORT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTERS OF ARTS IN PROJECT PLANNING AND MANAGEMENT OF THE UNIVERSITY OF NAIROBI.
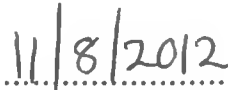
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DECLARATION

This project report is my own original work and has never been submitted for a degree award in any other university.

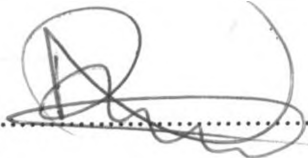.......*Mutekhele*..........   ...11|8|2012..........

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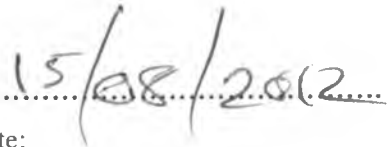
This research report has been submitted for examination with my approval as university supervisor.

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DEDICATION

This work is dedicated to my children: Brian, Cyril, Faith, Charlene and Abigael for their moral support during the preparation of this project report.

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To all my friends for the assistance offered in one way or another during my preparation of this research report, I say a big thank you. I thank my irreplaceable family for their support and prayers and finally, I give gratitude to the almighty God for the far He has brought me.

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LIST OF ABBREVIATIONS/ACRONYMS

ICT : Information and Communication Technology.

UNESCO : United Nations Education, Social and Cultural Organization.

MDGs : Millennium Development Goals.

EFA : Education for All.

KESSP : Kenya Education Sector Support Program.

ERS : Economic Recovery Strategy.

MOEST : Ministry of Education Science and Technology

CPF : Computer Practice Framework.

SITE : Society for Information and Teacher Education.

ISTE : International Society for Technology in Education.

ABSTRACT

Educational attainment is recognized as one of the fundamental indicators of development of a nation. The present world cannot think development of a country without Technical Education and Training. Yet, there is lack of information on the adoption of information and communication technology (ICT) in the tertiary institutions in Kenya. The purpose of this study was to determine the adoption of ICT in the learning process among college students by carrying out a case study of Kibabii Diploma Teachers Training College in Bungoma County. Specifically the study was to ; investigate how students demographic characteristics influence the adoption of ICT in the learning process, examine the extent to which the institutional environment influence the adoption of ICT in the learning process by students of Kibabii Diploma Teachers Training college, determine how the type of curriculum offered to students influences adoption of ICT in learning process and finally, assess the extent to which the student's background influences adoption of ICT in learning process. The study was guided by the theory of domestication, which looks beyond the adoption and use of ICTs to ask what the technologies and services mean to people, how they experience them and the roles that these technologies can come to play in their lives. The study was conducted through ex-post-facto design. Stratified sampling techniques were used to collect the data from a sample of 236 students of Kibabii Diploma Teachers Training College, nine(9) heads of departments and the college principal. Data was collected using questionnaires administered randomly to the respondents, and through interview schedules with H.O.Ds and the principal. It was pre-tested and coded in Statistical Package for Social Sciences (SPSS 17.5) and analyzed by frequency distribution tables, cross tabulation tables, descriptive statistics and, chi-square test. The study revealed that 64% of students who use ICT are male students, yet they do not extend the same to the learning process and the institution is poorly equipped in terms of ICT infrastructure. Another finding was that 62% of the teachers in the college do not use ICT in their lesson delivery. The study concluded that ICT has not been adopted in the learning process at Kibabii Teachers' Training College and the environment at the college has not been made conducive for ICT adoption in the learning process. From the afore said, this study recommends that the Government and policy makers should come up with strategies to sensitize people on the importance of embracing ICT, and the Ministry of Education should ensure implementation of the ICT policy by devising better monitoring and evaluation of ICT programs in schools and colleges and addressing emerging gaps. Emerging from this study it is suggested that more research be carried out among tertiary institutions to ascertain the findings of this study and research should also be carried out on science based institutions of this caliber to ascertain their levels of adoption of ICT in the learning process.

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Over the last decade, there has been exponential growth in the use of information and communication technology (ICT), which has made impacts both on the society and on people's lives. (Yuen, Law and Wong, 2003). The adoption of ICT has become a principle driver of economic and social changes worldwide. As ICT becomes ubiquitous and embedded in the modern society, they continue to offer the potential to restructure organizations, promote collaboration, increased participation by citizens in the country and make education and health care more accessible to the larger population, as well as foster cultural integration of people with different cultural backgrounds. (Kozma, 2010). The take up of computing and new participative approaches impact public services such as Government, the health sector, education and training. (Osimo, 2008; Ala-Mutka, 2008; Punie, 2008; Redecker, 2008). As Kozman (2005) opined, policy makers worldwide concur on the fact that education is among the public sectors that affect and is most affected by these developments. Further, the improvement of educational systems and increased educational attainment have enabled many countries to prepare for these global technological changes and within the education sector, ICT has been seen as a way to promote educational change, improve the skills of learners and prepare them for global economy and information oriented societies (UNESCO, 2002).

Although no comprehensive data on ICT in schools worldwide apparently exists, it is clear from many national examples that schools are also increasingly being equipped with ICT. It is also apparent that ICT equipment and internet connectivity is still much more abundant in North American schools and elsewhere (Geneus newsletter, 1998). In the United states, the ratio of students per computer dropped from 63:1 to 6:1 from 1985-1997 (market data retrieval 1998) while the number of schools with internet access has grown form 35% in 1994 (UN national Centre for Education Statistics, 1996) 72% in 1997 QEDs Educational Trends 1997. In south America the Chilean Government had planned to have 50% of primary schools and 100% of secondary schools connected to the national computer network by the year 2000. (Potashnik, 1996)

In Europe, more than 80% of schools in Slovenia have access to internet which is similar to percentages in developed countries.

In Asia similar developments are taking place. In Japan as of 1997, over 94% of public schools were computer equipped and 10% were connected to the internet. The Government had planned

to provide a pupil to computer ratio of 2:1 in middle schools and 1:1 in high schools in 1999. All the public schools in Japan were to be connected to the internet by 2003 (sekiguchi 1998). In china the central government intended to increase funding for basic, vocational and higher education projects and this plans included strategies to make increasing use of internet based educational program (Ning 1998) In Africa the creating learning networks for African teachers project part of the UNs harnessing information technology for development initiative had planned to equip a maximum of four teacher training collages in each of the twenty African countries with a computer and full access to the internet. The project was also to fund teacher training curriculum development and the creation of twenty national education www sites (UNESCO 1998). This few examples serve to illustrate that efforts to provide ICT and internet access to teachers and students in developed and developing countries around the world can be expected to continue and accelerate until most if not all schools are equip and connected in the next centaury (Blurton 1990)

Thus globally, ICT knowledge has been viewed to fundamentally affect the way humans do their work, learn and even develop their economies (Georgia, 2011). It is therefore not surprising to note that increasing attentions are being put into the use of ICT in education all over the world (Yuen *et al.*, 2003). The desire of countries to be globally competitive, grow economically and improve their social conditions has created a renewed interest for increased investments in educational improvements and enhanced application of ICT in learning institutions. At the global front, the Millennium Development Goals (MDGs) which have been adopted by the United Nation as the key development targets for the 21st Century mentions achievement of basic education as one of the goals. This goal builds on the Education for All (EFA) initiatives which was hatched in Jomtien (Thailand) in 1990 and reaffirmed at the second EFA meeting in Dakar (Senegal) in 1992. In the Dakar meeting (UNESCO, 1990), item 69 states;

"Information and communication technology (ICT) must be harnessed to support EFA goals at an affordable cost. These technologies have great potential for knowledge dissemination, effective learning and development of more efficient education services. This potential will not be realized unless the new technology serve rather than drive the implementation of education strategies. To be effective especially in developing countries, ICT should be combined with more traditional technologies such as books and radios and more extensively applied to the training of teachers."

In tandem with the above international aspiration, Kenya has developed policies to guide the integration of ICT into economic, social and educational programmes. In Kenya, the first stakeholders driven ICT policy was approved by the cabinet in January 2006 and an ICT policy document published through the Kenya Government Gazette notice of number 24 in March 2006 (KIC, 2006). The main theme of this policy was to develop a "prosperous ICT driven society" that recognizes and puts ICT at the centre of economic development. One of the main objective of the policy was to encourage the adoption of ICT and promote growth and development of e-learning across all levels of education in bid to leverage learning and teaching in the country.

Based on the national ICT policy, the Ministry of Education Science and Technology through sessional paper No. 5 of 2004, on policy framework, training and research whose vision was "quality education and training for development" targeted to achieve Education for All by the year 2015 (MOEST, 2005). The policy aimed to integrate ICT education and training into the education and training systems in order to prepare learners and staff and enhance the nation's ICT skills. In the year 2006, the Ministry of Education crafted the National Information and Communication Strategy for Education and Training" to enhance the adoption of ICT in the learning institutions.

The mission of the strategy was to integrate ICT in education for improved access, learning and administration (MOEST, 2006). ICT in education sector can be clustered in terms of e-Government (which aims at mainstreaming ICT in all government operations including education), EMIS (Education Management Information Systems whose aim is to furnish education managers and administrators with accurate and timely data for better and informed decision-making) and e-learning (which aim to mainstream in the teaching and learning process (MOEST, 2006). One way of doing this was to enhance adoption of ICT in learning institutions through equipping learning institutions on how to use the technology.

However, currently information on the adoption of ICT in the learning institutions in Kenya is unknown especially in the tertiary institutions.. It is on the above basis that this study sought to determine the adoption of ICT in the learning process among college students using the case of Kibabii Diploma Teachers Training College.

1.2 Statement of the problem

Many African countries envision being industrialized by the year 2020 and Kenya is no exception. The use of ICT has been tested to integrate many aspects that require deep thinking by the students because ICT envisage the realism of the subject under discussion among the students. Studies on ICT in secondary education by (Williams *et al* 2004; ICT Capacity Building project 2005) coincide with the worldwide emphasis placed on ICT in all facets of living including the ongoing learning process based on their findings, these studies go on to stress the need for relevant educational policy changes to accommodate ICT education in schools and teacher education curriculum. This policy initiatives and the "Political will will enable students at various levels of the schools system to attain IT skills and expertise and improve their performance and activities such as communication health education social and economic activities by employing affordable digital network infrastructure. Genuine commitment on the part of policy makers and educational leaders is necessary to prepare policy users including principal, teachers, students and parents. These studies revealed that the readiness of the stake holders especially teachers and principals is one of the major constraints in the successful development and implementation of ICT education in schools in their communities. The shortage of appropriately qualified teachers to take advantage of the pedagogical strength of ICT is also an issue and as Pelgium and law (2003; 58) comments. The prime focus of staff development in many countries has moved to the training of all schoolteachers so that they can make use of computers in their day –to- day teaching activities and the necessary staff development for principals and technology coordinators to lead and support ICT implementation across the curriculum.

Whether the above findings apply to Kenya is yet to be determined. It is therefore against this background that this study sought to determine levels of adoption of ICT in the learning processes among college students in Kenya by looking at the case of Kibabii Diploma Teachers' Training College.

1.3 Purpose of the Study

The purpose of this study was to investigate determinants of adoption of information and communication technology in learning process among college students; A case of Kibabii Diploma Teachers' Training college in Bungoma County.

1.4 Objectives of the Study.

The specific objectives of the study were:

1. To investigate how students' demographic characteristics influence adoption of ICT in the learning process at Kibabii Diploma Teachers' Training College.

2. To examine the extent to which the Institutional environment influence adoption of ICT in the learning process by students at Kibabii Diploma Teachers' Training College.

3. To explore how curriculum influences adoption of ICT in the learning process at Kibabii Diploma Teachers' Training College.

4. To assess the extent to which the students' background influence adoption of ICT in the learning process at Kibabii Diploma Teachers' Training College.

1.5 Research Questions.

1. How do the students' demographic characteristics influence the level of adoption of ICT in the learning process by students at Kibabii Diploma Teachers' College?

2. To what extent does the institutional environment influence adoption of ICT in the learning process by students at Kibabii Diploma Teachers' Training College?

3. How does the curriculum influence adoption of ICT in the learning process by students at Kibabii Diploma Teachers' Training College?

4. To what extent does the students' background influence adoption of ICT in the learning process by students at Kibabii Diploma Teachers' Training College?

1.6 Research Hypotheses.

1. There is no significant difference between adoption of ICT and student's age.
2. There is no significant difference between adoption of ICT and gender
3. There is no significant difference between adoption of ICT and student's background.
4. There is no significant difference between adoption of ICT by students and subject combination.

1.7 Significance of the study.

The significance of this study was both practical and scholarly. Educators' recommendations on how to best adopt ICT in learning in both teacher and technical Diploma training are useful to the Ministry of Education Science and Technology on how to best achieve the objectives of its ICT policy. It was also to benefit, educational leaders and students in society. Through this case study, readers were to know more about some of the factors hindering adoption of ICT in the learning process and hence develop strategies to overcome this scenario.

The scholarly significance of this study rested on the fact that it would provide information to members of the scholastic community regarding a gap in knowledge on why low levels of ICT adoption in learning and teaching persists. This is important for helping to ensure that decision making in education means better practices and not practices that hinder fulfillment of own national ICT policy.

1.8 Assumptions of the Study.

The study was based on the assumption that the participants would be co-operative and able to give the required information without any reservations and that the responses that would be given by the respondents would be a true reflection of the situation on the ground.

1.9 Limitation of the Study.

The use of the questionnaire as the only research technique had some limitations. For instance, the answers had to be accepted as final and there was no opportunity to probe beyond the given answer. The participants had to see all the items before responding to any one of them. This meant that the various answers could not be regarded as independent.

Availability of students to respond keenly could have been another drawback.

1.10 Delimitation of the study.

The research was carried out in Bungoma County and focused on Kibabii Diploma Teachers' Training College which is a public institution with students hailing from various parts of the country and with a total population of 768 students. These students are classified as 1st years, 2nd years and 3rd years and hence offer three different levels of experience as teacher trainees. The College has meaningful experience in training and is likely to respond to the questionnaire with relative ease. The researcher hails from and works in Bungoma County and hence has a wide understanding on the various structures of Kibabii Diploma Teachers' Training College.

1.11. Definition of key terms

Adoption of ICT in learning process: Ability of students to embrace ICT as a means of acquiring and supplementing the learning process.

Institutional Environment: Refers to the ICT Infrastructure, Teachers' competence in ICT, School managers' support and students: computer ratio in learning Institution.

Students' demographics: Includes students' gender, age, experience with ICT and class level in a learning Institution.

Student area of specialization: Refers to students' courses and specialization ICT demand.

Student background: Means area of residence and ownership of ICT gadgets.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter contains the literature review which appears under the following sub-topics: Background Literature on ICT adoption in learning institutions, Institutional factors affecting the adoption of ICT in the learning institutions, Role of students demographic characteristics on the adoption of ICT in learning institutions, Students area of specialization influence on the level of adoption of ICT in learning institutions, Students background influence on the level of adoption of ICT in learning institutions, Theoretical Framework, Conceptual framework and the Summary of the Chapter.

2.2 Background literature on ICT adoption in learning institutions

There is no single concept of learning through the use of ICT. Many different types can be envisaged: computer assisted learning, web-learning, computer-classes, online training, distance education, eLearning, virtual learning and digital training. Some look at its diffusion in specific sectors, such as tertiary education, while others compare these different sectors to see where diffusion is most widespread. Other approaches look at differences between countries. Consequently, its impact on the learning process should encompass not only traditional learning outcomes but also the use of ICT by teachers and students in the tertiary institutions. Moreover, there are different approaches to measuring the diffusion of ICT-enabled learning (Beynon, 2007; Bryson *et al.*, 2008). Most studies seem to agree however that the traditional approach of counting the number of computers (with or without Internet) according to the number of students in the classroom is an interesting and useful comparative indicator but not sufficient to indicate the impact of ICT on education (Barbieri and Light, 2005; Burgelman and Punie, 2006; Chua *et al.*, 2009). Therefore usage should also be taken into account, both quantitatively (e.g. frequency of use) and qualitatively (e.g. how are computers used, and for what), as well as usage both by teachers/instructors and students.

The need for ICT in learning institutions is widely acknowledged. Therefore adoption of ICT in learning institutions has been acknowledged widely in literature. Teachers, students, trainers, and other learning facilitators have to be given the knowledge, examples and time to "adopt" ICT in their daily practice (Clariana and Schultz, 2011). Empowering people in the learning institutions is therefore fundamental (Cartelli, 2006; HELIOS 2006). One of the problems is that today's teachers need to learn to teach with digital technologies while many of them have not been taught

to do so (Broos, 2010), while students also need to learn the use of ICT in schools. There in the learning institutions the emphasis on both the teachers and students should not just encompass ICT skills but rather a full understanding and complete mastery of ICTs as learning tools. In a recent Futurelab review of research on teacher education (Fisher *et al.*, 2011), two different views on how to develop teachers and students training on digital technologies are distinguished: retooling versus renaissance. The first instrumental model (retooling) consists of digitalizing analogue processes. This is seen as limited since it only attempts to capture, copy and disseminate elements of 'good practice' out of the context in which they were developed. It may appear to meet short-term needs, but does little to develop reflexive professionals capable of intelligent action in fast-changing contexts. The renaissance model, on the other hand, is a more comprehensive account of students and teacher development, as it is based on the strong involvement and empowerment of both the students and teachers to effect change.

The challenge identified by the authors is to make sure that the technologies resonate strongly with students and teachers' sense of professional and moral purpose so that they can employ digital technologies fully - that is, for understanding, reflection, ingenuity and creativity, and, through these, support their own learning in new ways. The problem is that there is very little fundamental research that investigates how students and teachers might learn with digital technologies. Such research is needed, but it must be seen in the light of a holistic approach since many studies have indicated that the broader canvas of globalisation and the information economy influence, both directly and indirectly and how ICT is changing the face of education (Fisher *et al.*, 2011).

Thus, policies on developing students and teachers ICT training should look not only at quantitative measures such as significant investments and numbers of training courses but also at the qualitative impact of the actions promoted. It is particularly interesting to note that these considerations emerge not only in countries where eLearning is still in the early stages such as Kenya (Omanga and Davis, 2009) but also in countries usually considered to be forerunners. This means that the need to re-think the role of ICT in learning institutions emerges clearly (HELIOS, 2006). The Future lab study reveals positive results from a review of a number of case studies on ICT adoption in learning institutions. Although they are not representative, most of these case studies highlight positive impacts of ICT adoption in learning institutions through training with digital technologies. Some of the benefits derived from the use of ICT in learning institutions

include: increasing teacher confidence and competence in the use of ICT resources by providing them fully equipped multimedia portable computers (MPTP) (Fisher *et al.*, 2011) or by supporting online teacher and students communication. The "Talking Heads online community" pilot showed that informal online communalization can help to reduce head teacher isolation; enable head teachers to generate and exchange insights regarding practices for school improvement; and provide an effective way for gaining quick access to a spectrum of perspectives on key topical issues (de Castell *et al.*, 2012).

Another 2002 pilot on learning to use ICT for science learning and teaching (reviewed by David, 2008) showed that for the 140 schools that participated, the impact of equipped computers (with relevant software, support by a technician and access to a dedicated website for information sharing) reached far beyond individual teachers. It prompted department-wide exploration of new teaching strategies and renewed enthusiasm for sharing and collaboration. As a result, this approach was extended in 2004 to other subjects in science teaching and integrated into the teacher training curriculum (Enhancing Subject Teaching Using ICT) (Fisher *et al.*, 2011). Therefore, when looking at the current widespread diffusion and use of ICT in modern societies, especially by the young – the so-called digital generation – then it should be clear that ICT will affect the complete learning process today and in the future.

Kenya is one of the countries in Sub-Saharan Africa (SSA) that has dedicated effort and resources to the promotion and implementation of ICT in education and training; and they continue to do so (Amutabi, 2010). There is, in other words, a widespread belief that ICTs have an important role to play in changing and modernizing educational systems and ways of learning. There is, however, little scientific evidence of the concrete contributions of ICTs to the teaching and learning domain especially in the tertiary institutions in Kenya, despite the efforts of the last decades. Hence, there is a need to bring evidence together on the impact of ICT on learning in the tertiary levels of education in Kenya.

2.3 Students demographic characteristics and the adoption of ICT in learning institutions.

Students constitute a significant group within the learning environment and their numbers (demography) plays even more important part in framing the activities that take place in the learning institutions. Indeed, it has been argued that when the numbers of students are high in their learning environment, they can shape social and educational processes including encouraging innovation and adoption of learning ideas (Pollard and Tann, 1993). Research has demonstrated that, from an early age, young people are capable of insightful and constructive analysis of their experience of learning in school and are able to comment on teaching approaches and contexts that are helpful in their learning (Brown and McIntyre, 1993; Harris *et al.*, 1995; McCallum *et al.*, 2000; Rudduck and Flutter, 2000), yet their numbers remain very important to influence a decision. A key component in acquiring such understanding may be attention to the 'learners voice' (Keys and Fernandes, 1993; Blatchford, 1996; Rudduck *et al.*, 1996). Rudduck and Flutter maintain that: *we need to tune in to what number of learners can tell us about their experiences and what they think will make a difference to their commitment to learning and, in turn, to their progress' (p. 75).*

Recent research show how students demographics has been linked either to the development of school-based strategies based on consultation with learners on effective classroom practice, or to aspects of curricular evaluation (Lord and Harland, 2000) but few studies have focused specifically on secondary pupils' views on their current classroom use of ICT in teaching and learning. Where students' perspectives have provided the focus for such inquiry in other educational settings, students' enhanced participation in learning activities and their development of successful learning strategies were attributed to the combined influences of – and interactions between – the technologies employed and the demographics and social milieu of the students (Pedretti *et al.*, 1998).

The popular image of young people referred to by Rushkoff, (1997) – growing up in an increasingly technology-dependent society, connected by sophisticated telecommunication networks in a culture mediated by television and computer, is that of natural computer users from a 'digital generation'. Recent studies (Holloway and Valentine, 2008; Becta, 2010; Facer *et al.*, 2011; Wellington, 2011) have begun to examine the nature and extent of young people's use of ICT outside school and the influence that it may have upon their learning with ICT in school. Whilst results indicate that the number of students (often those who use computers extensively at home) are capable of integrating their use of ICT in balanced and sophisticated ways (Furlong *et al.*, 2000), the indications are that this further accentuates inequities between such young people

and their peers who lack similar access to these technologies. Findings also show that whilst boundaries between home knowledge and school knowledge are being eroded, learners' experience of ICT takes on a different character depending upon the number of students who are using the ICT. Furlong *et al* found that at home, young people tend to control their own time, how they use technology and the content of what they do. In school, however, the locus of control lies elsewhere; emphasis is on learning activities managed by the teacher, metered by timetable constraints, designed to meet curriculum criteria and attainment targets and incorporate the mandatory use of ICTs as well as the number of students present in class.

Educators' knowledge and willingness to adopt ICT is often associated with demographic factors such as age and number of students present in class or those using ICT (Cox and Marshall, 2007). Demographic factors to educators' approach may have an impact on whether the ICTs could be integrated into the teaching and learning process. If an educator believes in and holds on to requisite number of students in class, he/she may not be likely to change his/her pedagogy to embrace ICT in teaching and learning. Conversely educators with belief systems more inclined to constructivist principles are more likely to view the number of learners in class as active participants in the learning process and therefore, readily integrate ICT in their teaching and learning practices (Fredriksson *et al*, 2007; Niederhauser and Stoddart, 2000).

At the core of effective integration of ICT in teaching and learning, lie capacities which go beyond mere access and ICT literacy. There is little point in providing large quantities of equipment if teachers do not have the attitudes necessary to change their classroom demographics (Ertmer in Jones, 2004). In the West, many researchers move from investigating environmental barriers of access to individual students characteristics like total number per class, number per computer and number of student per teacher (Hermans, Tondeur, van Braak, and Valcke, 2008; Mueller, Wood, Willoughby, Ross, and Specht, 2008). One key area of teachers' attitudes towards ICT is their understanding of how it will benefit their work and their students' learning if the numbers of students are manageable (Jones, 2004).

2.4 Institutional environment and the adoption of ICT in the learning institutions.

School learning environment, constantly refer to physical infrastructure, teachers and students as an integral part of the process (Kolb, 1984; Bruner, 1985; Muth and Alvermann, 1999). An analysis of research findings from nearly two hundred studies identified that institutional factors have the strongest impact on student learning (Cuttance, 2002). These school influenced practices

include classroom management, development of meta-cognitive and cognitive practices, and student and teacher interactions. Other institutional factors, which have a lesser impact on learning, include design and delivery of curriculum and instruction, classroom climate and organization (Cuttance, 2002). Whether these institutional factors also hold true for learning of ICT is yet to be verified by research findings.

Yet the integration of ICT in learning institutions currently being undertaken to accomplish many objectives and improve the quality of lessons in all subject areas may be limited by a number of institutional factors (CITSTE, 2009). Merely providing schools with hardware, software and in-service training is not enough if the institutional environment is not conducive for effective teaching and learning of ICT. Also, just filling schools with the necessary ICT materials and/or equipment neither improves the quality of instruction nor creates more effective learning environments if the institutional environment is not right (Mohammad, 2003). Teachers may receive adequate training on ICT technology, may have matched to curriculum's philosophy and theory of learning, and adequate numbers of computers within their reach but if the institutional environment is not conducive, they have been found to perform poorly in disseminating ICT knowledge to the students (Aceto *et al.*, 2003). Thus, all schools have to be equipped with the necessary ICT in order to provide the next generations with the needed tools and resources for access and use and to attain the expected skills, beside better learning environment (Cradler *et al.*, 2002). Collis *et al.* (2008) point out the importance of accessibility as: "…teachers' use of technology for curricular purposes is almost exclusively a function of their access to that technology. Any in-service training for teacher in schools needs follow-up support, peer coaching and peer dialogue to ensure successful utilization of new technologies. There must be active involvement of the teachers concerned and proper institutional arrangements in the whole change process so that there is the element of "ownership" of the innovation.

Contextually, different institutional environments bring about different challenges in implementation and utilization of ICT in the learning institutions (Colardyn and Bjornavold, 2004). For instance, in a classroom situation, one such factor is the ratio of learners to computers in the computer laboratory. A high learners-to computer ratio results in less exposure to the computer per learner and may result in one learner dominating the use of a computer while the others simply watch passively. This may lead to inefficient teaching and learning since not all

dslearners may equally benefit from the technology (Pelgrum, 2011). Therefore, embracing a broader vision and philosophy, schools should revise present teaching programs, practices and resources, and ICT should be integrated into all levels of an educational system for use in management, teaching and learning activities.

Infrastructure in schools is another contextual factor affecting ICT adoption in learning institutions. The infrastructure required for the use of ICTs in teaching includes physical space, furniture, electricity and internet connectivity (Levin *et al.*, 2009). While the availability of such infrastructure may not be a challenge in developing countries or in schools in affluent areas, their availability (or ease of acquisition) in disadvantaged schools is not guaranteed (Galanouli and McNair, 2009). Without a constant and reliable electricity supply, it is difficult for the regular running of ICT facilities in schools.

The institutional management also plays a significant role in the adoption of ICT in schools. In environments where there is a top-down management style with little consultation between levels, staff members feel coerced into using ICT and therefore do not use it effectively (Czerniewicz and Brown, 2009). Staff members feel constrained by a lack of institutional support and vision and many feel unsure of the direction they should take and the purpose that the use of ICT is meant to serve. Furthermore, research has shown that the vision, leadership and management provided in well-managed institutions enable the staff members to use ICTs more productively than their counterparts in institutions which are not well-managed (Cawthera, 2001; Guha, 2007; Harrison *et al.*, 2008).

As also concluded by King et al. (2002): *It is not necessarily the technology that has to be innovative, but the approach to teaching and learning as well as the learning environment must be" (p. 35).*

Therefore the integration of information and communication technologies in a conducive learning environment can help revitalize teachers and students. This can help to improve and develop the quality of education by providing curricular support in difficult subject areas in conducive learning atmosphere for the teachers and students (OECD, 2006). To achieve these objectives, teachers need to be involved in collaborative projects and development of intervention change strategies, which would include adequate teaching environment.

Preparing students for real life in technological and diverse world requires that teachers embed ICT in significant learning experiences devoid of disturbing environment (Ramboll Management, 2005). However, research studies show that most teachers do not make use of the potential of ICT to contribute to the quality of learning environments, although they value this potential quite significantly (Smeets, 2005). Harris (2002) conducted case studies in three primary and three secondary schools, which focused on innovative pedagogical practices involving ICT. Harris (2002) concludes that the benefits of ICT will be gained "...when confident teachers are willing to explore new opportunities for changing their classroom practices by using ICT" (p. 458). As a consequence, the use of ICT will not only enhance learning environments but also prepare next generation for future lives and careers (Wheeler, 2001).

The individual teacher is usually the one who makes the decisions on the classroom practices, also concerning technology. It is obvious that teachers use such tools and practices that support their beliefs about "good learning environment" and tools that fit easily into the existing conceptual and social organization of classrooms. As Marx, Bluemenfeld, Krajcik and Soloway (1998) noticed, that proper institutional factors mainly maintains the existing culture, and they have little potential for transforming teachers' work, or the nature of teaching and learning in classrooms. In the studies of Hakkarainen *et al.* (2001) and Moseley *et al.* (1999), it was found that there was a relationship between teachers' pedagogical conceptions and the quality of teaching/learning environment in the institutions.

Schools can shape teachers ICT ability. Teachers with good ICT skills used ICT more, and more often in a student-centered way (Moseley *et al.*, 1999; Hakkarainen *et al.*, 2001). In a study on the instructional use of software (Niederhauser and Stoddart, 2001), the results indicated that teachers who had supporting institutional environment and conducive learning atmosphere, used open-ended software had a strong learner-centred orientation and a weak computer-directed orientation, while teachers who had very poor institutional support had the strongest computer-directed and lowest learner-centred orientations. Lim and Barnes (2002) in their case study described, how schools who succeeded in using a digital application had success in using ICT in teaching, and had the necessary attitude, skills and knowledge to identify the cognitive opportunities and

limitations of the program, and to plan and organize activities to exploit its opportunities and address its limitations.

2.5 Curriculum and its influence on the level of adoption of ICT in the learning process

There are findings that link students' area of specialization and ICT adoption in learning institutions. Norton, McRobbie, and Cooper (2000) found that in some schools, students did not use ICT in learning because of a student-centered view that ICT is only useful in technological fields. Because the non-use was essentially based on such beliefs, students did not take any actions to increase their ICT-related expertise or access. Selwyn (1999) wrote about 'computer identity' in terms of the subjects and courses students take. These computer identities are shaped by many influencing factors, including learning environment, an individual's own personal interests, and crucially his or her identity as a student, including his or her identity as a student of a particular subject. In some subjects, students have a stronger congruence with ICT than in others, and learning is more closely related to ICT, e.g. music students were positive about the potential of new technologies both in performance and composition (John, 2005), while for English students computers were a natural tool for writing activities (Zhao and Frank, 2003). In general, probably for the time being, for a student identity it is not yet necessary to have a strong ICT competence and to use ICT, although ICT has spread widely to schools.

A review of 219 studies on the use of technology in education consistently found that students in technology rich environments experienced positive effects of computers in all subject areas (Look, 2005). In particular, Becta (2003) pointed out that ICT provide fast and accurate feedback to students, and speed up computations and graphing, thus freeing students to focus on strategies and interpretation. Further, use of interactive multimedia software, for example, motivates students and leads to improved performance. In fact, studies showed that more students finished high school and many more consider attending college where they routinely learned and studied with technology (Becta, 2003). Barak (2004) pointed further revealed that the use of ICTs in education would promote deep learning, and allows schools to respond better to the varying negfeds of the students.

Despite the apparent benefits of the use of ICT for educational purpose, studies showed that in many cases, the learning potential of ICT is deprived as many teachers are still not fully ICT literate and do not use it in their teaching. Studies on students' readiness for ICT generally, suggest that there is still a long way to go before learning institutions will be able to take full advantage of the opportunities provided by 21st century technology (Ya'acob et. al., 2005; So and Paula, 2006). Barak (2006) reveals that while students may exploit ICT for their own learning,

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they are cautious about integrating and learning advanced technologies in their core subjects. The study also suggests that while teachers recognize the potential of technology in stimulating students' learning and making school studies relevant to real-life contexts, they do not think that ICT is preferable for class-based instruction for promoting cooperation and reflection in learning of the individual subjects of the students.

To investigate the factors hindering students' readiness and confidence in using ICTs in their individual subject areas, Tella, *et al.* (2007) found that inadequate knowledge to evaluate the role of ICT in learning, lack of skills in the use of ICT equipment and software had resulted in a lack of confidence in utilizing ICT tools for individual subjects among the students. This is consistent with Preston (2000) who concluded that lack of technical support to be key inhibitor to the use of ICT in classroom for students in handling their individual subjects. As shown by Bradley and Russell (2007), recurring faults, and the expectation of faults occurring during teaching sessions have reduced teachers' confidence and caused many students to avoid learning ICT in their individual subjects. In addition, obstacles such as access to equipment, time pressures, lack of mentor and opportunities for apprenticeship of observation also have an impact on students ability to use ICT (Slaouti and Barton, 2007). Further, students' workload in their individual subjects and time management was found to be inhibiting the implementation of computer instruction in classroom (Guha, 2000).

Some case studies have especially examined the impact of using ICT on the changes on individual subjects. ICT skills were taught in a context integrated into the curriculum and as part of complex skills such as information handling, collaboration and communication, and were embedded in an authentic context (Kozma, 2003b; Voogt and Pelgrum, 2005). Students skills in ICT, problem solving, information management, collaboration and communication (often called "lifelong competencies") develop when ICT is used in a student-centered way (Kozma, 2003a; 2003b; Lowther *et al.*, 2003; Voogt and Pelgrum, 2005). There also arose a need to support students' information searching and processing skills (Ruthven *et al.*, 2005). *Learning projects* became student-centered; they were longer, more time-consuming processes, and many of the ICT-based innovations involved multidisciplinary and collaborative projects, such as project-based learning and independent inquiry (Kozma, 2003b; Lowther, Ross, and Morrison, 2003; Ruthven, Hennessy, and Deaney, 2005; Yuen, Fox, and Law, 2004). The proportion of authentic activities increased, and students worked on topics meaningful to them because of the connection to real

life and the student's own experiences (Voogt and Pelgrum, 2005; Yuen *et al.*, 2004). The students' role changed, they were engaged in general and/or online inquiry, and in productive learning (Yuen *et al.*, 2004), which developed their sense of capability and agency (Ruthven *et al.*, 2005), and collective cognitive responsibility (Lakkala *et al.*, 2007).

Using student voice to discover personal perceptions of subject matter, the teacher and teaching practices, and of the cultural and social circumstances (key aspects of the milieu) will significantly add to the body of knowledge about individualized learning with ICT in school environments. But while there is a great deal of studies about how ICT is being used in studies of individual subjects in developed countries, there is not much information on how ICT is being integrated into schools in developing countries (Beukes-Amiss and Chiware, 2006). This persists even for the tertiary learning institutions in Kenya.

2.6 Students background and adoption of ICT in learning institutions.

Pozo and Stull (2006) highlighted the importance of the initial provisions (secondary studies and competence in mathematics) in success at university. The secondary performance also depends on socio-economic variables. The students who come from underprivileged socio-economic environments have worse school performances than the less underprivileged students (Conger *et al.*, 1997; Haveman and Wolfe, 1995; Wilson, 1987). Bratti *et al.* (2007) show that the differences in student performance can be explained by the differences between the areas in economic terms of structures, regional leisure, type of institutions and the individual characteristics of the students (family and social characteristics).

Didia and Hasnat (1998) examined the determinants of student performance on an introductory finance course. They found that age, as a measure of maturity, had a significant influence on performance. Reid (1983) focused his study on an introductory university economics course and also found that age was a significant variable, with older students performing better than younger ones. Jaggia and Kelly-Hawke (1999) included variables concerning school inputs and student's family background in order to test whether these two variables influence student performance. They found that higher levels of spending did not have any consistent relationship with student performance. However, family background was clearly very important in explaining differences in achievement.

There seems to be a very close link between the ICT revolution and the socio-economic variables. Family structure, social environment and related variables are not sensitive to ICT, yet ICT may act on secondary education and contribute to better achievement. However, ICT may have an impact on students' motivation. Becker (2000) found that ICT increases student engagement, which leads to an increased amount of time students spend working outside class.

The present-day students are essentially in a different situation from previous generations, with the large majority of students having ICT skills that are of a different type from their teachers' (and parents'), often better and wider; even the time spent using a computer efficiently supports the improvement of ICT skills. It is obvious that for the younger generation using ICT is easy and ordinary, characterizing a life-style consisting of the functions of both working and learning, as well as functions of leisure time, like gaming or uploading and listening to music. Nardi and O'Day (1999) call this phenomenon 'information ecology', by which they mean a system of people, practices, values and technology in a certain environment. In such an "ecosystem", technology in not in the centre but it is integrated into the existing practices and manners, and users and tools form a wide variety, complementing each other. There is a cultural gap between students and teachers in terms of the digital world, and, as mentioned in Pedersen *et al.* (2006), very few teachers know what is going on in the digital world of a 13-year-old student (see also Ilomäki and Rahikainen, 2001). This differentiation and students' ICT competence are challenges for teachers because the digital skills are nowadays basic skills, such as reading and writing (Pedersen *et al.*, 2006). Digital skills divide into very different sub-skills of which only some are important and used in school. As presented above, students' informal learning of ICT and experiences in using ICT are far more attractive than the school can typically offer.

As a result, students face few challenges in using ICT in school. Moreover, there is probably in every school a group of students with high-level expertise in ICT. These "student-experts" have the kind of adaptive expertise which is useful in novel situations with technology: they learn quickly in practice, they have networks to help and give guidance, they are committed, and they are not afraid to face challenges. Only seldom can these students gain from the ICT use in school, although they could be an important source of help and support at school level.

There is no need to over-romanticize the younger generations' ICT competence but it should certainly have an effect on classroom practices and on the teacher's role, and as such, it is a

challenge to teachers; in general, a challenge that is not met, as e.g. when Erstad (2007) describes the different strategies that teachers used when facing students' better ICT competence. Some teachers competed with students, to some it was a challenge for their didactic and subject-oriented skills, while others teachers simply ignored computers. Especially Internet services challenge previous practices of working and learning. Weller (2007) suggests that the essence of the Internet is in robust, decentralized, and open communication; these technological features have also become social features and influenced the social values of the net. Many virtual communities have adopted these, but, as Weller says, these elements do not characterize learning communities, not even e-learning communities. Yet, the new generation of learners will become used (and some of them already are) to these features and they demand them also in the learning communities. The challenge is how to integrate the technological possibilities, the sophisticated communication strategies of the learners used to the Internet, and the formal structures of learning organizations.

There are some characteristics in students' ICT skills which are essential when thinking about the use in school. Students' ICT skills are often learned in informal learning contexts, at home and with friends; this concerns boys especially (reported in several studies, see e.g. Eurydice, 2005). In their study, Ruthven *et al.*, (2005) say that sometimes this informal learning means insufficient or odd ways of working, and that especially the information-processing skills need support: students' searching procedures are inefficient and they need more systematic guidance to develop these. Similar findings were reported, for example, in a study on sixth grade children studying science (Wallace, Kupperman, Krajcik, and Soloway, 2000): students were not very effective in finding useful information (but students were well engaged and involved in the inquiry and search activities). In another study on literacy skills of sixth grade children (Bowler, Largeb, and Rejskindc, 2001), the researchers found that fact finding skills were inadequate, and efficient use of the web implied a background of knowledge about computers and inquiry.

Students did not understand their role as knowledge makers and the need for responsible use of information. As the authors say, understanding that one must back up statements and opinions with reliable proof should be seen as a life skill, but such understanding was missing. They emphasized further that the needs and abilities of grade-six students do not match the design of the Web. As a matter of fact, information searching in the Internet is not easy for older students, either, as studies among upper secondary school students and experienced adult graduate student Internet users showed (Kiili, Laurinen and Marttinen, 2008–2009; Nachmias and Gilad, 2002).

Most of the upper secondary school students only seldom evaluated the credibility of information, and the evaluation of relevance was more important than the evaluation of credibility. Some students did not find relevant and correct information, although teachers were not aware of this and they trusted the students' information skills too much (Kiili, Laurinen and Marttinen, 2008–2009).

Similarly, the search processes of adults were ineffective and often unsuccessful (Nachmias and Gilad, 2002). Lallimo, Lakkala and Paavola (2004) present in their reviews that the starting point for effective information-seeking with technological support is embedded in a sound theoretical understanding of the information seeking process, as it is intertwined with meaningful pedagogical practices. The authors put the question whether ICT presents totally new challenges for students' information-seeking skills, or is it more a question of supporting students' basic information-seeking skills regardless of the technology.

The socio-economic context of the learner may also affect ICT adoption at school. In affluent settings, many learners have access to computers at home, and should therefore be confident with the use of the technology within the schooling environment (Muller *et al*, 2007). In contrast, many learners in schools in disadvantaged areas do not have these amenities at home and, therefore, are less familiar with their use. Such learners will have a low propensity to the use of the computers (Bovee *et al*, 2007). This agrees with Chigona *et al* (2010) when they report that most of the learners in disadvantaged schools do not have computers at home so that they (learners) are introduced to such technologies for the first time at school.

Similarly, educators who come from less privileged socio-economic settings are less likely to have computers at home. Because they are less likely to constantly use a computer, their skills are less advanced compared to more regular users. A key role of education is to empower students with skills and attitudes that are essential to their success in our knowledge society future. Cuttance (2001) suggests that new ways of thinking and solving problems in supportive classroom learning environments require well-developed motivation, self-regulation strategies and meta-cognitive capacities to engage students successfully.

A central aim is to ensure students, such as those in the middle-years, acquire essential information skills (Barratt, 1998) appropriate to the knowledge society, and to nurture modes of learning, or learning styles, such as visual, auditory and kinesthetic (Hinkley, 2001) to maximize the learning potential of individual students. This means that a new challenge confronting education is concerned with meeting the needs of *all* students: personalized learning where learning is designed around students needs (Hargreaves, 2004). Hargreaves (2004) highlights the importance of 'nine gateways' to personalizing learning-curriculum, workforce, organization, student voice, mentoring, advice and guidance, new technologies (ICT), assessment for learning and learning to learn, with each potentially "enhancing student motivation and commitment to learning" (p 7). This paper is concerned with two of the aforementioned gateways to personalizing learning: student voice the use of new technologies (ICT).

It would be meaningless to say we are personalizing learning unless we involve them [students] in the process" (Hargreaves, 2004:10). Practices that focus on designing curriculum experiences have been encouraged as central features of reform initiatives to improve the quality of learning in schools. The use of student voice benefits teachers and therefore possible changes to teaching practice and curriculum experiences. In this context, this paper considers student voice from middle-years students (early adolescents), Years 5 to 9, from Victorian Government schools. The voice of students is able to make a significant contribution to what they regard are important factors, particularly with the use of ICT, that affect learning. Furthermore, the need to consider personalized learning adds to the importance of identifying with students in an effort to improve student performance.

2.7 Theoretical Framework.

Domestication is described as the process of technology adoption into everyday life. The concept of domestication was originally adapted from other disciplines such as anthropology and consumption studies, as well as from the media studies considering the context in which ICTs were experienced by the people using them (Haddon, 2006). According to Haddon (2006) the framework looks beyond the adoption and use of ICTs (as well as gratifications or benefits) to ask what the technologies and services mean to people, how they experience them and the roles that these technologies can come to play in their lives. The processes observed in this framework are about how individuals encounter technologies and deal with them, sometimes rejecting them and

at other times accepting them (Haddon, 2006). Domestication consists of three main processes namely *Commodification*, *Appropriation* and *Conversion* (Frissen, 2000). Some researchers split the appropriation stage into Objectification and Incorporation stages, thus making four stages (Habib, 2004). In this study the researcher adopted the four stage process of domestication.

Commodification (also known as imagination) refers to the way a technological product is designed and is given an image by the users as it emerges into the public space. At this stage symbolic and functional claims about the product are noted. The images could be a result of an advertising campaign. The product is evaluated on how well it would fulfill the consumers' perceived needs (Habib, 2004). In the case where the consumer has a choice of adopting, the commodification process may affect his/her decision to acquire the product. Once purchased by an individual or an organisation, the product or object goes through a process of *appropriation*. At this stage the product is possessed by the owner and becomes authentic. When looking at appropriation, the objectification process is considered to examine how the product finds space and enters the geographical area of the owners. Objectification does not necessarily mean the product is accepted by the potential adopters. Products entering the school sphere may not be immediately integrated into its pedagogy. The product is then incorporated into the daily routines of its owners. Incorporation begins by first integrating the product in temporal structures both formally (in the work schedules) and informally (in the routines and habits).

In the *conversion* stage, the adopters of the innovation show their adoption by displaying it to the outside world physically or symbolically (Habib, 2004). In case of ICT for curriculum delivery, the display could be by individual teachers within a school environment or by the entire school as an adopter displaying to other schools. The first two stages of the domestication process are equivalent to what is normally referred to as adoption in most adoption frameworks (Pedersen and Ling, 2003). Thus, it is noted that the domestication framework allows for investigating the processes beyond the acquisition of the technology.

In this review the researcher employed the domestication framework as the lens to understand: how the educators are domesticating ICTs in their pedagogy; and the factors affecting integration

of ICTs in the schools. The domestication framework has been used to study the adoption processes of a variety of technologies including personal computers, televisions and mobile phones (Perdesn and Ling, 2003). Again it should be noted that although the framework has been widely used to study person ,organization ,household or institutional adoption of technology including ICT and therefore was found to be very suitable in the current study where ICT is adopted for teaching/learning in Tertiary institutions.

2.8 Conceptual framework

Independent variables   **Moderating variables**   **Dependent Variable**
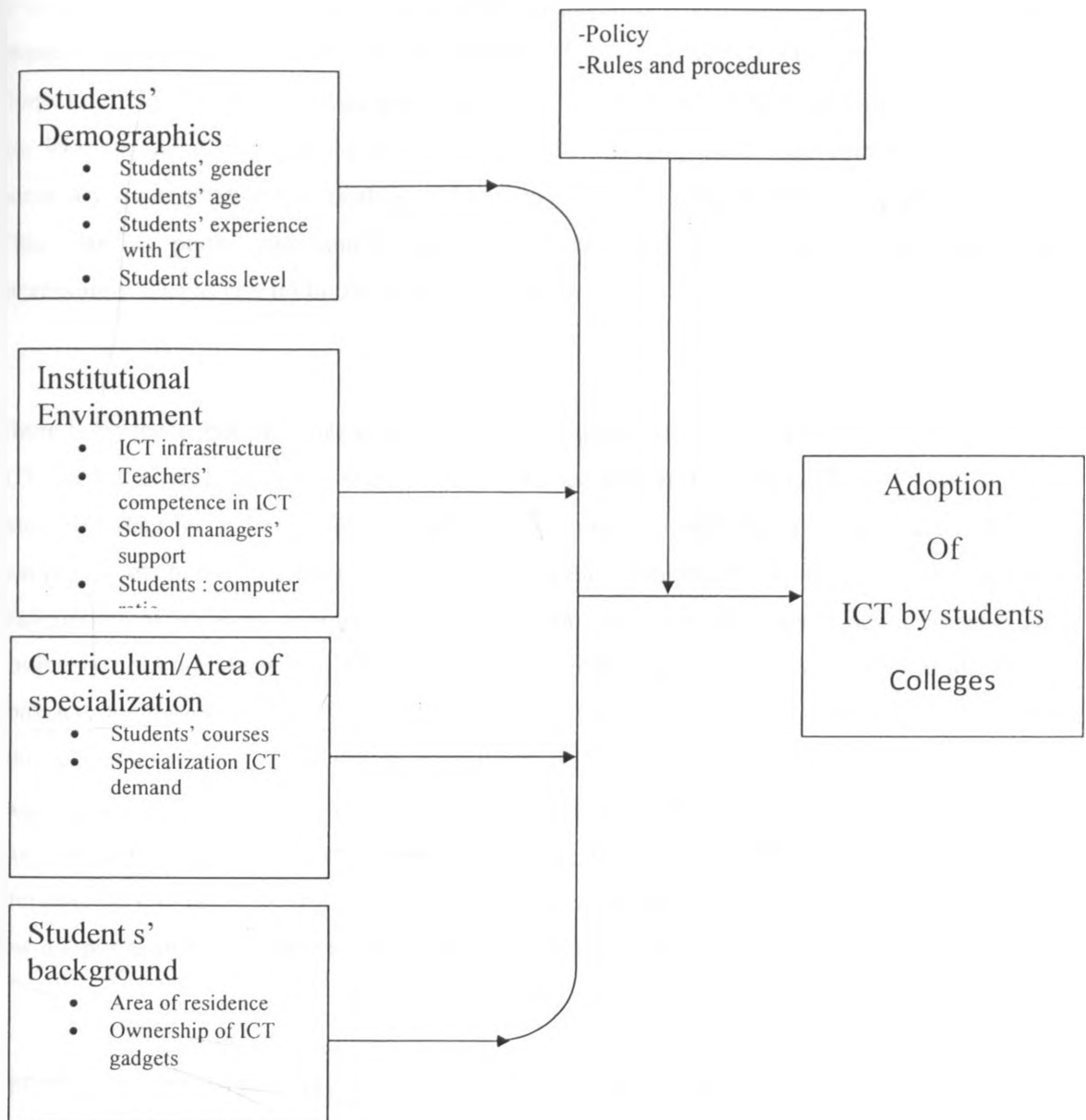
Figure 2.1 Conceptual framework that guided the study

2.9 Summary of Literature Review

It is necessary to take a broad view in order to understand and determine how ICT adoption impacts on learning in the tertiary institutions. This is because educational achievements are shaped not only by the way education is organized but also by the socio-economic background of the learners, their socio-cultural environments, the changing skills and competences that are necessary for employment, education and training, self-development and participation in society. This clarifies partly why non-formal learning, informal learning and adult learning are increasingly seen as crucial for the future of learning.

There is evidence that educational achievements are positively influenced by ICT, but not only by ICT used at school. Indeed, it seems that experience with ICT, in particular the computer, is a more important factor for school achievements. However, it is still the case that access and use of computers at home is shaped by socio-economic differences. Thus the socio-economic background of students continues to be important for their educational achievements. This obviously does not mean that the use of ICT in formal education does not matter at all. On the contrary, there is evidence that it is quite significant, but it depends on how ICT is used in educational institutions. Currently, it seems that ICTs are used as tools to support and improve the existing learning process and its administration more than for their transformative potential. ICT has not (yet) been able to revolutionize learning and teaching. This Chapter reviewed the literature on low adoption, from a global context of low adoption, including a historical context of low adoption, and an in-depth review of the context of low adoption as it affects.

This chapter on literature review leaves no doubt that all the factors affecting adoption of computer especially among tertiary college students should be perceived as a unit within a system for successful educational performance. What is quite apparent is that these factors are quite many and it is only by delineating them well can specific data be obtained and analyzed. However, the determination of attitude, perception and ability without using the pre-tested instruments as a foundation is deemed to fail.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

Methodology refers to the system of methods or procedures used in sampling and collecting data required for a particular research. It is also the application of the principles of data collection methods and procedures in any field of knowledge. This section describes research design, target population, sampling design and sample size, data collection methods, validity and reliability of research instruments and data analysis technique.

3.2 Research design

The study adopted Ex-Post-Facto design (also called causal comparative). This design according to Mcmillan and Schumacher pg 335 (1989), is used to explore possible causal relationships among variables that cannot be manipulated by the researcher .It is useful whenever we wish to test hypothesis about differences in one or more dependent variable. Since the research focuses on what has happened differently for comparable groups of subjects Ex-Post Facto design is the most suitable to be used.

3.3 Target Population

Kibabii Diploma Teachers College had a total of 768 students enrolled as follows:-

First year students totaled to two hundred and sixty nine (269), while second years students were two hundred and ninety three (293), Third years were two hundred and six (206). This information was as per the records in the deputy principal's office (June 2012). The college also had twelve heads of department and one principal.

Since Third year students were out on teaching practice and hence not available, the target population consisted of 562 students (1st and 2nd years), 12 H.O.Ds and the principal making a total of 575.

3.4 Sample Size and Sampling Procedure.

This section discusses sample size and sampling procedure.

3.4.1 Sample Size

To determine the sample size of students, the Yamane (1967) formula was used thus $n = \dfrac{N}{1 + Ne^2}$.

Where n = required responses

   N = Sample size

   e^2 = error limit

Substituting   in   the   above   formula   yielded   a   sample   size   of:
Sample size $(n) = \dfrac{575}{1 + 575 * 0.05^2} = 236$. Therefore the sample size was to be 236.

3.4.2 Sampling Procedure.

The number of respondents was selected proportionally. The technique used was stratified sampling. To get the number of 1st year students to be sampled the formula below was used:

Number of 1st years X Sample size giving 113.

Total target

Using the same formula the number of second years was 123. These figures were divided equally per subject combination and per each gender group.

Only 9 heads of departments together with the principal were available and were sampled purposively since they had specific information required by the researcher. The students responded to a questionnaire while the HODs and the principal were interviewed.

3.5 Data Collection Instruments

The data collection instruments were questionnaires to the students. The student questionnaire consisted of 4 sections as per the thematic areas i.e. students' demographics, institutional environment, students' curriculum offered to the students and students' background. Some questions had multiple choices while others needed respondents'' own responses. .

The questionnaire was the most suitable instrument for this study since it is a set of systematically structured questions used by the researcher to get needed information from the respondents.

It is an important research instrument and a tool for data collection and has its main function as measurement (Oppenhelm 100). A questionnaire is the main data collection method in surveys

and yield to quantitative data due to provision for open-endedness. It has several advantages which include Low cost of collecting data, Designing the questionnaire and sending it to a respondent as well as being less expensive in analyzing and processing the data in terms of both time and material resources. Finally there is no likelihood of interviewer bias as the interviewee would be interpreting the questions his own way.

3.5.1 Pilot testing of instrument

Questionnaires were pre-tested to ascertain their effectiveness before the actual research process began. This was to ensure that the instruments are adjusted accordingly to ensure reliability. To test the instruments, 20 students at Busia Diploma Teacher training college were sampled proportionally per year of study, subject combination and gender to respond to the questionnaire. Five heads of departments together with the principal were interviewed. This institution is different from that where the study was carried out.

3.5.2 Validity of the instrument

Validity refers to the degree of accuracy and meaningfulness of inference based on research results. This is basically the process of collecting evidence to support the inference made. Validation of the data was done using content-related validity. This measures the degree to which the data collected using a particular instrument represents content of a particular concept (Mugenda and Mugenda 1991). In a nutshell it refers to the content and format of the instrument to be employed. Main questions here are; How appropriate is the content of the instrument to the purpose of the study? , How comprehensive is the content in measuring all the constructs of the variable being measured? , Does the content logically get at the intended variable? , How adequate does the sample of items or questions represent the content to be measured? , Is the instrument format appropriate?

3.5.3 Reliability of the instrument

Reliability refers to the degree to which the instrument yields consistent data or results after repeated trials (Mugenda and Mugenda 1991). Reliability indicates the stability and consistency with which the data collection instrument measures the concept.

To increase the reliability of data collected the research employed split-half method to measure consistency within the instrument. A total score for the odd number questions was co-related with

a total score for the even number questions (although it might be the first half with the second half). The spearman-Brown prophesy formula was applied to the correlation to determine the reliability as follows

Reliability of scores on total tool = 2 x reliability for ½ test
$$\frac{}{1 + \text{reliability for ½ test}}$$

Where the value is 0.5 or more the instrument was deemed reliable.

3.6 Data Collection procedure

To collect data the researcher had to appear before a panel for defense from the University of Nairobi to defend the research project proposal and gnce approved, the researcher proceeded to obtain permission to carry out research by seeking a permit from the National Council of Research. There after the researcher went to the field to carry out the study beginning with the pilot study. By the end of one month, the researcher had collected the necessary data for the study which was analyzed and based on the findings of the analysis a report concerning the study was written and defended before the university authorities for consideration of the award of a Masters Degree in Project Planning and Management to the researcher.

3.7 Data analysis

Data was analyzed descriptively. Data analysis was facilitated by use of SPSS (Statistical Package for Social Sciences version. 17.0) Computer Package. Qualitative methods of data analysis employing descriptive statistics were employed in analyzing qualitative data where frequency tables ,cross tabulation and ratios were used in interpreting the respondent's perception of issues raised in the questionnaires so as to answer the research questions. Descriptive statistics such as frequency distribution, percentages, were calculated. The significant differences among attributes with gender, age group and subject combination were analyzed by the Chi-square (χ^2) test . All data will be analyzed at $\alpha = 0.05$. After appropriate analytical procedures will be undertaken, the data will be presented in a synthesized form using tables, to enable for easy inferences of the results.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION, INTERPRETATION AND DISCUSSION OF THE FINDINGS.

4.1 Introduction

The results of the data analysis are presented in this chapter. Data has been organized and presented as per the objectives of the study and demographic information of the respondents handled as deeply as possible.

4.2 Questionnaire Return Rate

The study used questionnaires as a tool for data collection, the sample size of this study was 236 students who were students at Kibabii Diploma Teachers college. Each of the respondents was given the appropriate questionnaire and not all the respondents returned the questionnaires. Out of the 236 questionnaires 230 were filled and returned. This represented a response rate of 97.45% this response rate was good when compared to the recommended response rate to verify consistency of measurements required for analysis(for example over 60% based on Kothari,2005) Table 4.1 shows this information;

Table 4.1 Questionnaire Return Rate

Questionnaire	Number	Percentage%
Delivered	236	100
Returned	230	97.45
Not returned	6	2.542

4.3 Demographic information of respondents.

The first objective of the study was to investigate how students demographic characteristics influence adoption of ICT in the learning process in Kibabii Diploma Teachers College .The first question that the researcher inquired was for the respondent to state their sex and the responses to this question were as in table 4.2

Table 4.2 Gender Frequencies

Sex	Frequency	Percentage
Male	120	52.0
Female	110	48.0
Total	230	100.0

From table 4.2, the study revealed that most of the respondents (students) in Kibabii Teachers Training College were; male 120(52%) while the rest 110(48.5%) were female. This implies that majority of students in Kibabii TTC were of male gender.

The researcher on the same issue of gender sought to determine gender and computer use and the information in table 4.3 shows this.

Table 4.3: Gender and Computer use

	Computer use		
Sex	Most Frequently	Frequently	Total
Male	12(5.2%)	135(58.7%)	147(63.9%)
Female	4 (1.7%)	79(34.3%)	83(36.1%)
Total	16 (7%)	214(93.0%	230(100%)

From table 4.3, 147 (64%) who are male use ICT more than female students who are 83 (36%).This is in line with findings of two researchers who have documented consistent differences in computer use by males and females(Sutton,2007 ,Light,2006) This shows gender disparity in ICT use at the college.

A test of statistics gives the Chi-square table.

Table 4.4 Chi-square test for gender and computer use

	Computer Use.	Sex.
Chi-sqare.	75.592	320
df	2	1
Asymp. Sig.	0.00	0.572

From the Chi-square test, since the value of P= 0.572 which is greater than 0.05,there is no significant difference between ICT adoption and gender(Proof of Hypothesis 2).

4.3.1 Age of respondents

Under the same objective on students' demographic characteristics, the researcher sought to establish respondents by age by asking the respondents to state their age brackets the responses to this question were as shown in table 4.5.

Table 4.5 Age of Respondents

Age	Frequency	Percentage(%)
20&below	28	12.0
21-30	198	86.0
31-40	4	2.0
Total	230	100.0

The study revealed that out of the 230(97.5%) students who were interviewed, 28 (12%) students were aged 20 years and below,198(86%) were between the age of 21-30years and 4 (2%) lies between 31-40 years hence most of the students in Kibabii teachers training college lie between 21-30years old. When the respondents' age was cross-tabulated with computer use, the following information came up as shown in table 4.6.

Table 4.6 Age / Computer Use

33

	Computer use.			
Age	Most frequently	Frequently	Not Frequently	Total
20&below	0(0%)	0(0%)	30(13.04%)	30(13.04%)
21-30	8(3.4%)	8(3.4%)	175(76.1%)	191(83.04%)
31-40	0(0%)	0(0%)	9(3.91%)	9(3.91%)
Total	8(3.4%)	8(3.4%)	214(93.04)	230(100%)

The study also revealed that students aged below 20years who number 30(13.04%) out of 230 do not frequently use computers in their learning process, out of those aged between 21-30 years, 8(3.4%) out of 198 most frequently use computers , 8(3.4%) frequently use computers and 175(76.1%) do not frequently use computers for is learning purposes. This information is highlighted in the cross tabulation table4.6, 31-40, 9(3.91%) out of 230 use computer but not frequently. This study shows that the students whose ages fall between 21 – 30 years who constitute 86% of the total college enrolment and they do use computer most frequently but rarely for learning purposes. They frequently use their phones for communication and playing games and not for research to support their learning activities. This revelation is in agreement with Furlong et al 2000, who says young people tend to control their own lives, how they use technology and the content of what they do.

The Chi-square test on age and computer use is as shown

Table 4.7 Chi-square test for Age/Computer use

	Computer Use.	Age.
Chi-square.	.75.592	63.160
df	2	2
Asymp. Sig.	0.000	0.000

From the Chi-square test the value of P = 0.00 which is less than 0.05.This implies that there is a significant difference between adoption of ICT and age (Proof of Hypothesis 1)

4.3.2 Year of study and computer use

In this section he researcher sought to establish the respondents' year of study and how it influenced ICT adoption in learning. The specific question posed to the respondent was for them to state their year of study visa vi their computer use as per the questionnaire. The responses are shown in table 4.8

Table4.8 Year of Study/Computer use cross tabulation

Year of study	Computer use (in percent.)			
	Most Frequently	Frequently	Not Frequently	Total
1st year	2	0	36	38
2nd year	2	6	54	62
Total	4	6	90	100

The research found out that out of 230 respondents, 87(38%)were first years while 143(62%) were second years only 2(2%) out of 87(38%) first years use computers most frequently while 31(36%) first years do not use computers frequently. 9(6%) out of 143(62%) second years use computers frequently ,3(2%) use computers most frequently and 77(54%) do not computers frequently in their learning process hence both first year and second year students do not use computers in this college. From these findings there is no significant difference between the two levels of study and their computer use.

4.3.3 Type of secondary school attended

The researcher still under the first objective sought to establish whether there is any relationship between the type of school attended by respondents before joining Kibabii TTC and whether it had any bearing in the adoption of ICT in the learning process. On cross tabulation with computer use, the following information came up as shown in table 4.9.

Table 4.9 Type of Secondary School Attended/ Computer Technology use

Type of secondary	Computer technology use		Total
	YES	NO	
National.	0(0%)	0(0%)	0(0%)
Provincial	105(46%)	23(10%)	128(56%)
District	55(24%)	42(18.3%)	97(42%)
Private	0(0%)	5(2.2%)	5(2.2%)
Total	160(69.6%)	70(30.4%)	230(100%)

Out of 128(56%) who came from provincial schools, 105(46%) used computer technology, 55(24%) out of 97(42%) from district schools used computer technology and none from the private schools used computer technology in the learning process. The cross tabulation table 4.9 shows this information clearly

It was noted from the research that those students who joined the college from provincial schools use computer technology in their learning processes more than those who came from district and private schools. This implies that the type of school attended has a great influence on computer use in the learning process. It was also glearing from the findings that none of the students enrolled at Kibabii Teachers College came from a national school.

4.4 Institutional environment and adoption of ICT

The second objective of the study was to examine the extent to which the institutional environment influences adoption of ICT in the learning process by students at Kibabii Diploma Teacher's collage. This led to the formulation of the research question: To what extent does the institutional environment influence adoption of ICT in the learning process by students at Kibabii Diploma teachers college?

4.4.1 Computer Technology Use

First the researcher sought to find out whether computer technology is used at Kibabii Diploma Teacher's college for the learning purpose by asking the question : Is computer technology used in your institution for learning purposes? Table 4.10 shows the responses.

Table 4.10 Computer Technology use

Computer technology use	Frequency	Percentage (%)
Yes	69	30.0
No	161	70.0
Total	230	100.0

The research found out that only 30% of the respondents said that computer technology is used in the learning process at the institution while the majority i.e. 70% of the respondents said that computer technology is not used at the institution. From these findings it can be concluded that computer technology is not used in the learning process at Kibabii Diploma Teacher's college.

4.4.2 Adequacy in teaching of the computer class

Secondly, the researcher sought to find out whether computer classes are adequately taught at the institution by asking the following question: Is the computer class adequately taught? The responses to this are as in table 4.11

Table 4.11 Computer Class Adequately Taught

Adequacy	Frequency	Percent (%)
Yes	64	28.0
No	138	60.0
Undecided	10	4.0
Under scrutiny	18	8.0
Total	230	100.0

The research found out that, only 64(28%) out of 230 students said they were adequately taught, 138(60%) said they were not adequately taught, 10(4%) were undecided while 18(8%) said they were still under scrutiny. This revealed a very high number of students who felt they were not taught computers adequately. From this finding, it can be concluded that computer classes at Kibabii Diploma Teachers College are not adequately taught. This is supported by the high student teacher ratio of 88:1 as per the observation schedule. It can be concluded that computer classes are not efficiently taught at the institution.

4.4.3 Equipment of Computer Laboratory

Thirdly, the researcher sought to establish whether the computer laboratory at the institution was adequately equipped for adoption of ICT in the learning process. This led to the question: Do you think the computer lab is adequately equipped to give you the practical skills? If NO, where did you acquire the computer skills? The responses to this are shown in Table 4.12.

Table 4.12 Computer lab adequately equipped

Adequacy of Lab	Frequency	Percentage (%)
Yes	60	26.0
No	170	74.0
Total	230	100.0

Which revealed that out of 230 students who responded to this questionnaire, only 60(26%) said the lab is adequately equipped for practical's while 170(74%) said the laboratory is not adequately equipped.

This is a clear indication that the institution has not put sufficient structures in place to enable adoption of ICT in the learning process to take place at Kibabii Diploma Teachers College.

4.4.4 College management support in the adoption of ICT in the institution

The researcher was also interested in establishing whether the college management supported the adoption of ICT in the learning process at the institution by asking the following question: Do you think the college management supports the adoption of ICT in the learning process in the institution? If YES how? The responses to this question are shown in Table 4.13

Table 4.13 College Management Support

Management Support	Frequency	Percentage (%)
Yes	115	50.0
No	115	50.0
Total	230	100.0

Out of 230 students (respondents) 115(50%) said they receive support while 115(50%) said they do not. This reveals that management support for adoption of ICT is not certain at the institution. This is further supported by responses from Heads of Departments in an interview schedule who felt that enough has not been put in place by the college management to support adoption of ICT in the learning process given that they had laptops which they could only use for typing purposes and no access to the internet since the college was not connected to the internet and there were no modems for the laptops.

4.4.5 Teachers use of ICT in lesson delivery.

The researcher was also interested in finding out whether teachers at Kibabii Diploma Teachers College used ICT in their lesson delivery. She therefore posed the following question: Do the teachers use ICT to deliver their lessons at the college? The responses to this are shown in table 4.12

Table 4.14 Teachers' use of ICT in lesson delivery.

Teachers use of ICT	Frequency	Percentage (%)
Yes	87	38.0
No	143	62.0
Total	230	100.0

On whether the teachers in Kibabii Diploma Teachers College use ICT in lesson delivery, out of 230 respondents 143(62%) said they do not use it while 87(38%) said they use it but not frequently.

This shows that majority of the teachers (62%) do not use ICT in lesson delivery and this could be attributed to the lack of necessary skills in computer. This can be supported by the findings from an interview schedule of H.O.D's who were asked to state whether they possessed basic or advanced skills in computer and their responses were as in Table 4.15

Table 4.15 H.O.D's Computer Skills

Computer Skills	Frequency	Percentage (%)
Basic skills	9	100.0
Advanced skills	2	22.0

The table 4.15 reveals that in Kibabii Diploma Teachers College, all the H.O.D's have the basic computer skills i.e. 9 out of 9 H.O.D's that were interviewed hence 100%computer literate but only 2(22%) have basic as well as advanced computer skills. With this revelation of lack of advanced skills in computers, adoption of ICT in the learning process may prove difficult to take place at the institution.

4.4.6 Student to Computer Ratio

The researcher asked the respondents to give the approximate student to computer ratio at the institution since she was interested in establishing the efficiency in the provision of ICT lessons at the college. Responses to this question are shown in Table 4.16

Table 4.16 Student Computer Ratio

Ratio	Frequency	Percentage
Above 30:1	60	26.0
20:1	51	22.0
10:1	41	18.0
5:1	46	20.0
2:1	32	14.0
Total	230	100.0

4.4.7 Provision of adequate ICT environment

Finally, under objective two of the study, the researcher sought to find out the opinions of the respondents on the provision of an adequate ICT environment by asking the question: In your

own opinion, has the college provided adequate and suitable environment for you to use the available ICT facility in the learning process? Table 4.17 shows the response to this question.

Table 4.17 Adequacy and Suitability of Environment

Adequate & Suitable Environ.	Frequency	Percentage (%)
Yes	55	24.0
No	156	68.0
Don't know	18	8.0
Total	230	100.0

It revealed that generally only 55(24%) out of 230 respondents felt the environment in the institution was adequate and suitable for ICT use, 156(68%) which was the majority said the environment was not suitable and adequate while 18(8%) said they did not know whether it was adequate and suitable.

Going by majority (68%) of the responses, it can be concluded that the college environment has not been made adequate and suitable for ICT adoption in the learning process.

4.5 Curriculum and adoption of ICT in the learning process.

The third objective of the study was to explore how curriculum influences adoption of ICT in the learning process at Kibabii Diploma Teachers Training College. Under this objective, the researcher sought to look at subject combination and the demand of the area of specialization for ICT.

4.5.1 Subject combination

The researcher sought to determine whether the students subject combination influenced adoption of ICT in the learning process by asking the following question: What is your subject

combination? When these was cross-tabulated with ICT adoption in the learning process, the findings were as in Table 4.18

Table 4.18 subject combination/Area of specialization.

Subject combination.	YES.	NO	TOTAL.
Geog. / CRE	11(17.5%)	52(82.5%)	63(27.4%)
Eng./Literature.	22(34.4%)	42(65.6%)	64(27.8%)
Maths/ Geography.	20(35.1%)	37(64.9%)	57(24.8%)
Kiswahili/ History	19(41.3%)	27(58.7%)	46(20%)
Total.	72(31.3%)	158(68.7%)	230(100%)

From the above findings, Geog./CRE had a YES of 11(17.5%) and NO of 52(82.5%) , Eng. / Literature had a YES of 22(34.4% and NO of 42(65.6%) , Maths / Geography. had a YES of 20(35.1%) and a NO of 37(64.9%) , Kiswahili / History. had a YES of 19(41.3%) and a NO of 27(58.7%) .From this revelation, all subject combinations offered at the Kibabii Diploma Teachers College have majority of the students not using ICT in the learning process. It can be concluded that subject combination/area of specialization doesn't influence adoption of ICT in the learning process at Kibabii Diploma Teachers College. It can also be seen that all subject combinations are Arts oriented.

4.5.2 Improved learning by ICT.

Under objective three, the researcher sought to establish whether the various subject combinations used the internet for research by asking the following question: Do you do research using the internet? The responses to this question are shown in Table 4.19

Table 4.19 Research Using Internet

Research Using Internet	Frequency	Percent (%)
Yes	71	31.0
No	159	69.0
Total	230	100.0

It was revealed from the study that only 71(31%) respondents out of the 230 do their research using internet while 159 (69%) do not research using internet.

On interviewing the H.O.Ds on the same issue on whether ICT has improved their teaching learning process 9 out of 9 said yes but with varied opinions. The CRE department head said ICT is useful only in micro teaching, teacher preparation presentations in class, the French head said it's only useful during education communication technology, PE department said he uses it only when he wants updates on rules of certain games, Mathematics head said only during microteaching and generating programs, Geography head said only during physical Geography, ICT department head said he uses it always, English head said only during speech work and oral skills and finally the principal said she requires the use of internet and ICT in many cases.

The views of the department heads reveal a low ICT use because 90% of the departments only use it occasionally.

4.6 Students' background and ICT adoption in the learning process.

The fourth objective of the study was to assess the extent to which the student's background influence adoption of ICT in the learning process at Kibabii Diploma Teachers College.This led to the research question: To what extent does the students background influence adoption of ICT in the learning process by students at Kibabii Diploma Teachers College? To answer this question, the researcher considered the following sub-themes: Students area of residence and ownership of ICT gadgets.

Table4.20. Computer Use before Joining College

Age of first access	Computer technology use.

to computer for learning	YES	NO	UNDECIDED	TOTAL.
Below 13 years.	9(3.9%)	5(2.2%)	0(0%)	14(6%)
14 – 17 years.	80(35%)	25(11%)	5(2.2%)	110(48%)
18 -22 years	66(29%)	30(13%)	0(0%)	96(42%)
Above 22 years	0(0%)	5(2.2%)	5(2.2%)	10(4.3%)
Total.	55(67%)	65(28.3%)	10(4.3%)	230(100%)

4.6.1 Computer use before joining college.

The researcher sought to find out whether there was any relationship between the age at which the respondents first accessed computer and the adoption of ICT in the learning process. The following question was put to the respondent: At what age did you first access a computer for learning purposes? The cross tabulation of these is shown in Table 4.20

On being asked at what age they had first accessed computer for learning, below age 13 years 3.9% said YES and 2.2% said NO. For the age between 14 -17 years, 35% said YES, 11% said NO while 2.2% were undecided. For age 18 – 22 years 29% said YES and 13% said NO. For those above 22 years, none said YES 2.2% said NO while 2.2% were UNDECIDED.

When test of statistics was carried out, on Table 4.21 the following Chi-square came up:

4.21 Chi-square test for computer use before joining college

5. Chi-square Tests.	Value.	df	Asymp. Sig (2 sided)
Pearson Chi-square.	13.843	6	0.031
Likelihood Ratio	8.749	6	0.188
Linear by Linear Association.	1.787	1	0.181
No. of valid cases.	230		

From the Chi-square test, the value of **P = 0.031**. This is less than 0.05 implying that there is a relationship between the age at which one first accesses computer use and adoption of ICT

The frequency table below (table 4.19) shows responses as at what age the students have a first access to computer for learning purposes.

4.6.2 Computer use at home and adoption of ICT.

The researcher sought to establish whether there is any connection between computer use at home and adoption of ICT in this section. To do that she asked the following question: Do you have a computer at home? This was cross tabulated as shown in Table 4.22

Table 4.22 Computer ownership at home and ICT adoption.

Computer ownership at home.	Most frequently.	Frequently.	Not frequently.	Total.
YES	0(0%	0(0%)	45(20%)	45(20%)
NO	5(22%)	5(22%)	175(76%)	185(80%)
TOTAL.	5(22%)	5(22%)	220(96%)	230(100%)

The study revealed that out of the 230 students (respondents) only 45(20%) own computers at home and do not use ICT frequently while own computers at home 5(22%) said they do not own computers in their homes and they use ICT most frequently. 5(22%) of those who do not own computers at home use computers frequently and 175(76%) do not use ICT frequently.From this,it can be concluded that there may be no significant relationship between ownership of computers at home and adoption of ICT.

4.6.3 Computer use and Residence

The researcher also wanted to establish whether the respondents' area of residence has an influence on adoption of ICT. The following question was asked: What is your area of residence? The responses to this were as shown in Table 4.23

Table 4.23 Computer use and Residence

Computer use	Residence			
	Most frequently	Frequently	Not frequently	Total
Urban	14(6%)	124(54%)	4(2%)	142(62%)
Rural	4(2%)	84(36%)	0(0%)	87(38%)
Total	18	208	4	230(100%)

It was revealed that 124(54%) out of out of 230 respondents who come from urban areas (residents) use computers frequently, while 84(36%) who come from rural centres do not use computers frequently. 4(2%) from rural areas use computers most frequently while 14(6%) from urban areas use computers most frequently 4(3%) from the urban area do not use the computers. This reveals that a high number of urban residents use computers more frequently than those coming from rural areas. The cross tabulation below is a summary of this information.

4.6.4 Use of Phone for Learning Process

Finally, the researcher sought to establish whether there is any relationship between phone ownership and ICT adoption. The following question was asked: Do you own a phone? The cross tabulation is shown in Table 4.24

Table 4.24 Use of Phone for Learning Process

Phone ownership	ICT ADOPTION			
	Most Frequently	Frequently	Not Frequently	Total
Yes	10(4%)	15(7%)	185(80%)	210(91%)
No	0(0%)	0(0%)	20(9%)	20(9%)
Total	10(4%)	15(7%)	205(89%)	230(100%)

Finally the study revealed that out of 230 respondents 10(4%) of those who own phones use ICT most frequently 15(7%) of those with phones use ICT frequently and 185(80%) do not use ICT frequently. Of those who do not have phones, none uses ICT most frequently; none uses ICT frequently and 20(9%) not frequently. It can therefore be concluded that even those with phones do not use ICT frequently and hence there is no relationship between phone ownership and ICT adoption.

CHAPTER FIVE
SUMMARY OF FINDINGS AND RECOMMENDATIONS

5.0 Introduction

In this chapter, the major findings of the study are highlighted and conclusions drawn from the study. In addition the implications and policy recommendations derived from the research findings are aptly stated and the chapter also presents suggestions for further research.

5.1 Summary of findings

The major findings from this study were; Kibabii Diploma Teachers Training College; has a higher enrolment of male students (52%) compared to female students (48%). Moreover, the study went on to reveal that gender disparity exists when it comes to use of ICT as demonstrated in table 4.3 With more male students (147 out of 230 respondents) using ICT frequently compared to 83 out of 230 female students who use it. This agrees with (Gill and Grint 1995) who argue that although careers in computer technology are open to females and males and more specifically that females are as capable as males in these career areas, low female participation persists. It was also revealed that computer use but not for learning purposes was most frequent by ages between 21 – 30 years which constitutes 86% of the total enrolment of the institution. This is in agreement with Furlong et al 2000, who says young people tend to control their own lives, how they use technology and the content of what they do.

The research also found out that on institutional environment and adoption of ICT, computer technology was not being used at Kibabii Diploma Teachers College for learning purposes and that majority of the students feel that the computer class is not adequately taught because of the high student to teacher ratio and lack of educational software coupled with failure of the college to access internet services. It was also revealed that the computer lab is not adequately equipped as demonstrated by the high student to computer ration(30:1) Alongside this was the fact that majority of the teachers at the college(62%) do not use ICT in their lesson delivery and (78%) of the H.O.D's only had basic skills in computer. It was the feeling of the majority of the respondents (68%) supported by views from the H.O.D's that the college environment is not adequate and suitable for adoption of ICT in the learning process.

The study also revealed that none of the subject combinations offered by the college adopted ICT in the learning process as much as the respondents felt that their areas of specialization actually demanded the use of ICT. Almost all the subject combinations were found to be Arts oriented.

On students background and adoption of ICT in learning, the study revealed that very few of them (6%) first accessed computers below the age of 13 years while majority accessed computers between the ages of 14 – 17 years. Apart from that, only 14% of the respondents owned computers at home while majority of them came from urban settings (62%) and used computers more frequently than compared to those from rural settings.

5.2 Conclusions

From the findings of the Study it can be concluded that:-

ICT has not been adopted in the learning process at Kibabii DTTC since neither teachers nor students are using it in the teaching/learning processes.

The institutional environment at Kibabii DTTC has not been made conducive for the adoption of ICT in the learning process since the student to computer ratio is very high (30:1) and there are no adequate number of computer labs since there are only two that are poorly equipped with not educational software and a very high student to teacher ratio (88:1) persists.

ICT and computers are used mainly by ages between 21 – 30 years therefore there is a significance difference between adoption of ICT and students age. This is in agreement with Furlong et al 2000, who says that young people tend to control their own time, how they use technology and the content of what they do.

The male gender has embraced ICT and computers more than the female gender and hence there was significant differences between adoption of ICT and gender.

A high number of students to computer ratio was also revealed in this study (30:1). According to Colaldyn and Biornarld, 2004), a high learners to computer ratio results in less exposure to the computer per learner and may result in one learner dominating the use of a computer while the others simply watch passively. This may lead to inefficient teaching and learning since, not all learners may equally benefit from the technology.

On curriculum /area of specialization, none of the subject combinations offered by the college embraced adoption of ICT in the learning process. As much as the college offers arts based curriculum ICT should be adopted in the learning process as argued by John 2005 and Zheo and Frank 2003 in literature review.

Computer use and ICT adoption by college students depends on socio- economic variables like family financial status, area of residence among others.

5.3. Recommendations

Based on the foregoing discussion of the findings and conclusion, the following recommendations are offered.

The government of Kenya and policy makers should come up with strategies of sensitizing the public on the importance of embracing ICT for development of our nation.

The Ministry of Education Science and Technology (MOEST) should ensure implementation of the ICT policy by devising better monitoring and evaluation of ICT programs in schools and colleges.

The government of Kenya should come in fully to support learning institutions by providing ICT equipment and infrastructure to facilitate adaption of ICT in the learning process.

The students should be encouraged to do more research using the interest to widen the scope of content in their area of specialization especially at tertiary and higher levels.

Policy makers and institutional management should be more committed to ensuring integration of ICT in the teaching /learning process.

5.4 Suggestions for Further Research

1. More research to be carried out to a ascertain levels of adaption of ICT in tertiary Institutions.

2. Research to be carried out in science and Technology based tertiary institutions to cross check the findings of this study.

3. Research to be done on factors influencing computer use in school and homes.

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APPENDICES

Appendix I: Introduction letter

Beryl Namalwa Mutekhele

University of Nairobi

P.O Box 1198

Nairobi,

Kenya

21 April 2012

Dear Respondent,

I am a student at the University of Nairobi pursuing a Masters degree in Project Planning and Management and carrying out a research on "Determinants of the adoption of Information Communication Technology(I.C.T) in learning process among college students; A case study of Kibabii Diploma teacher training college in Bungoma County." I am requesting for your assistance. Do assist by filling in the questionnaire provided. The information will help me accomplish the research objectives. All responses were treated with total confidentiality.

Thank you

Yours faithfully,

BERYL NAMALWA MUTEKHELE

APPENDIX II: QUESTIONNAIRE FOR STUDENTS

Instructions:

1. Kindly fill this questionnaire with an open mind and be as honest as possible

2. The information given will be treated confidentially and will not be used for other purposes except academics.

3. Try to understand the questions before responding to it.

SECTION A: Background information

Please respond to each item by putting a tick ( ) or writing in the spaces provided.

1. What is your sex?

Male	( )
Female	( )

2. What is your age?

20 and below	( )
21 -30 Yrs	( )
31 – 40 Yrs	( )
41 and above	( )

3. What type of secondary school did you go through before joining college?

National	( )
Provincial	( )
District	( )
Private	( )

4. In which year of study are you?

1st year	( )
2nd year	( )
3rd year	( )

5. What is your area of specialization at this college?

6. .How many students are you in your class?

7. How often do you use computer for learning purpose?

Most frequently	( )
Frequently	( )
Not frequently	( )

8. For how long have you been using computers?

Over 10 yrs	( )
5-9 yrs	( )
1 -4 yrs	( )
Below 1 yr	( )

9. What is the student teacher ratio in your computer class?

<div align="center">

Above 80:1   ( )

40-79:1   ( )

15-39:1   ( )

Below 14:1   ( )

</div>

10. Outside class time, how often do you use computers?

       Most frequently   ( )

       Frequently   ( )

       Not frequently   ( )

       Not at all   ( )

11. Have you ever acquired learning material through ICT gadgets in college?

Yes ( ) No ( )

If Yes how frequent

Section B: institutional environment and adoption of ICT

1. Is computer technology used in your institution for learning purposes?
Yes ( ) No ( )
If yes how often

2. Is the computer class adequately taught?
Yes ( ) No ( ) Undecided ( ) Still under scrutiny ( )

3. Do you think the computer lab us adequately equipped to give you the practical skills/
Yes ( ) No ( )
If no where did you acquire the computer skills?

4. Do you think the college management supports the adoption of ICT in the institution?
Yes ( ) No ( )
If Yes, how?

5. Do the teachers use ICT to deliver their lessons at the college?
Yes ( ) No ( )
If Yes, how often?
Ones in a while ( )
Frequently ( )
Always ( )

6. Give approximate student to computer ratio
Above 30:1   ( )
    20:1   ( )
    10:1   ( )
    5:1   ( )
    2:1   ( )

7. In your own opinion, has the college provided adequate and suitable environment for you to use the available ICT facility in the learning process
Yes ( )   No ( ) Don't know ( )

Section C:Curriculum and adoption of ICT .

1. What is your subject combination?...

2. Do you think you need ICT for learning in your area of specialisation? ....

3. Do you do your research using the internet?

   Yes ( )   No ( )

4. Do you do any assignments using the internet ?

   Yes ( )   No ( )

5. How has ICT improved learning in your area of specialisation ?

Section D. Students background and ICT adoption.

1.) At what age did you first access a computer for learning purposes?

Below 13 yrs	( )
14-17 yrs	( )
18-22yrs	( )
Above 23 yrs	( )

2.) Do you have a computer at home?

Yes	( )
No	( )

If yes how many ....

Have you used a computer to learn in your previous schools before joining college?

Yes	( )
No	( )

3.What is your area of residence?

Urban	( )
Semi-urban	( )
Rural	( )

4. Do you own a phone? Yes ( ) No ( )

If yes, how frequent do you use it for college learning process?

Frequently ( )   Rarely ( )   Not at all ( )

APPENDIX III: INTERVIEW SCHEDULE FOR HEADS OF DEPARTMENTS AND PRINCIPAL.

1. Do you have basic computer skills?

2. Do you own an ICT gadget that can be used in facilitating your teaching?

3. How often do you use computer?

   If rarely, why?

4. Do you think your area of specialization requires ICT in the teaching/learning process?

5. Do your students use ICT in the assignments in your subject area?

6. What can you say about your students:
   i.   Gender and ICT use?

   ii.   Age and ICT use?

7. Do you think the ICT infrastructure that has been put in place is adequate to support the teaching/learning process at college?

8. Does the college management support use of ICT in the teaching and learning process?

   If yes, what policy has been put in place concerning use of ICT at college?

9. In your own opinion has the college provided adequate and suitable environment for you to use the available ICT facility in the learning process?

APPENDIX IV: LETTER OF AUTHORIZATION.

REPUBLIC OF KENYA

NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

Telephone: 254 020-2213471, 2241349
254 020-310571, 2213123, 2219420
Fax: 254-020 318245, 318249
When replying please quote
secretary@ncst.go.ke

P.O. Box 30623-00100
NAIROBI-KENYA
Website: www.ncst.go.ke

Our Ref. NCST/RCD/13/012/49

Date: 25th July 2012

Beryl Namalwa Mutekhele
University of Nairobi
P.O.Box 30197-00100
Nairobi.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on
*"Adoption of information and communication technology in learning
process among college students: A comparative study of Technical and
Teacher Training Diploma Colleges in Bungoma County,"* I am pleased
to inform you that you have been authorized to undertake research in
Bungoma County for a period ending 31st August, *2012.*

You are advised to report to the **District Commissioners and the
District Education Officers, Bungoma County** before embarking on the
research project.

On completion of the research, you are expected to submit **two hard
copies and one soft copy in pdf** of the research report-thesis to our office

DR. M. K. RUGUTT, PhD, HSC.
DEPUTY COUNCIL SECRETARY

Copy to:

The District Commissioners
The District Education Officers
Bungoma County.

APPENDIX V : RESEARCH PERMIT.

PAGE 2

THIS IS TO CERTIFY THAT:
Prof./Dr./Mr./Mrs./Miss/Institution
Beryl Namalwa Mutekhele
of (Address) University of Nairobi
P.O.Box 30197-00100, Nairobi.
has been permitted to conduct research in

Location
District
Bungoma   County

on the topic: Adoption of Information and
Communication Technology in learning process
Among college students: A comparative study
Of Technical and Teacher Training Diploma
Colleges in Bungoma County.

for a period ending: 31st August, 2012.

PAGE 3

Research Permit No. NCST/RCD/13/012/49
Date of issue   25th July, 2012
Fee received   KSH. 1,000

....
Applicant's
Signature

Secretary
National Council for
Science &Technology