



ADDIS ABABA UNIVERSITY
COLLEGE OF NATURAL AND
COMPUTATIONAL SCIENCES
SCHOOL OF INFORMATION SCIENCE

ASSESSMENT OF KNOWLEDGE, ATTITUDE AND
UTILIZATION OF ICTs IN SELECTED PRIVATE
SECONDARY SCHOOLS AT ADDIS ABABA CITY
ADMINISTRATION

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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.

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Acronyms and abbreviations

AAEB:	Addis Ababa Education Bureau
ABE:	Alternative Basic Education
BECTA:	British Educational Communications and Technology Agency
EFA:	Education for All
EICT:	Educational Information and Communication Technology
ESDP:	Education Sector Development Program
ETP:	Education and Training Policy
GEQIP:	General Education Quality Improvement Package
GER:	Gross Enrollment Rate
ICT:	Information and Communication Technology
ICT4E:	Information Communication and Technology for Education
IT:	Information Technology
ITU:	International Telecommunications Union
LDC:	Less developed countries
LMIC:	Lower-middle-income country
MCIT:	Ministry of Communications and Information Technology
MDGs:	Millennium Development Goals
MoE:	Ministry of Education
PSS:	private secondary schools

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ABSTRACT

The advancement in Information Communication Technology (ICT) provides greater ease of access and use to exploit the benefits of computing for education system as well as enhancing the delivery of quality education. However, there is no adequate information on the level of knowledge and utilization patterns of ICT among students and teachers in Ethiopia. With the aim to assess the knowledge, attitude and utilization of ICT among students and teachers in selected private secondary schools at Addis Ababa City administration, the researcher used a descriptive cross sectional survey which was conducted in ten selected private secondary schools at Addis Ababa, between March and April 2016. A total of 355 study Participants (students and teachers) were randomly selected .

The quantitative data were collected using self administered pretested questionnaire. The study was complimented with in-depth interview. Data were exported to SPSS version 20.0 for analysis. A total of 257 students and 98 teachers participated in the study and about 159(44.79%) of the respondents had satisfactory knowledge. Around 99(27.9%) of the respondents had at least one computer at home and 283(79.7%) of study subjects had Internet access mostly from their home using personal computers and cell phones.

The study indicated that students and teachers had low knowledge level and poor utilization status of ICTs. About 330(93%) of study participants had positive attitude towards ICT. The utilization rate of computer was 140(39.4%) for all respondents. The findings also indicate that the need for improving the existing ICT course in the curriculum to be more skill oriented and also its better to give formal in-service ICT related trainings for teachers would result an asset for both the school and students. Further, it is recommended that schools(investors) as well as MOE should consider and assist in improving the ICT facilities for students and teachers with the aim of delivering quality education.

CHAPTER ONE

INTRODUCTION

The purpose of this chapter is to give the overall picture of the research work which focuses on the concept and base of the study. It comprises the research motivation, statement of the problem, objectives, research questions, significance of the research, scope, organization of the study and operational definition.

1.1 Background

Secondary education has been implemented in Ethiopia for many years providing for post-primary education. It is split into two cycles; the first cycle covering grades 9-10 and the second cycle covering grades 11-12. The focus of secondary education is predominantly on the first cycle with 80% of students in secondary education enrolled in grades 9-10. At the end of the first cycle when the student finishes grade 10 (general secondary education) they take the national examination (Ethiopian General Secondary Education Certificate Examination). This is used to certify completion of general secondary education and to select students that qualify for the next higher level of education called the preparatory level. The preparatory level is the second cycle of secondary education and prepares students for university education. Those who do not fulfill the criteria for the preparatory level can be enrolled to Teachers education colleges and to technical and vocational training schools (TVET).

Ministry of Communications and Information Technology (MCIT) of Ethiopia is responsible for the national ICT policy. MCIT (2010) indicated that Ethiopia's Information and communication Technology (ICT) policy is an integral part of the country's larger development goals and objectives. Setting these goals and objectives are aimed to rapidly transform the country's subsistence agricultural-based economy and society into a predominantly knowledge and information-based economy and society. As the country's ICT development process is the focal

point of the policy, the Government of Ethiopia has developed multiple policies, most notable of which are the National ICT Strategic Plan and the ICT4D Action Plan for the year 2006-2010. The broad ICT sector policy of the Ethiopian government that derives from Plan for Accelerated and Sustained Development to End Poverty (PASDEP), as developed in 2006 by the Ethiopian ICT Development Agency (EICTDA). The policy aims to:

- ✓ Develop ICT as a globally competitive industry, and as an engine of national growth;
- ✓ Create the necessary conditions for the rapid development of ICT within the economic development process;
- ✓ Promote and facilitate an extensive use of ICT in support of key sectors of the economy including agriculture, industry and the services sectors;
- ✓ Transform Ethiopia into a knowledge and information-based society and economy; and promote the use of ICT for modernizing the civil and public services.

1.2 Research Motivation

In this globalized information era the involvement of Information and communication technology (ICT) is a change factor that has transformed many aspects of the way we live and operate. If we compare how organizations and business fields such as medicine, tourism, travel business, law, banking and Insurance, engineering, Education, architecture and other fields, the impact of ICT across the past decades has been enormous. The way these fields operate today is extremely different from the ways they operated in the earlier years.

The benefits of ICTs in development process was long recognized, and the access to ICTs was even made one of the targets of the Millennium Development Goal, which give attention the benefits of new technologies by integrating ICTs in the fight against poverty. According to World Bank report on ICT4D, with a 10 percent increase in high-speed internet connections, economic growth will be improved by 1.3 percent (World Bank, 2009).

Simultaneously there is a growing view that ICT can also substantially minimize the environmental impacts of other sectors, in particular by increasing their energy efficiency. ICT

can help all economic sectors to become more energy efficient since ICT allows existing processes to be optimized or enables entirely new, more energy efficient processes. The energy that could be saved by ICT induced energy efficiency is estimated to be several times larger than the total energy consumption of ICT itself. The European Commission recognizes this potential as Europe will go a long way toward achieving its target of 20% Greenhouse gas reduction by 2020 by deploying ICT for energy efficiency. (Lorenz M. and et.al. 2007)

Many companies try to review their managerial patterns and to find basic solution so that they can access to competitive advantage. Today's revolution in information and communication technology has changed in a way that people and organizations are conducting their business easily. Hence, managers and organizations should deploy ICT in order to maintain and to achieve competitive advantage (Ebrahimi, 2011).

The role of ICT in facilitating (political) information exchange is manifested in the way information flows faster, more generously, and less expensively throughout the planet for decision-making and development (Ahmed et al., 2006). ICTs facilitate the sharing of information or ideas by different nations of the world. It can improve government and strengthen democracy and citizen empowerment, and can help foster the most transparent governance by enhancing interaction between government and citizens (United Nations Economic and Social Council, 2000). It can be particularly powerful in providing a voice to people who have been isolated and invisible.

In education, ICT has begun to have a role to play but its impact has not been as far-reaching as in other fields (Ron, 2003). From the time as education is a very socially oriented activity and quality education has traditionally been linked with strong teachers having high degrees of personal contact with students. The application of ICT in education provides the teaching learning process to be more student-centered learning settings and often this creates some stress for some teachers and students. But with the globe moving swiftly into digital media and information, according to Ron (2003) the role of ICT in education is becoming more and more important and this importance will continue to grow and develop in the 21st century. Currently the freedoms of choice provided by educational institutions that can be accessed at any place are also supporting the delivery of programs with units and courses from a variety of courses and places, there are now numerous ways for students to complete undergraduate degrees. For example, to

study units for a single degree, through a number of different institutions, an activity that provides considerable diversity and choice for students in the programs they complete.

Thus, education is becoming an increasingly important tool to combat poverty and to establish a modern nation. Feature of modern society is the penetration of information technologies in all spheres of life, including schooling. In general, the new technologies have been recognized to play a valuable role in developing and improving the teaching and learning situations.

In Ethiopia, the 1994 Education and Training Policy (ETP) committed the government to creating the conditions needed to encourage and support private investors to open schools and establish other education and training institutions. Nevertheless, the government currently remains almost exclusive provider of general education, enrolling some 95 percent of primary and secondary students. Enrollments in non-governmental (private) secondary schools have been increasing steadily since 2000; nevertheless, they represented only about 5.2 percent of the total secondary enrollment by 2010. This share is much lower than countries such as Mauritius (59 %), Indonesia (49 %), Chile (55 %), Vietnam (21 %), Jordan (18 %), or Ghana (15 %).

Ethiopia has made considerable progress in improving enabling conditions for effective learning. Yet challenges remain, especially in the most disadvantaged areas, with 35 percent of secondary schools not having a sufficient number of classrooms and only 20 percent having Internet access. Many laboratories lack basic equipment and supplies and it is unclear how well libraries are stocked. (Rajendra and Adriaan, 2013)

According to ESDP IV, two priorities were also given to improve the quality of general education and to increase access and equity where the quality improvement program integrated the low level of confidence among a number of teachers on the benefits of ICT. In order to improve the quality of teaching and learning, it was necessary to go beyond the provision of more ICT infrastructure (MoE, 2010).

1.3 Statement of the problem

Extant literature report on the utilization and access of ICT on education warn that the rapid growth in Information Communication and Technologies (ICT) has brought remarkable changes in the twenty-first century, as well as affected the demands of modern societies. According to

Ethiopian Education Sector Development Programme V (ESDP (V), 2015) the application of science, technology and innovation as the major instruments to create wealth has now taken its place as the foundation for achieving the long-term vision of transforming Ethiopia into a middle-income country.

As it was stated by Rahel B. (2010), incorporating the learning styles of students in the teaching learning process makes learning easier for students to enhance their interest and understanding. The implementation of educational technology and the preparation and utilization of ICT is an important component. Ajayi (2002) rightly noted that any industry that sidelines ICT has simply signed a “death warrant” on its continued relevance. Therefore information and communication technology can be said to hold the key to continuity and sustainability of successful educational activities.

According to McMahon's study (2009), there are statistically significant correlations between studying with ICT and the acquisition of critical thinking skills. A longer exposure in the ICT environment can foster students' higher critical thinking skills. Thus, schools are strongly advised to integrate technology across all of the learning areas and among all learning levels. In utilizing and integrating information communication technology in the field of education can be influenced by many factors. The main issue in teachers' decision to utilize or not to use ICT is related to their attitudes. The results of a study by Badri et al., (2013) shows that an individual's attitudes have a significant impact on his/her behaviors in ICT use. Teachers' attitudes (positive or negative) influence how they respond to and employ ICT. Therefore, information is needed about teachers' attitudes for planning about and future investment in ICT (Tezci, 2010). Likewise, Keramati et al. (2011) found that teacher's motivation and training play a substantial role in ICT application in education. Hence, their attitudes toward ICTs can play an important role in the acceptance and utilization of computers.

According to Bitew (2008) in his research on ICT broadcast in secondary schools, students that are from private and religiously owned secondary schools showed positive attitude on the implementation and use of ICT equipments because of their familiarity on ICT and their language skill along with ICT infrastructure development in their schools makes them to relatively to adopt it. Relatively due to the limitation of infrastructure on ICT and skilled man power in public schools the research only focused on PSS.

Similarly a study made by Miressa (2007) on the usage of information communication technology in a higher education institute, there is a common situation where most of the staff members have the awareness and access towards it. However, he continued to set that his findings come with some doubt whereby the awareness of the staff members does not guarantee the integration of ICT into the teaching-learning system. Education in preparing and using e-lessons, the usage of educational technology in general and the usage of ICT in particular were outlined because they are the basic pillars in seeing whether the available infrastructure and trainings given are up to how they are supposed to be. In order to gain the required skills Knowledge and access to ICT and the utilization status of the available ICT related technologies were needs to be examined in order to properly implement and integrate ICTs in schools. According to 2016 report by MoE, Ethiopia has already deployed over 26 million students in the formal education system aiming to become middle income country. In order to achieve this, the country needs to build technology driven society. In GTP II one of the components is expanding ICT in education sector. In order to achieve this goal there is a great demand to assess the current states of ICT knowledge, attitude and utilization of ICTs in the country specifically in privately owned secondary schools at the capital city.

If the creation and sustenance of a knowledge society is a policy goal, then there are several trends and challenges introduced by ICT which cut across all sectors in society. A society that wishes to create, share, and use knowledge for socio-economic development must be aware of these trends and their related challenges, paying particular attention to how these challenges impact on the education sector, which feeds and supports all other sectors. Education institutions and national systems can no longer ignore ICT, and now grapple with the challenge of how best to deploy ICT to the benefit of students, academics, and countries. (African Leadership in ICT Program, 2011)

Despite the growing interest in application of ICT in 21st century, there is no research in Ethiopia that has yet seriously examined the knowledge, attitude and utilization of ICTs in secondary schools that involves both students and teachers in private secondary schools. Hence, this research is intended to fill this gap and to show the current knowledge, attitude and utilization status of ICTs in private secondary schools at Addis Ababa together with challenges and possible

recommendations for management intervention in short and long term in order to maximize ICTs utilization in schools.

1.4 Research Questions

Starting from the birth of the motion picture in 1922 to the introduction of the computer in the mid-1970s, scholars have been intrigued with the potential of technology to help renovate education and improve student learning. Studies in education demonstrate that the use of technology (e.g., computers) can help improve students' scores on standardized tests (Bain & Ross, 1999)

The use of information communication tools such as e-mail, fax, computer and video conferencing have made it possible to overcome barriers of space and time, and opens new possibilities for learning. The use of such technology is increasing, and it is now possible to deliver training and teaching to a widely disperse audience by means of on-demand two-way video over terrestrial broadband networks. There is now an increasing awareness regarding the potentials of ICTs in learning. Many private and public secondary schools are now infusing ICT into their teaching activities (Tella et.al, 2007). Therefore the major research questions of the study seek to explore the following questions:

- 1) What is the level of ICT use by teachers and students?
- 2) What are the attitudes and skill levels among teachers and students towards the use of ICTs?
- 3) Which ICTs do teachers/students have access to and how is their utilization status in their schools and how frequent is the access?

1.5 Objectives of the study

Research shows that adopting and utilizing ICT in schools leads to significant expansion of education and pedagogical outcome which are valuable to both teachers and students. When appropriately optimized, ICT can help to strengthen the importance of education to increasingly networked society, raising quality of education by making learning and teaching an active process connected to real life (Zaman et.al, 2011). Further studies shows that the adoption and

use of ICT in schools can promote collaborative, active and lifelong learning, increase students' motivation, offer better access to information and shared working resources, deepen understanding, help student think and communicate creatively (Khan et.al, 2012). In other words, ICT seems to change the way teaching and learning is carried out in schools. With emerging uses of ICT in schools, teaching could be changed from emphasis on teacher centered to student centered, hence creating interesting and interactive learning environment. ICT facilitates a pedagogical shift entailing an educational interaction between teachers and learners.

However, studies suggest the benefits of adopting and using of ICT in schools all over the world has not been automatic. The effective implementation of ICT in schools is a multifaceted, complex process that doesn't just involves only providing the technology to schools but also involves teachers' competencies, schools readiness, long term financing and curriculum restructuring, among others (Zaman et al, 2011).

In reality, the usual teaching and curricula approaches still remain basically unchanged in many schools, while the technology is typically inadequately adopted and underused in classroom (Dzidonu, 2010). It becomes visible that the emphasis is on students ICT capabilities rather than application of ICT knowledge and skills to other subjects across the syllabus. Keengwe&Onchwari(2011), noted that, despite rapid growth in ICT access by teachers and students both at home and school, and substantially improved school ICT infrastructure (connection to internet, computer labs, availability of educational software, etc.) most teachers are not keen on adapting and using ICT tools during teaching and learning. It appears that their skills and attitudes towards ICT remain a challenge for them to adopt and use the technology efficiently in classroom. From this point of view the following objectives are aroused:

1.5.1General objective

To assess the knowledge, attitude and utilization status of ICT among Students and Teachers in some selected Private Secondary Schools (PSS) at Addis Ababa city administration.

1.5.2 Specific objectives

- ✓ To assess knowledge of ICT among students and Teachers in some selected PSS at Addis Ababa

- ✓ To examine attitudes of students and Teachers in some selected PSS at Addis Ababa.
- ✓ To measure the extent of computer and Internet use among students and Teachers in some selected PSS at Addis Ababa
- ✓ To identify factors affecting knowledge gain and utilization status regarding ICT among students and Teachers and to recommend alternative solutions for the betterment of delivery and proper access and utilization of ICTs in PSS.

From these specific objectives, the ultimate outcome is to assess the knowledge, attitude and utilization of ICTs among teachers and students which intern benefit and encourage the participation of students, teachers, and other educational stakeholders in education and training in secondary school to use ICTs effectively in teaching and learning processes.

1.6 Significance of the study

It is well known that, if ICTs tools are properly taught and used, they could play an important role in restructuring the learning-instruction processes in a way that can help to enhance teachers' competency and determine students' academic success. It is from this premise that the significance of this study arise. This study is expected to contribute to the understanding of the current status of students and teachers regarding the use of ICT4E and to reveal the Knowledge, attitude and Utilization of ICTs in private secondary schools (PSS). Besides, it is expected to show the factors and possibilities that are affecting or hindering their ICT consumption which intern guides policy makers, curriculum developers, secondary schools, investors on secondary educations, the state and regional education bureaus and Implementers. In the long run, this will help to realize how best they can integrate ICT in the current secondary education curriculum. Further, findings of the study are expected to open areas for further study by other researchers and academicians, hence benefiting the whole community.

1.7 Scope of the study

Due to time and financial constraints the study included only private secondary schools in the capital city. This research concentrates on the assessment of Knowledge, attitude and Utilization of ICTs in 10 selected private secondary schools that are located at Addis Ababa.

1.8 Organization of the study

This paper is organized into six chapters. The first chapter was discusses introduction and background of the study, statement of the problem, objective and scope of the study. The second chapter presents review of related literatures ,the role of ICT in education, ICT in Ethiopian education system, Accessibility of ICT, Knowledge and Attitude towards ICT, Utilization of ICT and challenges in integration of ICT's in schools. The third chapter discusses the methodologies and procedures followed for the data collection, analysis and interpretations. The fourth chapter discusses the analysis, result and findings of the study and the sixth chapter brings to an end of this survey research to an end with conclusion and recommendations.

1.9 Operational Definition

Information and communication technology (ICT)

Information and communication technology is a term that applied to any communication device or program, such as: radio, television, cellular phones, computers, software, hardware, networking, satellite systems and the like. Information and communication technology is often used in specific concept and position in a more accurate review of application, such as information and communication technologies in education and health, libraries and so on, convergence between computer and communications. The most important feature of information and communication technology is storage method, processing and access to information (Malekian, 2010).

ICT: Mainly focuses on respondents knowledge, attitude, access and utilization of computers, Internet and electronic documents.

Computer literacy: The level of familiarity of respondents with computers. It generally refers to the ability to use applications rather than the program.

Knowledge on ICT: Refers to the respondents' level of awareness on computer and its application. The minimum level for having knowledge on ICT refers to knowing basic

terminologies related to computer hardware and software, communication tools, and Internet services.

Satisfactory knowledge on ICT: Respondents who scored 75% (3rd quartile) and above for a set of 45 basic ICT knowledge questions

Unsatisfactory knowledge on ICT: Respondents who scored less than 75% (3rd quartile) for a set of 45 basic ICT knowledge questions

Access to ICT: The level of availability of computer, Internet, electronic documents for academic needs of respondents in the selected PSS.

Attitude towards ICT: Respondents feeling or perception towards accessing and using of computer, Internet and electronic documents.

Favorable attitude: Respondents who scored mean (2nd quartile) and above for a set of five questions of attitude towards ICT

Unfavorable attitude: Respondents who scored below the mean (2nd quartile) for a set of five questions of attitude towards ICT

Basic skill: respondents ability to open the program and able to do some of the MS office program of the specified computer applications.

CHAPTER TWO

RESEARCH DESIGN AND METHODOLOGY

The major components of this section are the methodology, data collection methods, study design and sampling frame, study area, sampling procedures and the methods for data analysis.

The study aimed at assessing students' and teachers' knowledge, attitude and utilization of ICTs in PSS at Addis Ababa. The study employed a mixed approach (quantitative and qualitative) study focusing in PSS in Addis Ababa, Ethiopia.

A questionnaire was designed, adapted and distributed randomly to teachers and students in the selected PSS.

2.1 Study design

The study is descriptive cross-sectional survey. This method was chosen due to the reason that the nature of the research problem calls for a description and identification of factors that portray existing conditions.

2.2 Study Area

The study was conducted at different 10 PSS from 10 sub-cities (one from each sub city) in Addis Ababa. Due to time and budget constraints, schools are selected because of their convenient accessibility and proximity to the researcher. Hence convenience sampling technique was applied in selecting the 10 PSS that are located at Addis Ababa. Addis Ababa is the capital and largest city of Ethiopia. It has a population of 3,384,569 according to the 2007 population census, with annual growth rate of 3.8%. According to Addis Ababa Education Bureau (AAEB) which learned from the 2014 report; there are about 1671 private schools in Addis Ababa. The city is divided into 10 boroughs named sub-cities.

The 10 sub-cities are:

1. Addis ketema
2. Akaki-Kality
3. Arada
4. Bole
5. Gullele
6. Kirkos
7. KolfeKeranio
8. Lideta
9. Nifas Silk-lafto
10. Yeka



Figure 1: Addis Ababa by sub-city

The following are list of schools selected from each sub-cities based on the location and minimum distance for the data collectors and to the researcher to minimize cost and available time.

No.	Sub-city	Selected school
1	Addis ketema	Radical Academy
2	Akaki-Kality	Ethio-national school
3	Arada	Lideta Cathedral Catholic school
4	Bole	Prestigious Academy
5	Gullele	Enat school
6	Kirkos	St. Joseph school
7	Kolfe-Keranio	Atlas School
8	Lideta	Ethio-Canada School
9	Nifas- silk Lafto	Cruise School
10	Yeka	Magic carpet school

2.3 Source population

The population for research consisted of teachers and students enrolled in 10 PSS. Stratified simple random sampling technique was employed according to their proportion in selecting student and teacher representatives. This technique ensures group size balancing if more than one group is to be selected.

2.3.1 Sample size

By using the standard formula for the sample size, for sample size (n)

$$n = \frac{Z^2 * p(1 - p)]/e^2}{1 + [Z^2 * p(1 - p)/(e^2 * N)]}$$

Which is valid where **N** is the total population and **n** is the sample size, the value for Z is found in statistical tables which contain the area under the normal curve in which the z-score is a constant value automatically set based on the confidence level(1.96 for 95%) that describes how sure that the results are accurate. whereas p is the standard deviation that how much variation is expected . since this value is difficult to determine before the actual survey , by considering this value at 0.5(50%), this is the worst case scenario percentage. And **e** is the desired level of precision (the marginal error) that shows the range the survey result falls between if the confidence level held true.

The population for the quantitative study is composed of 8036 students and 407 teachers having a total of 8443 from the selected 10 PSS. Due to lack of previous studies showing the proportion of knowledge attitude and of ICTs and literacy among teachers and students in PSS of Ethiopia, the following assumptions have been made By considering p=0.5 (maxi-mum variability). Furthermore, with 95% confidence level and ±5% precision. The resulting sample size is calculated by as follows

$$n = \frac{Z^2 * p(1-p)]/e^2}{1 + [Z^2 * p(1-p)/(e^2 * N)]} = \frac{[(1.96)^2 * 0.5(1-0.5)]/(0.05)^2}{1 + [(1.96)^2 * 0.5(1-0.5)]/[(0.05)^2 * 8443]}$$

$$= \frac{\left(\frac{0.9604}{0.0025}\right)}{1 + \left[\frac{0.9604}{21.1075}\right]} = \frac{384.16}{1.0455} = 367 \text{ respondents}$$

Computing with the above formula gives a total sample size of 367. An allowance of 12% was added to compensate for possible non respondents during the actual survey. Based on these assumptions, the total calculated sample size was 412.

2.3.2 Sampling procedures

Quantitative Study

Among all secondary school students in a given PSS, grade 9 to grade 12 during the study period (March to April, 2016) were selected for the study this range selected because the national ICT education curriculum is mandatory for grade levels starting from 9 through 12. These groups were selected by using stratified random sampling technique. This is mainly to increase the likelihood of having more respondents from different strata. Then the total sample size was proportionally allocated based on the number of PSS. Finally the respondents were selected randomly from each category in the proportion that 27.8% of teachers and 3.7% students were participated in the sample selection process. (See figure-3 below)

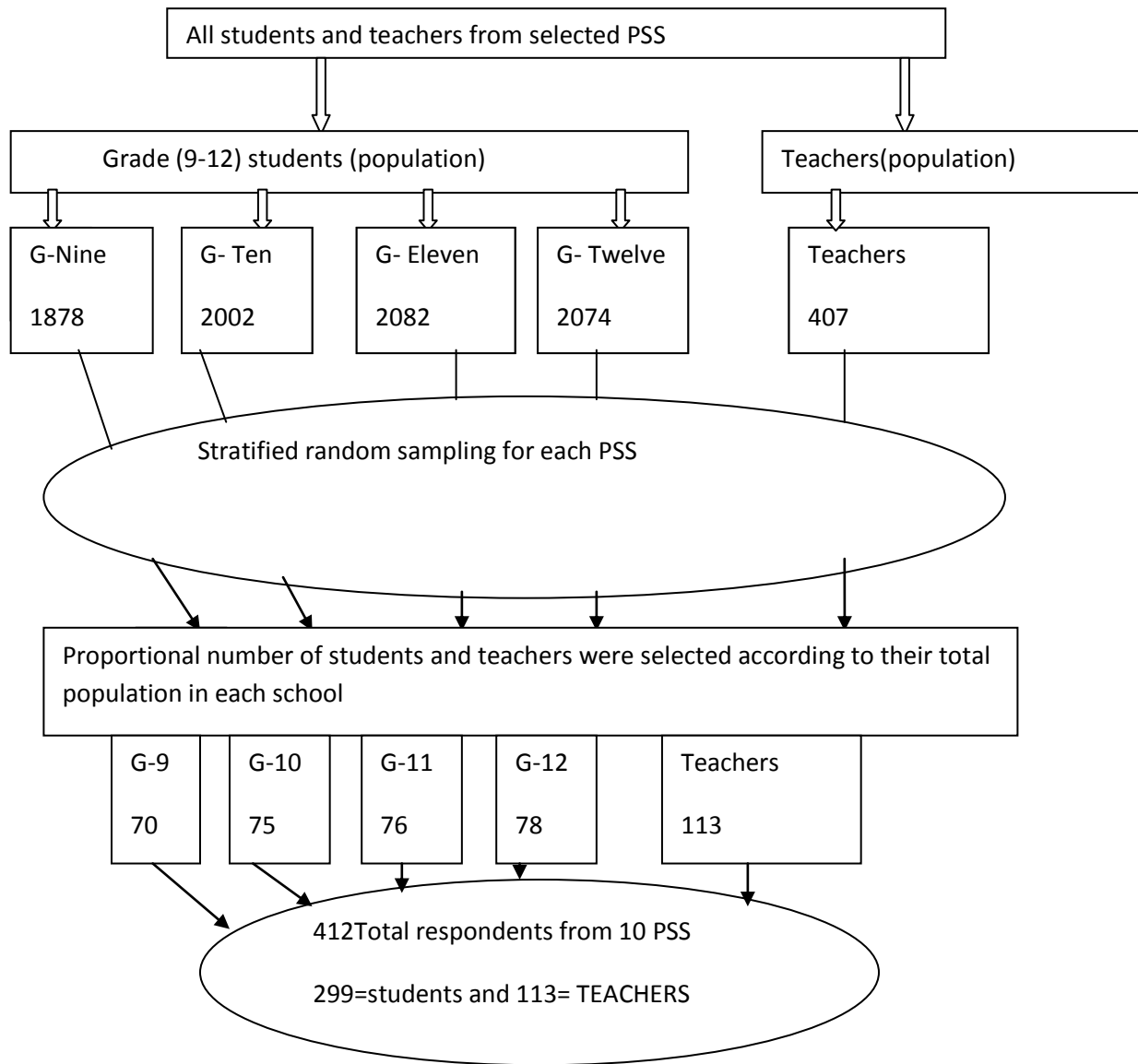


Figure 2: Schematic presentation of the sampling procedure at ten selected PSS

2.4 Data collection

Both quantitative and qualitative techniques of data collection were employed in the study.

Quantitative component

Structured questionnaire encompassing all the variables of interest were adapted from other related articles for its consistency reliability next to standard questionnaire and it's modified to the context to fit the current study population. The questionnaires were further developed and

enriched by reviewing additional literature. The questionnaires were pre-tested at Alpha Keranyo secondary school and Tiwliid Tesfa secondary school and modified before actual data collection is commenced.

Primary Data Collection

Primary data were collected through questionnaires, personal interviews with stakeholders that were involved. Those are: - ICT teachers, School principals and other secondary school teachers and researcher's observation in schools ICT Laboratory is also included. An assessment of the ICT tools available in the selected PSS was made through interviews with key informants such as teachers/trainers and school administrators. The willingness of different stakeholders in adopting the use of ICT tools in order to promote active learning and participation of teaching and learning process in secondary schools were explored through interviews. The research was done by distributing the adapted version of Charoula Angeli (2008) and Melisachew A. questionnaire. The questionnaire was divided into five parts. The details of every part were reported below.

Part 1: Demographic Information

In the first part, gender, types of school, teaching experience and education level of the respondents were studied. These questions were looked at in order to ascertain the socio-demographic level of the respondents in the research and assessing their generic ICT skills.

Part 2: Knowledge on ICT

In this section, respondents were asked to rate their knowledge on ICT skills such as to identify primary and secondary data storage devices and basic knowledge of ICT, word processing, e-mailing, internet, excel and power point. Respondents were required to tick (yes or no) options that are IT words to identify whether they already familiar with them or not.

Part 3: Access and Attitude towards ICT

In this part, the respondents were asked to respond towards Access and their attitude upon ICT.

Part 4: Skill and Utilization of ICT

In this part, respondents were required to respond on their competence of computer

By ticking four likert scale as, None, Basic, Average or Advanced

Qualitative Component

Semi-structured questionnaire were adapted to guide the qualitative data collection. In-depth interview was carried out with ICT department heads, senior teachers and school principals to gather qualitative information. The in-depth interview was conducted using separate interview guide for each participant from each category of respondents by the researcher. Tape recorder was used because there was no refusal of the key informants to be recorded as they already informed about the confidentiality of their response.

Secondary Data Collection

Secondary data were collected by reviewing related literature and relevant documents available in MoE and from selected PSS. Review of the schools' office plans that were done to establish whether there are any ICTs implementations in secondary school subjects / courses. The use of questionnaires, interviews and observations provided the grounds for the thorough way of complementing the weakness of qualitative research methods from quantitative research methods (i.e. triangulation)(Johnson, et al.,2004).

2.4.1Data Analysis

Quantitative data were initially entered and analyzed using SPSS version 20.0 for analysis. Frequency tables, proportions and cross tabs were used for the descriptive analysis. And for presentation tables and different type of graphs were employed. Association between independent variables such as, computer training, computer possession, having computer course, and socio-demographic characteristics of students and outcome variables of Knowledge, Attitude and Utilization, was examined using logistic regression when it is appropriate.

Qualitative data were analyzed manually. Responses of each key informant were initially categorized based on thematic issues addressed; then similar issues were merged to the selected thematic area. Finally the responses of the in-depth interview were summarized by 8-10 thematic issues. In addition to this, some of the ideas of key informants were quoted as it is. Basic ICT Knowledge status of respondents was assessed by analyzing response to a set of 45 questions. Continuous scores from these categories were dichotomized into "Yes/No"

The attitudes of respondents towards ICT were assessed by analyzing response to a set of ten questions. Continuous scores from these categories were dichotomized into “yes or No”

2.4.2. Data quality assurance

The results of this research need to be measured for validity and reliability. Validity is an important consideration in research. Davidson and Tolich (2003) put forward the following definition of validity; “validity refers to the extent to which a question or variable accurately reflects the concept the researcher is actually look for “(P.32). Taggart (1998) suggests that validity can be improved by ensuring their detailed transparency of method, data, including interpretation, reporting and triangulation of data.

To improve the validity of the data collection instrument, it was used to measure the variables precisely; steps were being taken to do so.

The questionnaire was pre tested in Alpha keranio secondary school and Tiwli Tesfa secondary school among 80 students and teachers to ensure clarity and uniformity of understanding of questionnaire among data collectors before the actual data collection. The process helped to avoid any inconsistencies and vague questions. Data collectors were also oriented on data collection techniques and tools. In doing so The first step was to enhancing the quality of the questionnaires and interviews. Secondly arranging the use of separate classrooms for student respondents during questionnaire administration and the aim is to minimize the possibility that responses would be untruthful due to pressure from friends. The use of a self-administered questionnaire also contributes to the generation of valid data. To ensure reliability, pilot survey instruments have been developed and applied. And observations were also employed by the researcher in the study of role of ICT in achieving quality of education. The following table shows the Cronbach alpha value that shows reliability analysis for internal consistency, based on the average inter-item correlation.

Reliability Statistics

Cronbach's Alpha	Number of Items
0.770	76

Table 1: reliability test result for inter correlation, March 2016

2.5 Ethical considerations

Oral consent was sought before administering questionnaire and conducting interview from each selected participant of both quantitative and qualitative data collection to confirm willingness and those not willing were given the rights to do so. To ensure confidentiality filling of self-administered questionnaire was done separately. Confidentiality was ensured throughout the process. Before administering and starting the interview the researcher had informed the study participants about the purpose and significances of the survey to get the consent of the respondents. The researcher has maintained a strong sense of ethical responsibilities in terms of collecting data, analyzing the facts and producing the findings. Required citations have been provided throughout the paper. Most importantly, the researcher behaves with the highest integrity prior to and during the recording of interviews (Oates, 2006, pp 60). The informants were later promised the ability to provide the feedback as a complete paper in due course of time.

2.6 Dissemination plan

The thesis report will first be submitted and presented to School of the Natural and Computational Sciences Department of Information Science of Addis Ababa University. The findings of the research will be shared with Addis Ababa Education Bureau, the ten PSS which participated in this study and the Federal Ministry of Education. Effort will also be made to publish the major findings of the study in one of the peer reviewed journals.

CHAPTER THREE

LITERATURE REVIEW

This chapter includes views of different writers and researchers on the different aspects of role of information communication technology in realizing quality of education, ICT in Ethiopian education, Accessibility of ICT, Knowledge and attitudes towards ICT, Utilization of ICT Challenges integrating ICT's in schools and inhibiting factors in using ICT in education. Besides, an attempt is made to see other countries experience and the Ethiopian context.

3.1 The Role of ICT in Education

The history of the use of ICTs in education is relatively short. Before 1979, computers existed primarily in tertiary level educational institutions. Then, in the eighties, microcomputers began to be distributed to schools, and teachers began to grapple with the question of how to use computing for education rather than simply educating about computing. Starting from the mid-nineties, the use of ICTs in schools rapidly expanded in developed nations through curriculum support, networking, the professional development of teachers and software improvements (Aston, 2002). A growing number of researchers and educators began to develop applications that used hypertext, multimedia and networking to build cognitive and constructivist learning environments aimed at improving learning (Scardali, et.al 1991, Schank et.al 1995, Resnick, 1996). However, these applications were initially found to be ineffective in attaining better results as compared to learning outcomes achieved through traditional pedagogies and assessed against traditional metrics. This finding may be largely influenced by teachers' and learners' lack of familiarity with ICTs as well as the inappropriateness of the traditional metrics in and of themselves (Siemens, 2005).

In recent years, bandwidth has greatly increased and user familiarity with the Web and ICTs in general has evolved, contributing to an evolution of the Web. Policy based on the prevailing ideas about ICTs has also been a major driver shaping the adoption of ICTs in education. For example, the late 1980s and early 1990s were dominated by rhetoric surrounding the idea of the transition from the Industrial Society to the Information Society, where managing, generating and sharing information would be a key to national economies maintaining the cutting edge in an increasingly globalized market (Strong, 1995). This idea promoted the concept that the education

system would need to create a “learning culture,” which would prepare citizens for lifelong learning in an information society; which is the prime necessity for building digital society. The accelerated adoption and use of Information and Communication Technology (ICT) has resulted in the globalization of information and knowledge resources (Islam et.al.,2007). That is why it has become very important to adopt the technology for the betterment of the education system.

Several studies argue that the use of new technologies in the classroom is essential for providing opportunities for students to learn to operate in an information age. It is evident, as (Siemens, 2005) argued that traditional educational environments do not seem to be suitable for preparing learners to function or be productive in the workplaces of today's society. She claimed that organizations that do not incorporate the use of new technologies in institutions cannot seriously claim to prepare their students for life in the twenty-first century. Furthermore, it has been shown that the use of ICT in education can help improve memory retention, increase motivation and generally deepens understanding (Dede, 1998). ICT can also be used to promote collaborative learning, including role playing, group problem solving activities and articulated projects (Forcheri, P. &Molfino, M.T, 2000).

Miller et.al, (2000)stated that technology-based teaching may not be essential in all classes but generally it is most facilitative as a result of providing relevant examples and demonstrations; changing the orientation of the classroom, preparing students for employment; increasing flexibility of delivery, increasing access, and satisfying public demands for efficiency.

According to Xavier et al.,(2013)In the last decades, there has been a growth in Information Communication and Technology for Education (ICT4E) in sub-Saharan Africa. Through support from local and international development agencies, several Higher Education Institutions (HEIs) have engaged in introducing, implementing and supporting ICT4E.

Abolade and Yusuf (2005) described Information and communication technologies as essential tools in any educational system. They have the potentials of being used to meet the learning needs of individual students, promote equality of educational opportunities; offer high quality learning materials, increase self-efficacy and independence of learning among students, and improve teachers' professional development.

The use of ICT in education has the potential to enhance the quality of teaching and learning, the research productivity of teachers and students, and the management and effectiveness of institutions (Kashorda et al., 2007). Access to ICT facilities is a major challenge facing most African countries, with a ratio of one computer to 150 students against the ratio of 1:15 students in the developed countries. (Kiptalamet.al ,2010)

The ICT in school setting enhances teaching and learning process and motivates students to learn. In the school management level, ICT is used in detailed student data management, on the level of test and term mark; teacher data management, such as attendance and weekly lesson plans. Information gained from the computer enables management to follow up on each and every the principal should evaluate the input of the teachers and output of the students. School management information system enhances planning, organizing, and monitoring, and is used as a tool for improving the effectiveness of the educational system in school (Hadjithoma-Garstka,2011).

Undoubtedly, ICTs are potentially a useful tool both for managing education and teaching. Application of ICT in managing educational institutions should be encouraged, as they should be used by instructors to gain access to educational materials. By teaching computer skills to youngsters, they may influence inward investment for the future society as well. ICTs are most likely to be cost- effective when they are used to reach a very large numbers of students, when used for research, and when used by administrators irrespective of time and place. (Anupamet.al, 2011)

Thus, technology can effectively improve teaching and learning abilities , hence increasing learners' performance as (Castro, 2003) and (Cawthera, 2000) discussed, ICT has the means to aid in the preparation of learners by developing cognitive skills, critical thinking skills, information access, evaluation and synthesizing skills. In addition, ICT provides fast and accurate educators to respond better to different needs of different learners (Lau &Sim, 2008). According to (Newhouse, 2002), ICT-supported learning environments could be beneficial to a constructivist teaching approach.

3.2 ICT in Ethiopian Education system

Ethiopia is one of the most educationally disadvantaged countries in the world, where most people had little access to schooling. This legacy continues to affect its human resources. According to World Bank's study by (joshi, et.al 2013) only 36 percent of the country's adult population is literate. Access to education has surged, especially at the primary level, where more than 85 percent of the relevant age group is now in school. At the secondary level, the gross enrollment rate (GER) for grade 9–10 is more than double since 2000. Yet key challenges remain in secondary education:

- i. A low primary education completion rate constrains the growth of secondary enrollments;
- ii. Access to secondary education remains inequitable; and
- iii. Levels of student learning are disappointing.

At the primary level Ethiopia has almost reached middle-income country enrollment rates, with a GER of 96 percent and a net enrollment rate of 85 percent, compared to the LMIC averages of 107 percent and 83 percent, respectively. However, it lags substantially behind the LMIC average for all other levels of education. The lower and upper secondary (preparatory) GERs for Ethiopia are 38 percent and 8 percent, respectively, compared to the respective LMIC averages of 72 percent and 45 percent (Joshi, et.al, 2013).

The fact that the majority of Ethiopian population lives in rural areas and in fairly dispersed communities poses specific problems for the education sector: spreading education and ensuring equitable access to education presents specific challenges in such a geographic context. In addition, the existence of many pastoral and semi-pastoralist groups raises issues of organization of the school system and also of the application of science, technology and innovation as the major instruments to create wealth has now taken its place as the foundation for achieving the long-term vision of transforming Ethiopia into a middle-income country. Progressively, greater shares of economic production will come from industry and manufacturing with consequent demands for middle- and higher-level skilled manpower. The demographic pressures of the country increase the demand for quality education and offer a great window of opportunity for development if investments are made to ensure a fair distribution of education at all levels.

Modern education was introduced to Ethiopia nearly a century ago. However, the education and training offered during these long years had a limited positive impact on the lives of the people and national development. The education offered has not enabled to solve the problems of farmers, pastoralist, and change the lives of the over whelming majority of the people (MoE, 2002).

As of Lishan Adam,(2012) The Ethiopian Government has been investing on human resources development and e-applications to aid its expanding communications network. The national e-Government Strategy of 2011 lists over 200 e-services to be ICT sector grew rolled out over the next few years. The Ethiopian Government has also been building a national “IT Park” with the aim substantially over of attracting IT service companies such as those involved in business process outsourcing. The last decade, however the Ethiopian ICT sector remains underdeveloped compared to its peers in Africa, such as its neighbors Kenya and Sudan. The country’s global ICT index has only improved marginally over the past few years. Mobile underdevelopedpenetration is three times less than that of the African average of 60%, at roughly 25% in 2012. The 2.7% internet access compared to its ratio is half the African average of over 5%. Broadband penetration, which has been found to increase competitiveness among African peer institutions and between individuals, is, at 0.1% in 2012, 40 times smaller than the African average of 4%.Broadband internet speed is extremely slow, operating far below advertised speeds, and frequently with a high contention ratio. The low broadband quality of service (QoS) is weakening the investment, economic growth, education, and entrepreneurship.The potential for competitive ICT sector development exists if the government’s efforts in infrastructure development can be accompanied by policy and regulatory reform. The experiences of neighboring African countries show that the ICT sector fares better when the government creates a competitive and innovative environment. The ICT regulatory and ICT sector experiences in Kenyareveal that liberalization of the ICT environment in Kenya has generated government tax revenue close to the amount that Ethiopia borrowed from China’s Export-Import Bank. Nothing prevents Ethiopia from making similar progress over the next ten years if careful policy choices are made to foster its ICT sector. In the short-term, the government needs to:

- introduce competition in areas such as the internet, web content, and the domain registration market; and

- License a second mobile operator to focus on broadband offerings (assuming the voice gap will be closed soon).

According to Ethiopia Ministry of Education's, In ESDP IV, it was planned to equip all secondary schools with the equipment necessary to access satellite television education and e-learning programmes in well-organized computer laboratories. To date, 69% of government's secondary schools have benefited from the educational satellite television broadcast programme. To overcome shortages of power supply in schools and interruption of satellite transmission, newly developed educational television programmes were digitized and dispatched to all Rural Education Bureaus on DVDs. Only 28% of secondary schools have access to an internet service and, of these, only 6% have high capacity content servers. Disparities, linked to power/network limitations, are common in ICT utilization in education among the regions. English language interactive radio instruction programmes have been developed by the Centre for Educational Information and Communication Technology (CEICT) of the MoE to be used in primary schools. During ESDP-IV, these programmes, as well as educational audio programmes in other subjects, were aired to primary schools.

The broad objectives of the Ethiopian ICT policy and strategy are as follows:

- ✓ Build ICT Infrastructure throughout the country with unlimited access.
- ✓ Create the necessary skilled human resources required for the proper knowledge and usage of it.
- ✓ Develop the necessary legal framework for the application of ICT and design and implement appropriate security systems for the prevention of unlawful practices.
- ✓ Promote the use of ICT for modernizing the civil and public services to enhance its efficiency and effectiveness for service delivery; so as to promote good governance and reduce wastage of resources.
- ✓ Expand and strengthen the role of the private sector to ensure the rapid development of ICT.

Telecommunication service was introduced to Ethiopia in less than two decades after the invention of telephone. However, starting from the introduction of the service in the country up to 1991, expansion of telecommunication services were not given much priority and thus

penetration level and geographic coverage remained at low level. According to ITU Regional report on ICT Indicators and Measurements for Africa Addis Ababa, October 2015, the Telecom Expansion project was executed in the second half of the first 5 years of the Growth and Transformation Plan (GTP I). As of June 2015, the country has achieved high subscription levels by raising the number of mobile subscribers to 40 Million, and Internet users to 10 Million. The Telecom Expansion Project has resulted in Mobile service penetration of 44%, and Internet penetration has also reached 11%. The Telecom Network and service expansion activities are taken as one of the major component of the second Growth and Transformation Plan (GTP II). It is planned that in 2020, mobile service subscription will reach 103.7 million and that of internet and fixed line will be 56 Million, and 10 Million, respectively. The mobile and internet penetration will be 100% and 54%. And out of 56 Million Internet subscribers 39 Million will be Broadband Internet Subscribers.

The additional ICT Strategies for 2020 are:-

- To upgrade the level of Government electronic services.
- To distribute broadband connectivity in all schools, universities, government administrations, and rural villages.
- To work on ICT Skills Development, Capacity Building Trainings, Creation of information and Knowledge based society.
- Establish ICT Research and Innovation centers.
- Develop Standards and Legal and Regulatory frameworks for ICT sector Development. Reinforce ICT industry and their competitiveness, ICT manufacturing, software
- Development industry, cloud computing and Electronic Commerce (ITU, 2015).

ICT use in the Ethiopia's education system, particularly the computer and internet is very much limited though there is a clear policy direction. Awareness creation and preparation to use computer and the internet for learning seems promising. The promise founded itself on the launching of WoredaNet, an e-government communication and the ICT strategy, which are the major enablers for the fast development of ICT use in the country (Hare, 2007). The public sector and the education sector have begun to benefit from Woredanet and the ICT strategy though the accomplishment is not to the perceived standard. The national e-education initiative with implementation strategy of ICT use in education and the subsequent action plans, for

example, has come up because of the WoredaNet program. The implementation strategy of the country, also called ICT for development plan number 6 has three broad categories as described by (Hare, 2007). These are:-

(1) The Ethiopian National School Net initiative that is aimed at networking 500 schools and the utilization of ICTs to facilitate the teaching-learning process at primary, secondary, technical and vocational schools,

(2) The National ICTs in Higher Education Initiative that focuses on orchestrating ICTs within universities, colleges, and research institutes to facilitate learning, research activities, and community services, and

(3) The national ICT Education, Training and Awareness Initiative that promotes ICT awareness and literacy, adult education and lifelong learning, and virtual distance learning in the country.

Furthermore, the implementation strategy recognizes ICT as a potential for widening access to education and facilitation for education delivery and training at all levels. Nevertheless, despite the efforts and strategies in place, there are challenges to coordinate the implementation of the initiatives. For instance, if we consider the second initiative, very few courses from institutes of technologies in universities are in the Module (modular object- oriented dynamic learning environments) platform that employs the computer and internet connections to enrich student learning via blended design.

According to Fisseha(2011), the most challenging condition to implement ICT strategy in Ethiopian schools is inadequacy of existing infrastructures. Even though integrating ICT use in the teaching-learning process was given due recognition in the implementation strategy, only about 40 percent of schools in the country had computers, and most of which are in Addis Ababa. Moreover, those schools, which had computers, experienced limited or low access to internet connections.

On the other hand, lecturers in higher learning institutes are expected to adopt computers and the internet as a teaching tool. However, computers, network infrastructures and connections are not compatible with the size of enrolled students and existing demands. In addition, teachers do lack the required skill to match the technology (e.g. Computers and the internet) with innovative

pedagogies that benefit students' learning. Many teachers do not have the necessary IT skills and feel uncomfortable, nor do they have the specific training needed to be able to use the new resources in the classroom (Carnoy, 2004). That is why the number of students in higher learning institutes using computers and the internet is insignificant. Students' skill of using the technology is also a series challenge that needs the attention of the institutes. Thus, these have implications for the future, to work hard for the benefit of student learning through technologies.

3.3 Accessibility of ICT

Use of ICT and its related technologies is still at early stages of development and implementation, and use of inadequate and divergent curricula in secondary schools depending on the system of education that is not responsive to the fast changing ICT landscape (Kiptalam, et.al 2010).

An important influence on the use of ICT in subjects and classes is the amount and range of ICT resources available to the teachers and students. Where there are limited numbers of computers in a class, mostly in primary schools. This limits their impact because each individual student is only able to use the computer for a few minutes. Whole-class use of an electronic whiteboard has both positive and negative effects. It promotes students' debates and helps them visualize difficult concepts and processes. However, some teachers focus only on the presentation aspects, disregarding the use of simulations and modeling which might be more challenging for the student. Only a few teachers report using subject-specific software which links directly to the content and purpose of the curriculum. (Kiptalem et.al, 2010)

Mutula and Mutula (2007) asserted that there is a digital divide which refers to the widening imbalance of access to ICT's between communities and countries which creates an imbalance for equitable access to quality education in an electronic age. They further asserts that schools are being seen as very important institutions for bridging the digital divide in society because they represent focal points where many children from different communities converge for learning purposes. Servon (2002) argued that the technology gap should not be defined narrowly as a problem of access. Training and content, should be included as other dimensions of the digital divide so that policy makers and programs to narrow the digital divide would not lose their focus. It is therefore of paramount importance for teacher preparatory institutions to aim at

developing teachers ICT pedagogical competencies that will ensure teachers help the country to cross over the positive side of the digital divide and keep pace on the information superhighway.

Tella et al., (2007) conducted a study among private secondary schools in Ibadan, Nigeria on teachers' uses of ICTs and the implication for further development of ICTs use in Nigerian secondary schools. The finding showed that 61% of teacher respondents had access to only computer in schools; 19% had access to video equipment; 10% had access to digital camera; no teacher indicated access to internet and e-mail; technical support and internet was grossly inadequate; teachers lack expertise in using ICT in teaching and learning while majority of the teachers agreed that the use of ICT makes lesson more interesting and fun.

Access to ICT infrastructure and resources in schools is a necessary condition to the integration of ICT in education (Plomp, Anderson, Law, & Quale, 2009). Effective adoption and integration of ICT into teaching in schools depends mainly on the availability and accessibility of ICT resources such as hardware, software, etc. Obviously, if teachers cannot access ICT resources, then they will not use them. Therefore, access to computers, updated software and hardware are key elements to successful adoption and integration of technology. A study by Yildirim (2007) found that access to technological resources is one of the effective ways to teachers' pedagogical use of ICT in teaching. Further a study on 814 faculty members in higher education in Turkey showed that majority of the respondents reported having access to computers and the internet. 82.5% and 81.2% of faculty members had access to computers and internet respectively (Usluel, Askar & Bas, 2008).

Moreover, a quantitative study was conducted by Albirini (2006) to collect evidence from high school English teachers' view on computer attributes cultural perceptions, computer competence, computer access, and personal characteristics. The respondents of the study were 63 male and 251 female teachers. The result revealed that 57% of the respondents had computers at home and 33.4% had access to computers at school. This is an indication of teachers' inadequate access to computers. Another report revealed that over 50% of the respondents used computers for research and lesson preparation in their schools. About 78% of the respondents complained about the inadequate access to computers in classroom. Of this percentage, 38% of the respondents stated that inadequate computers were not the major barriers to ICT use in their teaching, but improved availability and fairness of access to technology resources by teachers, students and

administrative staff is essential. Access to hardware and software is not only important, but also the use of suitable kind of tools and program to support teaching and learning (Tondeur et.al, 2008). In addition, it is necessary to make a distinction of access to ICT resources. For instance, in a study of pre-service teachers by Dexter & Reidel (2003), they revealed that 37.4% of the teachers had access to computers and 14.4% of the students had access to computers implying that computers are more available to teachers than students. Obviously, to encourage student-centered technology learning, it is necessary that learners have access to quality technology resources.

Uribe and Marino (2006) surveyed 162 students at the School of Dentistry, University of Valparaiso, Chile to describe their use of ICT. All participants had access to a computer, and 96.4% used the Internet. Most students had home Internet connections (73.4%). The most commonly used Internet sites on at least a weekly basis were: email (92.2%); and search engines (88.3%). However, a very few (21.1%) used the Internet to search for dental information for their studies.

3.4 Knowledge and Attitude towards ICT

Even though teachers are often limited to the ICT resources available to them, many research works show that teachers are having a good understanding of a particular resource. However, very few teachers have a comprehensive knowledge of the wide range of ICT resources available in education. This means that their students are not given all the learning opportunities which ICT could provide. A research in Britain shows, teachers' attitude towards ICT in education has a significant influence on ICT adoption and implementation behaviors in the classroom. Teachers in general agreed that computers constitute a valuable tool and they are positive about students' attainment of ICT knowledge and skills. In many cases, they perceive ICT as a new subject matter in education rather than a new way of teaching and interaction between learners and knowledge (Williams et al., 2000). It appears that, even though they recognize the importance of introducing ICT in education, teachers tend to be less positive about its extensive use in the classroom and far less convinced about its potential to improve teaching (Cox et al., 1999; Zhao & Cziko, 2001; Russell et al., 2003).

In addition to students' ICT skills, their attitude towards ICT do matter. If students are to adopt computer technologies, they must have the right kind of attitude towards computers (Hassan et al., 2011). Researchers have investigated the relationship between computer attitudes and computer adoption. Students, who perceived the usefulness of computer and feel confident in using it, appear to be more positive in their attitudes toward ICT, thus tend to use computer more (Noiwan et al., 2005). In real world, motivation is highly valued because of its consequences where it mobilizes others to act (Ryan and Deci, 2000). The more the learning is intrinsically motivating, the more students will seek the knowledge for its own sake (Schweinle et al., 2006). When individuals learn for the sake of intrinsically motivating purposes, there will be greater persistency and consequently, this facilitates learning process in the long term (Vansteenkiste et al., 2004). Therefore, there is a need to tap into students' intrinsic motivation gained through ICT literacy class as an indicator whether students do enjoy learning the subject in school and perceived themselves better than before.

Although teachers show great interest and motivation to learn about ICT, Their use of ICT tools is limited and focused on a narrow range of applications, mainly for personal purposes. Most of them continue to use computers for low-level supplemental tasks such as word processing (lesson plans, worksheets, assessment tests, registration of grades, etc.) or getting information from the Internet. Relatively few teachers routinely use ICT for instructional purposes and even fewer are integrating ICT into subject teaching in a way that motivates pupils, enriches learning and stimulates higher-level thinking and reasoning (Becta, 2004a).

studies indicates that teachers have positive attitudes toward ICTs but they do not consider themselves qualified to effectively integrate ICT into their teaching learning process (Ropp, 1999). Lack of sufficient training and experience is considered one of the main reasons why teachers have negative attitudes toward computers and do not use technology in their teaching (Yildirim, 2000). On the other hand, most findings suggest that teachers with ICT knowledge have a more positive attitude toward the potential of computers in education (Cox et al., 1999; Yildirim, 2000). According to a study by Shapka and Ferrari (2003), it appears that teachers training to teach at secondary level had higher self-efficacy than elementary school teachers and were less likely to predict that they would give up or avoid a challenging task. The impact of effective teacher training on ICT can be measured in terms of changes in attitude level of

teachers (Yildirim, 2000; Kumar & Kumar, 2003; Galanouli et al., 2004) and of students as well (Christensen, 1998).

It has been shown that teachers with the most constructivist teaching philosophies regarded the role of computers in their instruction as very important (Ravitz et al., 2000; Becker, 2001). Higgins and Moseley (2001) argued that the most effective teachers not only had a positive attitude towards ICT but had good ICT skills and used computers as a part of a stimulating environment favoring pupils' inquiry and collaboration.

Burniske, R. (2001) show that students with competence in ICT will be able to serve as worthy citizens in their communities by understanding how society operates in the current competitive knowledge economy era. However, Hindi et al. (2002) point out that students who do not have skills in ICT are likely to encounter more challenges with the increased workplace demands for computer literate employees.

Boakye and Banini (2008) measured teacher's readiness for use of ICT from schools in Benin, Cameroon, Ghana and Mali with the objective of determining if the teachers were involved in the process of integrating ICT into education in these countries. Teachers were asked about their skills with regard to ICT and use of ICT in their pedagogical practices. Of the teachers questioned, 71% had never used the computer in class; while 10% used it for classroom activities. About 44% had never used the computer in preparing lesson notes while 49% did. A third of those who used it in preparing lessons used it "always" and the rest "occasionally". These uses included using the computer in Internet searches for content, typing out lesson notes, and designing teaching and learning materials. About 60% of the teachers consider themselves as having knowledge of web browsing, with 71% of them using email. Up to 78% of the teachers learnt how to use computers on their own. Despite the fact that some teachers did not use ICT at all, they agreed generally that the computer had changed the way students learn.

In Nigeria, studies by the Federal Ministry of Education (2010) revealed that most teachers still lack the knowledge and skills to use ICT facilities for curriculum instruction; this has been attributed to reasons such as: inadequacy of ICT facilities for the teeming population of teachers and students who need them, and other reasons are poor and inadequate infrastructural support

such as erratic electricity power supply, poor internet services, low bandwidth and poor maintenance of ICT facilities to mention a few.

To successfully initiate and implement educational technology in schools' program depends strongly on teachers' support and attitudes. It is believed that if teachers perceive technology programs as neither fulfilling their needs nor their students' needs, it is likely that they will not integrate the technology into their teaching and learning. Among the factors that influence successful integration of ICT into teaching are teachers' attitudes and beliefs towards technology (Hew and Brush, 2007; Keengwe and Onchwari, 2008). If teachers' attitudes are positive toward the use of educational technology then they can easily provide useful insight about the adoption and integration of ICT into teaching and learning processes. Demici (2009) conducted a study on Teachers' attitudes towards the use of Geographic Information systems (GIS) in Turkey. The study used questionnaire to collect data from 79 geography teachers teaching in 55 different high schools. The study revealed that though barriers such as lack of hardware and software existed, teachers positive attitudes towards GIS was an important determinant to the successful integration of GIS into geography lessons. In a similar study, Teo (2008) conducted a survey on pre-service teachers' attitudes towards computer use in Singapore. A sample of 139 pre-service teachers was assessed using questionnaire for their computer attitudes with four factors: affect (liking), perceived usefulness, perceived control, and behavioral intention to use the computer. He found that teachers were more positive about their attitude towards computers and intention to use computer than their perceptions of the usefulness of the computer and their control of the computer. Moreover, Drent&Meelissen (2008) conducted a study about factors which influence the innovative use of ICT by teacher educators in the Netherlands. A sample of 210 teachers was used for the study. Their study revealed that student-oriented pedagogical approach, positive attitude towards computers, computer experience, and personal entrepreneurship of the teacher educator have a direct positive influence on the innovative use of ICT by the teacher. Research has shown that teachers' attitudes towards technology influence their acceptance of the usefulness of technology and its integration into teaching, Huang & Liaw (2005). In European Schoolnet (2010) survey on teachers' use of Acer netbooks involving six European Union countries showed that a large number of participants believed that the use of netbook had positive impact on their learning, promoted individualized learning and helped to lengthen study beyond school day. However, evidence suggests that small number of teachers believe that the

benefits of ICT are not clearly seen. The Empirical survey revealed that a fifth of European teachers believed that the use of ICT in teaching did not benefit their students' learning, Korte&Hsing (2007). A survey conducted on UK teachers also revealed that teachers' positivity about the possible contributions of ICT was moderated as they became 'rather more ambivalent and sometimes doubtful' about 'specific, current advantages', Becta (2008, p.45). Teachers' computer experience relates positively to their computer attitudes. The more experience teachers have with computers, the more likely that they will show positive attitudes towards computers (Rozell& Gardner, 1999). Positive computer attitudes are expected to foster computer integration in the classroom (van Braak, Tondeur&Valcke, 2004). According to (Woodrow, 1992) for successful transformation in educational practice, user need to develop positive attitudes toward the innovation.

In Ethiopia, a study on ICT Knowledge and utilization at Addis Ababa University (AAU) Medical students and staff members indicated that 24.9% of the respondents had satisfactory knowledge on ICT and majority of them were undergraduate students and residents. Of which almost half of them 41.1% were interns and clinical year medical doctors and this may be due to their exposure from their high school stay.(Melisachew, 2009)

3.5 Utilization of ICT

Attempts to measure or assess the utilization of ICT in Africa have been hampered by lack of cross-country evidence. In some cases the evidence has been non-existent due to recent developments, the rapid revolution of ICTs and methodological challenges the studies undertaken have focused on information infrastructure issues, while few have been undertaken to measure the extent of ICTs in Africa, particularly in education [Kenya SchoolNet 2003].

Teachers need to be supported to get the most from using ICT in classrooms, Particularly where resources are limited. ICT initiatives need to be driven by the provision of appropriate technological solutions for the challenges faced by communities rather than by an interest purely in these physical technologies themselves. Those implementing technological solutions need to ensure that they are context-specific, and adapted to local needs and conditions. It is also imperative that ICT initiatives are sustainable or effective by ensuring the technologies embedded within them meet the demands of users in appropriate ways. It is essential that

potential users have a sound understanding of how to use new ICTs beneficially, and a cultural view of the relationship between learning and technology (Leach et al., 2005).

To compete successfully in a competitive global economic environment, a highly skilled and educated workforce with aptitude and skills in the application of ICT is very essential. This makes knowledge and use of ICT central to education in the 21st century (Wolf & Mackinnon, 2002). People need to be effective and efficient in the use of ICT for success in today's rapidly changing and highly competitive world which depends on such knowledge and skills; hence the concern for Africa to take the best advantage of the knowledge economy (Obanya 2004).

A study by Belay (2015) to assess status of utilization of ICT by both teachers and students, the study surveyed 131 students and 15 teachers at Sebeta Teachers' College and it indicated that 66.7% of instructor respondents confirmed that they always used computers during teaching-learning process. However, the majority of the student respondents (36.6%) indicated that instructors never used computers during teaching-learning process. This implies that there is a significant difference in using computers during teaching-learning process among the two groups of respondents. Accordingly 66.7% of instructor respondents and 56.6% of student respondents responded that instructors had never used projectors during teaching-learning process. Concerning the utilization of video materials, most of the instructors (80%) and students (81.5%) indicated that instructors did not employ video materials during teaching-learning process. Based on the usage of television during teaching learning 80% of instructor respondents and 84.7% of student respondents responded that instructors did not use television during teaching-learning processes. From this point of view, the responses show that instructors did not utilize other instructional technologies except computers during the teaching learning process.

3.6 Challenges in integrating ICT's in schools

In recent decades, scholars and international organizations working in the field of ICT have studied different factors accounting for successful and failed implementations of ICT in education. Depending on the level, the viewpoint or the focus, the factors of successful implementation of ICT can be categorized in different ways. Nachmias et al. (2004) analyzed literature from different studies and found the following perspectives:

- 1) Organizational aspects, and

2) Their education, structural factors within educational institutions, pedagogical approaches, and learning materials.

3) The vision, and

4) Resource allocation. Of importance are also teachers' beliefs and their education, structural factors within educational institutions, pedagogical approaches, and learning materials.

Nachmias et al. (2004) suggested a framework to map the intensity of factors involved in the implementation of innovations using ICT, which is shown in figure 3 below.

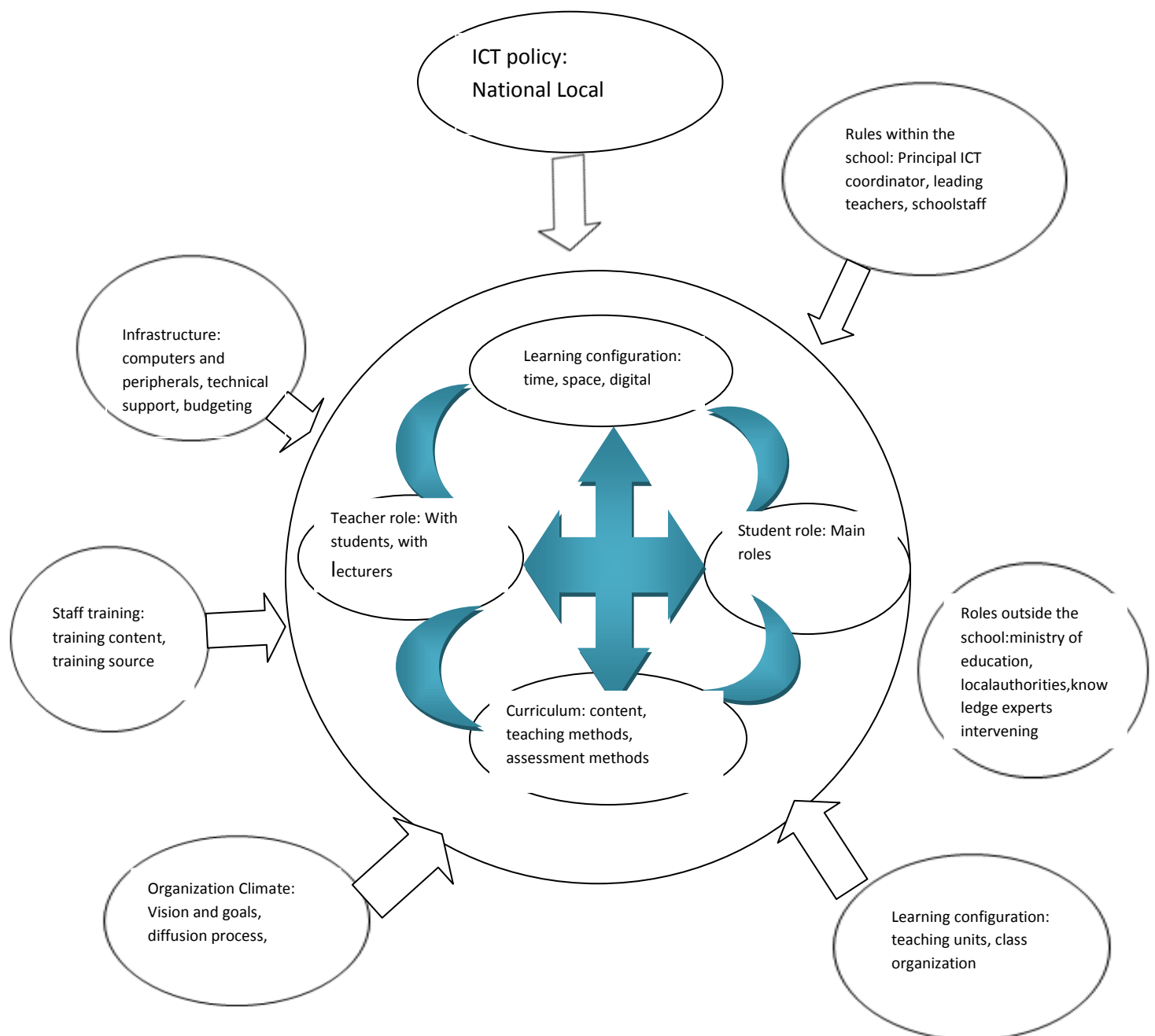


Figure 3: Configuration of the factors involved in pedagogical innovations using ICT (Nachmias et al. 2004).

This framework provides a helpful overview of the major factors essential for successful implementation and integration of ICT in education. The other framework was presented by Mumtaz (2000) he listed the factors that prevent teachers from using technology: (1) lack of teaching experience with ICT, (2) lack of on-site support for teachers using technology, (3) lack of help in supervising students when using computers and other ICT tools, (4) lack of qualified and competent ICT teachers to teach students computer skills, 5) Lack of ICT infrastructure, (6) lack of time required to successfully integrate technology into the curriculum, and (7) lack of budget and financial support. All of these factors are also related to the success factors outlined by Nachmias et al. (2004). The difference between the two frameworks are that Nachmias et al expresses the prerequisite for success and Mumtaz (2000) outlines the reasons for failure. Another difference is that Nachmias et al. (2004) also includes external factors like national and local ICT policy rules within the school and organization climate.

Across Africa and most developing countries, there are many challenges in bringing ICTs into the education process in general. Anderson (1997) identified a range of physical and cultural factors that affect ICT use by teachers, including lack of reliable access to electricity, limited technology infrastructure (especially internet access, bandwidth, hardware and software provision), language of instruction and available software; geographical factors such as country size, terrain and communications; demographic factors such as population size, density and dispersion. The issues of access are further exacerbated by extreme poverty, growing prevalence of HIV/AIDS, and lack of political will to alleviate the situation through proper planning. In addition, education and literacy rates, and access to professional development play an important role.

The most challenging condition to implement ICT strategy in Ethiopian schools is inadequacy of existing infrastructures. Even though integrating ICT use in the teaching-learning process was given due recognition in the implementation strategy, only about 40 percent of schools in the country have computers, and most of which are in Addis Ababa, causing a rural-urban divide to equity and access for quality education. Moreover, those schools, which have computers, experience limited or low access to internet connections. (Fisseha, 2011)

According to Jones (2004), teachers feel reluctant to use computer if they lack confidence. “Fear of failure” and “lack of ICT knowledge” (Balanskat et al., 2007) have been cited as some of the reasons for teachers’ poor confidence to adopt and integrate ICT into their teaching.

Similarly, in a survey conducted by (Becta, 2004), approximately 21% of the teachers who were surveyed, reported that lack of confidence influence their use of computers in their classrooms. Becta (2004, p.7) stated that “many teachers who do not consider themselves to be well skilled in using ICT feel anxious about using it in front of a class of children who perhaps know more than they do”.

Many studies have revealed that the workloads of teachers influence their acceptance of technology in classrooms. For example, Samarawickrema& Stacey (2007) investigated factors related to the use of learning management system in a large multi-campus urban university in Australia. They adopted case study method and purposive sampling to select 22 participants used web-based methods to teach both on- and off- campus students for the study. The findings of the research indicated that increased workload coupled with teaching with technology was critical to the participants of the study. Factors reported to contribute to increased workload were course maintenance and constant upgrades, student emails, learning new skills and a continuous search of sustainable strategies.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Quantitative Study

4.1.1 Demographic characteristics of Respondents

A total of 355 respondents were included for the final analysis of the study. 257 students and 98 teachers were included for the final analysis which makes the overall response rate of 87.01%. During the data collection, it was difficult to get completed questionnaires on time especially among teachers mainly due to workload and fatigue with frequent interview. As a result, the researcher was forced to distribute more than 410 questionnaires to attain the minimum required sample size.

As shown in table-2, 251(70.70%) of respondents were males, and 104(29.30%) were females. 257(72.39%) were students from 10 different private secondary schools at Addis Ababa, while 98 (27.61%) were secondary school teachers working at 10 different private secondary schools. The age of student respondents ranged from 15 to 18 years with median age of 17 and mean ($\pm$ SD) of 16.55 ($\pm$ 1.075) and The age of teacher respondents ranged from 20 to 56 years with median age of 31.5 and mean ($\pm$ SD) of 31.73 ($\pm$ 5.60). Of the total students who participated in this study 60(16.9%) were grade 9, 64(18.03%) were grade 10, 67(18.87%) were grade 11 and 66 (18.59%) were grade 12 students respectively.

Among the total secondary school teachers, 5(5.10%) are diploma graduates, and 85(86.73%) are degree holders and 8(8.16%) are Masters Graduates. The median service year of teachers was 7 years with mean ($\pm$ SD) of 7.61 ($\pm$ 5.21).

Characteristics	Respondent's Category	
	Teachers	Students
Sex	N=98	N=257
Male	90	161
Female	8	96
Age groups		
15-18	---	257
19-25	9	--
26-35	76	--
36-45	10	--
>45	3	--
Number of respondents	98	257
Grade level of the respondents		
Grade 9	--	60
Grade 10	--	64
Grade 11	--	67
Grade 12	--	66
Diploma	5	--
Degree	85	--
Masters	8	--
Teaching Experience	N=98	
1-5	36	
6-10	41	
11-15	18	
>15	3	

Table-2 socio-demographic characteristics of respondents

4.1.2 Knowledge on Basic Information Communication Technology

Based on the operational definition obtained from different researches and literatures, in general the knowledge status of respondents was assessed by analyzing response to a set of 45 questions. Continuous scores from these categories were dichotomized into “Satisfactory/Good knowledge” and “Unsatisfactory/Poor knowledge”. Respondents who scored 3rd quartile and above ($\geq 75\%$) were categorized as having satisfactory knowledge while scores less than 3rd quartile ($< 75\%$) were considered to have unsatisfactory knowledge. Accordingly, a total of 159(44.79%) respondents found to be categorized as having satisfactory knowledge. Out of which 24(15.09%) were grade-9 students, 17 (10.69%) were grade-10 students, 47 (29.56%) were grade-11 students and 32(20.13%) were grade-12 students. And 39(24.53%) of them were secondary school teachers. When the proportion of knowledge level was assessed within the respondents’ category, the study indicated that 40% of grade 9 students, 26.56% of grade 10 students, 70.15% of grade 11 students and 48.48% of grade 12 students and 39.80% of secondary school teachers had satisfactory knowledge on ICT.

All study subjects responded to basic ICT knowledge questions mainly about computer hardware, software, devices and communication tools. As indicated in table-3 out of those who responded, 308(86.8%) knew digital computer does its computation using binary systems, 253 (71.3%) knew CPU as a hardware, 203 (57.2%) knew data in the form other than database can be accessed through a network, 291(82.0%) knew network allows different PCs to access the same file, 251(70.7%) knew RAM as temporary memory of a computer, 275(77.5%) knew modem as a device to allow computer to communicate using a telephone line, 305(85.9%) understood that people who work at home often can communicate with their office using the modem and 271(76.3%) were aware of Email is the fastest and secured form of communication.

Characteristics	Frequency N= 383			
	yes	%	No	%
Digital computer does its computation using binary System	308	86.8	47	13.2
Digital sound and video can be communicated over a Network	305	85.9	50	14.1
Communication b/n PCs made by different vendor is Impossible	265	74.6	90	25.4
Only data in the form of database can be accessed using a network	203	57.2	152	42.8
Email is the fastest and secured mode of mail system	271	76.3	84	23.7
RAM is a permanent memory in the computer	251	70.7	104	29.3
A modem allows computers to communicate using telephone line	275	77.5	80	22.5
People who work at home often communicate with their office using the modem	305	85.9	50	14.1

Table-3: Knowledge of respondents on the basics of ICT

From the total respondents 245 (69%) of them knew at least one kind of secondary computer data storage devices. All study subjects were asked four multiple response questions to assess their knowledge on secondary computer data storage devices. Accordingly, 245 (69%) knew about compact disk, 319 (89.9%) knew flash disk (USB) and 295 (83.1%) knew DVD as secondary computer data storage devices. The details of secondary data storage device responses were described under table-4. Respondents were asked basic ICT terminology questions. Out of 18 basic ICT terminologies the respondents mean ($\pm$ SD) score were 14.73 ($\pm$ 3.24). Accordingly, the proportion of respondents who scored above the mean score was 259(81.41%).

DVD is a secondary storage device	Frequency	Percent
No	60	16.9
Yes	295	83.1
CD is a secondary storage device		
No	110	31
Yes	245	69
USB is a secondary storage device		
NO	36	10.1
Yes	319	89.9

Table-4: Knowledge of respondents on secondary computer data storage devices

Predictors of Knowledge on ICT

After adjustment was done for the possible confounding factors, computer possession had no significant difference in knowledge status of students[OR(95%CI)=0.225(0.128,0.268))]

In relation to socio-demographic characteristics, there were no significant difference in knowledge on ICT between males and females[OR (95%CI) =0.461(0.246, 0.95)]. It was also the age group 15 to 18 years 120 (47.06%) and 19 to 35 years 35(40. 23%) had a likelihood of better knowledge of computer among the other age groups . Among the respondents, the result showed that grade 11 students had ICT knowledge than other groups[OR (95%CI) =3.555(1.268,5.979)].

Variables	Knowledge		AOR(95%CI)
	YES(%)	NO(%)	
Sex			
Male	126(50.2%)	125(49.8%)	0.461(0.246,0.950)
Female	33(31.7%)	71(68.3%)	1.00
Age group			
15-18	120	137	0.994(0.14,1.043)
19-35	35	52	
36 and above	4	8	
Category of respondents status			
grade 9	24(40%)	36(60%)	1.00
grade 10	17(26.6%)	47(73.4%)	0.547(0.350,1.131)
grade 11	47(70.1%)	20(29.9%)	3.555(1.268,5.98)*
grade 12	32(48.5%)	34(51.5%)	1.424(0.781,2.823)
teachers	39(39.8%)	59(60.2%)	0.661(0.206,1.170)
computer training status			
yes	99(46.9%)	112(53.1%)	0.818(0.219,0.847)
No	60(42%)	83(58%)	1.00
Computer possession			
Yes	146(54.1%)	124(45.9)	0.225(0.128,0.268)
No	26(23.01%)	87(76.1%)	1.00

Table-5: Multivariate logistic regression of selected variables in relation to knowledge status of students and teachers

4.1.2 Access and Attitude of respondents towards ICT

As displayed in figure-4 below, from the total respondents 211 (59.4%) had taken different level of computer training. Among those who received training majority of them 134(63.5%) received short term basic computer training(< 6 month), 19(9%) were received advanced training level (6 month to 1 year) training and 58(27.5%) of them took both kind of training. Out of the total computer trained respondents 32 (15.2%) were grade 9 students and 42(19.9%) were grade 10 students, 30 (14.2%) were grade 11 students, 39(18.5%) were grade 12 students and 68(32.2%) secondary school teachers. When the proportion of computer training status of respondents were assessed within the category of respondents, 32 (53.3%) of grade 9 students and 42(65.6%) of

grade 10 students, 30 (44.8%) of grade 11 students, 39(59.1%) of grade 12 students and 68(69.4%) of secondary school teachers were received the training.

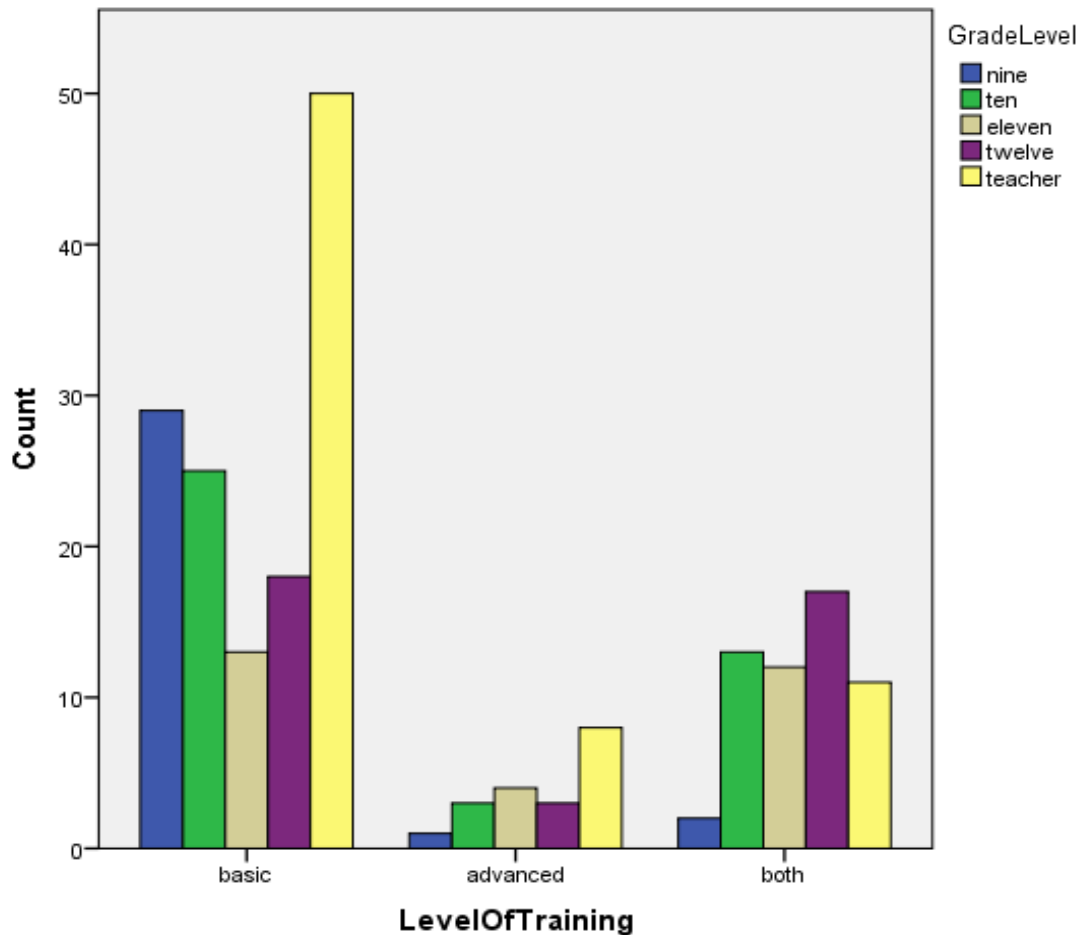


Figure 4: Distribution and type computer training

Ninety nine(27.9%) of the total study subjects had at least one personal computer in their home. Among them 201(56.6%) had Laptop, 99 (27.9%) had desktop and 56 (15.8%) had both laptop and desktop and 111(31.3%) of them had no personal computer. Among the total secondary school teachers 18 (18.4%) of them had at least one type of computer in their home. Possession of personal computer among students and teachers are described under figure 5 and figure 6 below.

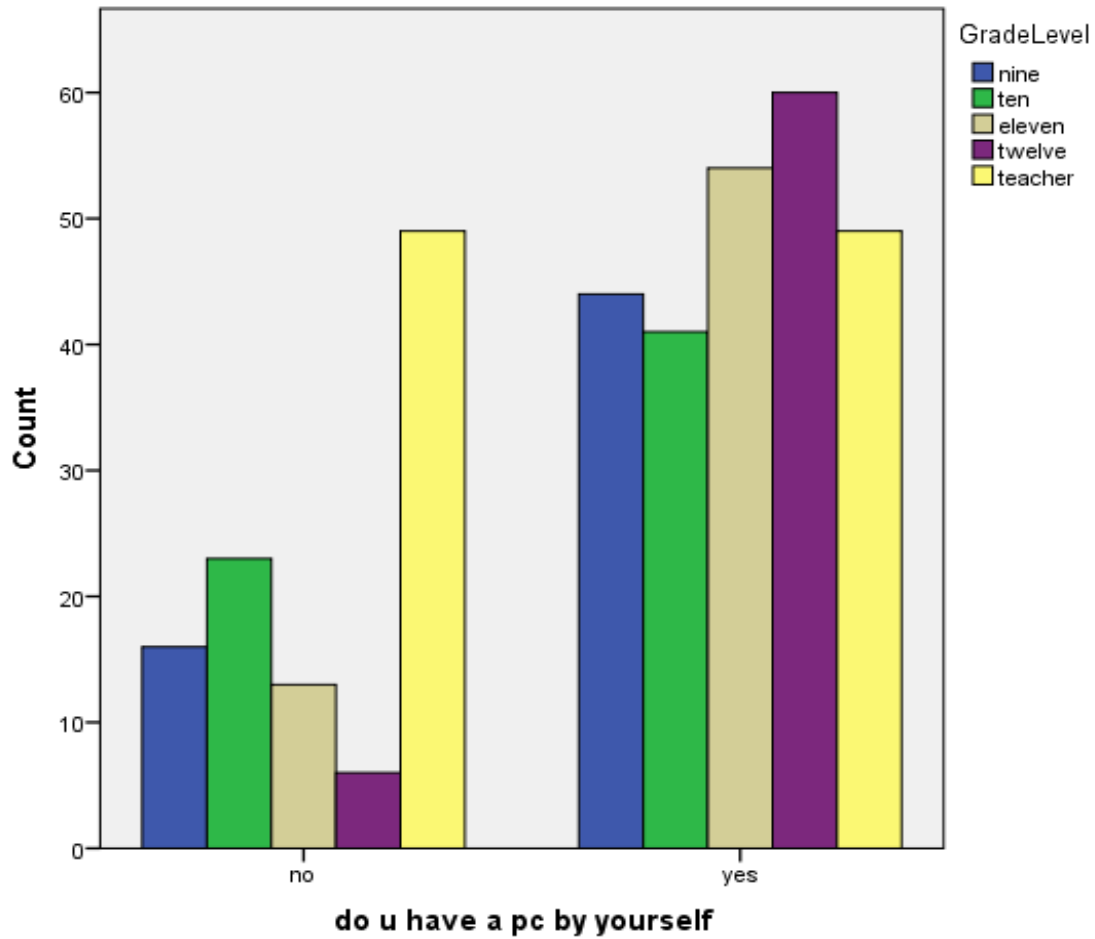


Figure 5: Computer possessions of students and Teachers

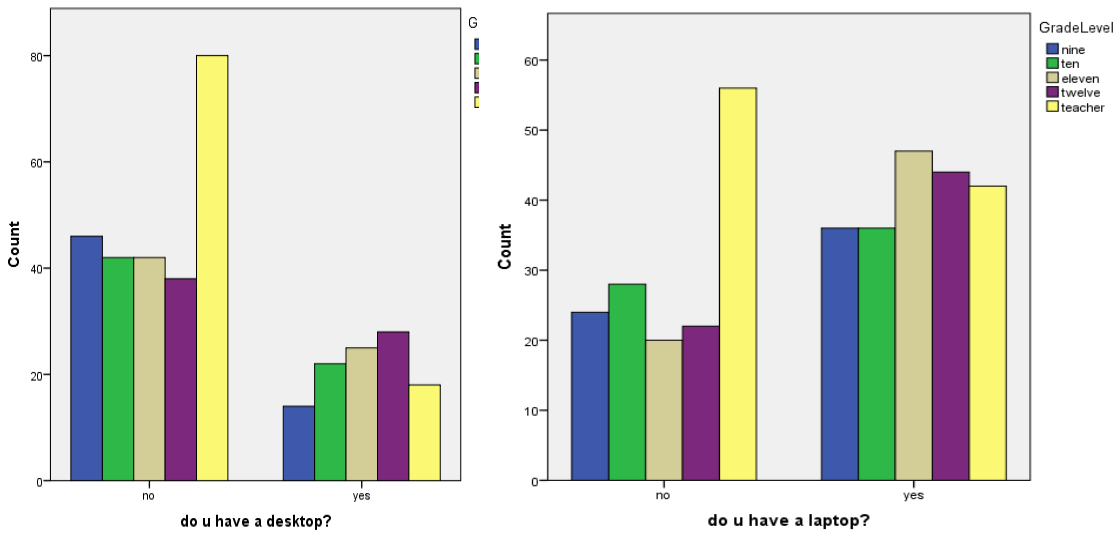


Figure -6: possession and types of personal computers among respondents

As described under table-6 below from the total study subjects 283(79.7%) had access to internet for different purposes. Of which 46(16.3%) were grade 9 students, 54(19.1%) were grade 10 students, 60(21.2%) were grade 11 students, (20.1%) were grade 12 students and 66(23.3%) were secondary school teachers.

The most frequently mentioned places for Internet access were Internet access in their home using computers and cell phones 204 (57.5%) followed by Internet café which contains 144(40.6%) and only 50 (14.1%) had internet access at school.

Variable	Frequency (N=383)	Percentage%
Computer Training status		
Yes	211	59.4%
No	144	40.6%
Type of training Received		
Short Course(<6 month)	134	63.5%
Certificate(6months-1year)	58	27.5%
Computer Possession		
Yes	248	69.9%
No	107	30.1%
Internet Access		
Yes	283	79.7%
No	72	20.3%
Common Place for Internet access		
Internet Café	144	40.6%
School/Office	50	14.1%
Home	204	57.5%
Working on Computer is enjoyable		
Agree	339	95.5%
Disagree	16	4.5%
ICT has a role in Education		
Agree	332	93.5%
Disagree	23	6.5%
Which statement describes best the way you Feel about using computer		
Feel very confident	228	64.2%
I feel I can cope	110	31%
I lack in confidence	17	4.8%

N.B : percentages are calculated using denominator in each group

Table 6: Respondents' access and attitude towards ICT

The attitude of respondents was assessed by analyzing response to a set of 5 questions. Continuous scores from these categories were dichotomized into “Favorable Attitude” and “Unfavorable Attitude”. Respondents who scored 2nd quartile and above ($\geq 50\%$) were categorized as having favorable attitude while scores less than 2nd quartile ($< 50\%$) were considered to have unfavorable attitude. As a result, of all respondents 330(93%) had favorable attitude towards ICT. Among respondents who had favorable attitude towards ICT, 55 (16.7%) were grade 9 students, 56(17%) were grade 10 students, 62(18.8%) were grade 11 students, 65 (19.7%) were grade 12 students and 92(27.9%) were secondary school teachers.

The proportion of attitude level within respondents category were found to be 91.7% of grade 9 students, 87.5% of grade 10 students, 92.5% of grade 11 students, 98.5% of grade 12 students and 93.9% of secondary school teachers had a favorable attitude towards ICT.

As indicated on table – 6 above, about 332 (93.5%) of the total study subjects thought that information communication technology has a role to play in their education or teaching profession. Among the total respondents 228 (64.2%) feel very confident when using computer 110(31%) feel that they can cope using computer easily & only 17(4.8%) completely lack confidence in using computer.

Predictors of Attitude towards ICT

As it is shown in table- 7 below, after adjusting the necessary variables influencing attitude of ICT among students and teachers, respondents those who have satisfactory knowledge found to have favorable attitude on ICTs [OR (95%CI)=2.737(0.481,4.380)]. Grade 12 was found to have more favorable attitude than other groups of respondents [OR (95%CI)=4.239(1.092,5.181)].

It was also true that respondents who had different type of computer training were more likely favorable attitude compared with those who did not [OR(95%CI) =1.018(0.423,2.570)].

Respondents' category like having personal computers did not have significant difference in attitude level of respondents. [OR (95%CI)=0.751(0.434,2.674)] and Sex, grade level and age group has also did not have significant difference in attitude level of respondents.

Variables	Attitude YES(%)	NO(%)	AOR(95%CI)
Sex			N = 355
Male	238(94.8%)	13(5.2%)	0.419(0.285,2.907)
Female	92(88.5%)	12(11.5%)	1.00
Age group			
15-18	238(92.6%)	19(7.4%)	1.031(0.33,1.972)
19-35	80(93%)	6(7%)	
36 and above	12(50%)	12(50%)	
Category of respondents status			
grade 9	55(91.7%)	5(8.3%)	0.717(0.629,2.730)
grade 10	56(87.5%)	8(12.5%)	0.457(0.421,1.919)
grade 11	62(92.5%)	5(7.5%)	0.809(0.115,1.444)
grade 12	65(98.5%)	1(1.5%)	4.239(1.092,5.181)
teachers	92(93.9%)	6(6.1%)	0.678(0.166,1.731)
computer training status			
yes	196(97.5%)	15(2.5%)	1.018(0.423,2.570)
No	134(93.1%)	10(6.9%)	1.00
Computer possession			
Yes	232(93.5%)	16(6.5%)	0.751(0.434,2.674)
No	98(91.6%)	9(8.4%)	1.00
Knowledge			
Yes	153(%)	6(%)	2.737(0.481,4.380)
No	177(%)	19(%)	1.00

Table-7: Multivariate logistic regression of selected variables in relation to Attitude status of students and teachers

4.1.3 Competence in basic Computer Application Skills

The highest level of competence, reported by the study subjects were Internet browsing skill 235(66.2%) , using word processing 202(56.9%), Email use 180(50.7%) using spreadsheet skill 179(50.4%) Draw and paint 283(79.7%) and playing games 283(79.7%), printing a document

242(68.2%). For the remaining items most of them reported low levels of competence. Out of the total respondents 206 (58%) reported that they had average and above competence of word processing skill and print out a document. Unlike office application, use of existing database skill were minimal. Among the total participants of the study 204(57.5%)

had basic maintenance like formatting skill and only 114(32.1%) of them had average competence of using existing database. From the total respondents of the study few of them had a competence of database design and programming skill.

4.1.4 Utilization of ICT

Out of the total study subjects almost all of them 353 (99.4%) had ever used computer for at least one application. Among these 212 (59.7%) used it every day, 90(25.4%) were once in a week time, 14(3.9%) were once in two weeks time and 36(10.1%) once in a month or more. When respondents asked the last time they used computer, 207(58.3%) used it a day before data collection, 53 (14.9%) were used three days before, 52(14.6%) used a week before and 39(11%) used months before.

The general utilization status was assessed by analyzing responses to a set of seven questions. Continuous scores from these category were converted to ordinal ‘‘Good’’ and ‘‘Poor’’ utilization scale. Respondents who scored the 3rd quartile and above ($\geq 75\%$) were categorized as having good utilization status while scores less than the 3rd quartile ($< 75\%$) were considered to have poor utilization status. Accordingly, 140 (39.4%) were scored good utilization status.

Among those who scored good utilization status, 41(29.3%) were grade 11 students, 31(22.1%) were grade 12 students, 20 (14.3%) were grade 9 students, 34(24.3%) were secondary school teachers and 14(10%) were grade 10 students. To this end, the proportion of ICT utilization within the category showed that 33.3% of grade 9 students, 21.9% of grade 10 students, 61.2% of grade 11 students, 47% of grade 12 students and 34.7% of secondary school teachers had good utilization rate.

Category	counted utilization in to two		Total
	Low utilization	Good utilization	
Ten	50	14	64
Eleven	26	41	67
GradeLevel Twelve	35	31	66
Nine	40	20	60
Teacher	64	34	98
Total	215	140	355

Table 8: cross tabulation of grade level Vs Utilization status of the respondents

As described under table-9, among the total respondents who had ever used computer, only 214 (60.3%) use Power-point application. Of which 63(29.4%) were used only once, 71 (33.2%) were used 2-3 times only and 80(37.4%) used more than three times. Most of grade 12 students 45(68.2%) utilize power-point application followed by grade 11 students that is 47(70.1%) the remaining were 32(53.3%) grade 9 students, 44(68.8%) grade 10 and 46(46.9%) were secondary school teachers.

Majority of the study subjects 225 (63.4%) had never participated in video conference, 42 (32.3%) participated only once and 91 (67.7%) participated twice or more in their life time. Among the total study subjects 235(66.2%) of them were internet users and 258 (72.7%) of respondents had email address for their mail communication . To identify the main purpose of Internet use among participants, the study subjects responded for 7 multiple response questions. Accordingly, most of them used for email service 194(54.6%),for research/education 283 (79.7%), for news/film 273(76.9%), for chatting 267(75.2%)and for game 204(57.5%).

Variables	Frequency	Percentage%
Ever used computer		
Yes	353	99.4%
No	2	0.6%
Frequency of computer use		
Almost every day	212	59.7%
Once in a week	90	25.4%
Once in two weeks	14	3.9%
Once in a month or more	36	10.1%
Computer used for the last time		
Yesterday	207	58.3%
3 days before	53	14.9%
A week before	52	14.6%
Months before	39	11%
Internet Use		
	N=355	
Yes	235	66.2%
No	120	43.8%
Have email address		
	N=355	
Yes	258	72.7%
No	97	27.3%
What do you use the Internet for (Multiple response)		
e-Mail	194	54.6%
Research/Education	283	79.7%
News/sport/film	273	76.9%
Chatting	267	75.2%
Game	204	57.5%
Produce Power point presentation		
	N=355	
Yes	214	60.3%
No	141	39.7%

Table-9: Respondents' utilization of ICT in selected PSS

Predictors of ICT utilization among students

After adjustment for the possible confounding factors to utilization status of ICT among students, the utilization status of ICT among gender was not statistically significant. Among respondents, grade 11 students 41(61.2%) and grade 12 students 31(47%) had better utilization rate of ICT than the rest of the categories[OR(95%CI)=2.968(1.088,10.972)]. Provision of different level of computer training (short term or certificate and above) didn't result improved utilization status of ICT among students and teachers. [OR (95%CI) =0.505(0.229, 1.367)]. Moreover, respondents who have personal computer at home had no significant different in utilization status compared with those who didn't have [OR (95% CI) = 0.377(0.259, 1.609)].

Among the total respondents who had Access to ICT 86(50.6%) of them had good utilization rate[OR (95%CI) = 2.484(0.223, 2.896)]. In line with this, students who scored satisfactory knowledge had more likely better utilization rate compared to those who had unsatisfactory knowledge score [OR (95%CI) = 4.234(0.231, 4.558)]. However, attitude towards ICT has no significant difference in respondents' utilization status.

Regarding socio-demographic characteristics and other variables like age group, and having personal computer had no significance difference in utilization status among respondents.

Variables	Utilization		AOR(95%CI)
	YES(%)	NO(%)	
Sex			
Male	112(52.1%)	139(47.9%)	0.457(0.225,0.2.893)
Female	28(26.9%)	76(73.1%)	1.00
Age group			
15-18	106(41.2%)	151(58.8%)	0.482(0.293,0.793)
19-35	30(34.9%)	56(65.1%)	
36 and above	4(16.7)	20(83.3%)	
Category of respondents status			
grade 9	20(33.3%)	40(66.7%)	0.941(0.346,1.008)
grade 10	14(21.9%)	50(78.1%)	0.527(0.369,3.006)
grade 11	41(61.2%)	26(39.8%)	2.968(1.088,10.972)
grade 12	31(47%)	35(53%)	1.667(0.511,2.468)
teachers	34(34.7%)	64(65.3%)	0.531(0.212,0.633)
computer training status			
yes	97(46%)	114(54%)	0.505(0.229,1.367)
No	43(30.1%)	100(59.9%)	1.00
Computer possession			
Yes	114(46%)	134(54%)	0.377(0.259,1.609)
No	26(24.1%)	81(75.9%)	1.00
Access to ICT			
Yes	86(50.6%)	84(49.4%)	2.484(0.223,2.896)
No	54(29.2%)	131(70.8%)	1.00

Table-10: Multivariate logistic regression of selected variables in relation to utilization of ICT

4.2 Qualitative Study

Descriptions of qualitative study

A total of seven key informants were involved in the in-depth interview drawn from different working environment based on their experience ,role and minimum distance to the researcher's

location three schools, that are:- Magic carpet school, Atlas school and cruise school were selected. Of the respondents four of them were department heads and secondary school teachers, three secondary school principals were selected. Two of the department heads were working both as a teacher and department head for the last 2- 5 years. Two of the secondary school teachers having more than 10 years teaching experience were participated during the study. All the principals involved in this interview were from each three different secondary schools. Below are summarized thematic issues of the discussion with the key informants during the in-depth interview:

- The status of secondary school students and teachers in relation to computer application skills in their academic and educational purpose
- Access towards ICT in their learning and working environment
- Gaps to use the computer if any and their recommendation to feel this gap
- The status of Internet connection (availability, reliability and speed) of the available computer and its main purpose of use.
- Advantages of ICT in the education system especially in the teaching learning aspect
- Appropriateness computer course delivered in the secondary schools in terms of delivery period, mode of delivery including its practical session and the possible recommendations as to the way to improve the existing course for the secondary school students.
- What are the main needs of computer skill in your stay that helps for current study as well as in your future career?

Computer skill

All of the department heads, teachers and principals agreed that currently the status of computer skill among the students and teachers were relatively improved when compared to previous days in terms of using it for the purpose of word processing for exam preparation and literature searching through Internet browsing. One of the teachers stated his observation as:

“In previous decades computer skill was almost non existence among teachers and students. But currently, it is by far better in terms of basic computer application skills”

Department heads from ICT unit and principals reported that computer skill among students was differing according to their age and grade levels. Students of older age have better skill of using the computer in the computer lab than the younger ones. The second respondent (teacher) who came from rural region expressed his experience of computer exposure as:

“I myself have only theoretical knowledge on computer during my high school education in the country side. I improved my skill just by my own personal effort ”

Access to computer

Almost all the interview participants have reported that there is very limited access to computer among the teachers and students in schools. Majority of the secondary school teachers had no access to computer in their office/stuff.

Only principals and very limited number of teachers had access to computer at their office in the PSS. In line with this, most of the teachers were using their own personal computer for their academic purpose. As a result, they had relatively better access to computer when compared with those who had not a personal computer. A teacher who is a postgraduate student expressed his view of availability of computer in the PSS as follows:

“In our school there is no computer dedicated only for academic purpose. There are around 4 desktop computers for more than 65 teachers. Two of the desktops are used only for secretary service and the other one is for the school principal and remaining desktop is for the finance department....”

ICT department head and lab assistant in the computer lab explained that the available computers in the lab are not proportional to the number of the students. Currently the number of students were more than 2300 within 40 sections each to share a total of around 40 computers in the lab during their ICT class. Moreover, the demand of students towards computer is increasing from time to time but PSS are not working to address this problem. One of the teachers stated his feeling as;

“The number of students assigned to the school is increasing from year to year but the number of computers and computer lab is not changed or upgraded to full fill the demands of students as well as teachers.”

Gaps for using ICT

Majority of the key informant explained that there are two main gaps to use computers in the PSS. One of the reasons is that there is very limited access to computer at staff as well as in their home. The other reason is lack of proper pre-service or in-service training on ICT. Similarly the recommendations suggested to fill this gap were provision of proper in-service training for teachers and appropriate skill training for them during their stay in the school and ensuring reasonable access of computer and internet at all levels.

Advantage of ICT in Education

Most of the key informants give their explanation of the advantages of ICT in school environment that is In order to provide education to cultivate abilities required for children who will lead the 21st century, it is important to take full advantage of the features of ICT, i.e., being free from time and spatial restrictions, having interactivity, at schools, which are the major place for students' and enabling easy customization in learning and daily life. the ICT utilization in education should be promoted, with teachers fulfilling their duties and utilizing ICT in a manner that makes the most of its features. Such efforts will promote individualized learning responding to each student's abilities and personality, and collaborative learning where children can teach and learn among themselves, along with conventional mass learning by class guidance all at once. More specifically, the ICT in education aims to enhance quality of education from the following three aspects:

- i. Information education (cultivating students' information literacy)
- ii. Utilization of ICT in course instruction (realizing easy-to-understand classes that deepen students' understanding through the effective use of ICT)

- iii. Introduction of ICT for school administrative works (enabling teachers to provide more detailed guidance through information sharing by utilizing ICT and reducing their burden of school administrative works)

All of the respondents agreed that having knowledge and access to ICT facilities provide them a chance to be competent professionals in their area. To attain this goal majority of teachers mainly need to have computer skills like; proper Internet browsing technique, existing database use technique and some of the statistical analysis software like ms –Excel and SPSS for educational research purpose. One teacher expressed his fear due to poor competence of computer skill as follows;

“I am mathematics teacher and I have a fear to join high paying international schools as most of them need high ICT literacy in class rooms to use interactive boards and to type my exams and submitting it by e-mail.”

The existing ICT course in secondary schools

The course is given at all grade levels. The course provided to all student is almost similar but different in breadth the topics included in the course. That are basics of computer, Ms-window and applications like word processing, how to use powerpoint application, Internet use and benefit. And to some extent browsing of Internet even if there is no internet connections in most of the schools.

Concerning the adequacy of the course delivered at the indicated pss, ICT department head explained that the course is given only once to twice with one and two periods(45minutes for one period) for grade 9-10 and 11-12 students respectively during their stay in the school. Most of the key informants agreed that the course provided is not adequate to acquire the necessary computer skill because there is a limited amount of personal computers and with very low or no internet access. In addition, the methodology of teaching focuses on the theoretical part. As it is said by the informant during the examination of the course more than 80% of the evaluation is theory.

Majority of the respondents suggest that the credit hour should be increased and also a continuation from their elementary school skill. On top of this, the course should be delivered

more than once for grade nine and ten . This may help to incorporate more topics in the existing curriculum. One of the key informants from IT unit proposed the following idea to support the incorporation of additional computer courses in the existing curriculum;

“Since computer learning is one of the skill based education it needs repeated exposure to acquire the required skill. So that the course should be graded and it is better to make it one of exam subjects for high school and preparatory leaving examination. As nations are relay on technology based education and to give emphasis so that schools can invest a reasonable amount of budget and to transform from chalk and talk to technology lead education. This may give chance for the Schools to provide additional computer courses for the students by increasing the number of credit hours in the existing curriculum.”

Curriculum Revision issues

Computer course was considered as mandatory by some of the respondents. Several reasons are stated by the key informants about the rationale of revising the existing curriculum for computer course. A study conducted by Abebe B. (2014) titled on the way forward for the future ICT education of Ethiopian secondary schools, stated that most of the university instructors (29, 84%) said the contents are good and medium to secondary school and some considerable number (5, 15%) of them said the contents are poor. In addition most secondary school teachers (38, 68%) rated the ICT curriculum as good. Some (12, 21%) of them said the contents are medium and (6, 11%) of them rated it as very good. And it's still needs improvements. One of the arguments to revise the curriculum is in this day's most of the updated references for educations are available in electronic form. The other argument forwarded by the key informants was, now a day's computer skill is considered as main requirement to be employed in quite a lot of organization. One of the key informants forwarded his view of the future generation as;

“In my opinion through time skill of computer is considered as the main requirement for admission of universities as it is practical in most of the developed countries”

Key informants and department heads proposed that in-service training should be considered for teachers who do not have formal course in their basic education. On top of this, routine in-service training for specific skills should also be considered for manipulating new digital equipments that require basic computer skill. With regard to methodology of teaching almost all of the key informants agreed that the practical session should be improved. Some of the practical aspects mentioned were home take assignment and solving real life problems.

Situation of the computer Lab in the secondary schools

Majority of the key informants agreed that the computer laboratory in the schools are not comfortable for the teaching and learning process. The main problems identified by them were its crowdedness, limited number of computers; and rooms are serving as a lecture room as well as lab session. On top of this, most of the computer hardware's were infected with virus and they are not frequently maintained or updated with antivirus. Regarding the Internet connection, almost none of the computers in the computer lab were connected. For those which are connected the speed is very slow and also not convenient to use due to the room set up and inadequate cable in the room. Informants explained that recently the problem of Internet connection was resolving slowly to some extent especially for those who have smart phones and laptop computer there is a wireless network in a school sites but the functionality is limited for administrative works. One of the key informants from ICT unit suggests a sort of future plan and his view to avoid the crowded situation of the computer lab;

“It is better to prepare mini computer lab in each grade level dedicated only for that grade level and pss should consider a reasonable investment for delivering a Wi-Fi connection and access for a personal computer at all levels .”

Type of computer skill needed

Informants from two categories agreed that they need to have skill of basic computer applications like word processing, spreadsheet, power-point and Internet browsing technique. Specially, informants from high school teachers suggests that in addition to the above skills they

need to have a skill of some statistical analysis software like SPSS, technique of browsing online teaching materials and literature searching.

4.3 Discussion

In Ethiopia there is no study that is conducted assessing the knowledge, attitude and utilization of ICT among private secondary school teachers and students. This study contributes as base line information on the knowledge, attitude and utilization of ICT among private secondary school teachers and students. The study indicated that 44.79% of the respondents had satisfactory knowledge and nearly half of them were grade 11 and grade 12 students 79(49.7%).the remaining 80(50.3)% were grade9, 10 and secondary school teachers in which from the total 98 teachers 39.8% of them had satisfactory knowledge and this may be due to their financial problem and lack of access to ICT materials in the school that is primarily dedicated for teachers and most of students are financially strong background as a result of this their access level is better than that of teachers.

This figure is comparable with the research conducted in 120 secondary school teachers in Nigeria, where 66.67% of the respondents cannot even boot the computer. 1.67% use the Computer to keep records while 15% use Microsoft-word to type their questions and other document. 7.5% of the respondents get their teaching material from the internet, 29% have e-mail address, so it means 29% of the respondent use the computer to send and receive mail. 10% of the respondents can use a search engine. 33.33% of the respondents can print using a printer. None of the respondent use powerpoint and Microsoft Access.

From the study it was concluded that ICT facilities are not readily available in almost all secondary schools and that there is low level of ICT utilization in secondary schools. The study revealed that most teachers lack the basic skill to use the computer and other ICT devices. However, this figure is less than the data obtained from Ghanaian secondary schools by frank et.al,(2011) in which the results showed that a significantly high percentage of respondent teachers (92%) were computer literate and 78% of respondent students also had basic knowledge in computer.

In this study 81.41% of the respondents know basic ICT terminologies. The study also showed that there is a difference in knowledge status of the younger age groups and the older one

because this might be younger groups are more eager to learn and use new things. And the study also indicated that males and females are almost comparable in knowledge level of ICTs. The reason behind may be now a day's both gender groups are equally favorite to new technology. In support of this finding, a study conducted in Kenyan public secondary school showed that, there is no significant difference between male and female students regarding their knowledge on ICTs.(Alcardo et al.,2015)

The study revealed that 59.4% of respondents had different type of formal and informal ICT trainings; however, training status was not translated to better knowledge among the respondents who have different type of training, only less than 15% of them score above the 3rd quartile. The possible reasons may be the type of training most of them had informal training less than 6 month and the time they received as well as the quality of the training may be poor; majority of teachers took the training during their high school or university stay. On top of this, quality of the training, content of the training, mode of delivery, trainers' capacity, allocated time for theory and practical session during the training and gap between the training time and the actual use of computer are also contributing factors for knowledge status among those who had short term training. In support of this, study conducted at Kenyan schools showed that, many teachers kept on thinking that they are not knowledgeable enough to use ICTs competently. They also feel that they lack the skills to manage an ICT integrated class sufficiently. During the ICT training for teachers, it's observed that many teachers kept on expressing fear of the limited knowledge they thought they had about technology use. They kept on whining that ten days training was not enough to make them competent in the use of ICTs.

In this study 27.9% of the total study subjects had at least one personal computer in their home. This figure is by far better than the result from ICT penetration in Ethiopia; this may be the cost of the computer in previous times and also all of the respondents in the current study were from private schools hence they had relatively a better income than those who learn in government schools. They can possess the larger proportion of personal computer. A survey of Information and computer literacy in Slovakian high school students showed that only 2.82 % of students do not use computers. Most of the students use computer at home, nearly 90 %. More than 60 % indicated using computers in the school. Approximately, a fourth of students use the computer at friend's home and 27.11 % of students use computer in the library or internet cafe

(Millan.K,2007). Among the grade level grade 11 students are more knowledgeable than other categories. This is may be the other grade levels specially grade 12 and 10 students are preparing themselves for the national exam and their use and access of ICT may be limited due to their focus and the other is may be due to the content and quality of delivery in the subject matter may create such difference.

The study showed that possession of personal computer is not the determining factors to have better score of basic ICT knowledge.

Access to computer in the selected PSS are very limited as disclosed in this study. The in-depth interview pointed out that almost no computer is dedicated for academic purpose in each department except in the computer lab. This explanation is similar with the study result from Kenya in which almost all the teachers and the students who participated in the study indicated that the number of computers in the schools were not enough. For the students 98% indicated that computers were not enough while for the teachers 92% indicated that the computers in their school were not enough.(Kamau, 2012)

Internet access was found to be 79.7% of the study subjects. The most frequently mentioned place for Internet access was in their home (57.5%) using personal computers and cell phones. This finding is comparable with the result conducted in Ghanaian secondary schools by Frank et.al(2011) in which the Internet usage ,over 80% of respondent teachers use the Internet and less than 35% of respondent students were Internet users. A study in Slovakia showed on 283 secondary school students, Most of respondents (68.89 %) marked the possibility “in the school”. More than half of students showed that they use the internet at home. About 30 % of students using the internet in the library or in an internet cafe, a similar number of respondents marked the possibility “at friend”. Nearly 7 % of students use the internet at parents’ place of work. More than 3 % of students do not use the internet (Millan, 2007).

In this study 93% of all respondents had positive attitude towards Information Communication Technology. This finding is more or less similar with the study conducted in Tanzania, that involved a total of 246 students from six public secondary schools shows mean score was 3.61 and standard deviation of students’ attitude towards ICT and their belief regarding its usefulness in the selected public secondary school was 0.515.This results indicate that, students have high

attitudes towards ICT use. The result also showed that respondents those who have personal computer were not likely to have better attitude level among respondents who don't possess personal computers. It was also true that respondents who had different type of computer training were more likely favorable attitude compared with who did not. Therefore, even if there is limitation in access to computer, most of the students and teachers are willing to know about ICT facilities and also to use it for their academic purpose and educational service delivery needs.

The highest level of competence reported by the study subjects were word processing 56.9%, email use 50.7% and Internet browsing 66.2%. Which was average and above competence of application skill. In addition, graphics and power-point competence is lower among both groups because of the fact that there is still a traditional way of educational delivery in almost all schools.

In this study 39.4% of study subjects were categorized under good utilization rate. Majority of users were grade 11 and 12 students and secondary school teachers. This also reflected by their computer possession 90.9% of grade 12 students and 80.6% of grade 11 students had their own computer at home. Similarly, 50% of teachers use computers for various purposes mainly for word processing and related activities (office tools). Provision of different level of computer training (short term or certificate and above) didn't improve the utilization status of ICT among students and teachers. This may be due to result of the quality of the training given and mode of delivery or content of the curriculum. Moreover, respondents who have personal computer at home had no significant difference in utilization status compared with who didn't have. This might be since majority of them use their personal computer at home there is not enough time to properly utilize it.

Among the total respondents who had Access to ICT 86(50.6%) of them had good utilization rate. In line with this, students who scored satisfactory knowledge had more likely better utilization rate compared to those who had unsatisfactory knowledge score. However, attitude towards ICT has no significant difference in respondents' utilization status.

Ethiopia's national ICT policy has set the stage for growth with in the ICT sector despite the country having one of the lowest penetration rates in the region. In 2004 the country recorded 225,000 personal computers to be in use, mainly in the capital city Addis Ababa.(Harry, 2007) .

A study conducted in Bangladeshi tertiary education revealed that 65.3% of the respondents regularly use MS-Word in teaching learning, where as 47.7% of them use MS-Excel in teaching learning and 77% of them know and use MS power-point (Arifa et al. ,2014).

This study indicated that Internet is used by 76.3% of respondents and 72.7% of the study participants had email address for their mail communication. The email was one the common applicationused. (54.3%) of them used internet for research and education (76.9%) for news and films. Similarly, a study conducted in Bangladesh tertiary education that consisted of 523 respondents from 31 universities showed that 95.4% of respondents have personal E-mail address.

The explanation for poor Internet use among students for academic purpose may be due to the fact that Internet connection is poor, slow and high cost in the Internet café. This makes difficult to download educational litratures and other documents from the Internet. As a result, most of the students inclined to use hardcopy for their education as a text or reference. Regarding the email service it is possible to be served with low level Internet connection in the Internet cafes.

The study also pointed out that computer possession is one resulted no effect in better utilization status of students.It is indicated that knowledge of respondents are one of the driving factor of utilization of ICT among students in the academic as well as in daily internet connection needs. Among respondents who had good knowledge 73% of them use computer satisfactorily.

From the in-depth interview it is indicated that majority of the key informants explained that, majority of students needs to have competence of computer skill like MS-office tools and online educational literature searching.

4.4 Strength and Limitations of the study

4.4.2 strength of the study

The combination of qualitative and quantitative study design to complement each other.Since this thesis work is one of the few studies in this area it provides baseline information for those who are interested. And it Includes both secondary school students and teachers as study subject and to get a better result. It uses large number of sample size for the analysis of the study.

4.4.3 Limitation of the study

The limitation of this study includes lack of similar studies especially in Ethiopia to make comparative discussion and presence of incomplete questionnaires which intern showed minimal response rate among teachers and students is the other problem the researcher faced. In this study administrative workers are not represented this may need further analysis by other researchers. Due to time and financial problem the researcher used convenience sampling technique in order to increase the statistical power of convenience sampling the researcher increased the sample size in order to maximize the likelihood of being chosen.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

To design proper interventions of improving the awareness and utilization of ICT in the secondary school Educational system, it is worth to assess the knowledge, attitude and utilization of students and teachers. Such kind of empirical investigation can be a spring-board for the appropriate interventions like curriculum development and revision or in-service training.

The results of this study have important implications for the knowledge and utilization status of students and teachers in the private educational sectors.

- ✓ The study indicated that majority of the students and teachers had a medium level of basic ICT knowledge and more than half of them are familiar with the basic ICT terminologies.
- ✓ Some of the respondents have received formal or informal ICT training, however their training did not differentiate them from those who have no training in the basic knowledge of ICT.
- ✓ Almost all of the study subjects have positive attitude towards ICT and willing to have the appropriate skill for their academic purpose as well as for their future carrier.
- ✓ Almost all of the students who received the ICT course were not satisfied with their computer lab sessions.
- ✓ Possession of personal computer was relatively better in preparatory classes which helped them to have relatively better utilization rate compared with the other groups.
- ✓ The younger age groups had more likely to have better knowledge attitude and utilization of ICT applications compared to older ages.
- ✓ The study showed that access to computer and other ICT facilities is positively associated with participants' knowledge and utilization of computer. However, access to ICT facilities in the private schools for teachers was very limited and there is no computer dedicated for academic purpose in each department so that the competency skills of

teachers are still needs a great attention in order to prepare the youth in to the technology era.

- ✓ Internet access was limited at each secondary school except one out of ten and majority of the respondents' access in their home using their cell phone mainly for email and social media service.
- ✓ The highest level of competence, reported by the study subjects were word processing and Internet browsing for email service and most of them acquired it through personal effort.
- ✓ In this study access on ICT is found to be one of the contributing factors for utilization of ICT facilities among students in the selected PSS.
- ✓ There are various reasons for poor utilization of computers and the Internet. Of which lack of access, inadequate training and knowledge of ICTs and high cost appeared to be the major constraining factors.

Recommendations

Based on the study findings and the above conclusions the following short term and long term recommendations are forwarded:

Short term

- ✓ The existing computer course in the curriculum should be strengthened in terms of content, weekly load, mode of delivery and computer lab sessions to make it more skill oriented.
- ✓ Computer skills like statistical analysis, online literature searching technique and using existing educational database systems should be provided to teachers during their stay in the school.
- ✓ Formal in-service training on basic computer application should be provided for teachers that are working in private schools.
- ✓ Investors in educational sectors should consider Internet access for students and teachers.
- ✓ There should be easier access to computers, especially in libraries, in order to encourage students to use computer applications for their academic purposes. Libraries should also be able to subscribe online resources.

- ✓ Lack of significant difference between trained and non trained participants' in terms of ICT knowledge should be further investigated.

Long term

- ✓ Resources should be allocated from the investors to better develop the ICT infrastructure in the schools.
- ✓ MoE should develop clear guideline and strategies on the need of ICT in the Private school system
- ✓ The current computer knowledge and utilization of students and Teachers should be revisited in terms of the new MDGs initiative requirements in order to create better balance in the long run.
- ✓ Large scale capacity building of students and teachers should be considered in line with the Education For All (EFA) implementation.
- ✓ Further study should be conducted to determine the influencing factors for acquiring skill and utilization of ICT among schools in the education system.
- ✓ The knowledge attitude and utilization of ICTs in public secondary schools also needs to be investigated so that the combined result will give a direct guide lines for curriculum developers , policy makers and MOE to trace the gaps and to bring about a better solution for the aforementioned obstacles.

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Annexes

Annex 1. Questionnaires

Questionnaire on the Assessment of knowledge, Attitudes, and utilization of Information Communication Technologies (ICTs) at Addis Ababa selected private High schools.

Dear Respondent,

I am Fisseha Ebba, a teacher at Cruise secondary and preparatory school. Currently, I am attending Master of Science in Information Science at Addis Ababa University, Ethiopia.

As part of my accomplishment for the program, my research topic lies on the Assessment of knowledge, Attitudes, and utilization of ICT at Addis Ababa selected private High schools.

Therefore, this is to kindly ask you to participate in the survey that needs data from Addis Ababa selected private High school teachers and students to assess the issues in relation to knowledge, attitudes, and utilization of ICT during their work/study.

This survey is anonymous. No one, including the researcher, will associate your responses with your identity. Your participation is voluntary. You may choose not to take the survey, to stop responding at any time, or to skip any question that you do not want to answer. Your response is extremely important and valuable for the success of the research to achieve the objective of the study and to the overall utilization of ICT in the education sector by indicating possible gaps, if any, and possible solutions need to be taken by concerned parties.

Therefore, I appreciate if you spend few minutes from your valuable time according to the instruction for each part. If you require any assistance or clarification, please don't hesitate to contact me through either of the following methods. **Mobile 0912037999 or Email: fissehaebba@gmail.com**

Thank you for your willingness to participate in this study.

April, 2016

PART I: Demographic Characteristics

1. Age _____

2. Sex : Male ☐ Female ☐

3. Your grade level

9th ☐ 10th ☐ 11th ☐ 12th ☐ er ☐

4. If you are teacher please select your highest level of your educational status **(for teachers only)**

Diploma ☐ Degree ☐ Masters ☐

5. Please specify your teaching experience to the nearest year _____ **(for teachers only)**

6. Did you receive any ICT training so far?

Yes ☐ No ☐

7. If your answer for Question 4 is yes, how did you receive the training?

Personal ☐ Sponsored By school ☐ both ☐

Other (Specify) _____

8. If your answer for Question 4 is “Yes”, the training was:

- ✓ Basic on office applications like MS Windows, MS-Word,
- ✓ Advanced Courses like programming, Database Design...
- ✓ Both

☐
☐
☐

Other (specify) _____

9. How do you rate yourself in using the following applications?

Please use a tick (✓) mark for your response.

	Excellent	Very good	Good	Fair
Generic ICT Skills				
Word Processing(Like MS-Word)				
Windows and File <u>Management</u>				
Spreadsheets(Like Excel)				
E-mailing				
Internet Browsing				
Presentation tools(Like power point)				
Graphics tools(like Adobe)				
Database Management				
Programming				
Software Installation				
Specific ICT skills				
Print out a document				
Cut and paste information				
Draw and paint				
Learn new applications easily				
Statistical tools(like SPSS)				
Games				
Set up mailbox				
Online discussion				
Web page design				

PART II

Knowledge

10. Which of the following are secondary data storage tools?

Please use a tick mark (✓) for your responses.

Compact Disk	
Mouse	
Flash Disk (USB)	
Key board	
Monitor	
Server	
DVD	
RAM	

11. A digital Computer uses binary system (0's and 1's) for its computation?

Yes ☐ No ☐

12. Is Compact Disk (CD) is hardware?

Yes ☐ No ☐

13. Is CPU is a hardware?

Yes ☐ No ☐

14. Is Communication between PCs made by different vendors (supplier) is impossible?

Yes ☐ No ☐

15. Do you think that only data put in the database form can be accessed using a network?

Yes ☐ No ☐

16. Is Digital sound and video can be communicated over a network?

Yes ☐ No ☐

17. According to coverage or distance between connected computers network can be Local Area Network (LAN), Metropolitan Area Network (MAN), and Wide Area Network (WAN).
Is the above statement correct?

Yes ☐ No ☐

18. Is Networks allows different Personal Computers (PCs) to access the same files?

Yes ☐ No ☐

19. Is the global Network of Networks is called the Internet?

Yes ☐ No ☐

20. Is E-mail, the fastest and secured mode of mail communication?

Yes ☐ No ☐

21. Can an organization have an Intranet mail system?

Yes ☐ No ☐

22. Is WWW stands for World Wide Web?

Yes ☐ No ☐

23. Is floppy Disk has a larger capacity than the Compact Disk?

Yes ☐ No ☐

24. Is RAM is a permanent memory in the computer?

Yes ☐ No ☐

25. Is modem allows computers to communicate using telephone line?

Yes ☐ No ☐

26. People who work at home can communicate with their office using the modem for their Internet connection.

Is the above statement true?

Yes ☐ No ☐

27. Please select terminologies that you confidently know their meanings from the list

Please put a tick mark (✓) in the cell in the second column only for those words or phrases that you know their meaning.

NO	terminologies	Put a tick mark	NO	terminologies	Put a tick mark
1	Icon		7	System unit	

2	Hypertext link		8	Browser	
3	Button		9	Folder	
4	Dial up connectivity		10	Menu	
5	Online communication		11	Search engine	
6	Hardware		12	Software	
13	Tool bar		17	Computer viruses	
14	Internet account		18	Operating system	
15	URL		19	Windows environment	
16	Website				

28. Do you know how to effectively use internet service for E-mailing?

Yes ☐

No ☐

29. Do you know how to find the necessary information through internet using a search engines like Google and yahoo etc?

Yes ☐

No ☐

PART III

Access and Attitudes towards ICT

30. Do you enjoy using computers and ICT?

Yes ☐

No ☐

31. Do you feel comfortable using computers and ICT?

Yes ☐

Sometimes ☐

No ☐

32. Do you think that use of computers and ICT will enhance your effectiveness in your work/education?

Yes ☐

No ☐

33. Do you have a PC at your work place/school?

Yes ☐

No ☐

34. Do you have a personal computer by yourself?

Yes ☐

No ☐

35. If your answer for Question 32 is yes, which type?

Desktop	
Laptop	
Palmtop	
Personal Digital Assistant (PDA)	

36. Do you have access to electronic documents in your organization/school?

Yes ☐ No ☐

37. Do you have Internet access?

Yes ☐ No ☐

38. If your answer for the Question 35 is “Yes” , where do you access internet more commonly using

a. Computer(PCs) or b. Cell phones **(please circle your choice as a or b)**

Home	
Office	
Internet café	
School	
Other places	

39. How often do you use internet at home/work?

Most than Once a day ☐ once a day ☐ once a week ☐

Other (Specify) _____

40. Do you think information technology has a role in your profession/education?

Yes ☐ No ☐

41. Which of these statements best describes the way you feel about computer?

Please use a tick mark (✓) for your response

I feel very confident using computer	
I feel I can cope	

I am completely lacking in confidence	
---------------------------------------	--

PART IV: Skill and Utilization

42. Do you use email for your own personal use?

Yes ☐ No ☐

43. Assessment of your ICT Skills.

(Please complete the table below by ticking “✓” in the appropriate boxes. If you need clarifications for the possible answers please see the details below the table.)

Skills	Your Competence of computer skill (Tick one box for each skill)			
	None	Basic	Average	Advanced
Using Microsoft word application				
Spreadsheets (Excel)				
Graphics (like Microsoft picture)				
Presentation(like PowerPoint)				
Internet - World Wide Web(using cell phone)				
E-mail				
Databases use (an existing database)				
Conducting basic maintenance (like formatting, install software)				
Databases design (set up a database)				
Programming				

NB: None: If you never operate the application program like Micro soft Office (Word, Excel, PPT etc...)

Basic skill: If respondents able to open the program and able to do some of the MS office program of the specified computer applications

Average skill: If respondents having the basic and developed additional skills including the use of different software programs and able to operate the specified computer application regularly for office or academic purpose.

Advanced skill: If respondents knowledgeable of hardware and software and able to operate the specified computer application beyond the routine office application like troubleshoot, advise and teach others.

Utilization of the available ICT infrastructure

44. Have you ever used a computer?

Yes, Almost every day	
Yes, Once a week	
Yes, Once in two weeks	
Yes, Once in a month or more	
Never used a computer	

45. When did you use a computer for the first time? (Please answer in either month or years)
_____ months ago or _____ years ago

46. When have you used computer last time

Yesterday	
3 days before	
A week before	
A month before	

47. Have you used a computer as part of your work?

Yes ☐ No ☐

48. Do you have an email address?

Yes ☐ No ☐

49. What do you use the Internet for?

Mail	
Research/Education	
Film/News	
Online forum	
File transfer	
Chatting	

Game	
Others (mention)	

50. Have you ever produced a presentation using PowerPoint tools yourself?

Yes ☐ No ☐

51. If yes, how many times have you produced a presentation?

Once	
2- 3 times	
More than three times	

52. How many times have you participated in video conferencing?

None	
Once	
Twice / more	

Thank you
For your patience to complete this questionnaire!!

Annex 2. Guideline for in-depth interview

Guideline for in-depth interview

Introduction

- ✓ Information Communication Technology (ICT) is playing a vital role in the education and practice of the developed world. But it is lagging behind in the education and professional training as well as during class room delivery of the developing countries Including Ethiopia. Hence all students and teaching professionals are expected to have the necessary computer skill during their stay in the educational institution.
- ✓ Providing the basic computer courses as part of the pre-service training is crucial in order to give access for the students online reference materials, as well to ease their way of education. And helps the students to be competent service providers after graduation by proper utilization of the available ICT infrastructure.
- ✓ Therefore the aim of this assessment is generation of valuable base line information and Factors influencing the skill of ICT among high school students that will help to develop a feasible plan of action to high school students' computer course components during their stay in their classes.

1. In-depth interview guide for ICT Department heads, teachers and principals

Main Topics

- ✓ How do you see the status of the existing ICT knowledge attitude and skills of High school students in your school?
 - ✓ How is the accessibility of computer for the teachers as well as for the students?
 - ✓ Do you know the ratio of computer – to- student in the school?
 - ✓ At which grade level does a student start ICT as a subject?
 - ✓ How suitable is the computer labs and other facilities room set up for effective Skills learning? If not what are the critical teaching learning materials, equipment's and facilities lacking?
 - ✓ In your assumption is the course given enough for the high school students to acquire the necessary ICT skill, especially for online reference data entering and processing.
 - ✓ How many computers are in the computer lab, how many of them are connected with the Internet?
 - ✓ In your department mainly for what purpose the students as well the teachers use the computer?
 - ✓ How many PCs in your office are dedicated for academic purpose?
 - ✓ Do all the department teachers have PC in the office?
 - ✓ Are all the PCs Internet connected or proportion of the connected one?
 - ✓ Mainly for what purpose the teachers use the Internet?
 - ✓ What type of computer skill/ competence do you need to know?
 - Curriculum revision (type of courses and methodology of teaching)
 - ✓ Advantages/ benefits of ICT/ education information system
 - ✓ What are the main challenges to improve the computer education for the high school Students?
 - ✓ What strategies would you recommend for the incorporation of computer courses From the existing curriculum?
 - What are the opportunities and threats of the proposed strategy .
 - ✓ Is there any policy/guideline to support/ incorporate the computer course in the Existing curriculum?
- Any other points and recommendations

Thank you for taking the time to conduct this interview!!