ADDIS ABABA UNIVERSITY

COLLEGE OF NATURAL AND COMPUTATIONAL SCIENCE

SCHOOL OF INFORMATION SCIENCE

ASSESSMENT OF TEACHERS' ICT COMPETENCY IN THE USE OF ICT IN THE CLASSROOM IN ADDIS ABABA CITY PREPARATORY SCHOOLS

By

TURI CHIMDESSA

JUNE, 2018

ADDIS ABABA, ETHIOPIA

ADDIS ABABA UNIVERSITY

COLLEGE OF NATURAL AND COMPUTATIONAL SCIENCE

SCHOOL OF INFORMATION SCIENCE

ASSESSMENT OF TEACHERS' ICT COMPETENCY IN THE USE OF ICT IN THE CLASSROOM IN ADDIS ABABA CITY PREPARATORY SCHOOLS

A Thesis Submitted to School of Graduate Studies of Addis Ababa University
in Partial Fulfillment of the Requirements for the Degree of
Master of Science in Information Science

(Information System)

By: Turi Chimdessa

Advisor: Temtim Assefa (PhD)

June, 2018
Addis Ababa, Ethiopia

ADDIS ABABA UNIVERSITY

COLLEGE OF NATURAL AND COMPUTATIONAL SCIENCE

SCHOOL OF INFORMATION SCIENCE

ASSESSMENT OF TEACHERS' ICT COMPETENCY IN THE USE OF ICT IN THE CLASSROOM IN ADDIS ABABA CITY PREPARATORY SCHOOLS

By: Turi Chimdessa

Name and signature of Members of the Examining Board

Temtim Assefa (PhD)	_____	_____
Advisor	Signature	Date
Gashaw Kebede (PhD)	_____	_____
Examiner	Signature	Date
Workshet Lamenew (PhD)	_____	_____
Examiner	Signature	Date

Declaration

This thesis has not previously been accepted for any degree and is not being concurrently submitted in candidature for any degree in any university.

I declare that the thesis is a result of my own investigation, except where otherwise stated. I have undertaken the study independently with the guidance and support of my research advisor. Other sources are acknowledged by citations giving explicit references. A list of references is appended.

Signature: _____

Turi Chimdessa

This thesis has been submitted for examination with my approval as university advisor.

Advisor's Signature: _____

Temtim Assefa (PhD)

Acknowledgements

First and foremost, I am grateful to the almighty God for giving me the knowledge and life to pursue my studies successfully. My advisor, Dr. Temtim Assefa has been a great help in giving me his most professional knowledge of advices continuously. If there had not been his support, the accomplishment of this study would have been in doubt. Really thank you is not nearly enough for him. Second, I would like to express my heartfelt appreciation to Dr Lemma Lessa for his supports while formulating the title of this study.

I would also like to say thank you very much for Dr.Shibiru Temesgen, Dean of college of Natural and computational science and Dr. Martha Yifiru, Head of school of information science , for their great cooperation to join this program.

I also wish to thank all administrative staff and teachers of sampled preparatory schools of Addis Ababa city administration for their cooperation & facilitations and letting me to collect data for my thesis in the school.

For the inner core of my heart, I would like to express my deep sense of gratitude to my families, my father Chimdessa Regasa and my mother Bachani Wakjira; they scarified many of their interests for the sake of my study; they paid a lot from the beginning to reach me at this spot.

I would like to thank my beloved wife Tsehay Yadessa, who has struggled and supported me through many things and my children Dawit Turi and Fenet Turi, for their great patience during the development of this thesis; without their understanding, I would never have been able to complete it.

Finally, my genuine appreciation and heartfelt thanks goes to all research participants, without them the study might not be possible.

Abstract

Over the past few years, information and communications technology (ICT) has become more important to education sector. And education is the key for development while the integration of ICT into education is the key to complement and generate support to teachers' professional development and students' learning skills. But for this effective utilization of ICT in education, it needs the competent teacher in ICT.

Hence, the overall objective of the study was to assess teachers' ICT competency level and its influence in the use of ICT in the classroom in Addis Ababa city administration. The study was conducted in 3 public and 5 private preparatory schools found in Addis Ababa City. The sample schools were selected by simple random sampling technique. The researcher used descriptive survey design method. The Study used frequency, percentage, mean, Std. deviation and, t-test. As additional work, SMART PLS application software was also used to undertake path coefficient analysis relationship between variables.

The study found that most of the preparatory schools already started to formulate a vision towards the development of ICT in their schools. Even though some of the teachers have computer in their home and school, the overall result of teachers' ICT accessibility revealed that, there is a significance problem on the ICT access for teaching purposes.

According to this study, most of preparatory teachers have basic computer skills and their level of competency falls in medium level; their attitudes of using ICT in classroom falls in high level but their usage of ICT in class falls nearest to low level class. The absence of ICT training in case of capacity building towards the new technology in preparatory school and lack of articulated school vision on integrating of ICT in teaching activities are those main challenges for teacher ICT competency. Insufficient knowledge of using ICT, insufficient skills of how to use ICT equipment, absence of ICT facilities in preparatory school such as Internet, computer etc. are also another challenge for teacher ICT competency for not use ICT in classroom. Finally, this study was revealed that, governmental teachers' ICT usage in the class is better than private teachers' ICT usage. Also the accessibility of different ICT tools in government is better than private schools.

Keywords: ICT competency, ICT skill and knowledge, Attitude, ICT training and ICT Access.

Table of Contents

List of Tables:

List of Figure

Appendix

Acronym and Abbreviation

ESDP	Education Sector Development Program
FDRE	Federal Democratic Republic of Ethiopia
GEQIP	General Education Quality Improvement Package
ICT4D	Information Communication for Development
ICT CST	Information Communication Technology competency standards for teachers
MCIT	Ministry of Communication and Information Technology
MDG	Millennium Development Goal
MoE	Ministry of Education
PLS	Partial least squares
VSAT	Very Small Aperture Terminal

CHAPTER ONE

1.1. BACKGROUND OF THE STUDY

Education is the key to development while the integration of Information and Communication Technology (ICT) into education is the key to complement and generate support to teachers' professional development and students' learning skills. The integration of ICT in teaching and learning can take place not only in the classroom but also from anywhere and at any time. Continuous ICT integration will enhance the use of educational resources and improve the quality of education. However, the integration of ICT in teaching and learning requires competent teachers in ICT. Overall, ICT skill is one of the important criteria in the 21st century education (Umara et al., 2015)

In today's world, there is no sector that does not need ICT. It is playing a great role in work places, business, education, health sectors, and entertainment. It changes dynamically the livelihood of the society across the globe including the education sectors. Tinio(2002) states the potentials of ICTs in increasing access to education and improving relevance and quality of education in developing countries. Tinio again describes that ICTs is greatly facilitate the acquisition and absorption of knowledge, unprecedented opportunities to enhance educational systems, improve policy formulation, execution and widen the range of opportunities for business.

In Watson's (2001) description, ICTs have revolutionized the way people work today and are now transforming education systems. Moreover, he mentioned that if children (students) trained using traditional learning methodologies and technologies, they may not be effective and fit in tomorrow's world. ICT is not only perceived as a catalyst for change, but also change in teaching style, change in learning approaches, and change in access to information. ICTs are also taken as dependable tools in facilitating the attainment of one of the Millennium Development Goals (MDGs), which is achievement of Universal Primary Education (UPE) (UNESCO, 2008). It allows teachers and students to create, share, connect and reflect on their learning and ICT is seen as key to modernizing education. This shows that ICT competency became the most critical demands in education.

“ICT-competency” is defined as an integrated set of knowledge, skills and attitudes for functional use of ICT in an educational context (Albirini, 2006). And it is also a means of using digital technology, communications tools, and/or networks to access, manage, integrate, evaluate and create information in order to function in a knowledge society (iSkills, 2002). So, when we say that teachers’ ICT competency, we are referring to those teachers who have the above three thing in an integrated manner (knowledge, skill and attitude). Not only teachers but also faculty member of the school should have these three things to use technology. As Baylor & Ritchie(2002) state, ‘‘regardless of the amount of technology and its sophistication, technology will not be used unless faculty members have the skills, knowledge and attitudes necessary to infuse it into the curriculum’’ (p. 398). But teachers are the most important agents of change within the classroom in using ICT in teaching and learning activities (Albirini, 2006). Competent teacher in ICT can enhance new technology in teaching and learning activity by applying a new system like E-learning to the education sector which is used to support the processes of teaching learning process.

In fact, the competency paradigm evolves towards the new approach where the competency represent integrated sets of capacities to obtain performances in a specific field, by flexible and innovative use of the cognitive, affective, psychosocial and possibly psychometric acquisitions in order to successfully solve complex tasks, problems or sets of problems and, generally, to function effectively within a given context and role (Glava, 2010).

The competent teacher in ICT is one of the key that make changes in class room by using ICT in class and influences the students to use it in and out of class room. But first the teacher should be competent in ICT. Mukti (2000) states that, “In order to use an instructional tool such as the computer to achieve the goals of teaching and learning, teacher must have adequate knowledge about the computer”. ICT is also one of the knowledge source that teacher should have it. Asan (2003) describes this as: The use of computers in education opens a new area of knowledge and offers a tool that has the potential to change some of the existing educational methods. The teacher is the key to the effective exploitation of this resource in the educational system.

Recognizing the challenge of the ‘‘information age’’, the Ethiopian government developed electronic-government strategy in various sectors such as education, health, agriculture and public administration are covered (Dzidonu, 2006). By now, Ethiopia is prepared the “National

Information and Communication Technology (ICT) Policy and Strategy which has a mission "To develop, deploy and use information and communication technologies to improve the livelihood of every Ethiopian, and optimize their contribution to the development of the country (MCIT, 2016)". In this strategy the great emphasis is also given to education sector to deliver quality online education by 2020. But as the strategy describes that a key challenge faced in deploying ICT in schools is that "teachers may not have been trained properly." For this challenge, the country has planned ESDP V (MOE, 2015), to equip all secondary schools with the equipment necessary to access satellite television education and e-learning programs in well-organized computer laboratories.

E-learning encompasses more than online learning, virtual learning, distributed learning, networked or web-based learning. As the letter "e" in e-learning stands for the word "electronic", e-learning would incorporate all educational activities that are carried out by individuals or groups working online or offline, and synchronously or asynchronously via networked or stand-alone computers and other electronic devices (Romiszowski, 2004). In order to facilitate and apply this all activities, the competent teacher in ICT is required in every school. To achieve mission of the country goal in education sector, the teacher's ICT competency in education needs huge concern from the management and leaders of the day. They can play an important role in the sustainable usage of ICT in the education industry and creating good citizens. The study of teachers' ICT competency and their influences on the use of ICT in class room in teaching and learning presses in preparatory school in Addis Ababa city administration is the central topic in this research.

1.2. Statement of the Problem

ICT at present are influencing every aspect of human life. They are playing salient roles in work places, business, education, and entertainment. Osuji (2010) argues that almost all the areas of human life today require knowledge of the computer. It is therefore mandatory for the modern day teacher to be highly computer literate in order to be able to assist learners to fit well into the modern society and encourage them in order to use ICT as supporting tool. Underlying aim of integrating and improving the use of ICT by students is an assumption that teachers themselves are competent and confident in the use of ICT and influences students to use ICT in teaching and learning process.

In Nigeria, assessment of teachers' ICT Competency to implement the new ICT curriculum in North Eastern Nigeria revealed that, the competency of ICT teachers on policy, curriculum, pedagogy, technology, administration and professional development is low (Badau & Sakiyo, 2013). The researchers farther revealed that lack of hardware, software, and financial resources, lack of electricity in most rural schools and insufficient information and experience are obstacles to teachers' ICT competency.

Generally speaking, teachers ICT competency is influenced by a variety of factors either in their pre-service training, their personal lives, or during their teaching career that will influence them to use technology in their classroom. One of the major factors that influence teacher technology use in the classroom is whether a teacher received technology training in their undergraduate coursework. If teachers are properly taught how to use technology before they enter a real classroom, their computer self-efficacy will increase, and their likeliness to use technology in the classroom will improve (Koh & Frick, 2009).

In Ethiopian teaching and learning system, the subject of introduction to computer (ICT) as a subject of teaching starts at grade nine. Preparatory students are also learning this subject. This may make most students are technologically better than their teachers. So the teacher should become ICT competent in using and applying ICT in teaching and learning process better than students. For example as a chemistry class needs to know detail of the subject matter, the teacher should also have a good knowledge and skills of ICT in order to influence students to be competent and confident in using ICT in the classroom.

Ethiopia has planned SchoolNet and EtherNet that concentrate on education sector. SchoolNet was planned to connect more than 550 high schools in the country with Very Small Aperture Terminal (VSAT) based broadband for delivery of video-based distance and standardized education. EtherNet was planned to connect all public higher learning institutions at campus; local institutional, regional and national levels (MoE, 2005). The aim of these programs was to apply E-learning system to make good and smooth teaching and learning process in classroom and out of classroom. In addition to the above program, Ethiopian government introduces e-learning in the schools such as Plasma. For this system, teachers' knowledge of computers is important in order to embrace the concept of e-learning (Morse et.al, 2009). However, this effort is not successful as different studies shows. One of the factors that contribute for e-learning

success is teachers ICT competency. This is not assessed so far. Therefore, this study was focused on assessing of teacher's level of competency in ICT and their ICT usage in class, by using new population from Ethiopia. The research has addressed the following specific research questions.

1.3. Research Questions

The research questions of the study are:

1.3.1. Sub Questions

- What is the teachers' ICT competency level?
- What are the challenges that determine teachers ICT competency?
- How teachers use ICT in the classroom?

1.4. Objectives of the Study

1.4.1. General objective of the study

The main purpose of the study is to assess teachers' ICT competency level and its influence in the use of ICT in the classroom.

1.4.2. Specific Objectives

The specific objectives of this study are:

- To assess the teachers' ICT competency level of both public and private preparatory school of Addis Ababa city education bureau.
- To assess challenges that determine teachers ICT competency to use or not to use ICT in class room teaching activities.
- To assess the level of teachers' use of ICT in the classroom by comparing both public and private preparatory school teachers.

1.5. Significance of the Study

The aim of this study was to focus on identifying level of ICT competency and areas of weaknesses among preparatory school teachers. The study also focused on assessing of teacher

ICT usage in the class. In addition, the study also identifies possible challenges confronting the effective use of ICTs in the classroom instruction in the preparatory schools.

The findings of the study may create awareness among the school administrator and managers of education about the level of ICT competency of preparatory school teachers. It also provides possible mechanisms and suggestions which would help in becoming ICT competent for the teacher and make influence on the use of ICT in the classroom. On the bases of the finding, the study also suggest successful methods of utilizing ICT as a basic source of knowledge and skills in any subject in order to make students competent and confident in their subject through ICT technology.

Once the level of teachers' ICT competency is known by this research, it helps the Ministry of Education (MOE) in formulation of policies and strategies that can be used to enhance the competency of teachers in Addis Ababa preparatory school. The result of the study could be also used for other schools to improve the competency of their teachers ICT skills. The study also makes possible recommendation towards increasing the use of ICTs in enhancing teaching and learning processes; lastly, it serves as a reference for future studies in the field.

1.6. Scope of the Study

The focus of this study was to investigate the level of teachers' ICT competency on the use of ICT in the classroom in preparatory schools in Addis Ababa city administration. There are a number of factors that can affect teacher's ICT competency in preparatory schools including such as lack of proper policies, finance, and provision of resources like Internet access, supporting staffs and the pedagogical constraints. In order to manage its scope, this research was delimited to assess the level of teachers' ICT competency on the use of ICT in the classroom based on the focus area of teachers' knowledge and skills in ICT, attitude, school vision, ICT accessibility and basic computer training given for teacher. The research was undertaken in selected preparatory schools of Addis Ababa city administration on 150 preparatory teachers only.

1.7. Limitations of the Study

It is worthy to note some of the limitations of this study. First, it is limited to preparatory schools in Addis Ababa city Administration. There were also no literature references regarding local

context of Ethiopia in the library of Addis Ababa University. Hence, the researcher was forced to depend much on foreign articles, journals, report, and books. The other limitation of the study was that it was conducted on three public preparatory school and five private high school found in Addis Ababa administration education bureau. In the light of these, future research should try and build on the limitations of this study by expanding its scope to cover more schools.

1.8. Operational Definition of Terms

In order to avoid ambiguity and to have clarity and consistency in the study, the following terms have been given with operational definition as follows:

Competency - is integrated set of knowledge, skills and attitudes for functional use of something.

Computer training - professionals instruct and help users acquire proficiency in a wide array of areas, including software, hardware, database management, programming, networking and more.

Electronic learning (E-learning) - is an electronically supported learning and teaching, which can be networked learning or not, and serve as specific media to implement the learning process.

Information Communication Technology (ICT) - Information and communication technology is used as an umbrella term that includes any communication device or application, encompassing: radio, television, cellular phones, computer and network hardware and software, satellite systems, as well as the various services and applications associated with them, such as video conferencing and distance learning.

ICT access - refers to technologies provide access to information through telecommunications. This includes the Internet, wireless networks, cell phones, and other communication mediums

Preparatory school - refers to grade 11-12.

School stakeholders - include teachers, students, principals, supervisors and parents.

School Vision - What kind of school do we want to be? And how does ICT fit into our vision?

Teacher Attitude - refers to individual teacher's thinking, behavior and feelings towards ICT integration in teaching and learning. Attitude comprises of emotions or actions of teachers toward technology in daily classroom practices.

Teacher ICT usage - refers to a range of learning opportunities from a stand-alone technology in a classroom environment where lessons are conducted by a teacher using ICT tools installed with instructional software.

Teacher ICT-competency - an integrated set of knowledge, skills and attitudes for functional use of ICT in an educational context

Technology - is the process of using scientific, material and human resources in order to meet human need or purpose.

1.9. Organization of the Study

This study has five chapters. The first chapter of the study includes the introduction part that contains background of the study, statement of the problem, research questions, and objectives of the study, significances of the study, scope of the study, limitations of the study and operational definition of terms.

The second chapter provides a review of literature on overview of what information communication technologies are, integration of ICT into education, the roles of information and communication technologies in education, facilitating and inhibiting factors in using Information technologies in education, competency, teacher's ICT Competence, school vision, computer access, ICT training, ICT usage in classroom, reviews of related literature, Key Challenges of ICT Integration in Education and summary of review of literature.

The third chapter covers, research design, target population, sample and Sampling techniques, variables, instruments of data collection, questionnaire, and method of data analysis, validity and reliability of data collection instruments. Finally, the chapter concludes with ethical consideration.

The fourth chapter contains the results of the analyzed data of the study. It includes analysis and interpretation of data.

The fifth chapter presents the major findings of the study, conclusions, recommendations and future work. Finally, list of reference materials used for conducting the study and data collection tools (Questionnaire) were annexed at the end.

CHAPTER TWO

2. REVIEW OF LITERATURE

2.1. Information Communication Technologies

Although ICT has several definitions depending on the nature of its use, the most common definition given by many researchers is that, ICTs are "a diverse set of technological tools and resources used to communicate, create, disseminate, store and manage information (Tinio, 2002)". These technologies include computers, the Internet, broadcasting technologies (Radio and Television), and (Mobile) telephony. Tinio further discussed, ICT can help to expand access to education. And he defined ICT in education sectors as:

> *ICTs are greatly facilitate the acquisition and absorption of knowledge, offering developing countries unprecedented opportunities to enhance educational systems, improve policy formulation and execution, and widen the range of opportunities for business and the poor. One of the greatest hardships endured by the poor, and by many others, who live in the poorest countries, is their sense of isolation. The new communications technologies promise to reduce that sense of isolation and to open access to knowledge in ways unimaginable not long ago* (Tinio, 2002).

According to Moges (2014), ICT presents an entirely new learning environment for students, thus requiring a different skill set to be successful. Critical thinking, research, and evaluation skills are growing in importance as students have increasing volumes of information from a variety of sources to sort through. ICT is a potentially powerful tool for offering educational opportunities. It is difficult and maybe even impossible to imagine future learning environments that are not supported, in one way or another.

The pace of change brought by new technologies has had a significant effect on the way people live, work and play worldwide. New and emerging technologies challenge the traditional process of teaching and learning and the way education is managed. ICT becomes an important area of study in its own right, and has a major impact across all curriculum areas. So, the field of education has been affected by ICTs, which have undoubtedly affected teaching, learning, and research. As cited by Yusuf (2005), ICTs have the potential to accelerate, enrich, and deepen skills, to motivate and engage students, to help relate school experience to work practices, create

economic viability for tomorrow's workers, as well as strengthening teaching and helping schools change.

2.2. Integration of ICT into Education

We are living in a fast paced world where our needs move fast, our technological solutions move fast and our education has to move with them. Among many sectors in which ICT is used, education can be regarded as one of the most important sectors that should be move with the fast growing of technology. And this sector has been affected by ICTs, which have undoubtedly affected teaching and research (Yusuf, 2005).

The emergence of ICT in education has been so rapid that there exists a serious information gap regarding the actual infusion of technology in education. The integration of technology in the process of teaching and learning is thought by many researchers and its aim is to increase student and teacher productivity as well as to make vast amounts of information available (Al-Zaidiyeen et al., 2010). These researchers claim that there are three reasons for investing in technology: (1) to increase students ability and interest in applying authentic settings, what district and states have identified as learning and tasks that students should know and able to do; (2) to prepare students for success in a technology centered world of work, and; (3) to prepare students to manage and use information so they can be productive in lifelong learning and responsible citizens. Furthermore, integrating technologies in learning classrooms has been shown to promote teachers and students' performance and motivation.

Several studies reveal that students using ICT facilities mostly show higher learning gains than those who do not use. For instance, as cited by Fisseha (2011) in (Kulik, 1994), finding of Kulik's across 75 studies in the United States showed that students who used computer tutorials in mathematics, natural science, and social science score significantly higher on tests in these subjects. Students who used simulation software in science also scored higher. The findings also indicated that primary school students who used tutorial software in reading scored significantly higher on reading scores. Very young students who used computers to write their own stories scored significantly higher on measures of reading skill.

The use of ICT in education has developed positive changes in educational institutes and communities. In recent years, there has been an increased emphasis on the integration of technology into curriculum especially at the high school level (Peake et.al., 2005). The researchers further listed technology used in the classroom in various forms including computers, DVD players, digital and video cameras, televisions, cooking equipment, and welding equipment. In addition (Barakat & Bataineh, 2008) point out that the use of computers as part of ICTs in the instructional process is seen as a positive change from the use of old-fashioned teaching methods. But positive changes brought in by ICT in education have been realized through appropriate infrastructure and ICT facilities encompassing electricity, telephone, educational software, Internet facilities and hardware such as computers, scanners, and multimedia projectors (Sithulisiwe & Cosmas, 2016).

Successful integration of ICT in the school system depends largely on the availability and competence and the attitude of teachers towards the role of modern technologies in teaching and learning. Research works have shown that most secondary schools have either insufficient or no ICT tools to cater for the ever increasing population of students in the schools and where they are available (Obakhum, 2011).

It appears that the primary reason for the lack of integration is that instructors' knowledge, skills and attitudes in Information Communication Technology (ICT) are inadequate, not only in terms of generic ICT competence, but specifically in integrating it into the pedagogy/teaching-learning process (Moges, 2015).The integration of ICT in teaching and learning process in school is not a method; rather it is a medium in which a variety of methods, approaches and pedagogical philosophies may be implemented (Hadi & Zeinab, 2012).

The crucial role that ICTs can play in facilitating and accelerating socio-economic development has been recognized worldwide. ICTs have the potential to accelerate, enrich, and deepen skills, to motivate and engage students, create economic viability for tomorrow's workers, as well as strengthening teaching and helping schools change (Yusuf, 2005). The role of ICT in education is that, it can increases the flexibility of delivery of education so that learners can access knowledge anytime from anywhere. This means, ICTs make curriculum implementation learner-centered with a self-learning environment that enables the student customize his/her own learning experiences.

ICTs are a potentially powerful tool for extending educational opportunities, both formal and non-formal, to previously underserved constituencies scattered and rural populations, groups traditionally excluded from education due to cultural or social reasons such as ethnic minorities, girls and women, persons with disabilities, and the elderly, as well as all others who for reasons of cost or because of time constraints are unable to enroll on campus (Tinio, 2002). He further discussed on:

- **Anytime, anywhere**. One defining feature of ICTs is their ability to transcend time and space. ICTs make possible asynchronous learning, or learning characterized by a time lag between the delivery of instruction and its reception by learners. Online course materials, for example, may be accessed 24 hours a day, 7 days a week. ICT-based educational delivery (e.g., educational programming broadcast over radio or television) also dispenses with the need for all learners and the instructor to be in one physical location. Additionally, certain types of ICTs, such as teleconferencing technologies, enable instruction to be received simultaneously by multiple, geographically dispersed learners (i.e., synchronous learning).
- **Access to remote learning resources**. Teachers and learners no longer have to rely solely on printed books and other materials in physical media housed in libraries (and available in limited quantities) for their educational needs. With the Internet and the World Wide Web, a wealth of learning materials in almost every subject and in a variety of media can now be accessed from anywhere at any time of the day and by an unlimited number of people. This is particularly significant for many schools in developing countries, and even some in developed countries, that have limited and outdated library resources. ICTs also facilitate access to resource persons mentor, experts, researchers, professionals, business leaders, and peers all over the world.

The other role of ICT in education is, it can enhance the quality of education in several ways, like by increasing learner motivation and engagement, by facilitating the acquisition of basic skills, and by enhancing teacher training. As discussed by Alharbi (2014), Students who did not enjoy learning can be encouraged through the use of ICT, which possesses the flexibility required to meet the individual needs and abilities for every single student. ICT cab also presents information in new ways that help students to understand. Even difficult ideas become easier to

understand when the information technology makes it more visible. Simulation offered by ICT encourages analytic and broader thinking as well as learning activation and stimulation, and it is considered successful specially in attracting the attention of students (Alharbi, 2014). So, ICT had a positive effect on the student's motivation, and the use of ICT boosted students' motivation to learn and led to a better performance for learning outcome.

ICTs such as videos, television and multimedia computer software that combine text, sound and colorful moving images can be used to provide challenging and authentic content that will engage the student in the learning process. Interactive radio likewise makes use of sound effects, songs, dramatizations, comic skits, and other performance conventions to compel the students to listen and become involved in the lessons being delivered (Moges, 2014).

Many countries in the world like Nigeria recognize the role of ICT in education sector. They are training teachers to use technology as tools for enhancement of teaching and learning.
The following are the importance of ICT as enumerated by the Nigerian Teachers Institute cited by (Igomu & Solomon, 2014).

i. It can be used to support conventional classroom works.
ii. To design and develop learning materials.
iii. Students can exchange electronic materials like journals, books etc.
iv. Some libraries store electronic versions of books and journals through which ICT teachers can have access, store and analyze information in electronic forms.
v. ICT is useful in research activities.
vi. ICT can be useful in administration, recording students' data, personal administration, purchasing/supplies and advertisement.
vii. Gives room for individualized and independent learning.
viii. ICTs make learning more vivid and engaging.
ix. ICTs have broken teachers-centered instruction
x. It also provides a two-way channel of communication for exchange between teachers and students with peers for feedback.

In view of the enormous benefits of ICT in the educational system, teaching will be simplified and learning experiences will be more effective with the use of ICT.

Like Nigeria, Ethiopian government also understands the key role that ICTs can play in widening access to education for Ethiopian population; for supporting literacy education and for facilitating educational delivery and training at all levels has been acknowledged in the Ethiopian ICT4D Policy. By recognizing the key role that ICTs can play in transforming the educational system and making education accessible to the greater proportion of citizens, the country is committed to: modernizing the educational system using ICTs to improve and expand access to quality education and training and make the educational system responsive to the changing needs and demands of the economy and society (Dzidonu, 2006).

2.3. Factors that Facilitate Use of ICT in Education

Even though there are many factors that hinder teachers from using computer in teaching and learning activities, according to some studies, there are many factors that encourage a teacher to use computer technology in his/her classroom. These factors include computer technology training, computer self-efficacy, personal computer technology use, positive teacher beliefs and attitudes towards computer technology, access to professional development in the computer technology knowledge and experience. All of these factors are important in motivating a teacher to use computer technology (Gilakjani, 2013).

Other factors which influence teachers' decisions to use ICT in the classroom are: access to resources, quality of software and hardware, ease of use, incentives to change, support and collegiality in their school, school and national polices commitment to professional learning and background in formal computer training (Mumtaz, 2000).

In general there are many challenges in bringing ICTs into the education process. The process of using ICT in everyday education is very complicated. The opportunities provided by ICT to support teaching and learning are not problem-free including developed country. The virtually limitless opportunities of access to information in an educational context can pose a real danger of information overload if the teachers do not have the skills in filtering information for relevance, or are unable to establish a coherent organizing principle. Both students and teachers may lack the necessity skills to access, process and use information (Hadi & Zeinab, 2012).

2.4. Factors that Inhibits Use of ICT in Education

The integration of ICTs in education systems may face various challenges with respect to policy, planning, infrastructure, learning content and language, capacity building and financing. As discussed by Olakulehin (2007), across Africa and most developing countries of the world, there are challenges of confronting the application of ICTs in teacher training and in the educative process in general. These challenges include limited ICT infrastructures (in terms of facilities and competent staff); lack of information and information illiteracy in teachers and teacher trainers-technophobia; poor or nonexistent Internet connectivity; inadequate learning resources including related educational tools, course curriculum and other learning materials; attitudes of teacher-trainees and teacher trainers which indicates a gross lacking in independent learning skills and reluctance to take responsibility for their own learning; software license and highly prohibitive costs associated with the maintenance and technical support as well as poor power supply in most parts the developing regions of the world (Olakulehin, 2007).

A number of early studies investigated factors that affect why teachers do not use computers in their teaching and learning. The study of Mumtaz (2000) revealed that, they are three interlocking factors that affect teachers' take-up of ICT. These are institution, resources and the teacher. He has been further discussed these factors as follows:

Institution: The school as an institution gives little time to teachers to manage and familiarize themselves with ICT. Due to pressures of work inside and outside the classroom, timetabling does not allow time for such learning. In addition to lack of time, schools provide no supportive network for teachers who are not confident enough to take up ICT. Thus, schools seem to be slow in embracing ICT, and there is a resistance to change. Schools do not feel a need to change; they are content with familiar tried and tested ways of teaching (Mumtaz, 2000).

Resources: As Mumtaz (2000) discussed, limited resources within schools are a great impediment to the take-up of ICT. Lack of computers and software in the classroom can seriously limit what teachers are able to do with ICT. Limited resources results in lack of computer integration, which in turn results in lack of sufficient computer experience for both students and teachers. Teachers need to be provided with adequate facilities and training to be able to use those facilities in order to progress in a technology-rich context.

Teacher: The last factor that Mumtaz found out is that teacher's personal level. Clearly, schools can go only so far to encourage ICT use; actual take-up depends largely on teachers' personal feelings, skills and attitudes to IT in general.

The lack of incentives and support for teachers are other factors hindering their use of ICT. School administrators offer very little structural support and few incentives to use the technology effectively in the classroom (Harriso et.al., 2010).

2.5. ICT Competency

In the current information society, with IT spreading across society, ICT contributes to increasing social and economic productivity all over the world. Accordingly, the need for securing human resources acquired with ICT competency is becoming a very important national and social issue (Cha & Jun, 2011).

The definition of ICT competency demanded in the present day information-based society has changed. It is defined in different ways. The most common definition accepted by many scholars is that, it is defined as an integrated set of knowledge, skills and attitudes for functional use of ICT in an educational context (Albirini, 2006). And it is also a means of using digital technology, communications tools, and/or networks to access, manage, integrate, evaluate and create information in order to function in a knowledge society (iSkills, 2002). The other definition given to ICT competency is that, "ICT-competency": an integrated set of knowledge, skills and attitudes for functional use of ICT in an educational context (Evers, 2008).

Nowadays teacher's ICT competence is understood as a part of his professional competence, which does not represent a strictly defined area (i.e. containing e.g. only technical knowledge and skills related to the use of ICT in education), but an area which is coherent and consequent with other areas of teacher's professional competency (subject, pedagogical, didactic and psycho-didactic, diagnostic and intervention and others (Glava, 2010)).

Reflecting the growing importance and ubiquity of new technologies in work, education, and everyday life, A Report of the International ICT Literacy Panel defines ICT literacy as: "ICT literacy is using digital technology, communications tools, and/or networks to access, manage,

integrate, evaluate, and create information in order to function in a knowledge society (iSkills, 2002)."

The panel's definition reflects the notion of ICT literacy as a continuum, which allows the measurement of various aspects of literacy, from daily life skills to the transformative benefits of ICT proficiency (iSkills, 2002).

ICT competency in recent ICT education aims is not only handling ICT well in an instrumental perspective, but more importantly understanding the principles of information technology which surrounds our lives and developing the skill and idea to create new information and information technology. For this, logical and algorithmic thinking, structuring problems and designing efficient problem-solving strategies are needed.

2.5.1. Teacher's ICT Competency

The ICT competency of a teacher is the teacher's ability and readiness to use ICT when fulfilling their labor functions (Avdeevaa et al., 2016). These researchers further discussed that, when discussing teachers' ICT competency, it makes sense to speak not only about the basic computer literacy (typing and simplest text formatting, creating simple presentation slides, file saving, working with the Internet browsers etc.) but also to put up the questions associated with understanding of the efficient use of various information presentation forms.

In the study of Baylora & Ritchie (2002), teacher technology competency was prepared to include teacher-perceived confidence in the following areas: using a variety of software programs (e.g. word processing, database/ spreadsheet, email, Internet), file management, solving general software or hardware problems, use of terms associated with computers, identifying and explaining basic computer components, operating technology equipment, selecting and implementing appropriate technology to support curriculum, incorporating technology (e.g. telecommunications, word processing, spreadsheets, computer based presentations, email, and the Internet) in instruction, and teaching students to use technology (e.g. graphics, Internet, word processing, spreadsheets/databases, electronic encyclopedia, and use of appropriate vocabulary).

Badau & Sakiyo (2013) made an assessment on teachers' ICT Competence to implement the new ICT curriculum in North Eastern Nigeria. In their study, they revealed that there is low competence of policy awareness, curriculum, pedagogy, technology, administration and professional development of ICT teachers for the implementation of ICT curriculum in secondary Schools. Beside of assessing teachers' ICT competency, they also assessed obstacles to teachers ICT competency. Lack of policy and vision, hardware and software knowledge and unavailability of infrastructure are some of the obstacles to ICT teacher's competencies for the implementation of ICT curriculum. The study made by Obakhum (2011) supports this finding as because of the absence of these facilities, most teachers are not competent in the use of ICT.

The study of Etejere & Ogundele (2008) investigated that the relationship between computer literacy and teacher's job effectiveness of secondary schools in Kwara state in Nigeria. The findings of their study revealed that computer literacy encourages appreciation and operation of computers during the teaching and learning processes. The use of ICT was seen as consistently supporting teachers' job effectiveness in job performance, record keeping, school discipline, and it supported the learners' academic performance. The study also revealed that computer literate teachers performed their tasks better than non-computer literate teachers during their teaching. The use of computers was perceived as a way of moving learners' interest in lesson delivery.

Especially in today's technology age, using computer in teaching and learning activities is very important. As Sithulisiwe & Cosmas (2016) cited in (Taylor et al., 2011) observed that, "Acquiring computer skills is more important today than ever before, especially in a developing country." A study on computer literacy and utilization of ICTs in learning by these researchers aimed at modeling factors influencing the success of the learning of computer literacy by means of an e-learning environment. The study revealed that the use of computers during the learning process influenced a huge success in the learners' results of their final school year. So, computer literacy for teachers is important for an improved instruction in the classroom and influencing students to use ICT in the classroom.

The ICT competency standards for teachers (ICT-CST) were designed by UNESCO and launched in 2008 to help educational policy-makers and curriculum developers to identify the skills teachers need to harness technology in the service of education (UNESCO, 2008). The intent of UNESCO ICT-CST project is "to connect education reform to economic growth and

social development that can improve the quality of teaching, reduce poverty and inequity, advance the standards of living, and prepare a country's citizens for the challenges of the 21st century".

UNESCO's framework emphasizes that acquiring ICT skills and be able to teach them to students is not enough for teachers. Teachers need to be able to mold students become collaborative, problem-solving, creative learners through using ICT. UNESCO arranges in three different approaches to ICT integration in education: (technology literacy, knowledge deepening, and knowledge creation) with the six components of the educational system (Policy & Vision, Curriculum & Assessment, Pedagogy, ICT Technology, Organization & Administration, and Teacher Professional Development). The first teaching approach aimed to let students use ICT to learn more efficiently. The second teaching approach enables students to acquire an in-depth understanding of their school subjects and use it for complicated and real-world problems. The third teaching approach allows students to create new knowledge required for more harmonious, fulfilling and prosperous societies.

The ICT-CFT is global in scope and any country can localize or contextualize the standard to guide and assess teacher competencies for the implementation of ICT curriculum. The guidelines recommend that the identification of ICT competencies for teachers should be based on a clear understanding of a country's overall approach to ICT use in education. Different countries could adopt any combination of the three approaches:

1. To develop a technology-literate workforce to enhance national economic productivity and competitiveness;
2. To develop knowledge workers, or individuals who can apply knowledge to add value to the economy and society; and
3. To develop innovators and knowledge creators for the knowledge society.

Finally, according to many researchers, when we say that teachers' ICT competency, we are referring to those teachers who have the three types of objectives in an integrated manner-knowledge (of terms, components, applications, social ethical issues), skill (word processing, spreadsheet, information retrieval, desktop publishing, problem solving), and attitude

(acceptance as a valuable tool, appreciation as a productive tool) for functional use of ICT in an educational context (Bhalla, 2014).

2.5.1.1. Teachers' ICT Skills

In today's world, the teacher should have good ICT skill in order to effectively exploit and use it in case of teaching and learning activity. As many researchers revealed that, there is little utilization of ICTs in schools in developing countries than developed country. But it is more important for developing country than developed country. Taylor et.al (2011) observes, "Acquiring computer skills is more important today than ever before, especially in a developing country."

The teaching and learning activities should be helped by competent and adequate teacher in ICT. Mukti (2000) States, "In order to use an instructional tool such as the computer to achieve the goals of teaching and learning, teacher must have adequate knowledge about the computer." So that teachers need time to appreciate and find ways to maximize technology in the classroom for the greater benefit of the learners.

Asan (2003) States that: The use of computers in education opens a new area of knowledge and offers a tool that has the potential to change some of the existing educational methods. The skilled teacher in ICT is the key to the effective exploitation of this resource in the educational system.

With respect to challenges of capacity building, a responsible body should have to develop competencies of teachers and school administrators for the successful integration of ICT in the education system. From these competencies, teachers need professional development to gain skills with particular applications of ICT, integration into existing curricula, curricular changes related to its use (Tinio, 2002). In addition, the major promises of ICTs use in education systems of developing countries focus on training teachers in new skills and introducing innovative pedagogies into the classrooms, investing on ICT infrastructure for schools and creating networks among educational institutes, improving overall standard of education by reducing the gap in quality of education between schools in urban and rural areas, initiation of smart school

with objectives to foster self-paced, self assessed, and self-directed learning through the applications of ICTs, and developing ICT policy for education and training (Fisseha, 2011).

The use of technological resources by teachers implies much technically mastering them. The skills like switching computer on and off, working around with the packages like Microsoft-word, excel, outlook, etc; power point ; work and produce out puts or results–typing, browsing, sending mails, etc. are basic skills needed by teachers (Osuji, 2010)

To conclude the above topic, ICT skills are needed by today's teacher in order to use ICT in teaching and learning activities, the following skills should be built: 1) the skill to use information in accordance with the objective and to collect, analyze, interpret, evaluate and express with ICT tools, 2) the skill to determine critically when and how ICT can be used most effectively when solving problems or expressing work and; 3) the skill to use ICT information sources, including information processing, creative thinking, questioning and decision-making skills and to reexamine, revise and evaluate using ICT (Cha & Jun, 2011).

2.5.1.2. Teachers' ICT knowledge

Teachers' ICT knowledge is one of the main parts of teachers' ICT competency. It refers to understanding of technology and benefits of using technology in daily life. In order to use ICT tools in teaching and learning process, teachers should have adequate knowledge about it (Kamaruddin et al., 2017). It has been discovered that knowledge of ICT usage improves human capacity in every field of human endeavor, including business transactions, industrial operations, educational programs and life in general (Igomu & Solomon, 2014). A study conducted by (Asan, 2003) in Turkey on teacher computer literacy and utilization of ICTs in learning revealed that, many teachers were not computer users, had low levels of technical knowledge and for some teachers; computer technology was not part of their teacher training. This implies that without teachers' knowledge and expertise in computers, it becomes very difficult to have ICTs integrated in teaching and learning.

The study of Mukti (2000) revealed that, teachers who were less knowledgeable perceived that they needed more skills and adequate knowledge to implement computer technology in the classroom. Teachers felt that having basic knowledge of computers is insufficient to teach with

computers in the classroom. They felt uncomfortable and under prepared to teach with computers. Mukti also further revealed that teachers who were knowledgeable in the use of computers can easily integrated computers in their teaching of subjects.

As Obakhum (2011) study shows that most teachers in secondary school do not use ICT in teaching students, for administrative purpose and for their personal purpose. He observed that most of these teachers lack the knowledge competence to use ICT to facilitate teaching-learning process.

Teachers are themselves master learners and knowledge producers who are constantly engaged in educational experimentation and innovation to produce new knowledge about learning and teaching practice. (Badau & Sakiyo, 201). It starts with computer appreciation which starts from knowing the common things of the computer, like its components, central processing units, visual display unit, key board, mouse, speakers (OSUJI, 2010).

It is not enough to say that those teachers who have a good knowledge about ICT are competent in ICT in case of using it in teaching and learning activities. The study of Caluza (2017) clearly revealed that teachers have basic knowledge in ICT. However, this is not enough to say that teachers are already competent in ICT. Teachers need to be proficient in knowing where and when to use technology for teaching and other related tasks. The teacher also need further to undergo in training that will help further enhance their computer skills, knowledge and attitude.

2.5.1.3. Teachers' Attitude towards the use of ICT

Attitudes are a complex combination of things that tend to call personality, beliefs, values, behaviors, and motivations. Recent studies have shown that the successful implementation of educational technologies depends largely on the attitudes of teachers, who eventually determine how and when they use ICT in the classroom. To successfully initiate and implement educational technology in the school, it depends strongly on the teachers' support and attitudes (Buabeng, 2012). As discussed by Buabeng, it is believed that if teachers perceived technology programs as neither fulfilling their own needs nor their students' needs, it is likely that they will not integrate the technology into teaching and learning. Evidence suggests that teachers' attitudes and beliefs influence successful integration of ICT into teaching. The development of teachers' positive

attitudes toward ICT is a key factor not only for enhancing computer integration but also for avoiding teachers' resistance to computer use.

Teachers' attitudes are considered as a major predictor of the use of new technologies in the educational settings. Thus, their attitudes toward computer can play an important role in the acceptance and actual use of computers. The successful utilization of technologies in the classroom depends mainly on the teachers' attitudes toward these tools (Albirini, 2006).

The study of Albirini (2006) investigated on the attitudes of English teachers' in Syrian high schools toward technology in education. He found that the results from both quantitative and qualitative data indicated that teachers had positive attitudes toward technology use in education.

Teachers' attitude plays an important role in the teaching-learning process that utilizes computers and Internet connections. Although teachers' attitude towards use of these technologies is vital, many observations reveal that teachers do not have clarity about how far technology can be beneficial for the facilitation and enhancement of learning. Some teachers may have positive attitudes to the technology, but refrain from using it in teaching due to low self-efficacy, tendency to consider themselves not qualified to teach with technology (Fisseha, 2011).

Having positive attitude towards using ICT in teaching and learning activities is not enough by itself. According to the study carried out in Nigerian secondary school on teachers' competence, although they have positive attitude towards the use of computer in schools, but teachers are not competent in basic computer operation and in the use of generic software (Yusuf, 2005). But if teachers have negative attitudes towards ICTs in educational processes, they will not struggle to use these technologies in the classroom. Hence, the development of teachers' attitudes towards ICTs is seen as a key factor for enhancing technology integration into teaching-learning process at school because ultimately their beliefs influence what they do in classroom (Bas et al., 2016).

Research shows that teachers who have a high value for ICT and perceive it to be useful completely transform their teaching (Mumtaz, 2000). Similarly, those teachers who are motivated and have strong commitments to their pupils' learning and their own professional development will evidently integrate computers more easily within their teaching. Teachers also perceive the use of ICT as enhancing recall of previous learning, providing new stimuli, activating the learner's response, and providing systematic and steady feedback.

In the study of Baylora & Ritchie (2002), the degree of teacher openness to change was repeatedly found to be a critical variable as a predictor in our study. Teachers, who are open to change, whether this change is imposed by administrators or as a result of self-exploration, appear to easily adopt technologies to help students learn content and increase their higher-level thinking skills. It also appears that as these teachers incorporate these technologies, their own level of technical competence increases, as does their morale.

If teachers have the above two elements (skill and knowledge) but has no positive attitudes about using ICT, he/she cannot be competent in ICT. If teachers' attitudes are positive towards the use of educational technology, then they can easily provide useful insight about the adoption and integration of ICTs into teaching and learning process. ICTs are important for educational process, so the teachers' attitude should play the main role in the adoption and integration of ICTs in teaching-learning process.

Overall, it is clear that the psychological factors of a teacher's own beliefs and attitudes to ICT and pedagogical innovation are both primary facilitators and barriers to teacher use of technology in the classroom (Harrison et al., 2010).

2.5.1.4. School Vision

School management must have a vision on ICT use, taking into account the new developments in ICT, and must formulate a strategy to achieve the ICT vision. In school vision, School might wish to ensure that all teachers and students use ICTs to create and share resources. This school vision for ICT should be driven towards improving teaching, learning and integration of ICT in all subject areas (Schreurs, 2007).

Implementing ICT into schools is the responsibility of the school principal; they have to ensure that the best interests of the teacher and students are served through effective ICT infrastructure and staff professional development (Gronow, 2007). For achievement of these teachers and students interest in ICT, the school principal should develop an ICT Policy, vision and strategy extends the environmental ICT context, facilitate technological infrastructure, promote professional development, improves curriculum, pedagogy and content enrichment, management and finance utilization and easy monitoring and evaluation(Tedla, 2012).

Since not every teacher can afford to have compute access at home, school plays an imperative role in providing opportunities for teachers to use computers as frequently as possible. But teachers and school administrators much ensure that computers in the access centers or laboratories are used for beneficial activities and not only for recreational activities such as playing games or online chatting (Hew & Leong, 2011).

2.5.1.5. ICT Access

Effectively introducing technology into schools is also largely dependent upon the availability and accessibility of ICT resources (e.g. hardware, software and communications infrastructure). Schools should be increasingly being equipped with computers for teaching, learning and administrative purposes; improving connectivity and students are enthusiastic about using computers for learning, despite the lack of equipment available (Harrison et.al, 2010).

More schools and communities now have access to ICT resources to join the global economy with knowledge workers who have 21st century skills and are inspired by life-long learning (Buabeng, 2012). But if there is no enough accessibility of technology in school, it may become an obstacle for teachers' ICT competency. Badau & Sakiyo (2013) discussed that lack of reliable access to electricity, limited technology infrastructure, language of instruction and available software as obstacles to ICT teacher's competencies. Also it was evident from the findings of the study of Sithulisiwe & Cosmas (2016) that, schools with Internet access motivated their staff to be computer literate.

Continually improving the technical equipment in the schools will positively affect the use of ICT by teachers. Access to hardware and computers contribute to greater development of ICT competencies of teachers including pedagogical use of ICT (Vitanova, 2015). Yildrim (2007) found in his study that access to technology resources is one of the effective ways to teachers' pedagogical use of ICT in teaching. It is, therefore, teachers should have access to computers, the Internet, hardware and software to increase their knowledge in ICT (Caluza, 2017).

2.5.1.6. ICT Training

The purpose of training teachers in ICT is making teacher educators ICT skilled both in personal activities, in day-to-day professional development and how to integrate ICT in teaching and learning activities. Training teachers on ICT integration helps to provide them with competencies and skills of how to incorporate ICT tools in their respective subjects in the classroom environment (Gaible et al., 2011). Schools can assist by providing in-service training that meets the needs of the faculty, and by promoting continual growth both within and outside the school boundaries (Baylora & Ritchie, 2002). So, the availability of trained teachers has been globally considered as a key strategy for advancement of the new technological innovation in the curriculum (OECD, 2004).

Teacher training curriculum should have a computer training program in its components. As recommended by the study of Sithulisiwe & Cosmas (2016), Computer training and the integration of ICTs in teaching and learning should form an integral component of the teacher education curriculum. From the findings of Buabeng (2012), it is recommended that courses such as computer supported learning, ICTs and designing instructional materials should be introduced in initial teacher training programs to improve teachers' level of confidence and perceptions towards the use of ICT.

If teachers are properly trained in ICT, they can effectively use it in teaching and learning activities. One of the reasons for low use of hardware tools could be attributed to lack of teachers' training skills in the use of ICT equipment. Lack of training with regards to integration of ICT into teaching and absence of a properly developed computer skills curriculum were barriers to teachers' application of the technology (Buabeng, 2012). Buabeng further recommended that teachers should be given sufficient training on how to use ICT into teaching and learning processes to acquire the requisite knowledge and skills in integrating the technology in classrooms.

2.6. ICT use in the Classroom

There is a growing demand on educational institutions to use ICT to teach the skills and knowledge students need for the 21st century (Buabeng, 2012). Studies reveal a number of factors which influence teachers' decisions to use ICT in the classroom: access to resources,

quality of software and hardware, ease of use, incentives to change, support and collegiality in their school, school and national polices commitment to professional learning and background in formal computer training (Mumtaz, 2000).

Successful ICT integration is related to actions taken at the school level, such as the development of an ICT plan, ICT support, and ICT training (Tondeur & vanKeer, 2008). The role of school leaders in building the capacity of teachers to support and facilitate ICT integration in teaching and learning is therefore very important (Schiller, 2003). The school leaders' major responsibility lies in initiating and implementing school change also in taking the right decisions to support the ICT integration into pedagogical practices.

ICTs have great potential for knowledge dissemination, effective learning, and the development of more efficient educational services. Moreover, the adoption of ICT by education has been seen as a powerful way to contribute to educational change, better prepare students for the information age, improve learning outcomes and competencies of learners, and equip students with survival skills for the information society. Therefore, teachers are expected to integrate ICT into their teaching and learning processes (Buabeng, 2012).

With the existing ICT infrastructure in the Ethiopian preparatory schools, there are obvious challenges to integrate ICT into education. But with only 40% of schools in Ethiopia having computers, this may be discouraging the task of integrating ICT in to education of teaching and learning activities. And of the schools that do have computers, most of them are in Addis Ababa, thereby creating a major rural-urban divide should the strategy be implemented within the current context (Hare, 2007).

2.7. Review of Related Literature

There is a common belief that ICTs have significant contributions to changes in teaching practices, school change and innovations, and community services. Since ICT can make positive impact on teaching and learning process, teachers and school administration should become aware in making conducive environment for integration of ICT in classroom.

As discussed by Fisseha (2011), if teachers are not competent in ICT, it makes difficulties on integration of ICT in teaching and learning activities in school. He further suggested as, in order

to improve, and make optimal use of ICTs, changes in the pedagogic approaches and classroom strategies as well as integrating ICT in teacher training and staff development practices accompanied by teacher motivation schemes are imperative.

ICT can enhance the educational system in areas such as access to a wealth of information and online courseware. Equally important is the digital skills imparting function of schools teaching students how to use ICT, as well as to develop higher level skills for future employment in computer related occupations. This pillar also ties into the foundational area of human capital development. For this achievement, teachers' ICT competency is critical things (MCIT, 2016). Because teachers assume as they have the role of facilitators and skills developers. They should help the students achieve a greater understanding of information by making use of new technologies. But first they should be competent in technology in order to help other (Moges, 2014).

Training given to teachers should be relevant to how to integrate ICT in teaching and learning practice. As Moges stated in his research result, most instructors stated that ICT training did not meet their needs for ICT integration. They claim that the training was not sufficiently relevant for ICT integration but it was mainly aimed at giving those basic ICT skills (of which they say they needed those skills). Most respondents expressed a need for more training in ICT skills and knowledge across all four contexts, that is, classroom practice, professional development, personal use and administration purposes but most particularly in relation to the use of ICT in the classroom practice (Moges, 2014). He further discussed how to integrate ICT in teaching and learning activities, he identified the following points: Training that is relevant for the classroom use; More practical examples of ICT integration lessons; Individual attention during ICT training; Opportunities to work and share ideas as a group regarding ICT integration and more support from ICT coordinators. These are the needs that instructors require to enhance their ICT pedagogy/teaching-learning integration.

The research undertaken on ICT Integration efforts in higher education in developing economies: The Case of Addis Ababa University point out that lack of accessible ICT resources ranks top among the perceived challenges faced by the teachers. Specifically, teachers reported lack of access to hardware (e.g. computers, LCD projectors, and printers) and inadequate access to the Internet in this category. In addition, this research also revealed that Lack of student ICT skills is

another factors for integration of ICT in teaching practic. A large number of teachers indicated poor ICT background of students as a challenge in bringing ICT enabled changes in their teaching/learning process. This indicates that teachers perceive that students are not familiar/comfortable with using ICT or do not have access to such facilities. This may limit teachers' enthusiasm about integration of ICT in their teaching/learning processes (Tibebu, Bandyopadhyay, & Negash, 2009). These researchers also asserted that ICT can enhance teaching and learning through its dynamic, interactive, and engaging content; and it can provide real opportunities for individualized instruction.

Ethiopian Government acknowledges education and training as the cornerstone of social and economic development. So, to support education system, the governments has been designed the ICT policy and integrate with educational system at different levels. According to Ethiopian ICT policy, in order to move Ethiopia into the knowledge and information age, and be integrated into the global economy, there is a need to vastly expand educational opportunities, modernize the educational system and improve its quality; this can be achieved best through ICT application. ICT facilitates the development of education and enables both individuals and countries to meet the challenges presented by the knowledge and information age. So, ICT is particularly crucial to Ethiopia because as the vast majority of the Ethiopian population lives in remote areas with shortages of teachers, ICT is crucial in addressing access and quality of education. Therefore, the government commits itself to the exploitation and application of ICT for educational development by ensuring ICT as an integral part of education and training at all levels (Dzidonu, 2006).

Recently the Ethiopian government introduced Plasma mode of education to all high schools of the country to provide standardized education to all high schools students despite their location in the capital city or in the remote village at the periphery of the country. The new intervention is designed to overcome the problem of qualified teachers in the remote villages where qualified teachers are not willing to work there. In this case, teachers are no more the only source of knowledge for students. As a result of this technological impact, the role of teachers has become a facilitator in networked classroom. The teacher suggests and guides students to access relevant sources of information in their learning process (Assefa & Rogers, 2017).

Recognizing the challenge of the "information age", the Ethiopian government developed electronic-government strategy in which various sectors such as education, health, agriculture and public administration are covered (Dzidonu, 2006). ICT has been introduced in the Ethiopian education system to strengthen and expand the quality of education nationwide. The Teacher Education Program in Ethiopia emphasizes enhancing the capacity of teachers in the use of ICTs in teaching and learning processes of various basic subjects especially in secondary schools. On one hand ICT helps teachers to use devices such as cell phones, computers, and Internet services, which make it easy for them to communicate with colleagues in other schools and campuses. On the other hand ICT readily facilitates communication between student and teacher both on the campus and off the campus. Further, ICT also helps in becoming technologically advanced by providing hands on practice for teachers, enabling them to access information through teacher portals, websites, office software, multimedia programs, and sharing information within and across the schools in the country. Literature suggests that teachers should be provided opportunities to contemplate on their practice while implementing new technologies in their system so that they can be directly involved in imparting quality education rather than remain passive consumers of learning (Ahmad, 2013).

In Ethiopia, schoolnet and Ethernet program are expected to support the teaching and learning process, using the Internet as an educational development and delivery platform to support teaching and learning. For successful implementation of these programs in school, it needs that a very competent teachers in using and applying it in and out of classroom. Implementation of integrated school-net system for Ethiopia will go beyond supporting basic teaching and learning. It also supports school administration and other non-teaching functions of the school system (Dzidonu, 2006).

2.8. The Key Challenges of ICTs Integration in Education

The integration of ICTs in education systems may face various challenges like the infrastructure challenges that may exist are absence of appropriate buildings and rooms to house the technology, shortage of electric supply and telephone lines, and lack of the different types of ICTs. Because of this, one need to deal with infrastructure related challenges before the planning of ICTs integration to education systems (Fisseha, 2011).

The other challenge of ICTs integration in to education systems is the skill gap of people implementing it (Tinio, 2002). For instance, teachers need professional development to gain skills with particular applications of ICT, integration into existing curricula, curricular changes related to its use, changes in teacher role, and on underpinning educational theories such as constructivism/or student-centered learning. Because of this, any attempt of ICT integration in education should parallel with teachers professional development. Similarly, those teachers who are motivated and have strong commitments to their students' learning and their own professional development will evidently integrate computers more easily within their teaching. As Mumtaz (2000) Discussion, teachers who have a high value for ICT and perceive it to be useful completely transform their teaching.

The study of Kamaruddin et al. (2017) looks at the problems faced by the teachers in using ICT. Majority of the preschool teachers agree that their awareness of using ICT is very low. The problem is related to the exposure of ICT teachers and other problems such as technical support, constraint of time, limited knowledge and skill. In addition, the majority of the teachers admitted that they often have problems with technical support, constraint of time in school to fully utilize the ICT equipment, limited knowledge and skills on how to make full use of the ICT. No doubt this issue could lead to their understanding on how to integrate ICT in teaching and learning is very low.

ICT integration in education should parallel with teachers professional development. The school leadership also plays a key role in the integration of ICT in education. Lack of support from the school administration is also a big challenge. Thus, for the effectiveness of ICT integration, administrators must be competent and have a broad understanding of the technical, curricular, administrative, financial, and social dimensions of ICT use in education (Fisseha, 2011).

The findings of Unal & Ozturk (2012) revealed that, the main challenge against the use of ICT based methods and equipment in teachers' instructional practices are lack of ICT equipment in classrooms, lack of ICT-based teaching resources, the effect of traditional approaches on teachers' practices, inadequacies regarding in-service teacher training and lack of time.

For successful integration of ICT into teaching, the review of Buabeng (2012) has highlighted on factors that positively or negatively influence teachers' use of ICT. These are personal, institutional and technological components:

- Personal level, there are numerous elements that influence teachers' use of ICT. Teachers' feelings, knowledge and attitudes are influence their usage of ICT in the educational activity. Teachers' professional development is a central component to successful integration of computers into classroom instruction.
- School level, components such as support, financing, training and facilities influence teachers' adoption and integration of technologies into their classrooms.
- Technological level, for successful adoption and integration of ICT into teaching, teachers must perceive the technology as more serious than previous practice; consistent with their existing values, past experiences and needs; ease to use, can be experimented on a limited basis before reaching a decision to adopt and finally the results of the innovation are visible to others.

2.9. Summary of Reviewed Literature

To sum up, as we have seen in this chapter there is a plenty of literature that describes teachers' ICT competency from a multitude of angles and views. In many researches in the literature it was determined that there was a strong relationship between teachers' ICT competency and integration of ICT in teaching and learning activities. These studies were conducted in many developing countries, yet there have been no researches conducted in Ethiopia. So, the aim of this research is to assess the preparatory school teacher' ICT competency in Addis Ababa City administration by taking a new population from Addis Ababa preparatory schools.

CHAPTER THREE

3. RESEARCH DESIGN AND METHODOLOGY

This chapter of the study includes Description of the Study Area, research design and methodology, source of data, sample and sampling techniques, instruments of data collection, procedures of data collection and methods of data analysis.

3.1. Research Design

Tayie (2005) defined research design as the arrangement of conditions to conduct research; this is, for collection and analysis of data. The study was used descriptive survey design, which is useful in collection of statistical data for study of teachers' ICT competency and their ICT usage in daily classroom practices. This method was preferred because a descriptive survey method allows the researcher to pose a series of questions to willing participants, summarize their responses with percentages, frequency counts, or more rigorous statistics, and draw inferences about a particular population from the responses of the sample and give proper recommendation. In addition, this method was preferred because the nature of the problem needs detail explanation and it helped to make detailed analysis of existing phenomena with the intent of employing data to justify current conditions (Best and Kahn, 1998). Therefore, in order to identify and analyze the existing conditions with the reviewed research findings of the past and to draw a general conclusion of the study, the researcher was interested in using this research method.

The study employed a quantitative approaches which is suitable for questionnaires as research instruments to collect data on teacher' ICT competency and factors that predict teachers' ICT competency. The quantitative approach enabled the researcher to collect statistical data of teacher' ICT competency.

3.2. Target Population

The main target population of this study comprised of teachers of public and private secondary schools found in Addis Ababa city Administration. There are 10 government preparatory schools found in Addis Ababa city. Out of these, the study focused on 3 public preparatory schools which are about 30% of the total preparatory school population. The study also included 5

privates' secondary schools in order to see the difference between government and public teachers' ICT competency.

The record in Addis Ababa city administration education bureau was analyzed to know the total number of preparatory schools found in the city.

3.3. Sample and Sampling Techniques

According to Mugenda and Mugenda (2003), sampling is the process of selecting a manageable number of individuals with potential to represent the large group of individuals from which they were selected. On the other hand, Gay (1998) argued that a minimal sample of 10% to 20% of the population which could be satisfactorily representative.

The study was carried out in the selected preparatory schools found in Addis Ababa city administration from both public and private schools. These schools are Gulele Medhanealem Preparatory school, Addis Ketema Preparatory school, Minilik II preparatory school, Asko St. John Baptist de LaSalle Catholic school, Asko Progress Academy, Nazarth School, Meskaye Hizunan Medhanealem School and Radical Academy. The researcher used simple random sampling technique in selecting teachers. Simple random sampling is to mean that, just choose who ever from the population to be a sample without having any procedure and rules or any criteria. This is based on the assumption that it gives equal chances for the respondents to participate in the research to select the representative respondents in each school. In this context, the schools are used as sampling units.

Based on this assumption, the researcher used 100 public preparatory teachers as a sample to represent 320 preparatory teachers which is the entire number of public teachers of selected preparatory school. In addition to this, the researcher also used 50 private high school teachers which represent 72 total populations of selected private schools as a sample.

Based on the above information, the sample population for this study is consisted of 150 teachers from both private and public preparatory school in Addis Ababa city.

3.4. Variables

Variables are those simplified portions of the complex phenomena that we intend to study. The researcher intended goal is to find out the level of teachers ICT competency in Addis Ababa city administration. For this study, the researcher identified independent variables like school vision toward the use of computers in teaching and learning activities, ICT access, computer training and teachers' attitude toward ICT. Teachers' ICT competency and teacher ICT usage are those dependent variables intended to study in this research. The teachers were asked to indicate the factors which affect their use of ICT in teaching activities. These variables are enables the researcher to identify basic preparatory school teacher's issues and concerns about their level of ICT competency and their influences on the use of ICT in the classroom. Other demographic related variables like Gender, Age, Qualification, Work Experience, teacher experience in computer usage and type of schools(private or Government) are used as variables.

3.5. Instruments of Data Collection

In order to get adequate and complementary information for the study, the researcher used that questionnaire as the major data gathering instruments of this study.

3.5.1. Questionnaire

The main data gathering instrument of this study was questionnaire. This was because it helped to secure relevant information on opinions and attitudes from respondents and it was cost-effective to collect data from many respondents at the same time without engaging the researcher in too much movement from one respondent to the other (Borg, 2001). The respondents were also able to fill in information in anonymity to avoid an avoidable fear of victimization. The questionnaire was composed of closed-ended items in a Likert scale. Moreover, using of the questionnaire was found to be important to draw out information on teachers' ICT skills, knowledge, school vision, ICT access, basic computer training given to teachers, attitudes and beliefs towards the role of ICT in improving quality of education.

Those questionnaire used to investigate teacher' ICT competency was designed on the basis of other studies on measuring teachers ICT competency and similar study areas by modifying them

(Osuji, 2010), (Alharbi, 2014), (Tella et al., 2007). The following tables shows that the sources of questionnaires.

Table 1: Source of Questionnaires

No.	Questionnaire	Sources
1	How do you rate your school vision on the Following statements	ICT Use In School: Vision and Performance Measures (Schreurs, 2007) and Literature Review
2	How do you rate your computer access on The following statements?	Assessment of secondary school teachers' use of information and communication technology (ICT) in Oyo Metropolis of Oyo State (Obakhume,2011) and study on the use of ICT in teaching in secondary schools in Kuwait (Alharbi, 2014)
3	How do you rate your computer training on the following statements?	Study on the use of ICT in teaching in secondary schools in Kuwait (Alharbi, 2014) and from literature review
4	What is your perception on using ICT for teaching on the following statements?	Teachers' attitudes toward information and communication Technologies: the case of Syrian EFL teachers(Albirini,2006)
5	How would you rate your knowledge and ICT skill level in terms of the following ICT Skills or applications?	An assessment of the computer literacy level of open and distance learning students in Lagos State, Nigeria (Osuji, 2010)
6	How do you rate your ICT usage on the following statements?	Assessment of secondary school teachers' use of information And communication technology (ICT) in Oyo Metropolis of Oyo State (obakhume,2011)
7	What are the challenges to use ICT in the classroom?	An assessment of secondary school teacher's uses of ICT's: Implications for further development of ICT's use in Nigerian Secondary schools (tella et.al, 2007).)

The questionnaires was consist of two parts; the first part is composed of the demographic profile of the teachers and the second part was focused on the ICT related skills and activities of teachers in the teaching-learning process with using ICT, respondent's perceptions and attitudes

towards instructional technologies, integration of information communication technology in education, factors for not using ICT, training given on the utilization of ICT, tools of ICT that schools used, levels of teachers ICT skill and knowledge.

Questionnaires were delivered personally to assistant head teachers of each school for distribution to the participants. This method is chosen to avoid low response rate.

Table 2: Participation in Questionnaires

Sample	Distributed Questionnaires	Returned Questionnaires	Returned Questionnaires in percentage
Teachers	153	150	98.03

As we observe the above table, from 153 copies of questionnaire distributed, 150 were filled and returned. The return rate was 98.03%. However, three copies of the questionnaire were not returned.

3.6. Methods of Data Analysis

Data Collected from the study were analyzed using descriptive statistics of frequency counts and Simple Percentage. As sited by Albirini (2006), descriptive statistics will be used to describe and summarize the properties of the mass of data collected from the respondents (Gay & Airasian, 2000, p. 437). In order to determine this, the arithmetic means, standard deviations, frequencies and percentages of teachers ICT skills and knowledge of using ICT was calculated. Statistical Package for Social Science (SPSS) was also used to generate these statistical results. In addition, crosstabs calculation is used to compare between computer access in private school and computer access in governmental school. This comparison helps the researcher to conclude in which type of school computer accessibility is high, medium and low.

T-test was also used in this research. It is used to compares two averages (means) and tells us if they are different from each other. The t-test also tells us how significant the differences are. In this research, T-test was used to check the significance of sample data in the comparison of schools.

The research also used Smart PLS software as addition to analyze the relationships between the variables by using the empirical data collected. PLS can test simultaneously the measurement model (relationships between indicators and their corresponding constructs) and the structural model (relationships between constructs).

Furthermore, an arbitrary "level" was identified as (high, medium, low) based on the following formula:

$$\frac{\text{The scale's highest value – The scale's lowest value}}{\text{Number of levels}} = \frac{5-1}{3} = \frac{4}{3} = 1.33$$

This formula is used to organize and summarize data to provide a simple indication of the level of the means associated with each response. Many researchers have used this method to group their result (Badau & Sakiyo, 2013), (Alharbi, 2014) and (Russo, 2016). Using these intervals of 1.33, we can define 3.67 to 5.00 as a "high" degree, 2.34 to 3.67 as a "medium" degree and any value below 2.34 as a "low" degree. In the analysis, the researcher also uses a value of "1" to differentiate between high (divergent) and low (convergent) levels of standard deviation. The scale is summarized on the Table 3.

The following degree of response has been adopted to assess the Requested Competencies (Badau & Sakiyo, 2013), (Alharbi, 2014) and (Russo, 2016).

Table 3: Degree of Response

Scales Value	**Response Level**	**Description**
Below 2.33	Low	➢ Limited or no use of competency required for the job ➢ Competency has been minimally demonstrated ➢ May have had low opportunity to apply the competency ➢ May have limited understanding of the competency
2.34 to 3.67	Medium	➢ Basic understanding or knowledge needed for the job ➢ Requires some guidance or supervision when applying the competency ➢ Understands and can discuss terminology and concepts related to the competency

3.68 to 5.00	High	➢ Detailed knowledge, understanding, and application of the competency, Ability to handle non-routine problems and situations ➢ Requires no guidance / works independently ➢ Consistently demonstrates success in the competency ➢ Capable of assisting others in the application of the competency

3.7. Validity and Reliability of Data Collection Instruments

Checking the validity and reliability of data collection instruments before providing to the actual study subject is the core to assure the quality of the data.

3.7.1. Validity of Instruments

Validity is an important consideration in research. Davidson and Tolich (2003) put the following definition of validity: "Validity refers to the extent to which a question or variable accurately reflects the concept the researcher is actually looking for" (p. 32). Researcher suggests that validity can be improved by ensuring their detailed transparency of method, data, including interpretation, reporting and triangulation of data (Coolican, 2014). Validity also "refers to the accuracy of the measure: Does it accurately measure the variable that it is intended to measure. (Mugenda, 1999) defines validity as the accuracy and meaningfulness of inferences, which are based on the research results. In other words validity refers to whether a measure is really measuring what it was intended to measure (Coolican, 2014).

The items of the questionnaires checked and rechecked by advisors and language experts. To ensure validity of this study, the researcher carried out a pilot study in Yekatit 12 preparatory school to determine content validity through the responses and results of respondents. The items that seem vague for the respondents were modified and rephrased. Then, the researcher administered the questionnaire to the respondents. Items that may fail to measure the variables as intended were modified or discarded completely. The schools that were used in the pilot study were excluded from the main study.

3.7.2. Reliability of Instruments

According to Mugenda (2003), reliability is a measure of the degree to which the instrument yields consistent results or data after repeated trials. Further, reliability of the research findings also depends on the clarity of the research instrument used in collection of data. According to Davidson and Tolich "reliability refers to consistency" (2003, p. 32). This means that the same results would be achieved when repeated at a different time, situation or place.

In general, reliability refers to the consistency or stability of a study instrument. In this research, in order to ensure reliability, descriptive research was used to generate questionnaire items based on the thoughts of members of the study population. Terms, concepts, and themes were generated through descriptive study. To ensure reliability, pilot survey instruments have been developed and applied. Different data gathering instruments like questionnaires', interviews and document analysis were also employed by the researcher in the study of assessing teachers' ICT competency.

After the questionnaire had been developed, the first draft was given to the advisor for its clarity and simplicity. Based on the feedback obtained, some items of the instrument were changed and some were modified. Then, the instrument was tried out for its suitability, reliability and validity in Yekatit 12 preparatory School before it was distributed to the main respondents. 5 teachers were selected using simple random sampling technique as participants of the pilot study. After the questionnaire was collected, modification was made on the items based on the hints obtained from the pilot study. Then, the internal consistency of questionnaire was tested by using Cronbach's alpha. Based on this, between 0.725 and 0.941 reliability coefficient was obtained and most of the items were reliable as shown in the following table.

Table 4: Internal Consistency Estimates of Dimensions for Instrument

	Dimensions	Coefficient Alpha	No. of Items
Teachers'	School Vision	0.826	4
	ICT Access	0.811	4
	Computer training	0.725	4

questionnaire	Teacher Attitude	0.800	6
	Teacher ICT knowledge and skill	0.861	5
	Teacher ICT usage	0.941	7
	Teacher ICT usage Challenges	0.940	7

3.8. Ethical Concerns

For researchers, ethics is an important consideration .First; the researcher was received a support letter from AAU and submitted to all selected schools. After getting the permission from all schools, the researcher was explained to his facilitators and participant that their participation is voluntary and statements will be kept confidential. The researcher did not ask participants to mention their names in order to preserve their privacy and information gathered from them is only for research purpose. So that Participants were assured of confidentiality and anonymity and were offered the option of withdrawing from the study at any time. And then the researcher was distributed questionnaires to teachers through facilitators.

CHAPTER FOUR

4. DATA PRESENTATIONS AND ANALYSIS

4.1. Introduction

This chapter deals with data presentation, analysis and interpretation. Questionnaires are used as the main tool in order to come up with the data. The study sought to investigate teacher' ICT competency in teaching and learning activities in both public and private preparatory schools in Addis Ababa city administration, Ethiopia.

In this chapter, the data gathered using questionnaires from the respondents were tabulated and analyzed by using SPSS. The analysis will be made by categorizing the data in to two parts where the first part deals with the characteristics of the respondents and the second parts deals with the analysis of the data gathered from different sources.

4.2. Characteristics of Respondents

Out of the 153 teachers sampled, 150(98.03%) filled and returned the questionnaires, while 3(1.97%) of the respondents did not return the questionnaires. These returned questionnaires were adequate to make conclusion. The questionnaires were prepared for preparatory school teachers. Both social science and natural science streams are included in the study. In the characteristics of the respondents their sector, gender, age, qualification, stream, grade teaches, work experience and teachers' computer usage in the different areas have been analyzed in the table below.

Table 5: Characteristics of Respondents Based on Teachers' School Type

Variables	Category	Frequency	Percent
Sector	Public	100	66.7
	Private	50	33.3
	Total	150	100

As we observe from Table 5, it shows that the highest percentage was from those working in public schools at 66.7%, and the lowest percentage were private schools at 33.3%.

Table 6: Characteristics of Respondent based on Teachers' General Information

Variables	Category	Frequency	Percent
Gender	Male	114	76
	Female	36	24
Age	below 20	2	1.3
	21-30	63	42.0
	31-40	54	36.0
	41-50	19	12.7
	above 50	12	8.0
Qualification	Master	53	35.3
	Bachelor	95	63.3
	Diploma	2	1.3
Stream	social science	60	40.0
	natural science	90	60.0
Grade teach	Grade 11	85	56.7
	Grade 12	65	43.3
Work experience	Below One year	4	2.7
	1-5 years	27	18.0
	6-10 years	50	33.3
	11-15 years	36	24.0
	16-20 years	15	10.0
	above 20 years	18	12.0
Teachers' computer usage	1-2 years	26	17.3
	3-4 years	30	20.0
	5-6 years	31	20.7
	7 years and above	63	42.0

Teachers' periods per week	1-10 periods	14	9.3
	11-15 periods	80	53.4
	More than 16 periods	56	37.3

The teachers sample taken from selected schools was 150, formed by 114 males (76%) and 36 females (24%). The findings revealed that male teachers were the majority while female teachers were the minority in a sampled selected for this study. In terms of respondents' academic qualification, the majority of teachers (63.3%) were attained bachelor degree, preceded by master level qualification at 35.3 %, and the lowest representatives were Diploma level qualification at 1.3%. In terms of teacher's streams, 60% of the selected population is from natural science background and the remaining 40% are from social science streams.

As described in the Table 6, it shows that the description of teachers sample according to the grade they teaches, it notice that the high proportion of grade eleven preparatory teachers with 56.7%, then the rests 43.3 % are teachers from those grade twelve teaches. In terms of the teachers' age distribution, the highest representation was from the age group 21-30 years with a rate (42%), then the 31-40 age group (36%), followed by the 41-50 age group (12.7%) , the 51-60 age group (12.7%) , above 50 age groups are (8%) and the smallest respondents are from age group of below 20 years (1.3%).

In terms of teaching experience, 33.3% of respondents had worked for 6-10 years, 24% of the respondents have 11-15 year experience, 18% have 1-5 year experience, 10% have 16-20 year experience and only 12% of the respondents have above 20 years experience. The remaining 2.7% of the respondents are below one year experience in teaching. In case of teachers' computer usage, 42% of the total sample population have more than 7 year experience in computer usage, around 40.7% of the samples have 3-6 years experience in computer usage. And the remaining 17.3% of the total respondents have 1-2 years computer experience. All of the respondents included in this study can use computer.

In terms of teachers' periods per week, the majority of teachers have more than 10 periods per a week. According to table 4B information, around 80(53.4%) of the respondents have 11-15 periods per a week. And also 56(37.3 %) of the respondents have more than 16 periods per a week

4.3. The Teachers' Response Results

4.3.1. School Vision towards the use of ICT

Next to demographic questions, the second section contains questions related to preparatory school visions towards the development and integration of ICT in teaching and learning activities. The data gathered from the respondents are analyzed with a view to answering the research questions outlined in Chapter 1 of this thesis. The quantitative analysis is undertaken by examining the questionnaire given to the teachers.

Respondents were asked to indicate on a five-point scales ranging strongly agree (5) to strongly disagree (1) based on their views on the school vision towards the use of ICT in their teaching and learning situations. Accordingly, the data gathered from the teacher is summarized in the following table. In order to determine the level of school vision towards the development or integration of ICT in teaching and learning activities, arithmetic means, standard deviations, frequencies and percentages applications were calculated.

Depending on the response of the participants, data gathered is calculated and presented on the following table. The data were collected to ascertain whether the preparatory School has clear Visions towards the ICT usage and motivation of teachers to use ICT in teaching and learning activities. The responses were summarized in Table 5 below.

Table 7: School Vision on the Development of ICT in Preparatory Schools

No.	Item	Mean	SD	Level of agreement
1	My school has articulated plan and strategy to use ICT in the classroom	3.41	1.216	Medium
2	My school has ear-marked budget for ICT infrastructure development.	3.29	1.115	Medium
3	My school always motivated me to use ICT in teaching activities.	3.00	1.204	Medium
4	My school helps me on ICT capacity building.	2.78	1.252	Medium
		3.12	**Medium**	

As indicated in Table7 above, the respondents were requested to rate their school vision regarding the development and usage of ICT tools by teachers in their teaching and learning process.

It is notable from Table 7 that the level of school vision on the development of ICT in the preparatory school is medium level, with an overall arithmetic mean 3.41. This shows that the school has no so much attractive articulated plan and strategy to use ICT in the classroom. There is no good earmarked budget prepared for ICT infrastructure development in schools. The other result obtained from the above table is that from total population, some of respondents are agreed that their school is motivated them in order to use and integrate ICT in teaching and learning activities. A small number of participants also agreed that, their schools' helps them in case of ICT capacity building in order to use and integrate ICT in their learning and teaching activities.

The overall respondents of Table 7, shows that there is good starting of formulating the necessary vision towards the development of ICT in their school with the average mean of 3.12. This show, almost half of the participants are agreed that their school has medium level of vision towards the formulating strategy for ICT development, planning of the necessary budget, motivating their teachers to use ICT and capacitating them. Since the standard deviations of all items are greater than 1, it indicates a wide variation in the responses.

4.3.2. Teachers' ICT access

This Section contains questions related to ICT Access found in preparatory schools. Accordingly the data gathered from the respondents are summarized by the following table.

Table 8: ICT Access

No.	Item	Mean	SD	Level of use
1	I have computer and Internet access in my school.	3.35	1.243	Medium
2	I have computer access in my home.	3.08	1.616	Medium
3	I have ICT access (computer, Internet, LCD projector			

	etc.) for teaching activities in my school.	2.96	1.387	Medium
4	I have Plasma access for teaching in my school.	3.08	1.557	Medium
		3.12	**Medium**	

As Table 8 illustrates, ‘‘school’’ is the respondents most frequent place of computer and Internet access for preparatory teachers with the mean of 3.35 of the respondents are agreed that they have computer and Internet access in their school. This indicates that most of school has computer and Internet access for their teachers. But totally when we summarized the first item of the above table based on the level of respondents, school is placed in the medium level as computer and Internet access for teachers.

As indicated in the same table of item 2 above, home came second to school of a place where teachers use computer and Internet. The mean rating of having computer access in the home indicates 3.08. Therefore, it seems that most of preparatory teacher has computer access in their home. So, according to the designed formula, the accessibility of computer in preparatory school falls in medium level.

Table 8 shows also that, the level of having ICT access (computer, Internet, LCD projector etc.) for teaching activities in preparatory school were again moderate, with an arithmetic mean of 2.96. But when we compare the mean of this item with other item of the Table 8, it becomes lower than others. This indicated that most of preparatory school has no ICT facilities for teaching and learning activities in their school. Totally, teacher’s ICT access in their school for teaching and learning activities in their school is put in the medium level.

The last item in the above table is prepared to investigate whether teachers have Plasma access in their school or not. Based on the above table, almost half of the respondents have plasma access in their schools with the mean of 3.08. Some of the respondents have no plasma access in their school. These respondents may be from private schools.

The overall arithmetic mean of the above table is 3.12; which shows that teachers’ ICT access in home or school is at medium level. Since the standard deviation is relatively high and greater than integer one it indicates a disparity among teachers at this level. Accordingly, almost more

than half the participants are agreed that they have computer access in their home and school. But ICT access for teaching activity is not so much attractive.

4.3.3. Teachers' Basic Computer Training

Short and long term trainings on different ICT programs are very important for teachers to improve the quality of education. Based on this idea, respondents were asked from where they were given the basic computer trainings.

Table 9: Trainings Given to the Instructors

No.	Item	Mean	SD	Level of use
1	I have taken basic computer training in my university study.	3.82	1.301	High
2	I have taken basic computer training organized by my school.	2.73	1.305	Medium
3	I have taken basic computer training organized by NGOs.	2.17	1.315	Low
4	I have taken basic computer training by my own at computer training center.	3.48	1.399	Medium
		3.05	**Medium**	

As indicated in Table 9 above, almost all of the teacher were trained a basic computer course from their university study when they study their qualification. Based on the data found in the above Table 9, the majority of preparatory teacher are strongly agreed that they were trained basic computer training course in their university study. From the above table, the overall arithmetic mean of the first item of Table 9 is 3.82; which shows that high percentage of respondents are trained basic computer training course at their university study.

The second item of Table 9 is designed to investigate whether teachers were trained basic computer training course which is organized by their school. According to respondents, most of them are not trained basic computer training program which is organized by their school. From

total respondents, as we observed that the mean 2.73 of the teacher respondents are agreed that, they were given basic computer training which is organized by their school. Even though, the overall response of computer training given to preparatory teacher which is organized by their school is falls in medium level, it is so much nearest to low level. This indicated that, there is no enough ICT training in preparatory schools.

Different NGOs are facilities different ICT training to teachers ICT capacity building in different schools. The third item of the above table is prepared to investigate teachers' basic computer training given with help of NGOs. According to the respondents' responses, the majority of the teachers are not trained basic computer training which is organized by NGOs. The overall arithmetic mean of the third item in Table 9 is only 2.17, which shows that only a few numbers of teachers are attained basic computer training course which is organized by NGS.

The last item listed in the Table 9 is prepared to examine whether teachers are trained basic computer training course by their own. According to the above information, most of teachers are trained by themselves at computer training center. The overall arithmetic mean of the last item in the Table 9 is 3.48 which show that most of the teachers are trained by their own at computer training center.

To summarize Table 9, some of teachers are agreed they have trained computer training course from different institutes. The majority of them are trained from their university with the highest mean of 3.82 and the second majority of teachers are trained from different computer training centers by their own (mean=3.48). However, Basic computer training given to teachers by NGOs is very small (mean=2.17). Totally, since the standard deviations of all items in Table 9 are greater than 1, it indicates a wide variation in the responses.

4.3.4. Teachers' attitude level toward the use of ICT in teaching and learning activities

The researcher sought to establish teachers' attitude towards ICT use and integration in teaching and learning activities. This is because the attitude of teachers towards ICT integration plays a significant role as a predictor of utilization of ICT tools for their professional as well as for private activities.

Table 10: Teachers' Attitude Level toward the use of ICT in Teaching and Learning Activities

No.	Item	Mean	SD	Level of agreement
1	I believe that using ICT can improve teaching and learning processes.	4.66	0.674	High
2	I believe that using ICT can enhance students' critical thinking skills	4.44	0.823	High
3	I believe that using ICT makes lesson easier.	4.54	0.748	High
4	I believe that using ICT can enhance teacher and student interaction.	4.35	0.851	High
5	I believe that using ICT can offer opportunities to teachers for obtaining new course materials.	4.47	0.775	High
6	I believe that using ICT increases students learning motivation.	4.50	0.766	High
		4.49	**High**	

As indicated in the above Table 10, the first item is prepared to examine the attitude of teachers towards using of ICT to improve teaching and learning processes. From the total selected population of the study, the majority of respondents have positive attitude towards using of ICT in learning and teaching activities. As we observe from Table 10, only a few numbers of the respondents are disagreed with using of ICT can improve teaching and learning process. The overall arithmetic mean response level of the first item in the Table 10 above is 4.66, which shows that almost all of the respondents are believed to using of ICT can improve teaching and learning processes at high level.

In the Second item of Table 10, with regard to the statement "I believe that using ICT can enhance students' critical thinking skills," the arithmetic mean of responses was 4.44 with standard deviation of 0.823 which highlights low divergence among teachers from this viewpoint. From the above calculated mean, we can observe that, the majority of respondents are

agreed with using of ICT in teaching and learning activities can enhance students' critical thinking skills.

In the third item listed in the above Table 10, with regard to the statement "I believe that using ICT makes lesson easier", the arithmetic mean of responses was 4.54. Accordingly, most the respondents are agreed to that of using ICT can make lesson easier than traditional method of teaching

In the Table 10 above, the fourth item analyzed shows that, teachers were broadly in strongly agreement with the positive statements about using ICT can enhance teacher and student interaction. From the total respondents to the statements of "I believe that using ICT can enhance teacher and student interaction", the arithmetic mean of the fourth item in the Table 10 is 4.35 and standard deviation of 0.851 which highlights a weak divergence among teacher towards this viewpoint. So, most of the respondents have high perception of using ICT can enhance teacher and student interaction.

The fifth item in the Table 10 above shows that, the majority of teachers were strongly agreed to using ICT can offer opportunities to teachers for obtaining new course materials for teaching and learning processes. The overall arithmetic mean of the respondents is 4.47 and standard deviation of 0.775 which highlights a weak divergence among teacher towards this viewpoint. This shows that the majority of respondents are agreed to the indicated statement in the Table 10 item 5.

The last item listed in the Table 10 above was aimed to investigate the teachers' perception towards using ICT can increases students learning motivation. Accordingly, most respondents are "strongly agreed" to the statement of "ICT can increases students learning motivation." The overall arithmetic mean of the last item is 4.5 with a standard deviation of .766 which shows that the majority of preparatory school teachers' respondents are agreed to using ICT can increases students learning motivation.

To conclude the above Table 10, teachers' attitude toward the use of ICT in teaching and learning activities is believed as positive with high level agreement of the respondents view point. Since the standard deviations of all items in the Table 10 are less than 1, it indicates weak variation in the responses.

4.3.5. Assessment of Teacher ICT knowledge and skill Level

The following table shows that the results associated with teachers ICT knowledge and skill.

Table 11: Assessing of Teacher ICT Knowledge and Skill Level

No.	Item	School Type (Mean Values)	
		Public	**Private**
1	I have basic computer knowledge and skills.	4.49	4.44
2	I have knowledge and skill to use presentation and publishing software like Micro soft power point.	3.59	3.50
3	I have knowledge and skills to develop website.	2.84	2.66
4	I can search and download information from Internet to develop my personal career.	4.15	3.98
5	I have basic software and hardware troubleshooting skills	3.14	3.00
		3.64	**3.52**

It is notable from Table 11 that all of selected preparatory school teachers' have basic computer knowledge and skills. As indicated in the table, we can observe that almost all of the respondents are agreed that they have basic computer knowledge and skills. Almost no one of the respondents was disagreed to the first statement listed in the Table 11. They only differ by the level of agreement. Some of them are strongly agreed and some of them are agreed. The overall arithmetic mean of the first item in both public and private is 4.49 and 4.44 respectively; which shows that teachers in both public and private are highly competent in having basic computer knowledge and skill. This shows that the basic computer knowledge and skill of preparatory school teacher falls in high level.

In the second item listed in the Table 11, for the statement “I have knowledge and skill to use presentation and publishing software like Micro soft power point” was agreed by most respondents of public and private with arithmetic mean of 3.59 and 3.50 respectively. This value of arithmetic mean shows, that teacher’ knowledge and skill to use presentation and publishing

software like Micro soft power point is almost nearest to high level. From Table 11 above, we can also observe that there is other respondents those have no necessary skills and knowledge of using presentation and publishing software like Micro soft power point in the class.

The third item is aimed to investigate whether the preparatory teachers have ICT knowledge and skills to develop website for teaching and learning activities. As noticed from Table 11 above, many the respondents of both public and private teachers have no ICT knowledge and skills to develop website. Only a few numbers of respondents are agreed to the statement of "I have knowledge and skills to develop website." As noticed in the Table 11, the level of teachers' ICT competency in the case of having the necessary skills and knowledge to develop website is almost low, with an overall arithmetic mean of public and privates are 2.84 and 2.66. But public teachers are better than private school teachers.

The fourth item is aimed to investigate whether the preparatory teachers can search and download information from Internet to develop their personal career. As noticed from Table 11, the majority of the respondents were strongly agreed to the statement "I can search and download information from Internet to develop my personal career. So, it is notable from Table 11, the level of teachers' ICT capacity in terms of searching and downloading information from Internet to develop their personal career skill is high in both public and private teachers, with an overall arithmetic mean of 4.15 and 3.98.

The fifth item listed in the Table 11 above is intended to examine whether preparatory teachers have basic software and hardware troubleshooting skills. As noticed in the Table 11, only some of the respondents of both public and private teachers have basic software and hardware troubleshooting skills. The level of them is medium; with an overall arithmetic mean of public and private teachers is 3.14 and 3.00 respectively

To conclude the above Table 11, the level of teachers' basic computer knowledge and skill in case of searching and downloading information from Internet is high. But in case of having skill of using presentation and publishing software, developing website, troubleshooting basic hardware and software problem, the teachers ICT competency falls in medium level. So, the overall arithmetic mean of teachers' ICT knowledge and skill in both public and private teachers is 3.64 and 3.52 respectively; which put teachers ICT competency in medium level. Even though

teachers ICT competency falls in medium level, the mean value of them is nearest to high level class. There is also no so much difference between public and private school.

4.3.6. Teachers' ICT usage in teaching Practice

Having the necessary ICT competency is the first criteria for teachers to use ICT in the class room. But only having skill and knowledge of ICT is worthless unless applied in classroom. So, the following table is designed to summarize the teachers' ICT usage in the classroom.

Table 12: Teachers' ICT Usage in Teaching Practice

No.	Item	School Type (Mean Values)	
		Public	**Private**
1	I use Microsoft office like Microsoft Excel, Word, and Power point in the classroom	3.19	2.92
2	I can develop and use E-learning in my classroom	3.03	2.54
3	I use Plasma in the classroom	3.84	1.84
4	I Set computer-based homework for students	2.95	2.18
5	I use email to communicate with other teachers and students	3.26	2.36
6	I use software to monitor the students' scores	3.05	2.52
7	I participate in an on-line interactive discussion with students	2.32	1.96
		3.09	**2.33**

The above table was summarized the response of preparatory teachers in case of teachers' ICT usage in the classroom. As noticed in the Table 12, some of the respondents are strongly agreed to the statement of "I use Microsoft office like Microsoft Excel, Word, and Power point in the classroom" and also some of the respondents are disagreed to this statement. This indicated that some of the respondents do not use Microsoft office tools in the class room. Accordingly, the teachers' level of using different Microsoft office software in the classroom is medium level in both public and private with an arithmetic mean of 3.19 and 2.92 respectively.

The second item is intended to measure the teacher ability of developing and using of E-learning in the classroom. Most of private respondents are disagreed to the statement of "I can develop

and use E-learning in my classroom". Only a small proportion of preparatory teachers can develop and use e-learning material in their classroom. As indicated in the Table 12, the arithmetic mean of the second item in both public and private is 3.03 and 2.54 respectively; which shows that teachers' e-learning usage in public is better than private school; but both of them are falls in medium level.

The third item in Table 12 is intended to measure whether preparatory teachers are using plasma in their classroom or not. As summarized in the table, some of preparatory teachers are using plasma in their class. As summarized by the above Table 12, the usage of plasma in public preparatory teacher is much better than private. The mean value of public and private in case of using plasma in class room is 3.84 and 1.84 respectively; which shows that teachers' plasma usage in public is high level but very much low in private schools.

The fourth item is aimed to investigate the teachers' ability of setting computer based homework for their students. As shows in the Table 12, the arithmetic mean of public school teacher is 2.95 which put them in medium level; and the arithmetic mean of private school teacher is 2.18 which make them in low level agreement.

The fifth item is aimed to investigate the teachers' usage of email as communication channel with other teacher and students. The arithmetic mean of both public and private respondents under item 5 is 3.26 and 2.36 respectively; which shows that most of public preparatory school teachers' can use email to communicate with other teacher and many of private teacher do not use email to communicate with other teacher and students. These mean values are put public in medium level and private in low level class.

The sixth item of Table 12 is aimed to investigate the teachers' usage of software to monitor the students' scores. In this item, the arithmetic mean of public and private in case of using software to monitor students' score is 3.05 and 2.52 which put them in medium level class; but teachers' usage of software to monitor their students' scores is in public school is better than private school.

The last item of Table 12 is aimed to investigate the teachers' participation in an on-line interactive discussion with their students. As shown in Table 12, the majority of teachers are not participating in an on-line interactive discussion with their students in both public and private.

As we observe from the Table 12, the arithmetic mean of public and private on the last item is 2.32 and 1.96 respectively; which shows that the participation of teachers in an on-line interactive discussion with students is low level in both type of school. But public school is better than private school.

As indicated in Table 12, teachers' ICT usage in the class room is not so much attractive. Particularly teachers' ICT usage in private is very low. The overall arithmetic mean of teachers' ICT usage in class in both public and private school is 3.09 and 2.33 respectively; which indicates that, the level public school teachers ICT usage is medium and the level of private school teachers are low level class. So, the following table is designed to measure those challenges that prohibit both public and private teachers from using ICT in the classroom.

4.3.7. Teachers' ICT Competency Challenges

The following table summarized teachers' responses on their ICT competency challenges of using ICT in the classroom.

Table 13: Challenges on Teacher ICT Competency to Use ICT in the Classroom

No.	Item	Mean	SD	Level of challenges to use ICT
1	Lack of awareness in using ICT.	2.86	1.475	Medium
2	Insufficient knowledge of using ICT.	3.08	1.402	Medium
3	Insufficient skills of how to use ICT equipment	3.16	1.443	Medium
4	Absence of ICT facilities in my school such as Internet, computer etc	3.43	1.266	Medium
5	Lack of ICT training in my school.	3.63	1.272	Medium
6	Insufficient time due to workload	3.14	1.336	Medium
7	Lack of articulated school vision on integration of ICT in the classroom.	3.55	1.173	Medium
		3.26	**Medium**	

The above table is designed to measure those challenges prohibit teachers from using ICT in the classroom. The table has seven items. The first item is aimed to measure teachers' lack of

awareness in using ICT in the classroom. As shown in the Table 13, lack of awareness in using ICT is taken as challenge of teacher ICT competency on using ICT in teaching and learning process. But the overall arithmetic mean of lack of awareness is 2.86; which shows that lack of awareness in using ICT is medium level challenge for teachers to use ICT in the classroom.

The second item was intended to measure whether insufficient knowledge of using ICT is the challenge of teacher ICT competency in using ICT in the classroom. As we observe Table 13, the overall arithmetic mean of the second item of response rate is 3.08; which shows that insufficient knowledge of using ICT is a medium challenge to using ICT in the classroom. The analysis of third item is also almost nearest to the second item (mean=3.16) which shows that insufficient skills of how to use different ICT equipment is a medium level challenges.

When we see the fourth item of Table 13, most of the respondents are strongly agreed as absence of ICT facilities in preparatory school such as Internet, computer etc are the major challenge of teacher ICT competency in using ICT in the classroom. The overall arithmetic mean of this item is 3.43; which shows that absence of ICT facilities in preparatory school such as Internet, computer etc. have a medium challenge to use ICT in the class room.

The fifth item is intended to measure whether lack of ICT training in preparatory school is the challenge of using ICT in the classroom. Accordingly, the majority of the respondents are strongly agreed that lack of ICT training in preparatory school is the challenge of teacher ICT competency in using ICT in the classroom. Its overall arithmetic mean of this item is 3.63; which shows that lack of ICT training in preparatory school is almost nearest to high level challenge of teacher ICT competency to the usage of ICT in the classroom for preparatory school teachers.

The sixth item is intended to measure time constraint due to workload is the major challenge of teacher ICT competency to use ICT in the classroom. As summarized, the overall demographic information of the respondents in the Table 6, most of teachers have 11-15 periods per week. As we observe from the above, the overall arithmetic mean of the sixth item of Table 13 is 3.14. From both table, we can observe that insufficient time due to workload of the teacher is a medium challenge of teacher ICT competency in using ICT in the classroom.

The last item which is intended to measure whether lack of articulated school vision on integration of ICT in teaching activities is a challenge of using ICT in teaching and learning

activities. Based on the above Table 13, the majority of the respondents was agreed with lack of articulated school vision on integration of ICT in the classroom is a major challenge. The overall arithmetic mean of the total respondents of the seventh item is 3.55; which shows that lack of articulated school vision on integrating of ICT in teaching activities is a medium challenge of teacher ICT competency in the usage of ICT in the classroom. This shows that, a few numbers of preparatory schools has developed a vision towards the integration of ICT in teaching activities.

As we observe from Table 13, those challenges that make teachers not competent in ICT are mainly lack of ICT training in preparatory school and lack of articulated school vision on integration of ICT in teaching activities. And the overall arithmetic mean of Table 13 is 3.26 which shows that those challenges listed in the Table 13 are not so much challenges. They are medium level challenges for teacher ICT competency in the use of ICT in the class room. But the standard deviations of all items are greater than 1, it indicates that a wide variation in the responses. This implies that the mean is not the true representative as it is affected by extreme values.

4.4. Discussion and Interpretation of the Findings

In today's education, ICTs which includes computers, Internet, and electronic delivery systems such as radios, televisions and projectors are widely used. Integration of ICT in education is one of the essential elements in educational sector and suggests that it is almost inevitable that governments and institutions strive to adapt and integrate technology in their educational set of courses. The use of ICT in the classroom is very important. It provides opportunities for instructors and students to operate, store, manipulate and retrieve information from anywhere at any place. But in order to effectively exploit and apply ICT in class and out of classroom, teachers should become competent in using ICT.

This research is undertaken to assess teachers' ICT competency in the use of ICT in the classroom in Addis Ababa preparatory schools. This research tried to address the following research questions:

1. What is the teachers' ICT competency level?
2. What are the challenges that determine teachers ICT competency?
3. How teachers use ICT in the classroom?

In order to answer the above research questions, the study tried to analyze and discuss the following points depending on the analyzed tables under data presentations and analysis section.

4.4.1. School Visions towards the utilization of ICT in the school

For the usage of any new technology in school, the principal of school should have a clear plan and strategy on how to use and apply that technology in their sector. Based on data obtained from respondents, some of preparatory schools found in Addis Ababa city administration have an articulated plan and strategy to use ICT in their classroom. Once the plan and strategy is prepared, the second job is setting a budget for necessary expenses. Some of the respondents agreed that their school has a budget for integration of ICT in their school. And also some schools of preparatory school teachers are agreed that their school is motivating them to use ICT in teaching and learning activities with the average mean of 3.00 as observed from Table 7. But the in case of teachers' ICT capacity building, the school effort is very small.

Generally, ICT is a major investment for the school and requires long-term planning and regular monitoring and review. Most of preparatory school visions' towards the development of ICT in their school is taken as a good starts in Addis Ababa city. Based on the information gained from the study participants, we cannot say that all preparatory school have a clear plan and budget for integration of ICT in their schools. But some of preparatory schools teachers' respondents agreed that their school were started to plan and formulate strategy for the development of ICT infrastructure in their school

4.4.2. ICT access and basic computer training

Among teacher respondents of the study, more of the respondents have computer and Internet access at their schools and knows how to operate computers. Only a few numbers of respondents have no computer access in their school and home. Some of preparatory school also have LCD projector for teaching and learning activities.

In case of Plasma utilization, around half of the respondents have plasma access in their school and some of the respondents have no plasma access in their class. The reason is, those respondents have no plasma access in their class is taken from private school as a sample. As pointed by Sani et el.(2013), the incomplete coverage of the plasma –TV to all schools in the project area and others make a difference among students which affects the access and quality of education which is true for teacher also.

In case of basic computer training given to the teacher, many of the respondents have taken training on basic computer course from their university study. Only a few numbers of respondents have taken basic computer course from their school. But the majority of teachers have trained by themselves at computer training center. This shows that today's teachers are trying to be competent in ICT by themselves without waiting other body to give them training. This finding also supports the study of ICT Competence among Teachers, which was undertaken in Federal Unity Colleges in North Central Geo-political of Nigeria. The study was revealed that, the majority of the teachers (82.0%) spend for ICT training individually (Igomu & Solomon, 2014). Mogas (2014) also recommended as continuous training and retraining of teachers, others supporting staff and academia on computers and ICT skill acquisition should be provided for successfully integrating ICT in education system. So, based on the Table 9 information, we can

conclude that most of the respondents have taken basic computer training course from different training institutes.

4.4.3. Teachers' Perception on the usage of ICT

To successfully initiate and implement ICT in the school program, it depends strongly on the teachers' support and attitudes. It is believed that if teachers perceived technology programs as neither fulfilling their own needs nor their students' needs, it is likely that they will not integrate the technology into teaching and learning. The other objective of this study was to investigate the extent to which teacher attitude influence integration of ICT in teaching and learning activities. On this case, the findings of this study revealed that teachers had positive attitude towards ICT integration in classroom activities. Regarding the usage of ICT, teachers are highly agreed that using computers can improve teaching and learning processes, enhance students' critical thinking skills, makes lesson easier, enhance teacher and student interaction, can offer opportunities to teachers for obtaining new course materials from different sources and increases students learning motivation. The same to this finding, the study of Albirini (2006) on teachers attitudes toward information and communication technologies: the case of Syrian EFL teachers, find out that teachers have positive attitudes toward using ICT in education.

4.4.4. Level of Teacher ICT knowledge and skill

As summarized in Table 11, the overall level of ICT competency in the preparatory teacher's, in case of having basic computer knowledge and skills, all of preparatory teachers falls at the high level range. Those teacher posses' excellent basic computer skill and knowledge are highly competent in case of searching and downloading information from Internet to develop their personal career. The result signifies that teacher educators have utilized presentation and publishing software like Micro soft power point in a medium level. Surprisingly, as indicated in the Table 11, the degree of teachers' competency in the case of having basic software and hardware troubleshooting skills, their competency is in medium level. This indicated that some of preparatory teachers can solve their computer problem by themselves without waiting to computer professional support. But the study carried out in Zimbabwean Secondary Schools is opposite to this finding. Their finding revealed that, the teachers lack of the necessary skills and knowledge of computers in basic software and hardware tools. For this problem, the researcher

point out that as a reason, lack of software and hardware knowledge and unavailability of infrastructure are some of the inhibiting factors to teachers' ICT competences (Bukaliya & Mubika, 2011). In other study, the research conducted in Kuwait Secondary Schools revealed that, teachers found in both private and governments are broadly confident on their skill and knowledge of ICT and its applications. Most of them fall in high level competency while some of them are falls in medium level (Alharbi, 2014).

4.4.5. Teachers' ICT Usage in Classroom and Challenges that prohibit them from using ICT

As discussed in previous topic, the study has been analyzed the level of teachers' ICT competency. Whatever the teacher ICT competency falls in any level, it is useless unless it apply in classroom activities. In this topic, the researcher discussed teachers' ICT usage in classroom activities. So, as summarized in Table 12, the usage of ICT in classroom by preparatory school teacher is put in the moderate level. Most of the respondents agreed as they use Microsoft office like Microsoft Excel, Word, and Power point in the classroom for different purposes. Teachers' also used ICT tools for monitoring students' result scores, for communication purpose with other teacher and students, for developing and using E- learning materials and for setting up computer based homework for their students in medium level. But the majority of public teachers are highly agreed that they set computer based homework for their students and they can use plasma in teaching and learning activities. But the participation in an on line interactive discussion in between teacher and student is very low level. Generally, the result implies that, teachers' in public preparatory school have better ICT usage at their school than private schools.

The other finding is regarding to the challenges that prohibit teachers from using ICT in classroom. As we observe from Table 13, the result revealed that some of the main inhibitive challenges are includes inadequate skills and knowledge in ICT usage and integration in teaching, lack of awareness in using ICT. The other respondents have also viewed as lack of facilities in preparatory school such as Internet, computer etc. are the main challenges that determine teacher ICT competency in the use of ICT in classroom. Moreover, lack of ICT training in their school, having insufficient time due to workload and lack of articulated school

vision on integrating of ICT in teaching activities was pointed as a deterrent factor that discouraged teachers from ICT competent in using ICT in teaching and learning activities.

4.4.6. Comparison on ICT Access of Private and Government preparatory school

The following table show that the comparison between private and government computer accessibility for teaching and learning activities.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Computer access * Type of school	150	100.0%	0	0.0%	150	100.0%

Computer access * Type of school(Government or Private) Cross tabulation

			Type of school		
			government	private	Total
Computer access	Low	Count	12	21	33
		% within Type of school	12.0%	42.0%	22.0%
	Medium	Count	53	21	74
		% within Type of school	53.0%	42.0%	49.3%
	High	Count	35	8	43
		% within Type of school	35.0%	16.0%	28.7%
Total		Count	100	50	150
		% within Type of school	100.0%	100.0%	100.0%

Table 14: Comparison between Private and Government Computer Access

The above table shows that, the comparison between government and private ICT access in preparatory school. Accordingly, 88% of the teachers from government agreed that they have computer access while, only 58% in private school agreed that they have ICT access in their

school. Government schools have better ICT access than private schools; this is probably government schools are supported by governmental and nongovernmental organizations. It is suggested that non-governmental organizations should also support the private schools as they have low computer access.

4.4.7. Comparison between ICT Usage of government and private school

The following table summarizes the comparison between ICT usage of teachers in private and government schools.

Table 15: ICT usage between Government and Private School

Group Statistics

	Type_school	N	Mean	Std. Deviation	Std. Error Mean
ICT usage	government	100	3.0914	1.04693	.10469
	Private	50	2.3295	.89744	.12692

When we compare the ICT usage between government and private school, as summarized on Table 15, we found that government school has better ICT usage in the classroom than the private school. The mean value for ICT usage for government school is 3.09 while for private school, it is only 2.33.

Table 16: Independent Samples t-test Result

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-ailed)	Mean Difference	Std. Error Difference	Lower	Upper
ICT usage	Equal variances assumed	3.979	.048	4.399	148	.000	.76190	.17319	.41966	1.10415
	Equal variances not assumed			4.631	112.574	.000	.76190	.16453	.43594	1.08787

We also checked with t-test if our sample result is statistically significant or not. The result of t-test on Table 16 is 4.399 and its p value is .000. This indicates that it is statistically significant at 99% level of confidence.

4.5. Additional Finding

The researcher also interested to see the relationship between variables selected from the literature to study the research. Accordingly, researcher judged the relationships between the dependent and independent variables of the research. The results asserted that all beta paths are statistically significant except teachers'

The analysis yielded results as presented in Figure 1.

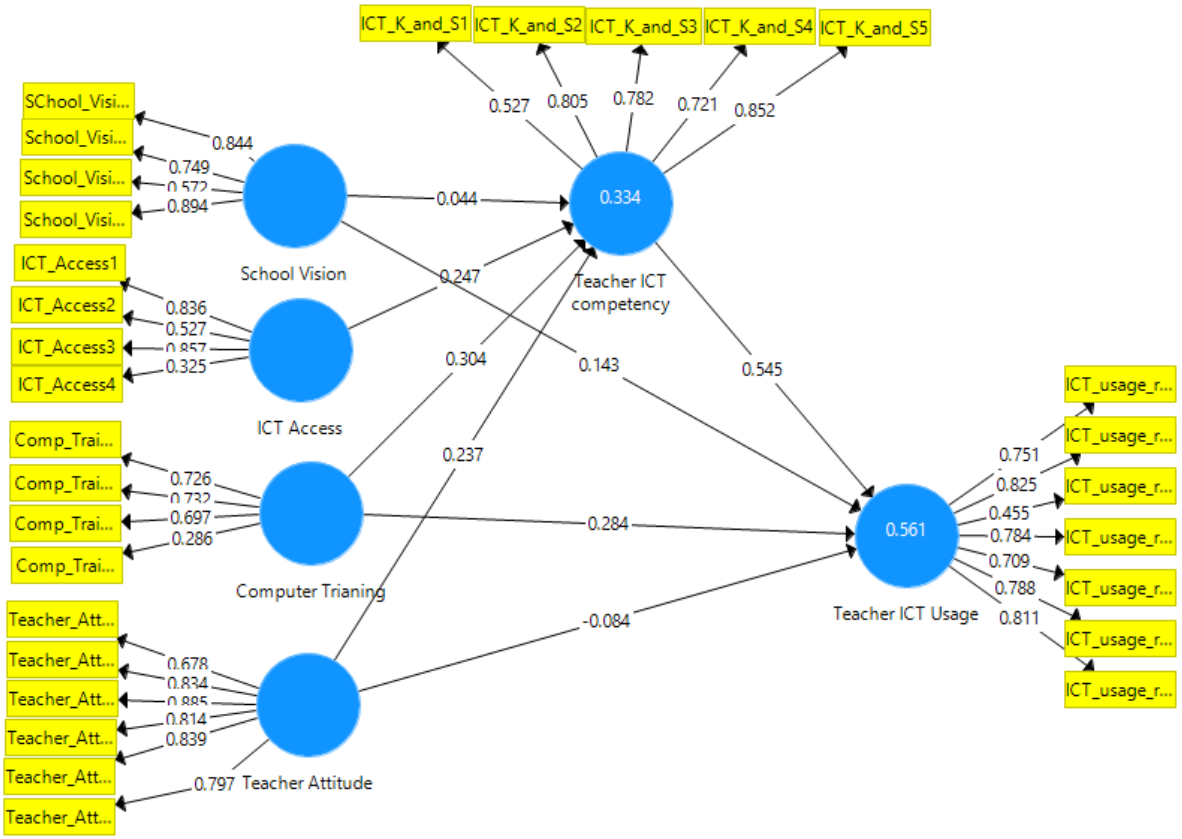


Figure 1: Relationship between Variables

The above figure shows the Structural Model PLS results. The model is good. Because, it explains ICT usage in the classroom for 56.1% of the variability. If the model explains 20% and above, it is statistically significant.

Computer access, computer training and teacher's attitude are those variables that affect the ICT usage of teachers in the classroom by increasing teachers' ICT competency. The effect of ICT access, computer training and teacher's attitude is statistically significant with a loading effect of greater than 20% on teachers' ICT competency; while the effect of school vision is not statistically significant on teachers' ICT competency development.

In addition, even though teacher attitude has direct effect on teacher ICT competency, it has no effect on ICT usage. Although literature reports that teacher attitude and school vision has a positive effect on ICT usage (Albirini, 2006), our empirical data does not support this claim.

Numbers on the arrow, which are called the path coefficients, displayed how strong the effect of one variable on the other variable. Moreover, the weight of each path coefficients allows the researcher to rank variables' statistical importance.

In view of that, the study's inner model explained that "teacher ICT competency" has a strong effect on "teacher ICT usage in the class" (0.561). In addition, "computer training", "ICT Access" and "teacher attitude" variables have strong impact on teacher ICT competency variable with (0.304, 0.247 and 0.237respectively). These variables influence "teacher ICT usage" in the class by increasing teacher's ICT competency level.

CHAPTER FIVE

5. SUMMARY, CONCLUSION, RECOMMENDATIONS AND IMPLICATIONS FOR FUTURE RESEARCH

This chapter presents the summary of the major findings, conclusions, recommendations and implications for further research. After presenting the summary of the findings, concluding remarks based on the results of the study was made. This was followed by the presentation of recommendations for the identified problems. This chapter ended by suggesting future studies that need to be undertaken to fill the other gaps.

5.1. Summary of the Main Findings

Information Communication Technology (ICT) is dynamically changing the livelihood of the society of every sector throughout the world. The general objective of this study was to assess teachers' ICT competency level and its influence in the use of ICT in the classroom of Addis Ababa preparatory schools and thereby to give remedial recommendations aimed at improving the situation.

ICT is one of the contemporary factors in shaping the global economy and producing rapid changes in education sector. It can transform the nature of education, where and how learning takes place and the roles of students and teachers in the learning process. Even though we are living in highly dynamic technological era, the most of preparatory teachers found in Addis Ababa city are not using some ICT tools in their instruction during practice of teaching.

To see the objectives, this study had addressed three basic research questions. In dealing with the research questions, related data were gathered mainly through questionnaire. Accordingly, 150 questionnaires were distributed to eight Addis Ababa preparatory school teachers and filled out only by teachers. Selected schools are from both private and government schools. The data obtained from the preparatory teachers were analyzed and interpreted by using tabulated frequency counts and percentage tables with the help of Statistical Package for Social Sciences computer package (SPSS).

5.1.1. Major Findings of the Study

- The level of preparatory school's vision for ICT development and integration in teaching and learning activity in case of having necessary budget, articulated plan and strategy for the usage of ICT in class room falls in a medium level. Most of preparatory schools already started to formulate a vision towards the development of ICT in their schools. But the majority of preparatory school are started to motivate their teachers to use ICT without helping them on ICT capacity building.
- In case of teachers ICT access, the number of teachers those have ICT access at home and at school is almost similar. Teachers' ICT accessibility at school is better than teachers ICT accessibility at home. But the overall study of teachers' ICT accessibility revealed that, there is a significance problem on the ICT access like computer, Internet, and LCD projector for teaching purposes.
- In case of basic computer training given to teacher, the majority of the respondents are trained in their university study. According to the finding of the study, the second highest level of teachers ICT training place is at private computer training center. They were taken basic computer training course when they study their main qualification. Only a few numbers of teachers are trained by the help of their school and different NGOs.
- This study also revealed that, the majority of the respondents have positive attitudes towards the usage of ICT in classroom. The study find out that using ICT in teaching and learning activities can improve learning processes, enhance students' critical thinking skills, makes lesson easier for students, enhance teacher and student interaction in class and out of class. Finally, more of the teachers are agreed that ICT can offer opportunities to them for obtaining new course materials.
- The other finding of this study is that, almost all of preparatory school teachers have basic computer knowledge and skills. And from all respondents, some of them can use presentation and publishing software like Micro soft power point in their class. And some of the respondents have basic hardware and software troubleshoot skill. But most of the teacher has no basic skill and knowledge of ICT to develop and use website. Generally, teachers ICT competency level in having and using ICT tools in different area falls in medium level.

- The last finding of this study is that, teachers ICT usage in class is not so much attractive. Most of the respondents are not using ICT in their class. This finding is inversely related with teachers ICT competency. This means that most of teachers have basic computer skills but they do not use ICT in their class. As the reason, which is pointed out from the study is that because of absence ICT facilities in their school and lack of ICT training related to their class activity may make teachers not competent in ICT. But, teachers in public school have better ICT usage than private school.

5.2. Conclusions

Based on the findings stated above, the following conclusions have been drawn.

According to the finding of this study, some of preparatory schools have no plan and budget for integration of ICT in teaching and learning activities by increasing their teachers' ICT competency. Especially in case of school helps of their teachers towards ICT capacity building, it is almost low level of supports. The positive thing is that, this study revealed that, most of preparatory teachers have positive attitudes to increase their ICT competency level and to integrate ICT in teaching and learning activities.

In the case of ICT access for teachers in their school and homes, almost the majority of teaches have computer access. But most of the teachers have ICT access in their school. And also almost all of the teachers have computer access in their school and home. Even though ICT access level like computer, Internet, LCD projector etc. for teaching activities in the school falls in medium level, but many teachers have no these tools in their schools.

The other finding of this study is that, almost all of preparatory teachers have been trained basic computer training course in different training institutes and they have basic computer skill and knowledge. But the majority of teachers are trained in their university study. Next to this, some of other teachers are trained by themselves at private computer training center. But very few numbers of teachers are trained by help of NGOs.

According to the study of this research, teachers' ICT knowledge and skill level are fall in medium level. Almost both public and private school have similar mean value of ICT level. But ICT usage in public preparatory school is better than private school.

The teacher attitude towards using of ICT in teaching and learning activities in classroom is positive. Almost all of teachers agreed with using of ICT in teaching activities can improve learning process by enhancing students' critical thinking skills and making lesson easier than traditional way. And teachers are believed as ICT can offer opportunities to teachers for obtaining new course materials from Internet. It also motivates students in learning activities. So, the level of teachers ICT competency in using different ICT tool falls in moderate level. But the

level of using basic ICT skill by preparatory teacher in classroom activity is almost nearest to low level.

According to the majority of respondents, the main challenges that make teachers not competent in ICT are: the absence of ICT training in case of capacity building towards the new technology in preparatory school and lack of articulated school vision on integrating of ICT in teaching activities. Insufficient knowledge of using ICT, insufficient skills of how to use ICT equipment, absence of ICT facilities in preparatory school such as Internet, computer etc. are also another challenge for teacher ICT competency for not using ICT in classroom.

5.3. Recommendations

Based on the findings of the study and the conclusions drawn above, the following recommendations were forwarded. The recommendation focuses on policy level, school leadership and preparatory teachers.

1. The decision makers should give high responsiveness for the integration of ICT as in teaching and learning activities by improving the current teaching curriculum method or styles. There should be a plan and strategy on how to develop and integrate ICT in teaching and learning activity. This may be done by Ministry of Education (MoE).
2. It is recommended that teachers be given sufficient training on how to use ICT in the classroom required. This will provide opportunities for teachers to support student-centered learning from anywhere at any time.
3. Teachers should be provided with adequate technological resources, technical support and administrative supp-ort to encourage them to successfully use ICT in classrooms and out of classroom.
4. Special attention should be given for the ICT infrastructure development like plasma-TV, Internet labs, and computers in preparatory school to meet current world education goals.
5. It is recommended that courses such as computer supported learning, ICTs and designing instructional materials should be introduced in initial teacher training programs to improve teachers' level of confidence and perceptions towards the use of ICT.
6. Nongovernmental organization may support both private and governmental preparatory schools equally.
7. ICT competency standards for preparatory teachers should be set up which provide guidelines for planning teacher staff development programs and training needs to be analyzed.

5.4. Implications for Future Research

This study focused on Assessing of Teachers' ICT Competency in the use of ICT in the Classroom in Addis Ababa City Preparatory Schools. In this case, the researcher was not able to deal with a wider range of issues pertaining to students' ICT Competency in the use of ICT in Addis Ababa City Preparatory Schools. Therefore, the researcher recommend that future research should focus on assessing of students' ICT competency in the use of ICT in and out of classroom in preparatory schools in Addis Ababa city administration, Ethiopia.

The study was aimed to investigate Teachers' ICT Competency in the use of ICT in Addis Ababa preparatory school teachers' on 3 public and 5 private schools. It is possible that future research may wish to have more schools, to develop a broader base of data for analysis.

6. References

Abdulkafi, A. (2004). Teachers attitudes toward information and communication technologies: the case of Syrian EFL teachers. *Computers & Education , 47*, 373–398.

Ahmad, S. (2013). Teacher Education in Ethiopia: Growth and Development. *African Journal of Teacher Education , 3* (3), 1-13.

Albirini, A. (2006). Harrison, W. & Rainer, K. (1992). An examination of the factor structures and concurrent validates for the technologies: the case of Syrian EFL teachers. *Computers & Education , 47*, 373-398.

Alemu, B. M. (2017). Transforming educational practices of Ethiopia into development and the knowledge society through information and communication technology. *African Educational Research Journal , 5* (1), 1-14.

Alharbi, E. (2014). *Study on the Use of ICT in Teaching in Secondary Schools in Kuwait.*

Almalki, S. (2016). Integrating Quantitative and Qualitative Data in Mixed Methods Research Challenges and Benefits. *Journal of Education and Learning , 5* (3), 288-296.

Almerich, G., & Orellana, N. (2016). Teachers' information and communication technology competences: A structural approach. *Computers & Education , 100*, 110-125.

Al-Zaidiyeen, N. J., Mei, L. L., & Fook, F. S. (2010). Teachers' Attitudes and Levels of Technology Use in Classrooms: The Case of Jordan Schools. *International Education Studies , 3* (2), 211-218.

Asan, A. (2003). Computer Technology Awareness by Elementary School Teachers: A Case Study from Turkey. *Journal of Information Technology Education , 2*, 3-19.

Assefa, T., & Rogers, C. (2017). *Integration of ICT in Education: the Plasma Mode of Education in Ethiopian High Schools.*
http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.583.7903&rep=rep1&type=pdf.

Avdeevaa, S., Zaichkinaa, O., Nikulicheva, N., & Khapaeva, S. (2016). Framework for Assessing the ICT Competency in Teachers up to the Requirements of "Teacher" Occupational

Standard. *INTERNATIONAL JOURNAL OF ENVIRONMENTAL & SCIENCE EDUCATION , 11* (18), 10971-10985.

Badau, K. M., & Sakiyo, J. (2013). Assessment of ICT Teachers' Competence To Implement The New ICT Curriculum In North Eastern Nigeria. *Journal of Education and Practice , 4* (27), 10-21.

Bank, W. (1999). *World Development Report 1998/1999.* Knowledge for Development. New York: Oxford University Press.

Barakat, & Bataineh. (2008). Jordanian student teachers' use of computers to develop primary stage pupils' literacy skills. *International Journal of Education and Development using Information and Communication Technology (IJEDICT) , 4* (4), 64-87.

Bas, G., Kubiatko, M., & Sunbul, A. M. (2016). Teachers' perceptions towards ICTs in teaching-learning process: Scale validity and reliability study. *Computers in Human Behavior , 61*, 176-185.

Baylora, A. L., & Ritchie, D. (2002). What factors facilitate teacher skill, teacher morale, and perceived student learning in technology-using classrooms? *Computers & Education , 39*, 395-414.

Borg, S. (2001). The research journal: a tool for promoting and understanding researcher development. *Language Teaching Research , 5* (2), 156–177.

Buabeng, C. (2012). An Exploration of Teachers' Skills, Perceptions and Practices of ICT in Teaching and Learning in the Ghanaian Second-Cycle Schools. *CONTEMPORARY EDUCATIONAL TECHNOLOGY , 3* (1), 36-49.

Bullock, D. (2004). Moving from theory to practice: an examination of the factors that preservice teachers encounter as they attempt to gain experience teaching with technology during field placement experiences. *Journal of Technology , 12* (2), 211–237.

Bukaliya, R., & Mubika, A. K. (2011). Teacher Competence in ICT: Implications for Computer Education in Zimbabwean Secondary Schools. *International Journal of Social Sciences and Education , 1* (4), 414-425.

Caluza, L. J. (2017). An Assessment of ICT Competencies of Public School Teachers: Basis for Community Extension Program. *IOSR Journal Of Humanities And Social Science (IOSR-JHSS) , 22* (3), 1-13.

Cha, S. E., & Jun, S. J. (2011). Measuring achievement of ICT competency for students in Korea. *Computers & Education , 56*, 990–1002.

Coolican, H. (2014). *Research Methods and Statistics in Psychology* (6 th Edition ed.). London: Psychology Press.

Davidson, C., & Tolich, M. (2003). *Social science research in New Zealand: Many paths to understanding. (2nd ed.).* Auckland: Pearson Education.

Dzidonu, C. (2006). *The National ICT for Development (ICT4D) Five Years Action Plan for Ethiopia [2006 – 2010]*.

Etejere, P., & Ogundele, M. (2008). Information and communication technology and administrative effectiveness. *Journal of NAEAP , 8* (2), 135.

FDRE. (2009). *Higher Education Proclamation, Federal Negarit Gazeta.* Addis Ababa: Birhanina Selam Printing Press .

Fisseha, M. (2011). The Roles of Information Communication Technolohy in Education Review Article with Emphasis to the Computer and Internet. *6* (4), pp. 1-16.

Gay.L.R. (1992).Educational Research: competencies for analysis and application. *Macmillan Publishing Company*: New York

Gilakjani, A. P. (2013). Factors Contributing to Teachers' Use of Computer Technology in the Classroom. *Universal Journal of Educational Research , 1* (3), 262-267.

Glava, C. (2010). Teaching skills training trough e-learning. *Procedia Social and Behavioral Sciences , 2*, 752–1756.

Hadi, & Zeinab. (2012). Challenges for Using ICT in Education: Teachers' Insights. *International Journal of e-Education, e-Business, e-Management and e-Learning , 2* (1), 40-43.

Hare, H. (2007). *ICT in Education in Ethiopia.*

Harrison, D., Wamakote, L., & Hennessy, S. (2010). Teacher Factors Influencing Classroom Use of ICT in Sub-Saharan Africa. *Itupale Online Journal of African Studies , 2*, 39-54.

Igomu, C., & Solomon, I. (2014). An Assessment of ICT Competence among Teachers of Federal Unity Colleges in North Central Geo-political of Nigeria. *American International Journal of Research in Humanities, Arts and Social Sciences , 5* (2), 147-152.

iSkills. (2002). *Digital Transformation A Framework for ICT Literacy.* A Report of the International ICT Literacy Panel.

Israel, G. (1992). Department of Agricultural Education and Communication, and extension specialist, Program Evaluation and Organizational Development. *Institute of Food and Agricultural Sciences (IFAS).*

Kamaruddin, K., Abdullah, C. A., Idris, M. N., & Nawi, M. N. (2017). The 2nd International Conference on Applied Science and Technology. (pp. 1-6). AIP Publishing.

Koh, J. H., & Frick, T. W. (2009). Instructor and Student Classroom Interactions during Technology Skills Instruction for Facilitating Preservice Teachers' Computer Self-Efficacy. *Journal of Educational Computing Research , 40* (2), 211-228.

MCIT. (2016). *The National Information and Communication Technology (ICT) Policy and Strategy.*

MoE. (2005). *Education Sector Capacity Development Strategic Plan(ESDP I).* Ministry of Education.

MOE. (2015). *Education Sector Development Programme V (ESDP V) 2015/16 - 2019/20.* Federal Ministry of Education.

MoE. (2006). *Five Year Education Sector Capacity Development Strategic Plan.* Addis Ababa: Ministry of Education.

MOE. (1998). *Education Sector Development Program I (ESDPI).* Addis Ababa: Ministry of Education.

MOE. (2002). *Education Sector Development Program II (ESDPII).* Addis Ababa: Ministry of Education.

MoE. (2010). *Education Sector Development Program IV (ESDP IV) 2010/2011 – 2014/2015.* Addis Ababa: Ministry of Education.

MoE. (2008). *General Education Quality Improvement Package (GEQIP).* Addis Ababa: Ministry of Education.

Moges, B. (2015). Integrating ICT into Teaching-learning Practices: Promise, Challenges and Future Directions of Higher Promise, Challenges and Future Directions of Higher Educational Institutes. *Universal Journal of Educational Research , 3* (3), 170-189.

Moges, B. (2014). The Role of Information and Communication Technology (ICT) in Enhancing the Quality Education of Ethiopian Universities: A Review of Literature. *Journal of Education Research and Behavioral Sciences , 3* (8), 246-258.

Morse, A., Khaimook, K., Paonil, P., & Suktrisul, S. (2009). eLearning Education for Thai Teachers. *Special Issue of the International Journal of the Computer, the Internet and Management , 17,* 1-7.

Mugenda, O. M., & Mugenda, A. G. (2003).Research Methods: Quantitative and Qualitative Approaches. Nairobi: *African Centre for Technology Studies*.

Mukti, N. A. (2000). Computer Technology In Malaysia: Teachers' Background Characteristics, Attitudes And Concerns. *The Electronic Journal on Information Systems in Developing Countries , 3* (8), 1-13.

Mumtaz, S. (2000). Factors affecting teachers' use of information and communications technology: a review of the literature. *Journal of Information Technology for Teacher Education , 9* (3), 319-342.

Noor-Ul-Amin, S. (n.d.). An Effective use of ICT for Education and Learning by Drawing on Worldwide Knowledge, Research, and Experience:ICT as a Change Agent for Education. *Department Of Education, University Of Kashmir* .

Obakhum. (2011). Assessment of School Teachers' Use of Information and Communication Technology (ICT) in Oyo Metropolis of Nigeria. *Journal of Educational and Social Research , 1* (5), 131-136.

Obakhume, A.-S. A. (2011). Assessment of School Teachers' Use of Information and Communication Technology (ICT) in Oyo Metropolis of Nigeria. *Journal of Educational and Social Research , 1* (5), 131-136.

Olakulehin, F. K. (2007). INFORMATION AND COMMUNICATION TECHNOLOGIES IN TEACHER TRAINING AND PROFESSIONAL DEVELOPMENT IN NIGERIA. *Turkish Online Journal of Distance Education , 8* (1), 133-142.

Osuji. (2010). AN ASSESSMENT OF THE COMPUTER LITERACY LEVEL OF OPEN AND DISTANCE LEARNING STUDENTS IN LAGOS STATE, NIGERIA. *Turkish Online Journal of Distance Education , 11* (4), 149-158.

Peake, J. B., Briers, G., & Murphy, T. (2005). Relationships between Student Achievement and Levels of Technology Integration by Texas AgriScience Teachers. *Journal of Southern Agricultural Education Research , 55* (1), 19-32.

Romiszowski, A. J. (2004). How's the E-learning Baby?Factors Leading to Success or Failure of an Educational Technology Innovation. *Educational Technology , 44* (1), 5-27.

Russo, D. (2016). Competency Measurement Model. (pp. 1-29). Madrid: European Conference on Quality in Official Statistics.

SANI, D., TASISA, W., & PANIGRAHI, M. R. (2013). INFORMATION COMMUNICATION TECHNOLOGY FOR EDUCATIONAL QUALITY: Challenges, Prospects in Ethiopian Context. *Turkish Online Journal of Distance Education-TOJDE , 14* (4), 235-251.

Schreurs, J. (2007). ICT use in school: vision and performance measures. *Michael E. Auer. Conference* (pp. 1-12). Villach,: Kassel University Press.

Sithulisiwe, B., & Cosmas, M. (2016). Examining Teachers' Computer Literacy and Utilization of ICTs in Teaching and Learning at Primary School Level. *J Communication , 7* (2), 231-240.

Tayie, S. (2005). *Research Methods and writing Research Proposals.* Center for Advancement of postgraduate studies and research in Engineering science Cairo University(CAPSCu).

Taylor, E., Goede, R., & Steyn, T. (2011). Reshaping computer literacy teaching in higher education. Identification of critical success factors. *Interactive Technologyand Smart Education , 8* (1), 28-38.

Tella, A., Toyobo, O. M., Adika, L. O., & Adeyinka, A. A. (2007). An Assessment Of Secondary School Teachers Uses Of Ict's: Implications For Further Development Of ICT's Use In Nigerian Secondary Schools. pp. 5-17.

Tibebu, D., Bandyopadhyay, T., & Negash, S. (2009). ICT Integration Efforts in Higher Education in Developing Economies: The Case of Addis Ababa University, Ethiopia. *International Journal of Information and Communication Technology Education , 5* (3), 34-58.

Tinio, V. L. (2002). *ICT in Education.* United Nations Development Programme. retrieved from www.apdip.net.

Trucano, M. (2005). *Knowledge maps:ICT in Education.* Washington DC. infoDev / World Bank. Available at: http://www.infodev.org/en/Publication.8.html.

Umara, I. N., & Hassanb, A. S. (2015). Malaysian Teachers' Levels Of ICT Integration and Its Perceived Impact On Teaching And Learning. *Social and Behavioral Sciences , 2015 – 2021*, 2015 – 2021.

Unal, S., & Ozturk, I. H. (2012). Barriers to ITC Integration into Teachers' Classroom Practices:Lessons from a Case Study on Social Studies Teachers in Turkey. *World Applied Sciences Journal , 18* (7), 939-944.

UNESCO. (2003). *Building Capacity of Teachers/Facilitators in Technology-Pedagogy Integration for Improved Teaching and Learning.*

UNESCO. (2008). *ICT COMPETENCY STANDARDS FOR TEACHERS.* By the United Nations Educational, Scientific and Cultural Organization.

Volman, M., Eck, E. v., Heemskerk, I., & Kuiper, E. (2005). New technologies, new differences.Gender and ethnic differences in pupils' use of ICT in primary and secondary education. *Computers & Education , 45*, 35-55.

WATSON, D. M. (2001). Pedagogy before Technology: Re-thinking the Relationship between ICT and Teaching. *Education and Information Technologies* , *6* (4), 251–266.

Yusuf, M. O. (2005). Information and communication technology and education: Analysing the Nigerian national policy for information technology. *International Education Journal* , *6* (3), 316-321.

Appendix 1: **Questionnaires for Preparatory School Teachers**

Addis Ababa University

College of Natural Science

School of Information science

QUESTIONNAIRES FOR PREPARATORY SCHOOL TEACHERS

General Directions

The main purpose of the study is to assess teachers' ICT competency level and its influence in the use of ICT in the classroom .This questionnaire is prepared to gather information regarding the preparatory school vision towards the use of ICT, teachers computer access, challenges that inhibit teachers from using ICT, Teachers' ICT knowledge and skill, Teachers' attitudes towards the use of ICT in teaching and learning activity. ICT is new recognized as one of the tools to achieve quality of education in Addis Ababa City Administration Education Bureau.

The response for each item in the questionnaire could be of great help to the intended purpose. Therefore, the researcher kindly requests your honesty reply. Responses to the questionnaire will be kept in confidential and I will assure you unprocessed data will not be given to the third party. The data will be used for undertaking masters' thesis research in Information system. Your timely and genuinely response would be appreciated.

Thank You for Your Cooperation!

Note. 1. Do not write your name.

2. Please respond by putting " √ " mark or by writing your responses on the space provided.

Section I: Demographic Information

1. Name of your school _____

2. Type of your school (Sector)

Government (Public) ☐ private ☐

3. Please indicate your gender by placing a tick (√).

Male ☐ Female ☐

4. Please Indicate your age by placing a tick (√).

Below 20 yrs ☐ 21-30 yrs ☐ 31-40 yrs ☐

41-50 years ☐ above 51 ☐

5. Qualification:

PhD ☐ Master ☐ Bachelor ☐ Diploma ☐ Certificate ☐

Any other please specify _____

6. Your Streams: Social science ☐ Natural science ☐

7. What grade do you teach? [If you teach different grades, tick all the grade you teach]

Grade 11 ☐ Grade 12 ☐

8. Subject you teach _____

9. How many periods per week do you have? _____

10. Indicate your total experience as a teacher in the school

Below 1 year ☐ 1-5 years ☐ 6-10 years ☐

11-15 years ☐ 16-20 years ☐ over 20 years ☐

11. How long have you been using computers?

1-2 years ☐ 3-4 years ☐ 5-6 years ☐ 7 years and above ☐

Section II: Your school vision

Please indicate your level of agreement or disagreement by ticking (√) in the appropriate response using the following key in all of the following tables:

SA – Strongly Agree, **A** – Agree, **U** – Undecided, **D**– Disagree, **SD** – Strongly disagree.

1. How do you rate your school vision on the following statements?

No.	Statements	SA	A	U	D	SD
1	My school has articulated plan and strategy to use ICT in the classroom.					
2	My school has ear-marked budget for ICT infrastructure development.					
3	My school always motivated me to use ICT in teaching activities.					
4	My school helps me on ICT capacity building.					`

Section III: Your ICT Access

1. How do you rate your computer access on the following statements?

No.	Statements	SA	A	U	D	SD
1	I have computer and Internet access in my school.					
2	I have computer access in my home.					
3	I have ICT access (computer, Internet, LCD projector etc.) for teaching activities in my school.					
4	I have Plasma access for teaching in my school.					

Section IV: Your Basic Computer Training

1. How do you rate your computer training on the following statements?

No.	Statements	SA	A	U	D	SD
1	I have taken basic computer training in my university study.					
2	I have taken basic computer training organized by my school.					
3	I have taken basic computer training organized by NGOs.					
4	I have taken basic computer training by my own at computer training center.					

Section V: Your Attitude level toward the use of ICT in teaching and learning activities

1.What is your perception on using ICT for teaching on the following statements?

No.	Statements	SA	A	U	D	SD
1	I believe that using ICT can improve teaching and learning processes.					
2	I believe that using ICT can enhance students' critical thinking skills.					
3	I believe that using ICT makes lesson easier.					
4	I believe that using ICT can enhance teacher and student					

	interaction.					
5	I believe that using ICT can offer opportunities to teachers for obtaining new course materials.					
6	I believe that using ICT increases students learning motivation.					

Section VI: Assessing of Your ICT knowledge and skill Level

1. **How would you rate your knowledge and ICT skill level in terms of the following ICT skills or applications?**

No.	Statements	SA	A	U	D	SD
1	I have basic computer knowledge and skills.					
2	I have knowledge and skill to use presentation and publishing software like Micro soft power point.					
3	I have knowledge and skills to develop website.					
4	I can search and download information from Internet to develop my personal career.					
5	I have basic software and hardware troubleshooting skills.					

Section VII: Your ICT usage in teaching Practice

2. **How do you rate your ICT usage on the following statements?**

No.	Statements	SA	A	U	D	SD
1	I use Microsoft office like Microsoft Excel, Word, and Power point in the classroom					
2	I can develop and use E-learning in my classroom					
3	I use Plasma in the classroom					
4	I Set computer-based homework for students					
5	I use email to communicate with other teachers and students					
6	I use software to monitor the students' scores					
7	I participate in an on-line interactive discussion with students					

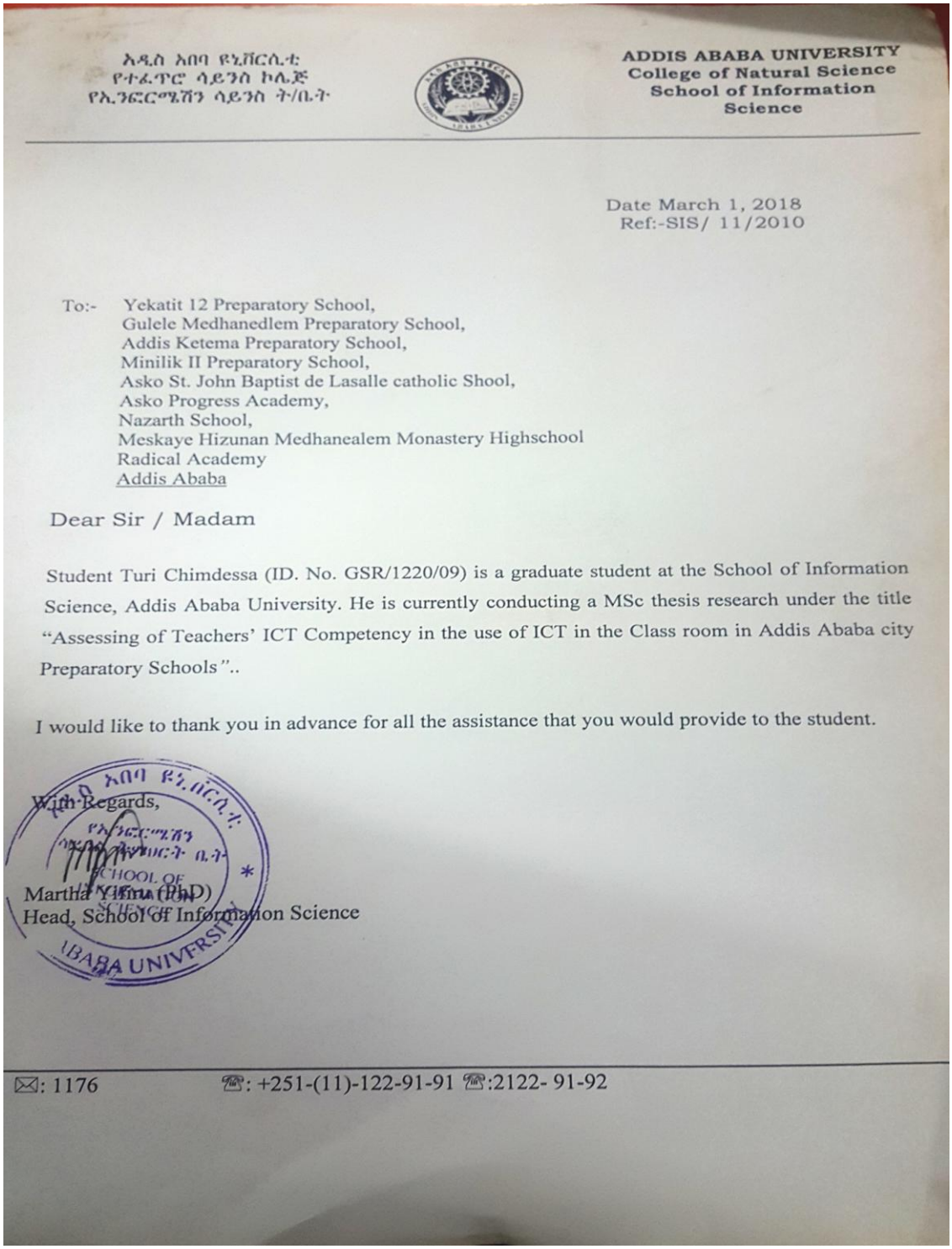
1. How do you rate the following challenges on your ICT competency?

No.	Statements	SA	A	U	D	SD
1	Lack of awareness in using ICT.					
2	Insufficient knowledge of using ICT.					
3	Insufficient skills of how to use ICT equipment.					
4	Absence of ICT facilities in my school such as Internet, computer etc					
5	Lack of ICT training in my school.					
6	Insufficient time due to workload.					
7	Lack of articulated school vision on integrating of ICT in teaching activities.					

Thank you for your co-operation

‘

Appendix 2: Support letter from Addis Ababa University



አዲስ አበባ ዩኒቨርሲቲ
የተፈጥሮ ሳይንስ ኮሌጅ
የኢንፎርሜሽን ሳይንስ ት/ቤት

ADDIS ABABA UNIVERSITY
College of Natural Science
School of Information Science

Date March 1, 2018
Ref:-SIS/ 11/2010

To:- Yekatit 12 Preparatory School,
Gulele Medhanedlem Preparatory School,
Addis Ketema Preparatory School,
Minilik II Preparatory School,
Asko St. John Baptist de Lasalle catholic Shool,
Asko Progress Academy,
Nazarth School,
Meskaye Hizunan Medhanealem Monastery Highschool
Radical Academy
Addis Ababa

Dear Sir / Madam

Student Turi Chimdessa (ID. No. GSR/1220/09) is a graduate student at the School of Information Science, Addis Ababa University. He is currently conducting a MSc thesis research under the title "Assessing of Teachers' ICT Competency in the use of ICT in the Class room in Addis Ababa city Preparatory Schools"..

I would like to thank you in advance for all the assistance that you would provide to the student.

With Regards,

Martha Yifiru (PhD)
Head, School of Information Science

✉: 1176 ☎: +251-(11)-122-91-91 ☎:2122- 91-92