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PRACTICES, CHALLENGESS AND PROSPECTS OF SCHOOL NET IMPLEMENTATION IN SECONDARY SCHOOLS OF ADDIS ABABA CITY ADMINISTRATION

BY

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Practices, Challenges and Prospects of School Net Implementation in Secondary Schools of Addis Ababa City Administration

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DECLARATION

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This is to certify that the thesis prepared by Hussien Said Aragaw, entitled: **Practices, Challenges and Prospects of School Net Implementation in Secondary Schools of Addis Ababa City Administration** submitted in partial fulfillment of the requirements for degree of Master of Arts in Curriculum and Instruction is his original work and meets the required standard.

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ACRONYMS

AACEB Addis Ababa City Education Bureau

ADSL Asymmetric Digital Subscriber Line

CEICT Center for Educational Information and Communication Technology

CD Compact Disk

CD-ROM Compact Disc Read only Memory

DVD Digital Video Disk

EICTDA Ethiopian Information and Communication Technology Development Agency

ESDP Education Sector Development Program

EMIS Educational Management Information System

ENEDI Ethiopian National E -education Initiative

ESELeN Ethiopian Schools Education and Learning Network

ESSI Ethiopian Smart Schools Initiative

ETA Ethiopian Telecommunications Authority

GDP Gross Domestic Product

GEQUIP General Education Quality Improvement Program

HD High Definition

ICTs Information Communication Technologies

IS Information System

IT Information Technology

ICT4E Information Communication Technology for Education

ICT4D Information Communication Technology for Development

ITU International Telecommunication Union

LAN	Local Area Network
MCIT	Ministry of Communication and Information Technology
MDG	Millennium Development Goal
MOE	Ministry of Education
NEPAD	New Partnership for Africa's Development
NGO	Non-governmental Organization
SCEO	Sub-City Education Office
SD	Standard Definition
SDG	Sustainable Development Goal
UN	United Nations
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
VSAT	Very Small Aperture Terminal
VOD	Video on Demand
WITFOR	World Information Technology Forum
WSIS	World Summit for the Information Society

Abstract

The purpose of this study was discussing the existing Practices, Predicaments and prospects of School net Implementation in selected secondary schools in Addis Ababa. The main research questions raised were the extent of School Net implementation in the sample schools, the perceptions of teachers', students' and school leadership on School Net and the challenges for successful implementation of School Net. The research utilized mixed research method. And descriptive survey research design was used. The sampling methods employed were purposive, random sampling and stratified random sampling. A simple random sampling method was used to select sample sub cities. A purposive sampling method was used to select sample schools,their principals and experts. A stratified random sampling method was used to select teachers and students. The study used both primary and secondary sources. The researcher collected data from teachers, students, School leadership from sample schools, AACEB experts and sub city educational experts. The major data collection instruments include Questionnaires, interviewers, observation check list and document analysis. The major findings of the study include there were no infrastructure, equipment shortage in the schools. But there were functionality problems of computer and plasma TV. The study showed teachers lack appropriate ICT training. Even teachers have the same perception like the previous plasma transmission. There was good perception on educational plasma content lessons. Lastly, the study revealed that the implementation of school net in schools in Addis Ababa faces different challenges. These challenges include unavailability and inappropriate ICT infrastructure, teachers training and educational plasma contents in the secondary schools; limited ICT knowledge and skills for both the teachers and the students characterized by inadequate time for in-service courses for teachers; limited technical support during teaching and learning process, and lack of proper ICT policies in the secondary schools. There is a gap in owning the project properly and there is no continuous support, monitoring and evaluating school Net and giving responsibility to school leaders and different office levels were not managed well. The teachers in School Net project did not include the plasma content lessons in their daily and weekly lesson plan. Hence, the research concluded that the inadequate practice, poor perception and the mentioned challenges hindered school net implementation in the schools.

***Key words**: ICT, School Net, Implementation, challenges, Prospects, Secondary School.*

Chapter One

Introduction

This chapter provides information on the background of the study, the statement of the problem, the objectives and questions of the research, the significance, of the study, delimitation of the research, limitations of the study, Acronym and organization of the study.

1.1 Background of the study

Education is fundamental for the overall development of a country. Due to this, a country invests huge capital to effectively use human resources that in turn ascertain economic and social development. And indeed, education is a major instrument that is used to develop human skills and knowledge.

According to (Todaro, 1989), states that the principal institutional mechanism for developing human skills and knowledge is the formal education system. In this regard, Information Communication Technology plays a major role.

The United Nations Educational, Scientific and Cultural Organization (UNESCO) uses the term ICTs, or information and communication technologies, to describe: "…the tools and the processes to access, retrieve, store, organize, manipulate, produce, present and exchange information by electronic and other automated means. These include hardware, software and telecommunications in the forms of personal computers, scanners, digital cameras, phones, faxes, modems, Compact Disk (CD) and Digital Video Disk (DVD) players and recorders, digitized video, radio and educational television. A broad definition of ICTs includes computers, the Internet, telephones, television, radio and audiovisual equipment".

Information and Communication Technologies' (ICTs) role is a powerful mechanism in every aspect of education: teaching and learning; teacher training, local-language instruction, monitoring and assessment of student performance, education-systems management, coaching and mentoring, and preparing students for a world in which Information and Communication Technology (ICT) is a necessity for successfully navigating their future careers and lives and contributing to their national economies.

Information Communication Technology for education has evolved and become more central to teaching and learning. The rapid development of information and communication technologies

(ICTs), internet technologies and web-based applications have initiated unparalleled transformation in the education sector all over the world (Cheng, 2010). Every aspect of human relationships and interactions within the educational environment has been affected by the World Wide Web in many ways. This technological breakthrough in the fields of education has further benefits with the use of electronic learning.

In the report "The National ICT for Development (ICT4D) Five Years Action Plan for Ethiopia", as Dzidonu (2006) mentioned that Ethiopia recognized the developmental potentials and opportunities of the information and technological revolution to embarking on a process of economic transformation through the modernization of the key sectors of the economy including those of agriculture, services and industrial sectors through the deployment and the exploitation of ICTs.

Acknowledging the key role that development, deployment and exploitation of ICTs can play in Ethiopia's economic and social development, the Government recognizes the need for the rapid development of the nation's information and communications infrastructure as well as the development of the nation's educational, human resources to bring about the necessary socio-economic change and transformation.

According to Dzidonu, (2006) not only does the Government of Ethiopia consider ICT as an indispensable tool and means to alleviate poverty but it also considers ICTs as a major tool for facilitating the on-going state transformation which is aimed at effective and efficient service delivery in every sector. The Government therefore views ICTs within a wider context of its socio-economic development goals. The goal is to make Ethiopia an ICT-driven country able to function effectively in a networked global economy.

To make this vision real, the government of Ethiopia formulated ICT4D strategy with different initiatives including E-health, Wereda Net and School Net to mention few. According to Gebeyehu (2014) and Birhanu (2012, 2013), the School Net project is one of the largest initiatives the Ethiopian government launched satellite TV program as part of the national School Net Initiative in 2004, which is a nationwide network of Ethiopia's secondary schools.

In the 1990s, with the advent of the Internet, digital pioneers envisioned a school, delivering quality education, most African countries started School Net initiatives and projects like most continents of the world, exceptionally Ethiopia started the project launching satellite TV program due timely problem of shortage of teachers and lack of infrastructure in the rural areas. But most countries started School Net deploying computer and internet in schools,

Today, Center for Educational Information and Communication Technology (CEICT) under ministry of Education (MOE), ICT-leading organization for general education of the government that provides educational satellite television has started to broadcasting to 1,710 high schools in Ethiopia via a total of 15,600 Plasma TVs, some 1482 television programs in 6 subjects (Biology, Chemistry, Physics, Mathematics, Civics and Ethical Education, and English) are broadcast to grades 9 to 12 students across the country(MCIT, 2013 and Gebeyehu, 2014).

Nowadays 1981 television programs in 11 subjects (Biology, Chemistry, Physics, Mathematics, Civics and Ethical Education, Economics, General Business, Technical Drawing, English and Amharic) are broadcasting to grades 9 to 12 students across the country (CEICT, 2015/2016 or 2009 E.C).

Besides broadcasting educational Satellite television programs from the Center, increasing access to these educational programs Via local area School Net program. The importance of research in identifying solutions and options for overcoming implementation obstacles in education systems and programs is widely recognized. This form of research addresses implementation bottlenecks, identifies optimal approaches for a particular setting, and promotes the uptake of research findings: ultimately, it leads to improved education and its delivery.

The School Net initiative developed from project and then program latter arises from the need to integrate ICTs into Ethiopia's educational system. It is designed to develop a wide-area network linking all schools in the country and making Internet and online education accessible to them. The initiative constitutes a key component of e-government program and aims at the application of ICTs for the purposes of teaching and learning (Dzidonu, 2006).

In general, a full-fledged national School Net program is expected to support the teaching and learning process, using the Internet as an educational development and delivery platform to support teaching and learning. Implementation of integrated School Net system for Ethiopia will go beyond supporting basic teaching and learning. It also supports school administration in communicating information, data and report through the internet from schools in zonal, regional and federal level, and teaching learning experiences and functions of the school system. This program is also hoped to enhance the existing in-class interactive video learning service through locally connected plasma channeled instruction and try to establish a computer laboratory-based learning experience managed through Local Area Network (LAN) cloud service.

1.2 Statement of the research Problem

The introduction and use of ICTs within the Developing Country has a substantial potential benefit for the economy and social service. ICTs are even seen by some commentators as a key link to globalization and development, as a means of overcoming the so-called 'Digital Divide,' or gap in knowledge and access between ICT users and non-users (Akpan, 2003).

Regardless of the potential benefits of ICT for the developing countries, there are ongoing barriers to implementation of these technologies within many developing countries. Developing countries can often be reprioritize in policymaking and resource allocation due to attitudes regarding the usefulness of ICT in the development process, as well as lack of knowledge regarding the potential benefits of ICT implementation (Imran, 2009).

Ethiopian educational system took ICT as one major component of General Education Quality Improvement Package. Among the initiatives ICT program, School Net project is one of the programs undertaken which arising from the need to integrate ICTs into the curriculum. This was previously started using plasma television transmission. Then later on, it was designed to develop both wide-area network and local area network linking all schools in the country and making Internet and online education accessible to them. Internet and communications technology have "flattened" the educational world and provided enormous possibilities for learner choice, flexibility, and interaction.

But positive change to implement the School Net program is challenged by different factors as Takauchi (2008) and Abrham (2016) described including failure in Planning, infrastructure, implementation, limited access to the internet, lack of discussion with stakeholders, lack of proper training before implementation, lack of financial and other resources, lack of Public Private Partnership participation and lack of continuous monitoring and evaluation. And Fikru (2012) also added that the School Net project is not implemented properly as it was stated in the project objectives.

The implementation of ICTs is particularly weak in Ethiopia. Ethiopia, with only 0.5(not even one person) Internet users per 100 residents and 6 telephone lines per 100 residents (UN-OHRLLS, 2011), has one of the lowest rates of basic communications technologies in the world. Its ICT sector is almost completely undeveloped.

Education has the role of preparing students for adult life, and therefore it must provide students with those skills necessary to join a society where technology-related competencies are becoming

increasingly indispensable. The development of these competencies, which are part of the set of the so-called '21st century competencies', is increasingly becoming an integral part of the goals of compulsory education. However, in a knowledge economy driven by technology, people who do not master these competencies may suffer from a new form of digital divide (the have and have not digital access) that may affect their capacity to fully integrate the knowledge economy and society.

Although ICT holds great potential to support ongoing educational as well as national development efforts, different studies suggest several challenges have affected its large-scale deployment and utilization for educational purposes, and these have very much reduced its capacity to do the nation good. There is a gap between the objectives of the project and current condition and situation of the project at schools (Abrham, 2016; Fikru, 2012 and Takauchi, 2008).

Many of these studies have been limited to investigating the planning, infrastructure and management of the project. There is substantially less research on School Net implementation practices, challenges and prospect for the teaching and learning where the previous researches didn't cover. This research will investigate these issues in delivering effective and efficient learning through desktop cloud solution (Local area Network) in Addis Ababa schools.

1.3 Objectives of the study

1.3.1 General Objectives

The main objective of the study was to examine the practices, challenges and prospects of School Net Implementation in Secondary Schools in Addis Ababa City Administration.

1.3.2 Specific Objectives

The specific objectives of this study were:

1. To gauge to what extent the School Net is being implemented in the study schools.
2. To identify the perception of teachers, students and school leadership on implementation of School Net.
3. To identify the main challenges of teachers, students and school leadership face in the implementation of School Net in the study area.

1.4 Research Questions

To make further progress, the Addis Ababa City Administration Education Bureau deploys School Net project (desktop cloud system) Secondary Schools in each sub cities. The researcher attempted to seek answers to the following research questions.

1. To what extent the School Net is being implemented in the schools?
2. What are the perceptions of teachers', students' and school leadership on School Net?
3. What are the challenges of teachers, students and school leadership for successful implementing of School Net?

1.5 Significance of the Study

This research is deemed significant in academic discipline of Curriculum and Instruction. This is because it brings lights the issue to engage solving practical problems on School Net implementation in Secondary Schools in Addis Ababa City Administration.

The researcher believes that this study serves as an indication as to how School Net project implementation be managed in the teaching learning process. This will be a background for educational policy makers to act and take action on the condition of the project. The research also serves as the basis for problem solving for ICT and plasma technicians. The findings of the study also offer profile of the ongoing realities of using ICT for education for further research on the area.

The research can also be used for School leadership, ICT professionals, Instructional designers, subject teachers, IT and plasma technicians, and even students.

The research goes a long way in helping to shape ICT for education related policies. The study is thus expected to be helpful in planning, designing, developing, implementing and evaluating instructional system design, ICT strategy and program for better E-learning integration in the curriculum by advancing the School Net program in our country.

1.6 Delimitation of the study

This study delimited on School Net implementation and assesses the practice, challenges and prospects in Secondary Schools in Addis Ababa. This study is also confined on sample students, teachers, School leadership, AACEB ICT experts, sub city Curriculum and Supervision experts. It would have been important if it is conducted proportional samples from 65 project implemented Secondary Schools of Addis Ababa. However, the study was confined to three (3) selected sub

cities and nine (9) government Secondary Schools. The researcher took three (3) selected schools from each sample sub-city of Addis Ababa.

1.7 Limitations of the study

The researcher encountered scanty similar research work and literature on the issue in Ethiopia in general and Addis Ababa in particular. As a result the researcher was obliged to rely to foreign related materials. The researcher faces scarcity of well documented project materials and conducted research report on the issue.

1.8 Definitions of terms

Computer laboratory-based learning: a means of instruction by the teacher using computer assisted learning with or without the internet

Desktop cloud Solution: a window desktop where all the programs, applications and data are run and stored in cloud computing center and Personal Computer (Pc), laptop, tablets and smart phone can access application and data from anywhere at any time.

Digital Divide: A gap in knowledge and access between ICT users and non-ICT users

Educational plasma – satellite television based instruction, referrers to locally as plasma‘.

Information and Communication Technologies: Information and communications technologies (ICTs) are technologies used to communicate and to create, manage and distribute information. A broad definition of ICTs includes computers, the Internet, telephones, television, radio and audiovisual equipment.

Program: Program is a group of related projects managed in coordinated way to obtain benefit and control not available from managing individually.

Project: A temporary organization that is created for the purpose of delivering one or more business products/outputs according to a specified Business Case.

School Net: School Net is a project for secondary school Internet network. It promotes the development of knowledge societies by connecting schools to the Internet, building connections among students, teachers and schools, sharing information and resources and supporting e-learning in online, networked environments.

School Net implementation is the process of putting the initiative into practice.

1.9 Organization of the study

The main objective of the study was to explore the practices, challenges and prospects of the implementation of School Net use in education. Thus, the first chapter of the study introduces the background of the research; the second chapter deals with review of related literature; the third chapter focuses on the research design and methodology; chapter four deals with data presentationand analysis of the study. The last but not the least chapter stresses on the summary, conclusion and possible recommendations for solving the practices, challenges and prospects of the identified issue.

Chapter Two

Review of Related Literature

Introduction

This chapter deals with the existing recent literature on Information and communication technologies /ICTs/, ICT4E projects, School Net project , E-learning in the implementation of School Net and E-learning has been reviewed which has relevance for the present study.

The literature related to ICTs and School Net projects and their benefits and pitfalls, the equipment and infrastructure in ICT and School Net, policy objectives and planning and implementation of the project in Ethiopia and the developing countries in the south, the challenges facing the implementation of the project, teacher professional development, the role of school leadership, educational satellite Plasma Television contents and the School Net experience in less developed countries in Africa, South East Asia, Latin America and experiences in Ethiopia.

2.1 Information and Communication Technologies /ICTs/

Education plays an important role in development. Basic education is at the core of national strategies aimed at enhancing human development, social and political empowerment and economic progress. The recognition of the value of education is clearly reflected in the second goal of the UN Millennium Development Goals, which aims to achieve universal primary education for children everywhere, boys and girls alike, by 2015. Moreover, the fourth goal of the UN Sustainable Development Goals succeeded the previous, which plans to achieve ICT enhanced education for all children everywhere, boys and girls alike, by 2030. Achieving these goals is particularly important in this age of the global knowledge economy, where many socioeconomic groups in developing countries risk exclusion from the economic and social benefits that this new knowledge economy can potentially provide (Castells 1996).

Information and communication technologies (ICT) have tremendous potential to enhance the lives of people in general and, particularly, those in developing countries. Use of ICT can boost business, support education and healthcare systems and also enhance all levels of government in their development processes worldwide.

In recent years, in most governmental schools have got ICT equipment and infrastructure, invested heavily in putting technology—especially educational satellite plasma Television, computers and their associated infrastructure—in the hands of students, teachers, and school leaders. Many people

involved in education, especially in information and communication technology from planning to implementation and from decision makers to teachers to parents, as well as the general public, want to know what technology exists in schools and how that technology is being used. These are a few of the questions that are typically asked: including how can technology support the educational vision in general?What are the technology needs of the society?Are our technology goals rights for our needs?Have we reached our technology goals yet?Where has the money gone? And are we doing as well as others?

The term "technology" can be used to mean a very wide variety of things, from computers to pencils. Here the term technology refers to ICT in general and computer — hardware and software, Educational satellite plasma television, the Internet, and computer-based multimedia.

In case of Ethiopia, there is a fertile ground to practice the ICT policy and strategy in different sectors of the economy and social services including strong desire to incorporate ICT in teaching and learning process in the primary level, secondary level and tertiary level education. But as a researcher it is not enough in formulating ICT policy and strategy and attention should be given in formulating ICT in education policy.

The Educational sector development program (ESDP-III, IV and V) in Ethiopian emphasize on the integration of information communication Technology infrastructures in to education to support country's education system with technology in order to bring quality education. Here attention should be given on the pedagogy rather than the technology. Technology is the means but not an end by itself.

In view of this, Information Communication Technology infrastructures are provided to secondary schools to receive satellite education transmission (plasma instruction) broad casted from one center to enhance quality education since 2004. Although the program lasted for more than fourteen (14) years, there is a disparity between the objectives it intended to address and what the program practically providing (Berhanu, 2013).

According to Sherry (1998) and James (2004) point out a structural model for ICT interventions that comprises the following components: Technological - access, cost, type and age of computers and hardware, physical aspects of the School Network, reliability and interface; Individual - user characteristics and perceptions, such as motivation, need for control, attitudes, anxiety, prior experience and skill level; Organizational - complex needs of the educational institution, district,

community and the broader community; and Teaching and learning factors - instructional goals, pedagogical strategies and espoused learning theories.

2.2 Information Communication Technology for Education/ICT4E/

Information Communication Technology has played an educational role in formal settings in programs provided by governmental agencies, public and private educational institutions, for-profit corporations and non-profit groups and secular and religious communities (Blurton, 1999).The above paragraph described that the application of ICT goes beyond education in both profit and non-profit driven organization to facilitate the quality and quantity of the product or service they provide to their customers.

Information and Communication Technology (ICT) has a direct role to play in education and if appropriately used, it can bring many benefits to students in the classroom as well as in education and training processes in general (Madzima et al, 2010). ICT also offers possibilities in facilitating skill formation, sustaining lifelong learning, and advancing community linkages. Planning for effective use of ICTs in education necessitates understanding of the potential of the technologies to meet different educational objectives and, consequently to decide which of these objectives is pursued.

There are radio, television and computer have used for educational purpose for long time. More importantly, the availability of radio and television frequently remains very low in a number of developing countries despite the fact they can play an important role in connecting schools, especially where more advanced forms of ICT are absent. While radio and television are known to be increasing in some countries to fill connectivity gaps, they are decreasing in others, particularly where the emphasis is shifting towards more advanced forms of ICT including computers and the Internet (WISIS, 2015). The Ethiopian experience technology in education shows that radio and television have used to fill the connectivity gaps in rural and urban areas.

The development of ICTs in developed and developing countries are different. The nature of infrastructure, connectivity, human resource and organization made a difference between the developed countries and developing countries. On the other hand, the developing countries are taking steps to narrow these digital gaps.

The development of ICTs in North America and Europe is different from Asia, Latin America and Africa. The best examples to our experience are those in South East Asia and our African counterparts. Asian country gives great attention to information communication technology to

inculcate among students the importance of lifelong learning, that is, to constantly seek new information to think critically and to take initiative has become ever more pressing in our fast-changing world. Countries in Asia and the Pacific have responding to challenges in different forms and at varying levels so as to enable their people to adapt to change, inspire creativity and innovation, and enhance their ability to apply knowledge& skill to solve emerging problems with confidence.

When we come to Africa ICT distribution and application is also not uniform. There is a great deal of variance in ICT policies in education among the African countries. However, South Africa is better in this case which clearly unique in terms of being able to move its ICT agenda forward through establishing school Set (South Africa School Net, 2013). Besides to South Africa some of North Africa countries which have both resources (software & hardware) and high bandwidth connectivity with Europe have also been able to make excellent progress in integrating and implementing the information communication technology in their educational plans.

The Educational sector development program (ESDP-III, IV and V) in Ethiopia emphasize on the integration of information communication Technology in the curriculum by deploying infrastructures, connectivity, human resource and organization in to education to support country's education system with technology in order to bring quality education.

In view of this, Information Communication Technology infrastructures, connectivity, human resource and organization are provided to secondary schools to receive educational satellite plasma transmission broad casted from one center to enhance quality education since 2004. Although the program lasted for more than fourteen (14) years, there is a disparity between the objectives it intended to address and what the program practically providing (Berhanu, 2013).

Among many sectors in which ICT is used, education can be regarded as one of the most important one. It is easy to understand that education has been a focal point of development when we consider the fact that main development initiatives have been always related to education such as Education for All (EFA) (UNESCO, 2007), the Millennium Development Goals (MDGs) (UN, 2004) and the recent Sustainable Development Goals (SDG) (UN, 2015). Thus, it is true that education is definitely crucial for human capacity building which is fundamental for development. Many authors (World Bank, 1995; Psacharopoulos, 1995; Colclough and Lewin, 1993) pointed out the importance of education for development (Lewin and Caillods, 2001). For instance, literacy enables people to have greater knowledge and skills which ensure higher-paid employment

(UNESCO, 2006). Moreover, educated mothers are likely to have safer deliveries; hence health babies, and also they tend to educate their daughters (Schultz, 1993).

In other words, education is essential for addressing development issue such as unemployment, poor health and gender inequality. Therefore, more efficient and effective educational projects are always needed for national development. Unsurprisingly, for this purpose, Information Communication Technology has gained more and more attention, and the use of Information Communication Technology including radio and television for education has a long history (Grace and Kenny 2003).

2.2.1 Benefits and Pitfalls of ICT for education

Now let us see the benefits of ICT for education as explained below.

1) **ICT can increase access to education**:

ICT such as distance education system, e-learning and access to personal computers (e.g. One Laptop per Child) provides education to people in remote areas where teacher recruitment is often difficult. It is also evident that educational satellite plasma television in Ethiopia has been accessed to rural and urban areas. Moreover, the internet enables these educational contents and other educational information to access in the world without actual transportation.

2) **ICT can improve the quality of education**:

The quality of education is improved by Information Communication Technology through use of multimedia digital teaching and learning materials, broadcasting qualified lecturers and providing distance learning for students as well as teachers.

3**) ICT can motivate students**:

ICT motivates not only students to study but also their parents to send their children to schools, because computers are something new which seem attractive and nowadays people recognizes that Information Communication Technology skill is necessary for the information age.

To realize the above mentioned benefits, many ICT4E projects have been implemented by international organizations, non-governmental organizations (NGOs) and developing countries' governments. Amongst these stakeholders, government may have the strongest influence since the educational sector is managed within a framework of national educational policies and most schools are governmental ones. Actually, in the case of Ethiopia, the Ethiopian government has

implemented ICT4E project as a key component of the broad e-government strategy (Getahun, 2006). Furthermore, when it is considered that 'government has been the single largest collectors, users, holder and producer of information' (Heeks 1999: 16) and that the national development policy is created by the government, it is obvious that the government is the most important stakeholder and top-down approach in implementing not only for ICT4E but also ICT4D initiatives in general.

2.2.2 Challenges of ICTs

Truly, there are many kinds of constraints or pitfalls for Information Communication Technology for Education /ICT4E/ projects, such as, poor infrastructure (Duncombe 2006; Ndou 2004), organisation or community acceptance (Whyte 1999 cited in Harris et al. 2003), relevance of information (Etta and Parvyn, 2003), financial sustainability (Oestmann and Dymond 2001), lack of training and skilled personnel (Ndou 2004), literacy (Roman and Colle 2002; Warschauer 2003), gender (Farrell and Isaacs 2007; Törenli 2006).

The principal factors that prevent schools from using Information Communication Technology including Educational Satellite plasma Television, School Net and computers as tools for teaching and learning are insufficient funds, insufficient numbers of computers, lack of computer literate teachers, lack of teacher competence in integrating computers into different learning areas, and the absence of properly developed curricula for teaching computer skills (Howell and Lundall 2000). This area discusses that school-networking projects should address and provides examples of how countries in Africa are coping with the challenges facing them.

As mentioned above, since the advantage/benefits and rationale of ICT use for development is understandable, an optimistic expectation may be generated that ICT is used as a powerful tool for development in many projects under the adequate government initiative. However, the reality is different from such an optimistic expectation.

According to Heeks (2003), 35% of e-government projects in developing and transitional countries are total failures and 50% are partial failures. Similarly, Gauld and Goldfinch (2006) mention the high failure rate of e-government projects, especially large projects. Likewise, in the case of Ethiopia, particularly, the report from Addis Ababa University states that Addis Ababa city administration spent huge amount of money for ICT investment but the outcome is not as much as expected (Bekele et al., 2005). Moreover, in the case of ICT4E projects, negative statements are found on the documents from InfoDev/World Bank. For example, 'the positive impact of ICT use

in education has not been proven' (Trucano 2005: 6) and 'the use of ICTs in education in many developing countries, especially the "poorest of the poor" is associated with high cost and potential failure' (infoDev, 2007: 2). Why do ICT4D projects fail in such a high rate? In the following sections, factors which can cause failures of ICT4D projects are presented from three angles.

2.2.2.1 Techno-centric approach

One of the major reasons for ICT4D projects failure is a techno-centric approach. The weakness of the technology-centred approach is explained in terms of Information Systems (IS) projects generally and ICT4D projects particularly. Firstly, in the case of Information Systems (IS) projects in general, many authors (Laudon and Laudon 2004; Avison and Fitzgerald 2003; Checkland and Scholes 1990) point that Information Systems (IS) projects often do not achieve expected benefits because of a lack of consideration to broad factors beyond technology. For instance, typical failures are such that a new Information Systems (IS) is developed and works properly, but nobody uses it and that an Information Systems (IS) is developed to solve the targeted problem, but the problem do not exist in fact (Curtis and Cobham, 2005).

According to Laudon and Laudon (2004), Information Systems (IS) is determined by not only technology but also management and organization. Similarly, Avison and Fitzgerald (2003) state that 'the world of information system is concerned with organizations and people as much as technology' (ibid: 38). Secondly, when it comes to the Information Systems (IS) projects in developing countries especially, there are more importance on the factors, such as political, economic, organizational and cultural aspects than technology since there are more diversities, instabilities and contradictions in the society and organization in the developing and transitional economy (Salazar, 1999; Westrup el al., 2003; Sahay and Walsham, 1996).

Truly, there are many kinds of constraints for ICT4D projects, such as, poor infrastructure (Duncombe 2006; Ndou 2004), organisation or community acceptance (Whyte 1999 cited in Harris et al. 2003), relevance of information (Etta and Parvyn, 2003), financial sustainability (Oestmann and Dymond 2001), lack of training and skilled personnel (Ndou 2004), literacy (Roman and Colle 2002; Warschauer 2003), gender (Farrell and Isaacs 2007; Törenli 2006).

When these constraints are allocated on the 'Onion-ring model' (Heeks 2007) which shows broad factors affecting Information System (IS), it is obvious that technology is just a part of a whole and most of the constraints are not technological factors. planners and technology advocates think of the technology first and then investigate the educational applications of this technology only later'

(ibid: 5). As discussed above, it is clear that taking the techno-centric approach without paying enough attention to broader factors is one of the main causes of ICT4D project failure.

2.2.2.2. Idolize Approach

Though the shortcoming of the technology-sided approach is understood, why does such an inadequate approach tend to be chosen? The reason is explained by the maturity of the project stakeholders. As is the case of most development projects, local policy makers tend to be the main stakeholders for ICT4D projects such as e-government and ICT4E. However, they often think that ICT is a silver bullet which can solve any problems (Piotti and Macome, 2007; Heeks, 1999). For example, a research about a national healthcare Information system (IS) project in Mozambique found that policy makers considered computers as a complex 'black box' which brings miracle solution for problems (Piotti and Macome, 2007). Though the 'Integrate' approach, which places technology as a tool to create a solution, is considered as the best one, the policy makers are unlikely to be so mature that they can consider technology as a tool, and therefore, they tend to take 'Idolise' approach, which places technology at the centre of projects.

It is because that there are many drivers which encourage 'Idolise' approach such as positive image and frequent advertisement of IT solutions created by the Western world including IT firms, IT technocrats, media and donors which advocate the technology-driven 'eDevelopment' (Heeks 1999; Wilson and Heeks 2000). Furthermore, a lack of IT training for local policy makers assists them to accept the attractive idea that technology is a solution (Piotti and Macome, 2007). The easy acceptance of values from outside may disable them to identify local strength and capabilities (Krishna and Madon, 2003).

2.2.2.3 Design – reality gap

The discussion above indicates that the 'Idolise' approach which leads to the techno-centric and rational project design is problematic to initiate ICT4D projects such as e-government and ICT4E in the project planning phase. As a result of this wrong approach, a project design does not match a reality. Heeks (2002) named this gap as the 'design-reality gap'. There are mainly three kinds of design-reality gaps, such as 'country context gaps', 'hard-soft gaps' and 'private-public gaps', which cause the failures of ICT4D projects such as e-government and ICT4E as explained below.

1) **Country context gaps**: Solutions created in industrialised countries do not work well in developing counties because of many differences between design and realities in terms of their social, economic, political and technical contexts.

2) **Hard-soft gaps**: Solutions based on the Western rationality which can be called 'hard thinking' do not match the 'soft' reality of developing countries where informality, complexity and contingency are common in organisational structure and work process.

3) **Private-public gaps**: Solutions from developed countries tend to be created for the private sector since the private sector is more dominant to use ICT. However, such solutions are not suitable for less developed countries where the public sector is the leading user of ICT because the characteristics of the public sector (e.g. less competition, stronger individual objectives than organisational ones, more bureaucracy, and so on.) are relatively different from the private sector. As mentioned above, these gaps, which are driven by the wrong project approaches, are considered as the main cause of ICT4D project failure.

2.2.3 Educational ICT Equipment and Infrastructure

The physical and technological infrastructure of ICT is a fundamental condition for implementing changes to use ICT in education. Setting up the infrastructure requires consideration of availability of physical infrastructure (e.g. rooms for servers, computer rooms, placing of cables and network points, electricity supply points), ICT hardware and software, human resources to set up and maintain the infrastructure and support everyday running (Lim, Chai and Churchill, 2010 cited in UNESCO,2012). Some key components of schools' ICT infrastructure and hardware including networks, Internet access, computer rooms, open access rooms, staff computers, computers for students, and digital media production facilities.

Given sufficient ICT infrastructure for both teachers and students, schools need to have technical assistants and coordinators to maintain systems and ensure that the infrastructure remains compatible with developments in software (Divaharan and Lim, 2010). While technical assistants help to maintain ICT equipment and ensure everything works, ICT coordinators help to keep up-to-date with new innovations in the ICT field, decide the direction of ICT use for their schools, and organize in-school training for teachers (Lai, Trewern and Pratt, 2002 as cited in UNESCO,2012). Through planning, allocating resources and budget, and giving technical and curriculum support, such coordinators lead the community of teachers in the integration of ICT-based teaching (Lai and Pratt, 2004 as cited in UNESCO, 2012).

For meaningful learning, ICT should not be considered only in terms of ease or efficiency when technology is advocated (Schacter and Fagnano, 1999). Both hardware and software need to be designed according to appropriate learning theories and pedagogical practices. Since different forms of ICT serve and augment different teaching and learning experiences, practitioners need to make informed judgments about which hardware or software is best suited to enhance student learning, achievement and the general ICT environment for the school. Software needs to be chosen or developed after considering the instructional strategy involved. For example, CD-ROM and DVD-ROM are well-suited to individualized instruction, but not necessarily for other types of pedagogy.

Classrooms which undergo the transition stage from being traditional to being ICT-facilitated may face many pedagogical problems, such as lack of appropriate example materials, insufficient in-class practice, overloaded curriculum content, and disordered learning sequences (Lee, 2001). Well-developed software that is motivating, organized, and interactive can help structure ICT-facilitated learning activities, and also allow students to learn individually outside of class. Wassermann (2001) suggests that schools consider their hardware needs before implementing any ICT-based learning activities among students or teachers. The reason is that even when schools have sufficient resources to purchase different software products for teaching, their hardware is not necessarily adequate.

Hardware is not limited to the efficiency of computers. Many ICT-based teaching and learning materials can only be best used within an environment with sufficient and appropriate hardware, which involves physical spaces, computer devices, audio/video appliances, and other equipment (e.g., special sensor devices for scientific experiments).Across the globe, technology has given principals, teachers, and students more powerful and increasingly cost-efficient tools to create, innovate, and collaborate. Portable digital devices, robust and fast Internet connectivity, social networks and the cloud, rich and engaging educational software and digital content, and users (teachers, students, and principals) who are comfortable with technology and understand how it supports student interaction with content are not simply the foundation of a successful educational technology strategic plan. Indeed, they are its oxygen.

Many of the questions about technology that schools or districts must answer concern the types and amounts of equipment and infrastructure that a school has. Schools and districts need to count and keep track of hardware in order to answer such questions.

The main equipment and infrastructure for ICT implementation include plasma television and its peripheries, computer and its peripheries, electricity and internet are crucial in the respective of the study area.

It also addresses the connection of computers and video equipment to networks and to the Internet—the requisite infrastructure that allows users to share information electronically. Much information can be drawn from a school district's inventory system. If an inventory system is set up with the capacity to produce useful reports, and is maintained routinely, surveys may take minutes instead of days to complete. The information that should be included in schools system to provide this capacity follows.

Indicators are provided both for the presence of computers and other technology resources in school administrative and instructional settings and for the availability of these resources to teachers, students, and administrative staff.

Different literature define the terms equipment and infrastructure differently, But here theyrefer to plasma television, computer hardware, electric system and internet and associated communications equipment and cabling, as well as other technology-related equipment regularly used in schools. Indicators address the availability, capabilities, and connectivity of computer equipment and infrastructure.

Computer equipment refers to both computers and associated peripheral equipment, such as:computers, including desktop and laptop machines, but extending to handheld computers (also known as Personal Digital Assistants, or PDAs), mainframe machines, and other specialized computing devices; and peripheral equipment that may be attached to computers, such as monitors, keyboards, disk drives, modems, printers, scanners, cameras, and speakers. Other technology resources in the school setting are also included, such as :network devices—routers, hubs, switches, access servers; communications support, such as fax-back and voice-mail resources in regular use by instructional and administrative staff; videoconferencing and other distance education tools, including satellite transmitters and receivers, cable-based receivers, and modem or codebase video equipment; projection devices, from transparent and opaque projectors to video monitors; and graphing calculators and other specialized computational aids

The term infrastructure covers both devices and cabling. Devices supporting technology in schools include specialized equipment (such as switches, routers, modems, or codecs) that link computers or video hardware to networks. Infrastructure also refers to cabling, whether wire, fiber optic, or

coaxial. In newer systems, links between computers are wireless, in which case infrastructure refers to receivers and transmitters.

For schools to use technology, they must first have it and make it available for students, teachers, and administrative staff. Acquiring that technology, from computers to modems to two-way conferencing equipment, is only one step in facilitating student learning. Curriculum integration in educational satellite plasma television contents and professional development are also essential components in this process.

One important element for access of technology is the ratio of computer to students. At least 40 percent of schools will *meet the minimum recommended standards* of having one digital device for every four students (OECD, 2000; President's Committee of Advisors on Science and Technology, 1997; Ministry of Education of Singapore, 2008)

2.2.4 Teachers ICT Professional Development

When teaching and learning takes place using information and communication technology especially educational satellite plasma television in school setting, one important component is teachers confidence, skill and interest to teach subjects incorporating information and communication technology. This is possible giving continuous training and practice to improving students' interest to learn and work more (Birhanu, 2012).

2.2.4.1 The Technological Pedagogical Content Knowledge

Technological Pedagogical Content Knowledge (TPCK) was introduced to the education world as a theoretical framework for understanding teacher knowledge required for effective technology integration (Mishra and Koehler, 2006 as cited in Birhanu, 2012). It is a framework to understand and describe the kinds of knowledge needed by a teacher for effective pedagogical practice in a technology enhanced learning environment. The TPCK framework acronym was renamed TPACK (pronounced ―tee-pack‖) for the purpose of making it easier to remember and to form a more integrated whole for the three kinds of knowledge addressed: technology, pedagogy, and content (Thompson and Mishra, 2007–2008 as cited in Birhanu 2012).

The idea of TPACK was originated from Shulman's (1986) pedagogical content knowledge (PCK) (Mishra and Koehler, 2006; Cox, 2008; Schmidt et al, 2009). To be precise, in 1986, Shulman proposed the idea of pedagogical content knowledge for teacher education instead of offering content knowledge and pedagogical knowledge separately. This scholar argues that teaching

content and pedagogy as two separate entities is as good teacher education requires a complex integration and balance of the two.

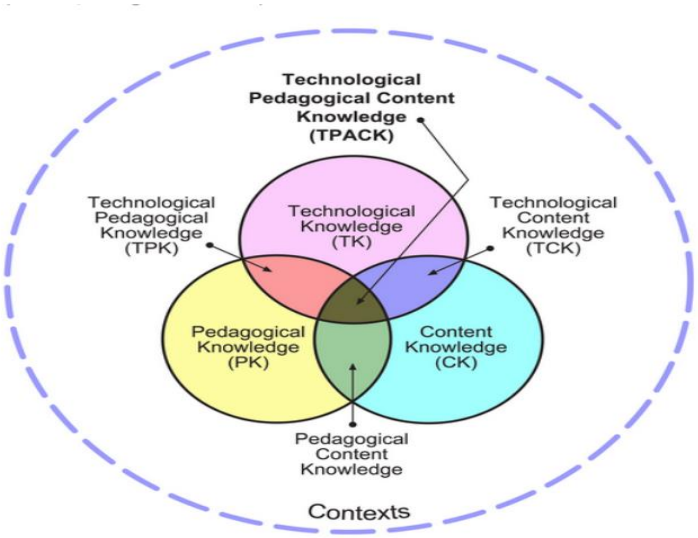

Fig.2.1The TPACK framework and its knowledge components by Mishra and Koehler (2007)

As Cox (2008) wrote, the concept of pedagogical content knowledge had both theoretical and political origins. Though Shulman felt a need to demonstrate the importance of subject matter knowledge in training teachers, there were external entities who believed that teacher training was unnecessary and that anyone with a college degree could be an educator. The implication of this belief was that teacher knowledge was no different than practitioner knowledge. Thus, the pressure to demonstrate the existence of specialized, professional knowledge in teaching was intense. When the framework was first introduced, pedagogical content knowledge was considered a subcategory of content knowledge. Later the term was considered as an amalgamation of one‘s knowledge of content and general pedagogical knowledge in a given context (Grossman, 1990 cited in Cox, 2008).

The TPACK framework builds on Shulman‘s construct of Pedagogical Content Knowledge (PCK) to include technology knowledge as situated within content and pedagogical knowledge (Schmidt et al, 2009). The introduction of instructional technology in the teaching learning environment breeds the notion. It connotes the integration of instructional technologies in the education world. The proponents of the framework argue that effective technology integration for teaching specific content or subject matter requires understanding and negotiating the relationships between three components: technology, pedagogy, and content. The framework incorporates the relationships and the complexities between all these three basic components of knowledge. TPACK does not consider these three key elements in isolation, but rather in the complex relationships in the system

they define, as Jimoyiannis (2010) asserts. At the intersection of the three knowledge types, seven components are included in the TPACK framework as illustrated underneath.

2.2.4.2 Technology Knowledge (TK)

Technology knowledge refers to the knowledge about various technologies, ranging from low-tech technologies such as pencil and paper to digital technologies such as the Internet, digital video, interactive whiteboards, and software programs (Schmidt et al, 2009). It is knowledge of technology within the context of technology integration in schools. TK stands for one‘s ability to use or manipulate instructional technologies for instructional purposes. This involves, as to Mishra and Koehler (2006), the skills required to operate particular technologies. In the case of digital technologies, this includes knowledge of operating systems and computer hardware, and the ability to use standard sets of software tools such as word processors, spreadsheets, browsers, and e-mail.

2.2.4.3 Content Knowledge (CK)

Content knowledge is the knowledge about actual subject matter that is to be learned or taught (Mishra and Koehler, 2006; Tesfaye, 2008; Schmidt et al, 2009). Teachers must know about the content they are going to teach and how the nature of knowledge is different for various content areas. It may also include knowledge of concepts, theories, conceptual frameworks as well as knowledge about accepted ways of developing knowledge (Shulman, 1986).

CK refers to a person‘s understanding of the concepts related to a specific academic discipline (Cox, 2008). For example, a secondary English language teacher is expected to know and understand the subjects that he/she teaches including knowledge of the grammatical aspects of the subject, exponents to express language functions, central facts and theories of the language and the like.

2.2.4.4 Pedagogical Knowledge (PK)

Pedagogical Knowledge (PK) refers to basic, generalizable teaching strategies. It includes generic knowledge about how students learn, teaching approaches, methods of assessment and knowledge of different theories about learning (Harris, Mishra and Koehler, 2009; Shulman, 1986), and it is a combination of many components including classroom management and organization, instructional models and strategies, and classroom communication and discourse(Cox, 2008). That is to say, PK includes knowledge about techniques or methods to be employed in the classroom, knowledge about how students acquire knowledge and how they can be evaluated.

2.2.4.5 Pedagogical Content Knowledge (PCK)

Pedagogical content knowledge refers to the content knowledge that deals with the teaching process which combines pedagogy and content effectively (Shulman, 1986). PCK interweaves pedagogy and content. It signifies one‘s ability to combine teaching methods (PK) and curricular understanding (CK) with knowledge about learners and learning. Pedagogical content knowledge is different for various content areas, as it blends both content and pedagogy with the goal being to develop better teaching practices in the content areas (Mishra and Koehler, 2006). This knowledge includes knowing what teaching approaches fit the content, and likewise, knowing how elements of the content can be arranged for better teaching. For instance, the PCK of language teaching may include language teaching methods and approaches, knowledge of linguistics components, knowledge of what makes those components difficult or easy to learn, knowledge of students‘cognitive difficulties to acquire/learn language skills, and so forth.

2.2.4.6 Technological Content Knowledge (TCK)

Technological content knowledge refers to knowledge about how technology may be used to provide new ways of teaching content. TCK is the manner in which technology and content are reciprocally related (Mishra and Koehler, 2006); it is the knowledge of pedagogical strategies and the ability to apply those strategies for use of technologies (Akkoç, Bingolbali and Ozmantar, 2008). It suggests that teachers understand that, by using a specific technology, they can change the way learners practice and understand concepts in a specific content area (Harris, Mishra and Koehler, 2009). The TCK in language teaching incorporates issues of how educational technologies are used to provide new ways of teaching language skills and elements.

2.2.4.7 Technological Pedagogical Knowledge (TPK)

Technological pedagogical knowledge refers to the affordances and constraints of technology as an enabler of different teaching approaches (Mishra and Koehler, 2006). TPK denotes knowing how teaching might change as the result of using particular technologies. It refers to the knowledge of how technology can create new representations for specific content. It suggests that teachers understand that, by using a specific technology, they can change the way learners practice and understand concepts in a specific content area (Schmidt et al, 2009). Cox (2008), moreover, mentions that TPK refers to a general understanding of the application of technology in education without reference to a specific content. It also includes the ability to creatively use available

technology tools in a pedagogical context. For example, online collaboration tools may facilitate social learning for geographically separated learners.

2.2.4.8 Technological Pedagogical Content Knowledge (TPACK)

TPACK refers to the complex interrelationship between a teacher‘s technology use, instructional methods, and understanding of the subject matter (Mishra and Koehler, 2006 as cited in Birhanu 2012). In other words, teachers who possess TPACK think about and use technology as a part and enhancement of their pedagogical methods in teaching content. It comprises the knowledge and understanding of the interplay between CK, PK and TK when using technology for teaching and learning. As was said, it is an incorporation of technological pedagogical content knowledge of any technological based instruction.

In relation to this, Koehler and Mishra (2006) argue that true technology integration demands understanding and negotiating the relationships between these three components of knowledge. Jimoyiannis (2010) asserts that good teaching is not simply adding technology to the existing teaching and content domain. Rather, the introduction of technology causes the representation of new concepts and requires developing sensitivity to the dynamic, transactional relationship between all three components suggested by the TPACK framework.

TPACK is not a simple combination of three independent domains; rather, content, pedagogy, and technology are interdependent, each one affecting the others (Harris et al., 2007 cited in Cox, 2008). The choice of content affects the pedagogical goals and methods as well as the technologies used; the technology used comes with certain limitations, requirements, or features that may affect which content is covered or how it will be taught (Cox, 2008). Understanding how to balance all three domains in a way that is most effective for learners is a difficult skill to acquire (Bull et al., 2007: Cox, 2008 cited in Birhanu, 2012).

2.2.5 Educational satellite plasma Subject matter content

Educational technology is now widely implemented to improve educational problems in the schools and universities. Its main goal is to empower teachers with additional tools so as to improve learning in the classroom. This study was undertaken to assess the School Net implementation in schools investigate the success and challenges that educational satellite plasma TV contents have in the project implementation in high schools.

The contents in subjects for School Net ware expected of various formats including printable, audio and video format via internet or CDs or DVDs taking immediate assessment and feedback. It is true that subject contents are video contents in educational satellite plasma television contents in Ethiopia going side by side with the curriculum.

In the 1990s, with the advent of the Internet, digital pioneers envisioned a school, delivering quality education, most African countries started School Net initiatives and projects like most continents of the world, exceptionally Ethiopia, Mexico and Brazil have started the project launching educational satellite TV program due timely problem of shortage of teachers and lack of infrastructure in the rural areas. But most other South East Asia, South America and African countries started School Net deploying computer and internet in schools,

At initial time of the project, the then Educational Media Agency now Center for Educational Information and Communication Technology (MOE-CEICT) under ministry of Education (MOE), ICT-leading organization for general education of the government that provides educational satellite television has started to broadcasting to 1,710 high schools in Ethiopia via a total of 15,600 Plasma TVs, some 1482 television programs in 6 subjects (Biology, Chemistry, Physics, Mathematics, Civics and Ethical Education, and English) are broadcast to grades 9 to 12 students across the country (MCIT, 2013 and Gebeyehu, 2014).

Nowadays the program provides educational satellite television broadcasting grows to 1,710 high schools in Ethiopia via a total of 15,600 Plasma TVs. Some 1981 television programs in 11 subjects (Biology, Chemistry, Physics, Mathematics, Civics and Ethical Education, Economics, General Business, Technical Drawing, English and Amharic) are broadcast to grades 9 to 12 students across the country (CEICT, 2015/2016 or 2009 E.C).

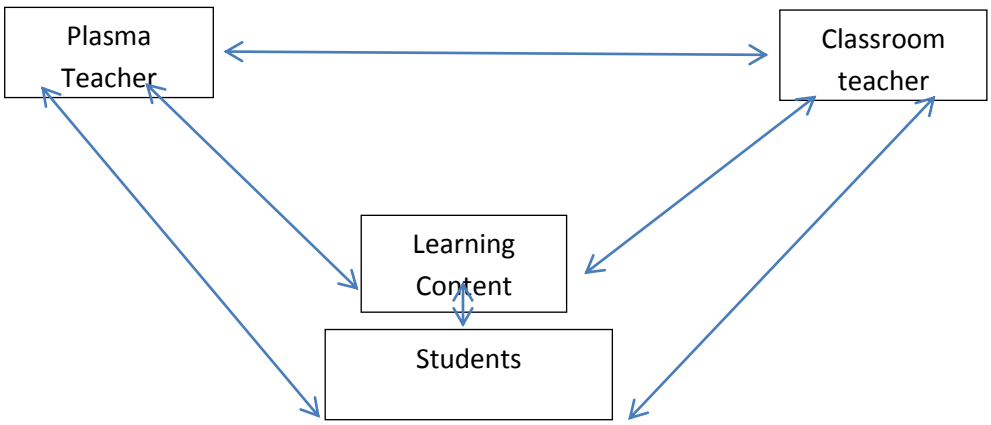

Fig. 2.2: Paradigm for Designing Satellite Instruction (Adapted by the researcher from Birhanu, 2012)

AssefaTemitim (2017) revealed that the educational satellite plasma TV integration in Ethiopian high schools brought some benefits for the students. Its multimedia content presentation attracts student attention for learning, simplifies complex concepts with visual demonstration, and helps teachers to upgrade their pedagogical skills by watching plasma teacher. However plasma TV is not without problems. The problems are classified as student, teacher, and technical related problems. The instructional delivery is fast and uses advanced command of English. These problems become a barrier for student learning. With regard to teachers, their role is limited to classroom managers rather than source of knowledge to their students. They cannot use their skills and knowledge to assist their students. Most of the class time is allocated for the plasma teacher. Technical problems like power interruption, class scheduling, and failure of plasma hamper the normal operation of the teaching learning process.

2.3School Net from planning to Implementation

The different research on implementation in programs, projects and interventions prove that implementation research takes what we know and turns it into what we do. On the other hand the basic intent of implementation research is to understand not only what is and isn't working, but how and why implementation is going right or wrong, and testing approaches to improve it.

Implementation research is a growing field of study with roots in many disciplines and research traditions. It addresses a wide range of implementation problems in diverse contexts. The term implementation research describes the scientific study of the processes used in the implementation of initiatives as well as the contextual factors that affect these processes. One major purpose of implementation research is to support and promote the successful application of interventions that have been demonstrated to be effective.

Educational Information and Communication technology related projects implementation defines the critical systemic process that different levels and schools use to enhance and support the use of technology among all teachers throughout the school. Research in implementation science suggests that quality evidence-based programs or practices that are *not* implemented effectively are likely to *fail* and not achieve the desired outcomes.

After better understanding of concepts, practices and realities on ICT4D in general and ICT4E in particular, focusing on their benefits and challenges of ICT implementation, the focusing on particularity to the issue of the review literature on School Net, its implementation and its practice,

challenges and prospects gearing to answer research questions in Addis Ababa city government secondary schools.

The concept of a "School Net" (School Network) has spread since the mid-1990s, when the internet began to be used more widely in education. Individual definitions and activities of School Nets vary but a School Net can be described, in general, as a network which is set up to support effective use of the information and communication technologies (ICT), particularly the Internet, for enhancing education, and for encouraging greater communication and co-operation among a network of schools.

School Net has become a strong voice for ICTs in schools and the education sector. Its wide contacts with key actors in the ICT and education sectors provide it with influence and leverage. Government and other actors have begun to take these issues seriously. Other similar projects are emerging.

From an organizational perspective, School Nets vary from being private, non-profit, governmental or intergovernmental initiatives. No matter what the type of initiative, however, the majority of enduring School Nets involve input of Ministries of Education. The same is true for the Ministry of Education in Ethiopia.

School Nets also vary in their goals and objectives, depending on such things as the policy environment in the country they are in and the accessibility of the required equipment. For example, the Thailand School Net has so far focused on establishing Internet connectivity in schools, while the Malaysian School Net, which faces a different policy environment and has fewer challenges in terms of connectivity, has focused on providing teachers with access to learning materials in the national language, Bahasa Melayu (UNESCO, 2004).

School Networks can be local, national or international (regional). One of the earliest international (regional-level) School Nets was the Nordic School Net, ODIN, which encompasses the Nordic countries and was set up in the early 1990s by the Nordic Council of Ministers. Around the same time, local and national School Nets were being set up elsewhere in the world, for example the Ohio School Net (set up as a network of schools in Ohio State of the United States of America in 1994), the Canada School Net and European School Net, which were all established in the mid-1990s.

2.3.1 School Net Project Implementation

To begin with, effective Innovations and effective Implementation results in Positive Outcomes. In essence, the implementation process involves coordinated change at the system, organization, program, and practice levels. It is a multiyear process, guided by a shared vision, and it is most successful when the leadership team has thoughtfully built an infrastructure of support for the initiative and has developed professional learning opportunities to build collective capacity.

Although recommendations vary in terms of the number of "stages" or "phases" to consider and the terminology used to represent each stage, they possess a number of common core elements. Key elements represented in most implementation and school change frameworks highlight the importance of: a planning phase, an implementing phase, and a scaling-up or sustaining phase; using data to identify needs, set goals, assess progress, and generally inform the process of implementation; creating relationships, collaborating with stakeholders, and building "buy-in" and building collective capacity

Implementation research, as it applies specifically to educational ICT, is a type of education policy and systems research concerned with the study of ICT for education policies, programs, and practices, with the basic intent being to understand not only what is and isn't working, but how and why implementation is going right or wrong, and to test approaches to improve implementation. As noted at the outset, very often it is concerned with the problems arising when an initiative is rolled-out or scaled-up.

Researchers suggest that School Nets face challenges in the following areas in high-growth situations:

Infrastructure: Where School Nets are providing network access or network-based services, network infrastructure needs to be expanded as the number of users' increases. This can include bandwidth, access infrastructure such as dial-up lines and server hardware. Smaller networks are more vulnerable to network bottlenecks than larger networks. For this reason, School Nets that work with large ISPs are at an advantage, as they do not have to invest in expanding infrastructure, and a larger network is more easily able to absorb sudden increases in usage.

Support: Increased demand for e-mail, telephonic, online or onsite support.

Quality of service: If infrastructure and support capacity do not keep pace with growth, the quality of service provided to and perceived by end-users will decrease. If not addressed, this can lead to

dissatisfaction and potentially fragmentation of the broader School Net network as schools or teachers seek service and support elsewhere.

Nature of services: As the volume of users grows, demand may increase for different types of services not previously offered. For example where a connectivity network is very successful, demand will increase for online content, and training teachers may become more important.

When the project work plan is complete, agreed by all involved parties and approved by relevant management groups, the implementation of the project may begin. It can be very helpful to include the entire research team (including stakeholders, partners and frontline workers) in the launching of the project. The team members review the project goal, objectives, indicators and work plan. They address potential issues and set up a mechanism of communication to ensure teamwork during implementation. The team leader must ensure that the work begins on time and the agreed standards of performance are followed within the approved budget limits (WHO, 2014).

2.3.2 National policy context to School Net Project

According to Ziphorah (2014), educational technology use involves understanding and developing sensitivity to the dynamic, transactional relationship between the three components of knowledge: technology, pedagogy and content, as modelled in the Technological Pedagogical Content Knowledge (TPACK) framework (see Koehler & Mishra, 2005). Moreover, to successfully integrate ICT in educational practice, the conditions at the school level need to be adjusted accordingly (Evoh, 2007). In this respect, Kennisnet (2013) stated that ICT integration is a matter of a well-balanced deployment of four key components: vision, expertise, content and applications, and resources (Four in Balance model). To achieve this balance, the involvement of all stakeholders in the preparation and execution of a clear ICT policy plan is needed (Vanderlinde, van Braak, &Tondeur, 2010). Consequently, the process of effective ICT integration in developing countries is complex and influenced by multiple historic, social, cultural, economic and political contexts (Krug &Arntzen, 2010).

Efforts to foster the integration of ICT in education in Africa are often rooted in large-scale top-down initiatives, such as the One Laptop per Child initiative and the Ethiopian Plasma TV program, and apply a ‘one size fits all approach’ that is heavily based on technology as a means of solving educational problems. Such initiatives are doomed to failure (Abera, 2013; Warschauer& Ames, 2010 cited in Voogt&Tondeur, 2015).

2.3.3 Forms of School Net

According to (UNESCO, 2004), report School Net programs can exist in a number of different organizational forms in different countries depending on country's specific factors and context. However; the common forms of School Net programs used worldwide are: Educational technology units located within the Ministry or Department of Education. Countries like Malaysia and Singapore exercising such types of School Net structure. In this forms the educational technologies are under the control of Ministry of Education or legal entity or department.

The other forms of School Net structure are the one where initiatives are within other department or organizations. For example; in Thailand the technology is housed by Thailand National Electronics and Computer Technology Center (NECTEC) and in Philippine the technology is run by Foundation for Information Technology Education Development (FIT-ED) which is non-government organization.

In some case the internet connectivity and educational service may separate in to different entity. Indonesia uses such type of School Net forms where the internet connectivity and educational services are provided by two different organizations. Whatever countries used different School Net forms, the effectiveness of the School Net project depends on the quality of project plan, availability of infrastructures, adequacy of resources, commitment of the stakeholders and above all strong and clearly stated ICT in education policy which guides how to select, adopt, share, innovate and manage the technology are very important.

2.3.4 Objectives of School Net in ICT policy and strategy in Ethiopia

The School Net project arises from the need to integrate ICTs into Ethiopia's educational system. It is designed to develop a wide-area network linking all schools in the country and making internet and online education accessible to them. The initiative constitutes a key component of e-government program and aims at the application of Computer Assisted Learning for purposes of teaching and learning. The broad objectives of this initiative are to:effectively deploy and utilize ICT to facilitate teaching and learning in Ethiopian schools;ensure that ICT and other educational delivery technologies are developed and effectively used to manage and administer the processes of teaching and learning;broaden access to learning and other educational delivery technologies to a wider section of pupils within the Ethiopian school system;support teaching and learning and improve the efficiency and effectiveness of administrative and service-delivery processes within the school system and promote and facilitate access to educational services and resources.

Additionally, the initiative objectives include to ensure that school administrative, teaching and support staff all have access to ICT resources to enhance their effectiveness and efficiency;develop educational delivery infrastructure capable of delivering a wide range of educational application systems and providing access to educational services and resources for the benefit of learners, teachers and administrators.

In general, a full-fledged national School Net program is expected to support the teaching and learning process, using the internet as an educational development and delivery platform to support teaching and learning. Implementation of integrated school-net system for Ethiopia will go beyond supporting basic teaching and learning. It also supports school administration and other non-teaching functions of the school system.

2.3.5 The use and Implementation of School Net in the World

Padian et.al (2011) defined implementation Science as it is the study of methods to improve the implementation, and translation of research findings into routine and common practices (the 'know-do' or 'evidence to program' gap). According to Leroy et al (n.d), the main challenge today is to transfer what we already know into action; deliver the interventions we have in hand to [those] who need them. As departing away from short-term goals and pilot projects, Implementation Research works to meet that challenge and move toward long-term goals, sustainability, and scale-up. Implementation Research aims to integrate evidence-based interventions and research findings into education policy and practice. So, Implementation Research moves results from effectiveness studies and efficacy trials to real world settings, obtaining information to guide scale-up and sustainability.

The function of Implementation Research includes identifying implementation problems that hinder access to interventions, and delivery of services, as well as usability of evidence-based interventions, and their main determinants; developing and testing practical solutions to these problems that are specific to particular health systems and environments or that address a problem common to a region; identifying how evidence-based interventions, tools, and services should be modified to achieve sustained education impacts in real-world settings, including low- and middle income countries and determining the best way to introduce practical solutions into education systems and facilitating their full-scale implementation, evaluation and modification.

It should be noted that monitoring and evaluation (M&E) activities are an important component of Implementation Research, but monitoring and evaluation (M&E) and Implementation Research

arenot the same. Implementation Research does not refer to standard program delivery or ‘business as usual’.

School Net’ is Internet-based system evolving and expanding as the project content conducts its work with sub cities and schools. These modules are available for those schools under the project and those outside. The system primarily discussed and used in all sub cities but for this study three sub cities and three respective Secondary Schools in this study included considering Account, Align, Assess, Outreach, and the Data Warehouse (CPRE,2007).

• The *Account* module tracks student performance and other data (School Net, Inc., 2005). The module allows administrators to generate reports to analyze assessment trends and efforts to meet School Improvement Plan (SIP) requirements and Academic Year Plan. Using this module, administrators can examine data at the school, student group, and individual levels. For example, the user can quickly access individual student information and history with this module. In case of the project the module track teachers performance in using the content in the allotted period and time.

• The *Align* module enables the district to align and disseminate curriculum, instruction, and assessment throughout the district (School Net, Inc., 2005). The program gives teachers access to current student performance data, online curriculum resources, and can track class progress towards covering the curriculum. Some examples of uses for teachers include analyzing individual student progress on tests in order to differentiate instruction. Teachers can also review overall classroom performance on assignments. In addition, lesson plans and best practices can be shared electronically throughout the district.

• The *Assess* module centralizes and automates the “scheduling, dissemination, administration, and processing of benchmark tests” (School Net, Inc., 2005, p. 1). Among its many functions, Assess can align benchmark test items to state standards and allow dissemination of teachers’ classroom assessments.

• The *Outreach* module provides districts with a mechanism to disseminate information about the schools to the community via the Internet (School Net, Inc., 2005). Using this module, teachers and administrators can create and maintain websites and communicate with students, parents, and teachers via discussion forums, electronic bulletin boards and other tools.

• The *Data Warehouse* integrates a data system to enable users to easily access data from one source (School Net, 2005). The district determines who has access to what data. Thus, teachers

typically only have access to student data for their class, whereas the principal has access to data for all students in the school. Parents have access to information about their child, but not other children.

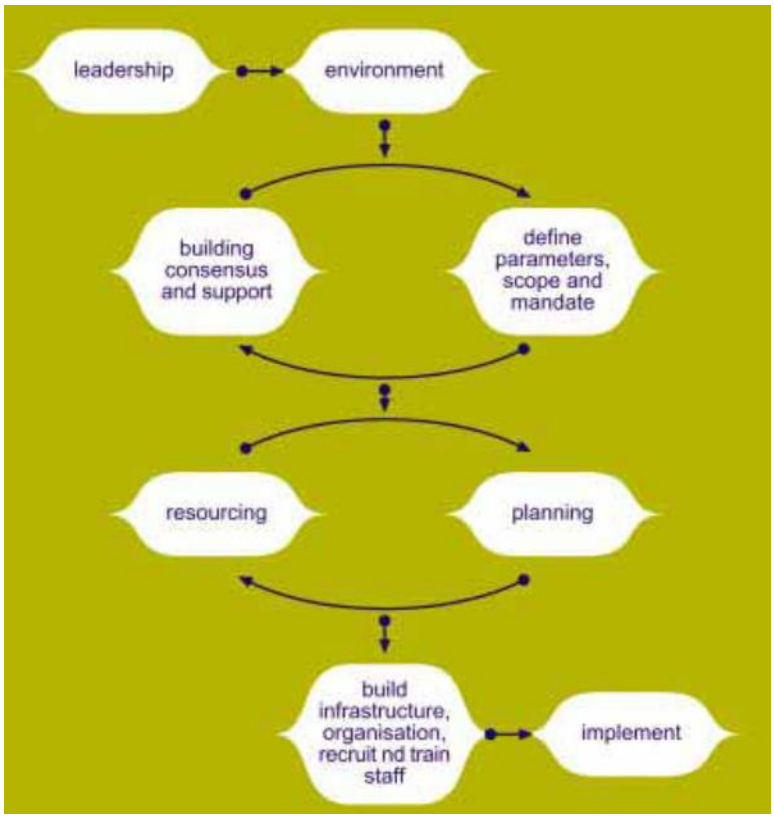

Fig.2.3 School Net start up process (School Net toolkit, 2004)

The figure above describes how the School Net process starts up and where it ends. As it is indicated the Schools Net start up process with the interaction between leadership and the environment. Then with in the environment there are two things to consider. They are building consensus and support in one side and define parameter, scope and mandate on the other side. Then accompanied by resources and planning. They also help to build infrastructure, organization, recruit and train staff. Finally implementation comes.

School Net also offers several types of services to support the development and use of the School Net system. These services include an implementation procedure, technological support, and capacity building support in the form of consulting, professional development, and communication about the reform (School Net, Inc., 2005). School Net technical services include data loading, data cleansing, integrating School Net with existing data systems, hosting the district's Internet program, supporting network administration and related activities. The district determines which services and the scope of selected service to procure.

There is only anecdotal evidence that School Net efforts are "*enhancing basic computer skills of learners and teachers*." Where it is happening, it seems to be due more to the efforts of an enthusiastic teacher (SIDA, 2004).

The European Schools Project, were implementing initiatives similar to School Nets in the early 1990s, but did not use the term "School Net" and worked mostly on a practical level with teachers, rather than also engaging policy makers.

All School Nets promote partnerships in learning. For example, Canada's School Net, one of the first national-level School Nets, explains a School Net as follows: "a partnership with the provincial and territorial governments, the education community and the private sector, which promotes the effective use of information and communications technologies in learning" (UNESCO, 2004). It also added there is evidence indicating that some schools connected by School Net are "reaching a high level of Internet usage by learners and their teachers."

When we come to Africa ICT distribution and application is not uniform. There is a great deal of variance in ICT policies in education among the African countries. However, South Africa is better in this case which clearly unique in terms of being able to move its ICT agenda forward through establishing school Set (South Africa School Net, 2013). Besides to South Africa some of North Africa countries which have both resources (software & hardware) and high bandwidth connectivity with Europe have also been able to make excellent progress in integrating and implementing the information communication technology in their plans.

Countries like Mauritius, Ghana, and Botswana which are in steadily moving to sustainable economic development constitute other groups that are making remarkable progress in ICT utilization. Perhaps the largest groups of the countries that are in transition from a sustained period of conflict and economic instability are looking for ICT applications to help them meet myriad challenge, particularly the development of their human resource capacity. They are among the neediest countries in terms of assistance (Farrell, Glen and ShafikaIsaacs. 2007). For effective implementation of information communication technology in education country's economic development, availability of infrastructures, connectivity, sufficient resources and political stability are very important.

The Educational sector development program (ESDP-III, and IV) in Ethiopian emphasize on the integration of information communication Technology infrastructures in to education to support country's education system with technology in order to bring quality education.

In view of this, Information Communication Technology infrastructures are provided to secondary schools to receive satellite education transmission (plasma instruction) broad casted from one center to enhance quality education since 2004. Although the program lasted for more than ten (10) years, there is a disparity between the objectives it intended to address and what the program practically providing (Berhanu, 2013).

In order to solve these problems the government's other alternative technology facilities - computer laboratories in secondary schools to make the students to access information through internet is underway. Furthermore, CEICT under the Ministry of education planned to implement School Net project through the connection of the schools with internet access in using computer Lab., Plasma TV and other technologies to make the schools to explore information.

2.3.6 The use and Implementation of School Net in Ethiopia

For the purpose of this research, we define implementation as Fixsenet. Al (2005),

Implementation is defined as a specified set of activities designed to put into practice an activity or program of known dimensions. According to this definition, implementation processes are purposeful and are described in sufficient detail such that independent observers can detect the presence and strength of the ''specific set of activities'' related to implementation. In addition, the activity or program being implemented is described in sufficient detail so that independent observers can detect its presence and strength.(Fixsen, Naoom, Blase, & Friedman, 2005, p. 5)

Information Technology as one subject is given from grade 9-12 in all schools throughout the country. It is early stage of ICT development in the country. There are some attempts to integrating ICT as important tool for facilitating the teaching learning activities. The best example for such integrating initiative of ICT in the curriculum has begun the radio transmission and Instructional plasma television transmission. The former is for elementary schools and the latter is for secondary schools.

The day today importance of ICT in the age of information, it would be necessary to go with time to improve the ICT infrastructure and equipment, the professional development of teachers and school leaders, improving the learning contents.

2.3.7 Practical Implementations of ICT into Schools

To promote the use of ICT as a resource and tool for teaching and learning, initiatives have been put into place globally, continentally and within individual countries.

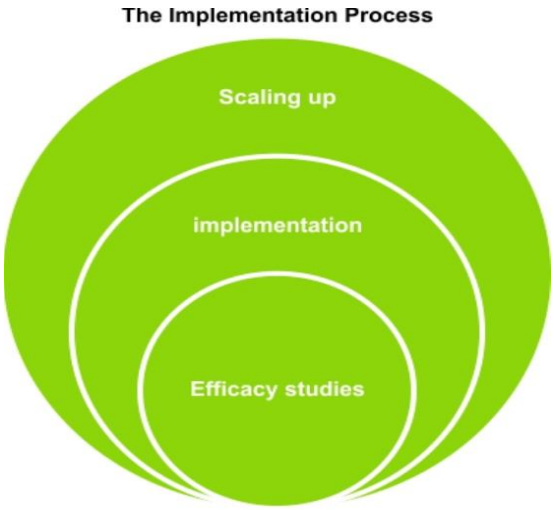

Fig. 2.4 The implementation process (adopted from 2012)

• **Global e-Schools Initiative**

The Global e-Schools and Communities Initiative (GeSCI), was established in 2003 by the United Nations (UN) ICT Task Forces (GeSCI, 2009). The goal of this initiative is to deploy ICT to improve the quality of teaching and learning in primary and secondary education in developing countries (GeSCI, 2012). To achieve this goal the GeSCI engages with Ministries of Education (MoE) and other ministries within a country, to identify the limitations as well as to exploit the potential of ICT (ibid). The objective therefore is to help authorities to make informed decisions with regards to the deployment of educational ICT into schools (ibid). Outcomes generated from the work of GeSCI are generally educational policies, strategic plans and action plans (ibid). Furthermore through the GeSCI ICT facilities are not only deployed into schools but also integrated into school curricula (ibid). Along with global initiatives to ensure integration of ICT into schools, there are also practices (ICT deployment and integration into school curricula) within continental structures.

• **ICT in Education: Practices in Latin America**

In Latin America, pressure to integrate ICT into schools has persuaded educational institutions to provide specialized training to aid the effective use of ICT for teaching and learning (Guerra & Jordan, 2010). Since the year 2000 therefore, various Latin American countries have initiated the integration of ICT (such as Internet resources, computers and educational software etc.) into school process by creating ICT policies (Guerra & Jordan, 2010). Examples of these policies in some Latin American countries are: a Digital Agenda Strategy in Argentina, a National Plan for Digital Inclusion in Bolivia, the Green paper on Information Society in Brazil, a Digital Strategy in Chile

and a Connectivity Agenda in Colombia (ibid). The general aim of these policies is to promote a widespread access to ICT and ICT skills training. Following on from the policy creation, the implementation strategies were led by inter-governmental structures such as the Latin America and the Caribbean (eLAC) multilateral organisation with the aim of fostering economic development and social inclusion in the region (ibid).

Within the individual Latin American countries, approaches to the subject of ICT implementation vary according to how the concept of ICT integration into school education is viewed. In Argentina for example, education is seen as a way of developing human capital and is considered a significant enabler (Auguste et al., 2008). To ensure quality education therefore, the central focus of developmental strategies is to ensure integration of ICT into schools to improve or maintain the quality of education (Guerra & Jordan, 2010). This is achieved by specialist training in technologies (such as learning programs) as well as promoting innovation, research and development within the country (ibid). In Uruguay for example, the 'CEIBAL' (i.e. Basic Computer Educational Connectivity for Online Learning) was developed to promote ICT deployment into schools and its integration into schools curricula (Gutterman et al., 2009).

The focus of CEIBAL is on educational infrastructure, curriculum redesign and digital inclusion (Winocur&Aguerre, 2011). As part of the One Laptop per Child program, CEIBAL also seeks to provide personal laptops for all teachers and learners within public schools in Uruguay (Prusa&Plotts, 2011). Finally, in Chile strategies to promote ICT in education are focused on developing course content, ensuring good infrastructure and building teacher as well as learner ICT skills (Light, 2010). Clearly, the fact that organizations within individual countries in Latin America are making efforts to deploy ICT into schools and to integrate it into school curricula indicates the significance they attach to it. Furthermore, this indicates the importance of ICT in the field of education in these countries as it is supported at high organizational levels.

• ICT in Education: Practices in ASIA and the Pacific Region

Despite efforts to improve the quality of education, the status of equal access to quality education in Asia and the Pacific region is mixed. In the area as a whole, the status of access to education, has improved over the years (The Global Monitoring Report, 2008). The literacy rate for East Asia and the Pacific for example, has risen from 95% to 98% for both females and males (UNESCO, 2010). In South and West Asia on the other hand, the literacy rate has risen from 61% to 80% (ibid). Although this is a great improvement, sadly in this region emphasis seems to be placed more on

access to education rather than the quality of educational content delivered (The Global Monitoring Report, 2008).

As a result a large number of children complete schooling without acquiring adequate literacy and numeracy skills to help them further their education, or to become employable and by this means improve their standard of living. Although noteworthy progress has been made in terms of the literacy rate over the past years, illiteracy, specifically for females, is still a problem, mainly in the South Asian countries (The Global Monitoring Report, 2008). These South Asian countries still have a large number of children, particularly girls who still lack access to quality education (UNDG, 2010). In essence 66 percent of out of school children are girls (ibid). It is for this reason that both regional development organisations and national governments in this region are turning to ICT to provide solutions to problems in their schooling systems.

In Asia initiatives to promote ICT in school education have also taken place across the continent and within individual countries. Across the continent for example, the Asian Development Bank (ADB) is supporting efforts towards the achievement of the Millennium Development Goals (MDGs), to reduce the poverty and illiteracy rate by half by year 2015 (ADB, 2003). In this regard, the ADB has developed a policy (i.e. ADB's Policy on education) to help create an ICT enabling environment, to develop ICT applications and information content and to provide ICT skills training (Loxley, 2004; Assessment, 2008).

The policy advocates equal access to quality education for all children and adults in Asia and the Pacific regions (ibid). The aim is to empower these people to improve their standard of living, to break the cycle of poverty and to enable them to be involved with national developmental strategies (Islands, 2004). ICT is further seen as a resource and tool to improve the quality of education and make it accessible to all, hence the ADB has developed an ICT in education policy (i.e. ADB's Policy on education) to ensure its integration into school curricula (ADB, 2009).

In addition to the ADB's ICT policy development, individual countries within Asia and the Pacific Region have created ICT in Education Master Plans (Lallana, 2012). Examples of these countries are Cambodia, China, India, Japan, Korea, Malaysia, Mongolia, Singapore, Sri Lanka, Thailand, Vietnam, Australia and New Zealand (ibid). To aid in the creation of these master plans a toolkit (i.e. ICT-in-Education Toolkit) can be accessed online for policy makers, practitioners and planners (OECD, 2009). The ICT-in-Education Toolkit contains toolboxes that provide interactive tools and step by step guidelines that assist users in the policy development process (ICT-in-Education Toolkit, 2007). On a practical level however the status of ICT deployment and its integration into

curricula varies from country to country. In many schools in Brunei, Malaysia, Singapore and Vietnam for example, ICT is seen as a significant tool and an enabler of the teaching and learning process and it is integrated into all subject areas (Park, 2011). In Indonesia, Myanmar, the Philippines and Thailand on the other hand ICT is only integrated into a few subjects, with the highest priority being given to Information Technology (IT) courses (OECD, 2009). In Timor-Leste and Lao PDR only the schools that opted to experiment on ICT usage have basic application training for both teachers and learners (ibid). Nevertheless, the presence of a practical focus on ICT in schools, however small it may be, shows the belief that countries have in the promised benefits of ICT.

• ICT in Education: Practices in Africa

In Africa a need for social transformation and economic development is used as the basis and justification for investments in educational reforms (Ang'ondi, 2010). ICT is therefore seen as a tool and an enabler of equal access to quality education (Wahab, 2006). As a result there has been a progressive shift in the process of adoption and distribution of ICT in education in Africa (Farrell & Isaacs, 2008). Within the phase of ensuring system implementations, priorities have been given to creating governmental policies that inform implementation efforts (ibid). Consequently most countries across the continent have taken steps to create ICT policies to articulate the ICT goals and implementation strategies for the educational sectors of government. Thus in those countries with ICT policies that indicate national commitment to ICT development it can be assumed that the educational sector can expect advancements in educational technology implementations in the schooling sector as well. The converse can also be assumed, in that countries with no policy undertakings may be least likely to have basic infrastructure that could support implementations of educational technology in schools.

Accordingly, the status of ICT policy development in Africa ranges from countries with no ICT policies in place via those in the process of developing a policy, to those with developed policies in place. Table 2 also shows the progress of ICT policy development over a period of eleven years. For example in 2000 very few countries had an ICT policy and the number of countries without a policy in place was more than double the number of countries that had developed a policy. The idea of ICT being a resource and tool for teaching and learning has been embraced gradually over the years 2000 to 2011. This is evident as the current status of ICT policy creation across the continent has improved significantly, with over 86% of African countries having an ICT policy in place in 2011 (Chekol, 2011). With this, educational sector policies are often embedded into national ICT

policies. The creation of policy indicates that national governments are taking positive steps to promote the use of ICT for socio-economic development.

From a general ICT policy perspective, most countries across the continent are in the process of transforming their telecommunication policies to promote more competition within the industry (Touré, 2007). A general ICT policy in the case of South Africa for example, refers to e-Education policy by the national Department of Communications (DoC) that provides a guideline to the South African Government's response to a new information and communication technology environment in education and regulates conditions for ICT in education to thrive (DoE, 2003). Anticipated implications for ICT access in schools is, hopefully, a declining cost of access to quality infrastructure. Though the cost of access to information and telecommunication is decreasing, most educational institutions are unable to gain Internet connectivity due to limited financial resources (Tino, 2003).

There is also a huge gap in terms of infrastructure development between the urban and rural areas (Farrell & Isaacs, 2008). For example, poor access to reliable electricity supply is a general problem in most countries across the continent (Eberhard et al., 2008). However, the situation is far worse in rural areas due to the challenges of connecting to national electrical grids (Haines, 2006). A greater problem is a lack of resources to provide ICT training and technical support (Bingimlas, 2009). Consequently there is a gap between the availability of ICT resources and competent individuals to integrate them into school curricula (Adebisi, 2008). Although national governments across Africa are taking relevant steps to promote ICT in education, the continent is plagued with poor infrastructure and resource inequalities (Farrell et al., 2007).

With the socio-economic issues that exist on the continent, there is a definite variation in the level to which countries are able to carry out their proposed educational technology strategies (ibid). For example, a need for appropriate infrastructure and a more mature economy means that few countries on the continent, such as South Africa among others, are able to implement their national ICT strategies (ibid). On the other hand due to their resources and high bandwidth connectivity gained from Europe, a few countries in the Northern parts of Africa have made significant progress in their ICT development strategies (Farrell & Isaacs, 2008).

Furthermore countries that are moving towards a more stable economy such as Botswana, Mauritius, Ghana and Cameroon identified the provision of ICT applications to their local economies as a high priority (Economic Commission for Africa) (ibid). Sadly however, a large number of countries on the continent are either in conflict or emerging from a period of conflict and

dictatorial leadership (Chacha, 2004). Although these countries see ICT as a tool to aid their efforts to promote equity and quality in education, internal conflicts and political instability make progress on ICT for education initiatives difficult. Fortunately even without policy development or adoption, there have been initiatives led by the formal school sectors to promote the integration of ICT into schools in most countries (Farrell & Isaacs, 2008).

• ICT Initiatives in Primary and Secondary Schools in Africa

Across the continent, countries such as South Africa, Senegal, Mali, Ghana, Nigeria, Cameroon, Namibia, Uganda and Kenya (to name but a few), have had ICT in education initiatives that were driven mainly by educational institutions (such as primary and secondary schools) (Farrell et al., 2007). Within these countries the use of ICT in schools has been made possible by large organizational programs such as the World Bank's Links for Development and School Net Africa. It is clear then that ICT is seen as a tool for achieving educational outcomes (LaRocque& Latham, 2003).

With the advances that ICT has to offer for the teaching and learning process, it is vital that every learner has access to ICT resources, in order to experience its full benefits. To this effect, most African countries (e.g. Ghana, Botswana, South Africa, Zambia, Kenya and Namibia) that have developed national ICT in education policies, place great emphasis on universal access and use of ICT in all schools. Furthermore, formal structures on the continent, such as New Partnership for Africa's Development (NEPAD) have developed programs such as e-Schools Initiative to promote universal access and use of ICT in all schools (NEPAD, 2010).

• NEPAD e-School Initiative

The NEPAD e-Schools initiative was launched in 2003 (ibid). The initiative views the acquisition of ICT skills by learners as crucial in ensuring that they are able to partake in the global information society and knowledge economy (Farrell et al., 2007). To this effect, the initiative advocates for the universal access to and use of ICT (Ayere et al., 2010). To ensure universal ICT access and use, the project seeks to deploy ICT equipment (i.e. computer, radio, television, phone, scanner, cameras, copiers, etc.) into all primary and secondary schools and connect them to the Internet (ibid). The overall goals of the e-Schools initiative is to equip all Africans in primary and secondary schools with ICT skills, and to train teachers with skills to use ICT tools to improve the teaching as well as learning processes (DoE, 2003). Finally the initiative seeks to equip school

managers with ICT skills to coordinate management and administration in schools (Onguko& Hennessy, 2010).

2.4 Ethiopian Experiences

Ethiopia has made education a key strategy in vitalizing her Socio-economic transformation and invests 5% of its GDP annually in education. Additionally, the United Nations Development Program helped establish the School Net project in Ethiopia to integrate national educational resources and help ensure the availability of education all over the country().

According to Addis fortune on www.allafrica.com 20 October 2013 wrote the tittle as "Ethiopia: School NetProgram to Connect All Secondary Schools in Addis Ababa" and continue

> "The Addis Ababa Education Bureau said it will connect all secondary schools in the metropolises with the School Net program this academic year. About 2,500 computers have already been purchased at a cost of 23 million Br to connect the schools," Delamo Otore, Former Bureau head.

The connection would encourage interaction among teachers and students of secondary schools as well as helps students to benefit from computer networking, among others, according to Delamo.

2.5 Challenges

Despite substantial improvements in urban areas, Ethiopia needed to extend more educational resources to rural areas. The country's School Net project had made some progress by establishing VSAT-based television broadcasts covering math, English, and physics. However, the rental cost in VSAT bandwidth was expensive, and the VSAT system only provided live programs. This limitation made it difficult for rural schools to schedule their courses or do more remote interactive teaching. In addition, the satellite signal was sensitive to weather conditions.

According to Assefa (2017) mentioned the instructional plasma TV integration in Ethiopian high schools brought some benefits for the students. Its multimedia content presentation attracts student attention for learning, simplifies complex concepts with visual demonstration, and helps teachers to upgrade their pedagogical skills by watching plasma teacher. Instructional Satellite Plasma TV has problems classified as student, teacher, and technical related problems. The instructional delivery is fast and uses advanced command of English. These problems become a barrier for student learning. With regard to teachers, their role is limited to classroom managers rather than source of

knowledge to their students. They cannot use their skills and knowledge to assist their students. Most of the class time is allocated for the plasma teacher. Technical problems like power interruption, class scheduling, and failure of plasma hamper the normal operation of the teaching learning process (ibid, 2017).

To make further progress, the School Net project owners decided to deploy a desktop system for 65 schools. The deployment and maintenance had to be centralized and simple because the Ethiopia IT team was already stretched to the limit. The plan was to construct a desktop-cloud-based system featuring HD remote interactive teaching.

Unfortunately, the infrastructure in Ethiopia was not reliable enough to support a Video on Demand (VOD) teaching system that was sensitive to bandwidth variations. Requirements for the desktop cloud system therefore included the following:

- **Excellent graphical transmission and processing capabilities**: The Video on Demand service must minimize network bandwidth usage without sacrificing the audio and video teaching experience
- **System reliability**: The desktop cloud system must have a mature reliability mechanism to ensure satisfactory Video on Demand service experience and enable centralized deployment
- **Implementation experience**: The contractor implementing the system must be able to deliver the desktop cloud project despite the complexities of the infrastructure

Successful factors for implementation can be viewed from two perspectives; strategy and affordability of the hardware, software and other related equipment for ICT.

From a strategic point of view, the first implementing factor is to develop a vision. A clear vision means understanding what needs to be achieved through the use of ICT in schools. The success will be limited unless there is a shared vision or understanding in the school environment. A clear vision will guide the development of a strategic plan, giving all members of the school a common direction and enabling them to work together.

Affordability views the successful factors of implementation as the ability to acquire the hardware, software and provide all the relevant facilities and infrastructure that can make ICT work in a school environment.

Miller et al (1996) listed critical factors that can help the adoption of ICT in schools including availability,accessibility, efficiency of technical support; and attitude of educational leaders.

2.6 Chapter Summary

In concluding the review of literature on the study of implementation of School Net in the facilitation of teaching and learning, the researcher observes that there are several gaps that need to be researched on. For instance; some scholars have carried out studies in secondary school ICT curriculum implementation (Hiwot,2013; Gebremariam Mesfin,2004), educational satellite plasma TV for teaching and learning (Wakshum,2012; Anagaw,2007, Abate, 2004) ICT4D in case of School Net project (Kassa,2012) and School Net implementation in Yeka Su-city(Abrham,2016). Their findings could not be generalized to the utilization and implementation of School Net with educational satellite plasma transmission or accessing using Internet connectivity in valid and reliable sample in Addis Ababa. The above studies did not investigate the practice, challenges and prospects of the project facing teachers and students in the use of instructional technologies in secondary schools. The current study therefore sought to fill the gaps created by the inconsistencies in the areas covered by the above scholars whose findings could not be generalized to secondary schools.

Chapter Three

The Research Design and Methodology

Introduction

This chapter highlights the research design, research method, location of the study, source of data, sample and sampling techniques, instruments of data collection, Pilot study and methods of data analysis.

3.1 The research design

In any research the type of methodology used depends on the research problem, research question, type and source of data to be collected and the analysis processes required (Koranteng, 2012). Research design is a comprehensive plan for data collection in a research project. It is a "blueprint" for research aimed at answering specific research questions or testing specific hypotheses, and must specify at least three processes: (1) the data collection process, (2) the instrument development process, and (3) the sampling process (Bhattacherjee A.,2012).

In order to achieve the objectives of this research, descriptive survey research design was applied. The researcher of this study used this design for two main reasons: firstly, descriptive survey research design helps the researcher to obtain current information concerning the implementation of school Net in the secondary schools. Secondly, it allows the researcher to use both the quantitative and qualitative methods, which provide rich data that lead to important recommendations (Kothari, 2005). a. Sproul (1995) states that; a survey research design collects background information. He recommends the technique for research where attitudes, ideas, comments and public opinion on a problem under investigation. It helps a researcher gain insight in generalizing a situation without utilizing the whole population. The study will also focus on assessing the implementations of School Net project in Secondary Schools in Addis Ababa City Administration. To this end, a descriptive survey design was employed with the assumption that it could help to get a description of the current state of the implementation of the program by examining its practical achievement, challenges and prospects. According to Kotheri (2004), the major purpose of descriptive research method is description of the state of affairs as it exists at present.Generally the research used the mixed research design.

To achieve this, the researcher employed mixed research design and data collection strategies. The design chosen for the study was suitable because it helped the researcher to:

i. Describe the practices in School Net used in the teaching and learning in secondary schools in the study area.
ii. Describe the perception of teachers, students and School leadership in School Net used in Secondary Schools in the study area.
iii. Describe the challenges both teachers, students and School leadership experience in the use of technology.

3.2 The research Method

As previously described in the research design, the researcher employed mixed research method with more descriptive Survey research method for the discussion of practices, challenges and prospects of School Net implementation in secondary schools in Addis Ababa. This type of research method could help the researcher to describe the issues under investigation. The method used is qualitative supported quantitative measurements in the form of frequency, percentages and tabular illustrations. The available data is explained, analyzed and utilized to suggest ways and means to improve the situation. Hence, mixed research method with more descriptive survey is used.

3.3 Location of the study

Addis Ababa is the capital city of Ethiopia and the largest city in the country, located in the heart of the country on the area of 540 square kilometer. It is situated between 9 degree latitude and 38 degree east longitude in the plateau that stretches at the range of 2,200 – 2, 800 meters of altitude above sea level.

The study was carried out in Addis Ababa, one of the city administrations in Ethiopia. Addis Ababa is the federal state capital. Addis Ababa is also the center of political and diplomatic center of Africa. Addis Ababa has ten (10) sub-cities. The researcher has chosen the city because of her proximity to technology and modernization in one hand and the initiative to implement the project on the other side which enhance better practices and exemplify the prospect of the project study and adopting. Gay (1996) argues that factors such as familiarity with an area, time limitations and money may influence the researcher's choice locale. It was an ideal setting for the researcher's interest, easily accessible and allowed good rapport with the participants for easy data collection just as Nkpa (1997) advices.

3.4 Sources of Data

The study covered nine (9) sample Secondary Schools found in three (3) selected sub cities in Addis Ababa City Administration. Thus, the data needed for the study were gathered from two sources, primary and secondary.

As primary sources, data were collected from teachers, students, school leaders (principals), supervisors, educational experts and the environment. Two sets of survey questionnaire for teachers and students were developed and gathered based on basic research questions to secure issues on the subject area under study.

Interview and observation checklist for school management and ICT experts as well as classroom environment were developed and gathered based on the basic questions to find factual information, opinions and perceptions on the subject area under study.

Audio visual and documents related with the study such as ETP, ESDP (IV and V), GEQUIP, and ICT/ School Net manuals and guidelines also thoroughly reviewed, checked and analyzed as secondary sources.

3.5 Sample and Sampling Techniques

The population of the study were 3(three) sub-cities from the total 10 (ten) sub-cities in city government of Addis Ababa. The researcher used simple random sampling (lottery) because all of the sub cities are in similar context and satisfy sample criteria. Hence reduced bias and find truth on the ground.

Table 3.1 Student data of sample sub cities (2015/2016 or 2008 E.C)

S. No	Sub city	Male	Female	Total
1	Arada	7251	9510	16,761
2	Gullele	6762	8148	14,910
3	Nifas Silk Lafto	11490	13848	25,338
Total		25502	31507	57,009
		Regional	**157,741**	**36% of the region**

Source: AACEB Annual Abstract 2008 E.C

Sample schools in each sub cities selected purposely by their actual performance in their teaching learning and school net implementation as high, medium and low performing (AACEB, 2017). Based on this reason the researcher took 3 from each criterion. Then totally there were 9 purposely selected secondary schools for the study.

To portray sampling frame, information was collected from AACEB (Addis Ababa City Education Bureau) and respected sample schools. Accordingly, the total numbers of sample schools in selected sub cities, in Addis Ababa were nine (9). Out of the total number of high school students in Addis Ababa, 36% were found in those sub cities (AACEB, 2017). Therefore, the researcher has taken 9 schools as a representative of all the schools from each sub cities in Addis Ababa.

Table 3.2 The sample schools, population and sample size/ Teachers/ Students/ principals /Experts

S.No	Sub city	Schools	Population				Sample Population			
			S	T	D	E	S	T	D	E
1	Arada	TikurAmbessa	1247	60	4	1	42	20	1	-
		Bethelhem	1104	58	4		42	20	1	-
		Minilik II	1934	140	4		42	20	1	-
2	Gullele	EntotoAmba	1994	108	4	1	42	20	1	-
		Yekatit 12	1207	87	4		42	20	1	-
		Mieraf	902	57	4		42	20	1	-
3	Nifas Silk Lafto	EwiketLehibmet	1548	80	4	1	42	20	1	-
		Frehiwot No 2	1061	53	4		42	20	1	-
		Higher 23	1683	90	4		42	20	1	-
Total			12,680	733	36	3	373	180	9	

Source: own field survey, **Key: T=Teachers, S=Students, D=Directors and E=Experts**

The sample for this study, therefore, comprised 9 secondary schools, 180 teachers, 373 students, 9 School leadership, three sub-city education office experts, 3(three) sub-city supervisors and 4(four) AACEB experts (two supervisors and two ICT experts). Hence, the total sample consisted of 9 secondary schools and 572 individual respondents. Among the total of 572 respondents, 373(65.32%) were students, 180(31.47%) were teachers, 9(1.57%) School leadership, and 6(1.05%) were sub-city education office experts.

On the other hand, sample schools, students, teachers, School leadership, sub city educational experts, city experts selected differently. Sample schools selected purposely. Students selected by stratified randomly selected to complete the questionnaires (Students stratified by grade and gender). Teachers randomly stratified in gender and subject to teach. And indeed, in order to provide an equal chance of being represented in the sample, stratified random sampling technique was employed. Besides, purposive sampling technique was employed to select sample school principals and interview those 9 School leadership who is very responsible to the project and 6 key informants (three sub city curriculum experts and there high school supervisors) and four ICT and supervision experts from Addis Ababa City Education Bureau.

The study were organized using surveying of 9 Secondary Schools taking into account the government school, in 3 sub cities (Arada, Gullele and Nifas silk). The objective is to assess the practical achievement, challenges and prospect of ICTs including technologies (like computers, internet connectivity, and digital learning content) in Addis Ababa especially in these sub-cities schools, which is necessary for the implementation of School Net. Accordingly, three school that have relatively better practices, three medium and three other that have relatively lower practices on the implementation of School Net in the teaching/learning process will be accommodated for the study.

The total population of the study is three Secondary Schools, the number of teachers, the number of students and the school management and experts related to ICT. There are also ICT experts in hierarchical level in education sector in the population.

The sample of teachers, students and school management will be proportional to total study population of teachers, students and school management in three sample schools. It will also consider the grades and subjects teachers teach teachers and students gender and the students' grades in sampling. Here the researcher will use random sampling.

While purposive sampling were used to take three sample schools because schools are assigned grades according to their activity performance including ICTs (AAEB, 2009 E.C / 2016/17),.The researcher took sample purposely one top, one medium and one less performing Secondary Schools.

Table 3.3 Teacher data of sample by sub cities

S.No	Sub city	Male	Female	Total
1	Arada	50	10	60
2	Gullele	50	10	60
3	NSL	50	10	60
Total		150	30	180

Source: AACEB Annual Abstract 2008 E.C

Table 3.4: Sampling methods of sample participants

No	Sample participant	Sampling method	Sampling size
1	Teachers	Stratified random sampling	180
2	Students	Stratified random sampling	373
3	Principals	Purposive sampling	9
4	Sub city experts and supervisors	Purposive sampling	6
5	AA city EB experts and supervisors	Purposive sampling	4
6	Schools	Purposive sampling	9
7	Sub cities	Random sampling	3
Total			572

Source: own field survey

From the table above it is evident that samples and the method of sample selection were described why and how the researcher chooses each sampling methods in the previous section. For this study, therefore, sample comprised of 9 secondary schools, 180 teachers, 373 students, 9 School leadership, three sub-city education office experts, three sub-city supervisors and four AACEB experts (two supervisors and two ICT experts). Hence, the total sample consisted of 9 secondary schools and 572 individual respondents. Among the total of 572 respondents, 373(65.32%) were students, 180(31.47%) were teachers, 9(1.57%) School leadership, and 6(1.05%) were sub-city education office experts.

3.6 Instruments of Data Collection

In this study, both quantitative and qualitative data were collected using different data collection tools. Basically, the researcher used four data collection instruments such as questionnaires, interview, direct observations and document analysis. These methods enable the researcher to obtain adequate information for the study.

Questionnaires

The questionnaires were designed and make to include both closed-ended and open-ended items. And they were distributed to teachers and students. In this study, two sets of questionnaires were utilized for the data gathering process. The first set of the questionnaire was for teachers to rate their perception, practice and challenges was executed among teachers and the second set was for the students to rate themselves.

Interviews

Interviews are methods of gathering information through oral questioning. It is the process of selecting the required information from interviewees. The interviews were held with school leaders and experts from AACEB (Addis Ababa City Education Bureau) experts and sample sub cities assigned in the project.

Individual interviews were conducted with nine (9) school principals, three (3) sub-city education office experts, three (3) sub city supervisors and four AACEB experts. Responses to open-ended and interviews questions were analyzed to determine common themes. The data were read and reread several times before each response was analyzed and coded.

Pseudonyms were used in respect of the participants and the schools which were selected for the purpose of this study to ensure that anonymity and confidentiality were strictly adhered to.

Direct observations

Direct observations were made in the ICT infrastructure, Internet connectivity, and computer lab and plasma Television classrooms. The researchers hold the observations in the teachers and the students' Internet rooms. These activities allow the researcher to see and internalize the impacts

made on the education sector due to the implementations of School Net. In addition to this, it enables the researcher to analyze and reach fair conclusion about the real challenges of ICT created in the education sector. And it provided a room to suggest ideas that should be done in order to improve the use of ICT in education.

Document analysis

Document analysis on ETP, ESDP, GEQUIP, and Annual statistical abstracts, ICT policy of the country and other training manuals and guidelines were made as part of the study. In general, the researcher tried his best to gather information that showed the state of the implementations of School Net Program in those Secondary Schools.

3.7 Pilot study

A pilot study mean finding out if the research survey, key informant, interview guide or observation were working in the "real world" by trying it out first on a few people. It can be used as a "small scale version or trial run in preparation for a major study" (Beck, &Hungler, 2001, p.467 cited in Simon, M. K., 2011). Pilot study or test is used to address whether the instructions used are comprehensive and help the researcher to check the reliability and validity of the result. Therefore, in addition to designing the questionnaires and interview guide questions according to the relevant literature the researcher conducted a pilot test during the preliminary study from January 15- 20/ 2010 E.c. to check the validity and reliability of the instruments by testing and re-testing techniques. Moreover, the researcher used multiple methods which involved teachers, students, school leaders and experts from Education Bureau project coordinators and sub city focal persons to make cross-checking of the finding to validate the instruments. For example the following table shows the teachers and students distribution of pilot respondents in two schools.

Table3.6: Pilot sample Teachers and Students

S. No.		**Male**	**Female**	**Total**
1	Teachers	25	2	27
2	Students	13	21	33
Total		38	22	60

Source: Own pilot result

The results of teachers and students questionnaires make the researcher to accommodate comments and suggestions with consult with my advisor. Primarily the researcher checks each items and measure its validity and reliability from the sample students and teachers. The instruments were

tested for their validity and reliability in order to reduce measurement error as the most useful instrument is both valid and reliable.

This were undertaken to determine the effectiveness of the research tools used to give the feasibility of the proposed study. The pilot study to pre-test the research tools was carried out in thirty (30) students in two secondary schools in the city, not participants in the actual study. The schools wereShimelis Habte and Balcha Aba Nefrso secondary schools which are well established schools. As Nkpa (1997) advices the schools were not used in the main study. The purpose of pilot study is to ascertain whether the instruments were logical and clear. The items in those instruments found unclear with distorted meanings were rectified. However, the students had similar features to the schools that were used for the final study.

3.8 Methods of data analysis

The data were collected from the respondents and cleaned, coded and then entered into SPSS computer software. The data were then analyzed, organized, tabulated and described quantitatively, using frequency and percentage. T-test tests were used to observe statistically significant difference and association among the responses of the two groups of respondents regarding the practices and challenges of ICT implementation in government Secondary Schools of in Addis Ababa usually various statistics which are presented in form of frequencies and percentages. The data are presented in the form of text, tables and figures. The qualitative data will be coded according to the various themes and analysed to produce text reports.

The data gathered through questionnaire instruments were analyzed by using quantitative data analysis techniques. Thus descriptive statistics, for instance, measures of central tendencies (mean) was used to describe the data. Besides, the existing differences were tested for statistical significance at α: 0.05 level in order to tolerate errors that could occur due to chance. The data that were collected from respondents through interview, open-ended questions, observation and secondary data were analyzed and narrated in words. Then findings are expected to indicate that teachers, students, school leaders and ICT experts views through qualitative and quantitative data. According to (Bordgan and Biklen, 2005) Qualitative data analysis is a complex process that involves back and forth between concert ideas of data and abstract concepts between inductive and deductive reasoning and between description and interpretation. (Bordgan and Biklen, 2005) have shown that data analysis in qualitative studies basically involves word argumentation rather than numerical explanation.

This equation is used to organize and summarize data to provide a simple indication of the level of the means associated with each response. Marwan (2000) as cited in (Alharbi, 2014) used a similar equation to group his results. Using these intervals of 1.33, He defined 3.67 to 5.00 as a "high" response, 2.34 to 3.67 as a "medium" response and any value below 2.34 as a "low response"

Table 4.5 Three level of responses

Response level	**Scales value**
Low	1.33 to 2.33
Medium	2.34 to 3.67
High	3.68 to 5.00

Source: Adopted from (Alharbi, 2014, p.97)

Chapter summary

Methodology is more comprehensive and systematic ways of solving problems. It is beyond research design and research methods. The researcher employed mixed research method with descriptive survey research design.

Data needed for the study were gathered from two sources, primary and secondary. There were questionnaires, interviews and observation as primary source. Document analysis was utilized as secondary source.

The sample for this study, therefore, comprised 9 secondary schools, 180 teachers, 373 students, 9 School leadership, three sub-city education office experts, three sub-city supervisors and four AACEB experts (two supervisors and two ICT experts).

Quantitative and qualitative analysis with mixed research method were performed. Quantitative data using SPSS soft were analysed.

Rationality of the data were achieved using triangulation methods by comparing teachers, students, school leadership and ICT experts' perspective and researcher's observation. Finally, conclusion was made based on the result of the analysis.

Chapter Four

Data Presentation and Analysis

Introduction

This chapter deals with the presentation and analysis of the data collected from sample groups of respondents: Government secondary students, subject teachers, School leadership, AACEB experts and sub-city education office experts. The data from these groups were collected through questionnaires, interview, observation checklist and document review. All the data gathered and through questionnaires were organized and analyzed in tabular form and interpreted using percentage and frequency. The qualitative information gathered through open-ended questions, interviews, observation and document review were narrated and interpreted to support the quantitative information.

The first part of this chapter focuses on the characteristics of respondents from sample schools while the second part deals with the analysis of the data corresponding to the basic research questions.

Analysis and interpretation of the data were made based on the responses obtained from responses and the data obtained from observation and document analysis.

4.1 Characteristics of Respondents

Description of the characteristics of respondents gives some highlights about the sample population. The following sections deals with demographic characteristics of sample teachers, students and principals, supervisors and experts in AACEB (Addis Ababa City Education Bureau) and sample Sub cities. The major characteristics of sample teachers include sex, chronological age, years of teaching experience, position as a teacher, subject taught, grade, school type and teachers by sub cities.

4.1.1 Characteristics of respondents, teachers, Addis Ababa

Table 4.1a Characteristics of respondents, teachers, Addis Ababa

S. No	Level	Alternatives	Frequency	Percent
1	sex	male	134	86.5
		female	21	13.5
		Total	155	100
2	age	20-30 years	69	44.5
		31-40 years	59	38.1
		41-50 years	17	11
		above 51 years	10	6.5
		Total	155	100
3	Educational Qualification	Certificate	0	0
		Diploma	41	26.6
		Degree	83	53.9
		MSC/MA	30	19.5
		Total	155	100
4	years of teaching experience	5 years or less	22	14.2
		6-10 years	78	50.3
		11-15 years	17	11
		16-20 years	11	7.1
		21-25 years	16	10.3
		26 or more years	11	7.1
		Total	155	100
5	position as a teacher	Beginner teacher	9	5.8
		junior teacher	33	21.3
		teacher	37	23.9
		higher teacher	39	25.2
		leader teacher	36	23.2
		Missed Values	1	0.6
		Total	155	100

***Source**: Own Survey result (2018) SPSS Output*

The above table shows that the teachers response frequency. Accordingly, the teacher respondents show 134(86.5%) male and 21(13.5%) female. Majority of the respondents were male compared to the female.

This implies that the teaching position were dominated by males in which females were under represented in secondary school teaching and School leadership' position in the area under investigation. But from ICT implementation perspective different studies (Key, 2006, Wozeny et al, 2006, cited in Abraham, 2016) reported that male teachers used more ICT in teaching and learning process than their female counter parts. Thus the greater number of males in the sample does not influence the validity, reliability and trustworthiness of the data.

The data revealed that the participation of females in teaching and learning position in secondary and preparatory school of the area of the study was low.

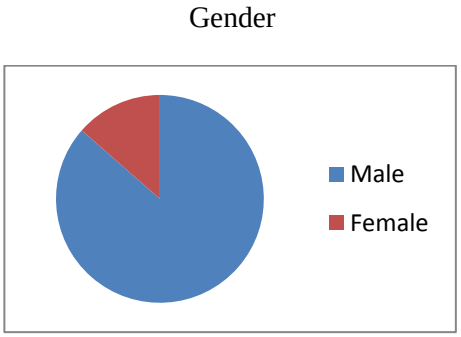

Fig.4.1 Proportion of teachers' by sex

On the other hand in the table above clearly shows that out of 155 teachers 69(44.9%) of them were in age group 20-30 years and 59(38.1%) of teachers were in age group 31-40 years. The remaining 27 sample teachers consists of 17 and 10 were age group 41-50 and above 51 years respectively.

Concerning educational qualification and working experience of teachers are important to support and create favorable condition for School Net implementation. According to table 4.1a above, the teacher respondent qualification consisted of 83(53.9%) have BA/BSC/BED and 41(26.6%) have diploma. 124 (80.5%) of sample secondary and preparatory teachers have first degree and lesser. 30(29.5%) have MSC/MA or above. The data indicate that majority of teachers were first degree holders. Hence, from these data one can conclude that the minimum requirement to be secondary and preparatory teachers is almost satisfied in sample schools. This could contribute significantly for success in the implementation of teaching and learning domain of ICT/School Net in Secondary Schools of the area considered in this study. From this, one can conclude that the respondents were well qualified and experienced in working with the ICT and educational plasma since 2004(CEICT-MOE,2006) for number of years which help them to understand the whole questions concerning ICT/School Net implementation in education and so, provide relevant answers to the questionnaires.

Table 4.1b Characteristics of respondents, teachers, Addis Ababa

S. No	Level	Alternatives	Frequency	Percent
6	subject taught	social sciences	29	18.7
		natural sciences	64	41.3
		languages	26	16.8
		mathematics	22	14.2
		others	2	1.3
		Missed values	12	7.7
		Total	155	100
7	Teaching grade	Grade 9	41	26.4
		Grade 10	50	32.3
		Grade 11	33	21.3
		Grade 12	31	20
		Total	155	100
7	school type	secondary school	84	54.2
		preparatory school	71	45.8
		Total	155	100
8	sub cities	Arada sub city	52	33.5
		Gulelle sub city	52	33.5
		Nifas silk lafto sub city	51	32.9
		Total	155	100

Source*: Own Survey result (2018) SPSS Output*

As can be seen in table 4.1b above, the frequency of Arada, Gulelle and Nifas silk Lafto sub cities consist of 52(33.5%), 52(33.5%) and 51(32.9%) respectively. Concerning the school type 84(54.2) were secondary and 71(45.8%) were preparatory schools. This shows that there were also balanced representation of Secondary Schools and sub cities.

With regard to teachers' subject taught and their teaching grades the following results were collected. 64(41. 3%) of teachers taught natural sciences (Chemistry, Biology and Physics), 29(18.7%) of teachers taught social sciences (Geography, Civics, Economics and General business) and 26(16.8%)of teachers taught English language and Amharic and 22(14.2%) of the teachers taught Mathematics in the schools.

Generally, the finding regarding the characteristics of the sample respondents confirms that the respondents are experienced, and qualified in the area. So, the response obtained from them is reliable and trust full that enables the researcher to move towards intended research finding.

4.1.2 Principals, Supervisors and Experts in AACEB (Addis Ababa City Education Bureau) and Sub cities

Table 4.2 Characteristics of Principals, Supervisors and Educational experts, Addis Ababa

S.No	Characteristics	principals	Supervisors		Experts	
			Sub cities	AACEB (Addis Ababa City Education Bureau)	Sub cities	AACEB (Addis Ababa City Education Bureau)
1	Gender					
	Male	8	2	2	2	2
	Female	1	1	-	1	-
	Total	9	3	2	3	2
2	Experience					
	10-20 years	3	1	-	-	2
	21-30 years	6	1	2	3	
	Total	9	2	2	3	2
3	Qualification					
	BA/BSC	2	1	1	2	2
	MA/MSC	7	2	1	1	
	Total	9	3	2	3	2

***Source**: Own Survey result (2018)*

The table clearly shows sample respondents of secondary and preparatory School leadership consisted of 8(88.9%) male and 1(11.1%) female. Except one (1) sub city curriculum implementation expert, all AACEB (Addis Ababa City Education Bureau) and Sub city experts were male. The table also reveals that 7 (77.8%) of School leadership have MA/Msc while 2(22.2%) have first degree. In working experience nearly 6(66.7%) of the principals have 20-30 years while the rest 3(33.3%) of them have 10-20 years. The data revealed that the participation of females in school leadership and expertise in regional as well as sub city level of the study was

low.Qualification and working experience of principals are important to support and create favorable condition for School Net implementation.

4.1.3 Characteristics of respondents, students, Addis Ababa

The major characteristics of sample students include sex, chronological age, grade, school type, students' stream and students by sub cities.

Table 4.3 Characteristics of respondents (Students) Addis Ababa

Item No	Level	Alternative	Frequency	Percent
1	Sex	male	137	40.5
		female	201	59.5
		Total	338	100.0
2	Age	below 14 years	5	1.45
		14 and 15 years	74	21.9
		16 and 17 years	150	44.4
		18 and 19 years	104	30.8
		20 years and more	5	1.,45
		Total	338	100.0
3	Grade	9	114	33.7
		10	79	23.4
		11	91	26.9
		12	54	16.0
		Total	338	100.0
4	School type	secondary	182	53.8
		preparatory	156	46.2
		Total	338	100.0
5	Stream	social science	94	27.8
		natural science	51	15.1
		general secondary	193	57.1
		Total	338	100.0
6	Sub cities	Arada sub city	112	33.1
		Gulelle sub city	121	35.8
		Nifas silk lafto sub city	105	31.1
		Total	338	100.0

***Source**: Own Survey result (2018) SPSS Output*

Concerning ages of respondent students as can be observed in the table above, 74 (21.9%), 150(44.4%) and 104 (30.8%) were 14-15, 16-17 and 18-19 years respectively. Generally, age range from 14-19 years of respondent students accounted 328 (97.1%).

From the above table, the student respondents from grade 9 to grade 12 consisted of 137 (40.5%) male and 201(59.5%) female. Majority of the respondents were male compared to the female. This was so because upon observation there were more female students than male students in the sample schools.

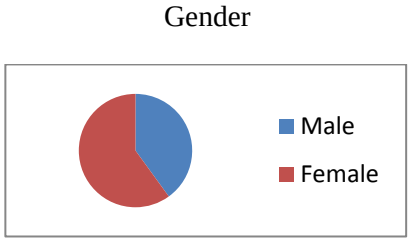

Fig.4.2 Proportion of students' by sex

The total sample population was 338 students. Distribution of students in grade level comprised of 114(33.7%) students from grade 9, 79 (23.4%) students from grade 10, 91 (26.9%) students from grade 11 and 54 (16.0%) students from grade 12. The students from Secondary Schools were 193 and 145 respectively.

Generally, the finding regarding the characteristics of the sample respondents confirms that the respondents are learning ICT as one subject and have some experience on it. So, the response obtained from them is reliable and trust full that enables the researcher to move towards intended research finding.

4.2 Data Analysis

The status of ICT practice, perception and challenges for School Net implementation among teachers, students, principals, supervisors and sub city and AACEB (Addis Ababa City Education Bureau) experts were considered to be the basis for School Net implementation across the curriculum in sample schools.

In order to determine the level of ICT practice, perception and challenges School Net implementation among teachers, students, arithmetic means, standard deviations, rank, frequencies, and percentages, p-value (type I error value) and t-value were calculated to measure the level of significance. The researcher used qualitative description regarding ICT infrastructure, practice,

perception, educational plasma contents and challenges in School Net implementation for principals, supervisors and sub city and AACEB (ADDIS ABABA CITY EDUCATION BUREAU) experts. Teachers and Students response on educational technology infrastructure, equipment and services

It was tried to collect data on the availability of educational technology infrastructure, equipment and services such as plasma TV, electricity supply and Internet connectivity in sample schools. The following table shows the response.

Table 4.4 Educational technology infrastructure, equipment and services (**teachers**), Addis Ababa

S. No	Item	Yes	No
10	Availability of plasma TV	129	26
		83.2%	16.8%
11	The available plasma in the school working properly	93	61
		60.0%	39.4%
13	Availability of electricity supply	93	61
		60.0%	39.4%
14	Availability of internet connectivity support	99	50
		63.9%	32.3%
16	Capacity of educational technology equipment and services	122	30
		78.7%	19.4%

***Source**: Own Survey result (2018) SPSS Output*

Table 4.4 above shows the teachers responses on educational technology infrastructure, equipment and services. Response on Question 10 about the availability of educational plasma TV 129(83.2%) were "yes" and 26(16.8%) were "No". Hence, from these data one can conclude that there is no scarcity of educational plasma TV and is not a negative factor for School Net implementation. Next, the response for the working condition of available educational plasma TV 93(60.0%) responded "Yes" and 61(39.4%) responded "No". Here there is a problem on the working condition of available educational plasma TV. This variation was due to spare part shortage, some students' improper handling of the plasma.

Concerning the Availability of electricity supply, respondents 93(60.0%) said "Yes" and 61 (39.4%) said "No". On the other hand internet connectivity and availability for teaching and learning responded 99(63.3%) "Yes" and 50(32.3%) "No". This shows that the importance of Internet for School Net implementation is essential element. Over 63% of teachers witnesses the availability of internet connectivity that there is no problem of connection in Addis Ababa schools. The insufficient power supply in most of the secondary schools in Africa had contributed to the slow integration of ICTs in the schools. This was because most of the secondary schools where there is inadequate electricity supply coupled with inadequate power backup. Conradie (2003) as cited in (Karimi, 2012) had observed that many areas in Africa do not yet form part of the national electricity grid. This is particularly an acute problem since technology and internet can only be effective if it is generated by electricity.

Finally response on capacity of educational technology infrastructure, equipment and services were 122(78.7%) and 30(19.4%) for "Yes" and "No" respectively. This shows that the educational technology infrastructure, equipment and services capacity for teaching and learning.

Table-4.5 Computer and Internet Service across the School

No	Sample schools	Number of Students	Total sections	Average class size	Computer in a Rooms	computer Labs	Computers Available	Compute/ student ratio .	Internet Rooms
1	Menilik II	1934	50	40	20	6	120	1:50	6
2	TikurAmbessa	1247	29	43	20	4	80	1:43	4
3	bethelihem	1104	22	50	20	4	80	1:50	4
4	Yekati 12	1207	30	40	20	6	120	1:40	6
5	EntotoAmba	1994	40	50	20	4	80	1:50	4
6	Mieraf	902	20	40	20	4	80	1:40	4
7	Higher 23	1696	33	50	20	4	40	1:50	4
8	Frehiwot No 2	1075	43	40	20	4	40	1:43	4
9	Ewketlelimat	1548	30	50	20	4	40	1:50	4

***Source**: Own Survey result (2018) from AACEB (ADDIS ABABA CITY EDUCATION BUREAU)*

The table clearly depicts computer and internet service in sample schools. Dagmawi Menilik and Yekatit 12 preparatory schools have 6 computer labs while the rest of the schools have 4. It can be seen that the available number of computers to students' ratio is very low in world standard.

Table-4.6 Plasma Television across the Schools

S. No	Sampled Preparatory schools	Total Students (grade 9-12)	Total sections	Average class size	Total P. Television	Classroom with disabled P. Televisions	Plasma Television to Students Ratio
1	Menilik II	1934	50	40	50	-	1:40
2	TikurAmbessa	1247	29	43	47		1:43
3	bethelihem	1104	22	50	24	-	1:50
4	Yekati 12	1207	30	40	55	2	1:40
5	EntotoAmba	1994	40	50	50	10	1:50
6	Mieraf	902	20	40	48	4	1:40
7	Higher 23	1696	33	50	41	3	1:50
8	Frehiwot No 2	1075	43	40	47	-	1:40
9	Ewketlelimat	1548	30	50	40	-	1:45

***Source**: Own Survey result (2018) AACEB (ADDIS ABABA CITY EDUCATION BUREAU)*

The table clearly shows that educational plasma television across sample schools. It can be seen from the table above that educational plasma television apparatus were available in all sections in sample schools.

Table 4.7 Availability of educational technology infrastructure, equipment and services by **students**, Addis Ababa

S. No	Item	Yes	No
8	Availability of plasma TV	327	9
		96.7%	2.7%
9	The available plasma in the school working properly	183	153
		54.1%	45.3%
10	Availability of electricity supply	191	144
		56.5%	42.6%
12	Availability of internet connectivity support	126	211
		37.3%	62.4%
14	Capacity of educational technology equipment	210	122
		62.1	36.7

***Source**: Own Survey result (2018) SPSS Output*

As can be depicted from the above table, response to item 8 about the availability of educational plasma TV 327(96.7%) said "yes" and 9(2.7%) answered "No". Hence, from these data one can conclude that there is no scarcity of educational plasma TV and this scarcity is not a factor for School Net implementation. On the other hand concerning about working condition of available educational plasma TV, 183(54.1%) responded "Yes" while 153(45.3%) responded "No". Here there is a problem on the working condition of available educational plasma TV.

Concerning the Availability of electricity supply, 191(56.5%) said "Yes" while 144 (42.6%) said "No". On the other hand internet connectivity and availability for teaching and learning responded 126(37.3%) "Yes" and 211(62.4%) "No". This shows the importance of Internet for teaching learning activity. But the schools need local area connection through cable which is essential for School Net implementation in schools. The insufficient power supply in most of the secondary schools in Africa had contributed to the slow integration of ICTs in the schools. Because of inadequate electricity supply coupled with inadequate power backup aggravate the problem.

Conradie (2003) as cited in (Karimi, 2012) had observed that many areas in Africa do not yet form part of the national electricity grid. This is particularly an acute problem since technology and internet can only be effective if it is generated by electricity. And the response showed that there is problem on internet connectivity and availability for teaching and learning.

For item 14 in the table above respondents answered 210(62.1%) "Yes" while 122 (36.7%) "No". This shows that the capacity of educational technology equipment and services in sample schools are well carried out but needs maintenance.

4.2.1 Perception and engagement in School Net

Table 4.8 perception and engagement in School Net (Students**)**

S. No	Item	Yes	No
1	utility of educational technology	246	90
		72.8%	26.6%
2	utilization of educational plasma	307	27
		90.8%	8%
3	using School Net for learning activities	150	179
		44.4%	53%
4	School Net implement in your school	133	191
		39.3%	56.5%
5	School Net usefulness for learning	271	52
		80.2%	15.4%
6	use of internet to get educational information	308	27
		91.1%	8%
7	students participation in workshop and training	27	277
		8%	82%

***Source**: Own Survey result (2018) SPSS Output*

As can be exhibited from the above table, response for item 16 about "the utility of educational technology in your school" 246(72.8%) were "yes" and 90(26.6%) were "No". Hence, from these data one can conclude that there is high utility of educational technology in sample schools. On the

other hand the response about working condition of available educational plasma TV 183(54.1%) responded "Yes" and 153(45.3%) responded "No". Here there is a problem on the working condition of available educational plasma TV.

Concerning the utilization of educational plasma, respondents 307 (90.8%) said "Yes" and 27 (8%) answered "No". On the other hand utilization of School Net for learning activities students responded 15(44.4%) "Yes" while 179 (53%) said "No". This shows that students' witnesses there is a problem in utilization of School Net for their learning activities.

For item 20 from the table 4.6 above, respondents answered about School Net implementation in the sample schools 133 (39.3%) "Yes" and 191 (56.5%) "No". This shows that the response of the majority implied that the respondents had seen problems in the implementation of School Net in sample schools. But on the other hand respondents acknowledged the usefulness of School Net for learning responding 271 (80.2%) "Yes" and 52 (15.4%) "No". The respondents also answered on the use of internet to get educational information 308(91.1%) "Yes" and 27(8%) "No". But surprisingly item 23 on students participation in workshop and training responded 27 (8%) "Yes" 277(82%) "No".

Generally, the respondents responded "yes" for the usefulness of School Net and importance of internet for teaching learning process. But they lack training and workshop on School Net. This implies the presence of these barriers hinder School Net implementation in sample schools.

4.2.2 ICT Training of teachers

Successful initiation and implantation of technology in the school program strongly depends on the teachers support and attitude (Andon, 2012 cited in Abrham, 2016). It is believed that if teachers perceived the technology as to fulfill neither their need nor students', it is likely that they will not integrate the technology in their teaching learning processes.

Table 4.9 Training and engagement in School Net (Teachers**)**

S. No	Items	Yes	No
17	participation in planning and implementation of plasma TV	99	56
		63.9%	36.1%
19	participation in planning and implementation of School Net	106	45
		68.4%	29.0%
21	using School Net for teaching and learning	54	100
		34.8%	64.5%
22	School Net implemented in your school	36	116
		23.2%	74.8%
23	Internet use for teaching and learning	49	105
		31.6%	67.7%
25	receiving computer training	59	96
		38.1%	61.9%
30	receiving School Net training	62	89
		40.0%	57.4%

***Source**: Own Survey result (2018) SPSS Output*

Concerning with teachers' participation in educational plasma lesson production in planning and implementation was reported 99(63.9%) as "Yes" while 56(36.1%) as "No" while their answer for participation in School Net planning and implementation was reported "yes" by 106(68.4%) while "No" by 45(29.0%) were. Teachers' perception on the use of School Net for teaching and learning was found 54(34.8%) "Yes" while 100(64.5%) "No". This shows that teachers perception on the recent School Net associated with plasma transmission was not well established.

To the question on the Internet use for teaching and learning in sample schools, teachers responded "Yes" 49(31.6%) and "No" 105(67.7%). This shows that students were not using internet for learning activity due to connectivity and lack of receiving equipment like lab top or mobile. And the response to the implementation of School Net in sample schools were 36(23.2%) "Yes" and 116(74.8%) "No". This data tell us that the School Net implementation in the schools have problem

and students are not receiving lessons by School Net. The teachers agree on the implementation problem of School Net.

The question on teachers training on computer and School Net found out the following result. The result shows that teachers received computer training 59(38.1%) said "Yes" while 96(61.9%) answered "No". This shows that teachers were not trained on ICT/computer. While concerning School Net training received 62(40.0%) of teachers answered "Yes" while 89(57.4%) of teachers said "No". One can conclude that teachers have computer and School Net training gaps.

Table 4.10a Teacherson ICT / School Net training

No	Item	the school	sub city	Addis Ababa Education Bureau	others		
26	computer training is given by						
		54	4	8	23		
		34.80%	2.60%	5.20%	14.80%		
27	Number of times taking computer training	1 time	2 times	3 times	4 times	more than 4 times	
		58	22	6	1	8	
		37.40%	14.20%	3.90%	0.60%	5.20%	
28	Time length of the computer training	8 hours or less	9 to 16 hours	17 to 24 hours	25 to 32 hours	more than 33 hours	
		39	18	6	12	23	
		25.20%	11.60%	3.90%	7.70%	14.80%	
29	usefulness of computer training for teaching and learning	No reasponse	highly useful	useful	undecided	less useful	Not useful
		34	60	49	5	5	2
		21.90%	38.70%	31.60%	3.20%	3.20%	1.30%

***Source**: Own Survey result (2018) SPSS Output*

In table 4.8, item 26, response to teachers"who gave computer training" shows 54(34.8%) of teachers answered their school, 4 (2.6%) of them their sub city, 8(5.2%) Addis Ababa City Education Bureau and 23

(14.8%) of teachers answered other institution. This shows that nearly 66(42.6%) responded "No", they did not take any computer training.

From those who took the training by the school, sub city or AACEB (Addis Ababa City Education Bureau), teachers answered the number of times (how long) they took computer training showed 58(37.4%) of teachers took only one time, 22(14.2%) of teachers took 2 times, 6(3.9%) of teachers took 3 times, 1(0.6%) of teachers took 4 times and more than 4 times 8 (5.2%) of teachers. This shows that the frequency of teachers training on computer is one time or two times a year.

Concerning the length of the training, teachers answered showed 39 (25.2%) of them took 8 hours or less, 18 (11.6%) of teachers took from 9 to 16 hours, 6(3.9%) of them took from 17 to 24 hours, 12(7.7%) of teachers took from 25 to 32 hours and 23(14.8%) of them more than 33 hours. This show that there is also problem on the length of time the training is given.

Table 4.10b Teachers on ICT / School Net training

No	**Item**	**No response**	**the school**	**sub city**	**Addis Ababa Education Bureau**	**others**	
31	School Net training given by	90	48	4	11	2	
		58.10%	31.00%	2.60%	7.10%	1.30%	
32	Number of times taking School Net training	No response	1 time	2 times	3 times	4 times	more than 4 times
		88	40	23	1	2	1
		56.80%	25.80%	14.80%	0.60%	1.30%	0.60%
33	Time length of the School Net training	No response	8 hours or less	9 to 16 hours	17 to 24 hours	25 to 32 hours	more than 33 hours
		90	54	5	3	2	1
		58.10%	34.80%	3.20%	1.90%	1.30%	0.60%

***Source**: Own Survey result (2018) SPSS Output*

The next items were related with School Net training given to teachers. There were "Yes" or "No" options whether teachers took School Net training. From those answered "Yes" the following response data were recorded.

Nearly 48(31.0%) of teachers said School Net training was given by their schools, 4 (2.6%) of them answered sub city gave Referring to the response to who gave in the sample schools answered School Net training was given by sub city, 11(7.1%) of teachers said School Net training was given by Addis Ababa City Education Bureau and 2 (1.3%) of them answered School Net training was given by other institution. From the total 155 collected response 65(42.6%) of respondents took School Net training. The rest 90(58%) did not take any School Net training by any institution. This shows that there is a School Net training gap.

From those who took the training, respondents answered the number of times they took computer training were 40(25.8%) took only one time, 23(14.8%) took 2 times, 1(0.6%) took 3 times, 2(1.3%) took 4 times and more than 4 times 1 (0.6%). The frequency of teachers School Net training is very minimal.

Concerning the length of the School Net training, the response showed 54 (34.8%) took 8 hours or less, 5 (3.2%) took from 9 to 16 hours, 36(1.9%) took from 17 to 24 hours, 2(1.3%) took from 25 to 32 hours and 1(0.6%) more than 33 hours.

Generally, ICT refers to the activity of creating of new learning environments by teachers where learners are in control of their own learning needs and habits. From the above, although teachers have basic computer knowledge and skills they lack competency that help them to apply or use that knowledge and skills successfully to perform a critical work function or task. This implies knowledge and skills required to integrate ICT in the class room is beyond the basic computer knowledge and skills.

4.2.3 Educational plasma TV contents

Table 4.11a Educational plasma TV contents (teacher)

S.No	Item	Agree	Neutral	Disagree	Total	Mean	SD
34	Educational plasma TV contents given in my subject are clear and educationally useful	116	26	12	154	2.06	0.975
		74.90%	16.80%	7.70%	99.40%		
35	Educational satellite plasma TV contents in the school net can easily be accessed	97	25	30	152	2.41	1.121
		62.50%	16.10%	19.40%	98.00%		
36	Educational satellite plasma TV contents available are up to date	73	39	38	150	2.63	1.207
		47.10%	25.20%	24.50%	96.80%		
37	Presentation of educational satellite plasma TV contents are attractive	98	39	16	153	2.27	0.921
		63.30%	25.20%	10.30%	98.80%		
38	Educational satellite plasma TV contents can help me develop my teaching skills	95	34	23	152	2.32	1.092
		61.30%	21.90%	14.90%	98.10%		
39	Teachers really like to use Educational satellite plasma TV contents in the teaching and learning activities	73	53	27	153	2.56	1.076
		47.10%	34.20%	17.40%	98.70%		

***Source**: Own Survey result (2018) SPSS Output*

It is notable from table 4.11a, item 34; teachers were requested to express their perception concerning the clarity and educationally usefulness of plasma TV contents in their subjects. 116 (74.90%) of the teachers agree that educational plasma TV contents were clear and also academically useful. Based on this data one can conclude that the selected contents for plasma TV transmission are clear to the learners and deserve usefulness to the educational experience of learners in Addis Ababa General Secondary Schools. The item had a mean of 2.06 with a standard deviation of 0.975, which highlights a convergence to the agreement students to this viewpoint. The mode was agreed where the percentage response rate was 46.5%.

In table 4.11a above, item 35, teachers response on their perception and practice on educational plasma subject contents in the School Net can easily be accessed were 97 (62.50%) agree. This shows that teachers agree on educational plasma subject contents in the School Net can easily be accessed.

It is notable from table 4.11a, item 36, teachers agree on the available plasma contents are up to date by 73 (47.10%). This shows that the available plasma lessons are up to date. This is supported by the students those teachers teach. One curriculum expert(Mr. I) on the interview points out

Science is science. But in social science there are subjects and their issue to be continuously up to date. Such subjects like economics, geography and civics and ethical education can be mentioned.

This shows that teachers agree on the subjects educational plasma contents available are up to date.

With regard to item 37, teachers were requested to respond their perception on the attractiveness of plasma TV lessons and contents are interesting and motivating for target audience (teachers, students). 98 (63.30%) of teachers witness their agreement on the issue. These shows that teachers agree on educational plasma subject contents are attractive.

In table 4.11a, item 38, nearly 95(61.30%) of teachers confirm their agreement on plasma TV contents not only help their teaching learning but also help them to develop their teaching skills in the classroom setting. This shows that teachers agree on educational plasma contents can help them to develop their teaching skills.

It is notable from table 4.11a, item 39, response to the perception on likeness of the use on plasma TV transmission both secondary and preparatory teachers witness their confirmation nearly half (47.10%). This shows that teachers were in agreement on their like to use educational plasma contents in their teaching learning activities.

Table 4.11b Educational plasma TV contents (teacher)

S.No	Item	Agree	Neutral	Disagree	Total	Mean	SD
40	Students really like to use Educational satellite plasma TV contents in the learning activities	49	42	63	154	3.14	1.146
		31.60%	27.10%	40.70%	99.40%		
41	Educational satellite plasma TV contents can be used for learning difficult parts of the subjects	84	41	28	153	2.49	1.071
		54.20%	26.50%	18.10%	98.80%		
42	Speed of internet connection for receiving Educational satellite plasma TV contents is satisfactory	59	29	66	154	3.12	1.286
		38.10%	18.70%	42.60%	99.40%		
43	Educational satellite plasma TV contents can be accessed only during school time	66	41	43	150	2.72	1.235
		42.60%	26.50%	27.80%	96.90%		
44	Support from the school leadership to use Educational satellite plasma TV contents is satisfactory	86	31	35	152	2.55	1.064
		55.50%	20.00%	22.60%	98.10%		
45	Educational satellite plasma TV contents can be used to improve the learning skills of students	106	31	17	154	2.26	0.987
		68.40%	20%	11.00%	99.40%		

***Source**: Own Survey result (2018) SPSS Output*

With regard to item 40, the result indicates 63 (49.7%) of responded teachers dis agree on their students perception not in favor of the use of plasma TV transmission and lessons in their learning activity. This shows that teachers agree on Students really like to use educational plasma subject contents in the learning activities.

As the result for item 41, indicates teachers perception on extent of educational plasma subject contents whether they can be used for learning difficult parts of the subjects or not responded agree by 84(54.20%). On the contrary students disagree on the issue by 164 (48.5%). This shows that teachers and students differ in perception on educational plasma subject contents can be used for learning difficult parts of the subjects.

In table 4.11b, item 42, teachers response on "Speed of internet connection for receiving educational plasma subject contents in the School Net is satisfactory" witnesses disagreement by 66 (42.60%). This shows that teachers were in disagreement with Speed of internet connection for receiving educational plasma subject contents in the School Net. Here teachers perception on School Net and internet connection are in separable but the practice show to receive plasma lesson on the classroom setting no internet connection is necessary.

As the interview with AACEB (Addis Ababa City Education Bureau) ICT unit expert (Mr.N) confirms that:

> *Teachers and School leadership strongly request internet connection is a problem to their daily work but is not. Actually internet is important to access additional resources from on line to support their teaching in their subjects. (School Net project coordinating expert from Addis Ababa City Education Bureau (Mr.N))*

It is notable from table 4.11b, item 43, teachers response on "educational plasma subject contents can be accessed only during school time" were 66 (42.60%) agree. This shows that teachers were not accessing their subject plasma contents and there is no mechanism to do that. This shows that accessing plasma lessons is the school time job. .

With regard to item 44, teachers response on "the Support from the school leadership to use educational plasma subject contents is satisfactory" were 86(55.50%).agree. This shows that teachers agree on the Support from the school leadership to use educational plasma subject contents is satisfactory.

With regard to item 45, teachers response nearly 106(68.40%) of teachers witness that on educational plasma subject contents can be used to improve the learning skills of students. This

shows that teachers agree on educational plasma subject contents can be used to improve the learning skills of students.

Table 4.11c Educational plasma TV contents (teacher)

S.No	Item	Agree	Neutral	Disagree	Total	Mean	SD
46	Educational satellite plasma TV contents can be used to improve the learning abilities of students	103	31	20	154	2.3	0.996
		66.40%	20.00%	12.90%	99.30%		
47	Educational satellite plasma TV content is gender-neutral and non-discriminatory	114	30	9	153	1.99	0.926
		73.60%	19.40%	5.80%	98.80%		
48	Educational satellite plasma TV content is interesting and motivating for target audience (teachers, students)	78	32	17	127	1.94	1.288
		50.30%	20.60%	11.00%	81.90%		
50	Educational satellite plasma TV contents Language, word choice; organization and sentence length in my subject are suited to the students.	88	43	19	150	2.35	1.018
		56.80%	27.70%	12.50%	97.00%		
51	The speed of Educational plasma TV lesson presentation is easy for students to follow	93	32	28	153	2.43	1.093
		60.00%	20.60%	18%	98.60%		
52	Educational plasma TV lesson is very important to support learning activities	76	26	50	152	2.76	0.976
		49.10%	16.80%	32.30%	98.20%		
53	Educational plasma TV lesson has good audio-visual quality and clarity	114	20	13	147	2.03	1.28
		73.60%	12.90%	8.40%	94.90%		

***Source**: Own Survey result (2018) SPSS Output*

With regard to item 46, 103(66.4%) the responded teachers witness that learning abilities of students can be improved using .educational plasma subject contents. This shows that teachers agree on educational plasma subject contents can be used to improve the learning abilities of students.

In table 4.11c, item 47, teachers result shows that 114 (73.6%) teachers agree on educational plasma lessons are gender-neutral and non-discriminatory. This shows that the plasma lessons consider gender balance and sign language for the deaf. The problem persist for the blind students using only the sound.

It is notable from table 4.11c, item 48, nearly 78 (50.30%) of teachers witness that plasma subject contents are interesting and motivating for them while 169 (50.00%) of students show that the plasma lessons transmitted are interesting and motivating for students. This shows that both teachers and students agree on the subjects plasma lessons are interesting and motivating for both teachers, students.

In table 4.11c, item 50, teachers indicate their perception on educational plasma subject contents on lessons language, word choice; organization and sentence length in subjects are suited to the students by 88 (56.80%). This shows that teachers agree on educational plasma subject contents Language, word choice; organization and sentence length in subjects are suited to the students

With regard to item 51, teachers' response on their perception on educational plasma subject contents presentation is easy for students to follow show nearly 93 (60.00%) agreement. This shows that teachers agree on educational plasma subject contents presentation is easy for students to follow.

In table 4.11c, item 52, teachers requested to respond on educational plasma subject contents are very important to support learning activities show 95 (51.40%) agreement. While students perception on the issue show that 185 (54.7%) students agree on. This shows that both teachers and students agree on educational plasma subject contents are very important to support learning activities. During interview this idea supported by one supervisor (Mr.H) as:

> *Instructional TV is method of teaching from the earliest time and is the most important instructional support for the teaching learning in our country when others start School Net with internet connection due to shortage of teachers and equity among urban and rural. But now technology is changing dramatically and students and teachers want to integrate to the digital world.*

In table 4.11c, item 53, nearly 114 (73.60%) of teachers prevail their perception that educational plasma subject contents are not having good audio-visual quality and clarity. The same result show that 189 (55.90%) of students disagree on the same issue. This shows that both teachers and students disagree on educational plasma subject contents are having good audio-visual quality and clarity.

Table 4.12a Educational plasma TV contents (students)

No	Item	Agree	Neutral	Disagree	Total	Mean	SD
25	subject plasma contents are clear and educationally useful	263	31	42	336	2.01	1.118
		77.80%	9.20%	12.40%	99.40%		
26	subject plasma contents in the school net can easily be accessed	147	68	113	328	2.81	1.373
		43.50%	20.10%	33.40%	97.00%		
27	subject plasma contents available are up to date	200	42	87	329	2.42	1.357
		59.10%	12.40%	25.80%	97.30%		
28	plasma TV contents are used to develop students cognitive, affective and Psychomotor skills	212	48	67	327	2.27	1.325
		62.70%	14.20%	19.90%	96.80%		
29	Teachers really like to use Educational plasma TV contents in the learning activities	198	55	72	325	2.33	1.328
		58.60%	16.30%	21.30%	96.20%		
30	I really like to use plasma TV contents in the learning activities	228	38	61	327	2.18	1.356
		67.40%	11.20%	18.00%	96.60%		

Source: *Own Survey result (2018) SPSS Output*

It is notable from table 4.12a, item 25; nearly263 (77.80%) of the students in both types of secondary education witness that educational plasma contents transmitted to them through plasma TV channels are clear and educationally useful to their learning needs. Thus, it can be concluded that students have similar perceptions with their teachers regarding to clarity and educationally usefulness of TV lesson contents. In this regard the interview with School leadership agree to this view.

In table 4.12a, item 26, even though students agree on the clarity and educationally usefulness of TV lesson contents above, the access of the content in School Net 33.40% students show their dissatisfaction on educational plasma subject contents in the School Net accessibility. Therefore, even students witness access of plasma subject contents in the School Net, interview made with supervisor and principal describe the following.

> *Due to server crash and lack of plasma spare parts makes the accessibility of the plasma lessons in the School Net is not functional in schools. (Mr. Q)*

It is notable from table 4.12a, item 27, students agree on the available plasma contents are up to date by 59.10%. This shows that the available plasma lessons are up to date. This is supported by their teachers that they agree on this point. One curriculum expert on the interview (Mrs. H) points out

Science is science. But in social science there are subjects and their issue needed to be up to date. Such subjects like economics, geography and civics and ethical education can be mentioned. (Mrs. H)

With regard to item 28, students were requested to express their perception on educational plasma TV contents are used to develop students cognitive, affective and Psychomotor skills data show that 212 (62.70%) of the students agree that through the plasma lesson they can develop their cognitive, affective and Psychomotor skills. This shows that students agree on educational plasma subject contents are used to develop students' cognitive, affective and psychomotor skills.

In table 4.12a, item 29, students response on their perception on their teachers whether they like to use educational plasma TV contents in their teaching learning activities point out 198(38.60%) of the students agree on the issue. This shows that students agree on teachers really like to use educational plasma contents in the learning activities.

It is notable from table 4.11a, item 30, on the other hand try to test students own perception and practice on their support and like to use educational plasma contents in the learning activities show 228(67.40%) agree on the request delivered to them. This shows that students agree on their really like to use educational plasma contents in the learning activities.

Table 4.12b Educational plasma TV contents (students)

S.No	Item	Agree	Neutral	Disagree	Total	Mean	SD
32	plasma TV contents can be used for learning difficult parts of the subjects	89	75	164	328	3.36	1.393
		26.30%	22.20%	48.50%	97.00%		
33	Speed of internet connection for receiving plasma TV contents is satisfactory	244	22	61	327	1.97	1.292
		72.20%	6.50%	18.00%	96.70%		
34	plasma TV contents can be accessed only during school time	148	57	123	328	2.85	1.427
		43.80%	16.90%	36.40%	97.10%		
35	Support from the school leadership to use plasma TV contents is satisfactory	253	36	45	334	2.03	1.176
		74.90%	10.70%	13.30%	98.90%		
36	plasma TV contents can be used to improve the learning skills of students	250	33	42	325	1.97	1.184
		74.00%	9.80%	12.40%	96.20%		
37	plasma TV contents can be used to improve the learning abilities of students	278	20	34	332	1.68	1.193
		82.20%	5.90%	10.10%	98.20%		

***Source**: Own Survey result (2018) SPSS Output*

With regard to item 32, nearly 164(45.50%) students response show that educational plasma subject contents are not used for learning difficult parts of their subjects. This shows that students disagree on the role plasma TV lessons for learning difficult part of their subjects.

In table 4.12b, item 33, students were requested to respond on their perception on the Speed of internet connection for receiving educational plasma subject contents in the School Net show that 244 (72.2%) agree. This shows that students were in agreement with Speed of internet connection for receiving educational plasma subject contents in the School Net were satisfactory.

It is notable from table 4.12b, item 34, nearly 148 (43.8%) of students show their positive perception on educational plasma subject contents easily accessed only during school time. This shows that students agree on educational plasma subject contents can be accessed only during school time.

With regard to item 35, students response on the Support from the school leadership to use educational plasma subject contents in their schools show that 253(74.90%) of students agree. This shows that students were in agreement to educational plasma subject contents in the School Net can easily be accessed.

With regard to item 36, students' response on "educational plasma subject contents can be used to improve the learning skills of students found out 250 (74.00%) agree on the issue. This shows that students agree on educational plasma subject contents can be used to improve the learning skills of students plasma TV contents can be used to improve the learning skills of students.

With regard to item 37, 278 (82.20%) of students show their agreement on educational plasma subject contents can be used to improve the learning abilities of students. Students comprehend different learning abilities through plasma using audio-video lessons. One can conclude that students agree on educational plasma subject contents can be used to improve the learning abilities of students.

Table 4.12c Educational plasma TV contents (students)

S.No	Item	Agree	Neutral	Disagree	Total	Mean	SD
38	plasma TV content is gender-neutral and non-discriminatory	190	56	81	327	2.4	1.366
		56.20%	16.60%	24.00%	96.80%		
39	plasma TV content is interesting and motivating for target audience (teachers, students)	169	32	125	326	2.39	1.289
		50.00%	9.50%	37.00%	96.50%		
40	plasma TV contents enhance cooperation and interaction with others	113	43	165	321	2.36	1.275
		33.40%	12.70%	48.80%	94.90%		
41	plasma TV contents Language, word choice; organization and sentence length in my subject are suited to the students.	206	48	74	328	2.35	1.358
		60.90%	14.20%	21.80%	96.90%		
42	plasma TV lesson presentation is easy for students to follow	239	37	49	325	2.01	1.415
		70.70%	10.90%	14.50%	96.10%		
43	plasma TV lesson is very important to support learning activities	185	61	77	323	2.37	1.351
		54.70%	18.00%	22.80%	95.50%		
44	plasma TV lesson has good audio-visual quality and clarity	189	52	88	329	2.51	1.237
		55.90%	15.40%	26.00%	97.30%		

***Source**: Own Survey result (2018) SPSS Output*

In table 4.12c, item 38, nearly 190 (56.20%) students witness their agreement that .educational plasma subject contents are gender-neutral and non-discriminatory. As the same time teachers also agree on the issue that the plasma lessons include special needs sign language for the deaf. This shows that students agree on the subjects taught through educational plasma are gender-neutral and non-discriminatory.

It is notable from table 4.12c, item 39, nearly 169 (50.00%) of the students on their perception show that educational plasma subject contents are interesting and motivating for target audience (teachers, students). The same result witnessed by their teachers too. This shows that students agree on educational plasma subject contents are interesting and motivating for target audience (teachers, students).

With regard to item 40, students response on educational plasma subject contents enhance cooperation and interaction among students show that 165 (48.80%) disagree. The plasma television lessons lack interactivity and focus on listening and watching lessons. Plasma teachers (presenters) give students some activities but it is limited. This shows that students disagree on educational plasma subject contents enhance cooperation and interaction with others.

In table 4.12c, item 41, students response on educational plasma subject contents Language, word choice; organization and sentence length in subjects are suited to the students show 206 (60.90%) agree on the issue. This shows that students agree on educational plasma subject contents Language, word choice; organization and sentence length in subjects are suited to the students.

With regard to item 42, nearly 239 (70.70%) of the students witness their response on educational plasma subject contents presentation is easy for students to follow. This shows that students agree on educational plasma subject contents presentation is easy for students to follow.

In table 4.12c, item 43, 185 (54.70%) of students observe their perception on educational plasma subject contents are very important to support learning activities of students. This shows that students agree in educational plasma subject contents are very important to support learning activities.

In table 4.12c, item 44, 189(55.90%) of students witness their perception on quality and clarity of audio-visual of plasma by agreement on the issue. This shows that students agree on educational plasma subject contents are having good audio-visual quality and clarity.

4.2.4 Challenges for implementation

Implementation in ICT and School Net in particular has a lot of challenges in developing countries including according to (Lulseged, 2010) pin point implementing ICT in schools there were a lot of challenges that hinder the attempts. The challenges have been lack of adequate computers in the computers classroom, unavailability of computer classes for students to practice in their free time and disabled computers due to virus attack.

Table 4.13a Challenges on School Net implementation (teachers)

S.No	Item	Disagree	Neutral	Agree	Total	Mean	SD
54	Absence of appropriate ICT training	30	23	101	154	3.77	1.333
		19.30%	14.80%	65.10%	99.20%		
55	Teachers lack of interest in using plasma for subject teaching	58	38	57	153	2.92	1.302
		37.40%	24.50%	36.80%	98.70%		
56	Lack of Teachers computer Competency	38	29	84	151	3.35	1.342
		24.50%	18.70%	54.20%	97.40%		
57	Teachers' negative attitude (beliefs about teaching and learning with ICT)	90	26	36	152	2.38	1.355
		58.10%	16.80%	23.20%	98.10%		
58	Teachers' frustration of technology/ICT use	79	28	43	150	2.54	1.392
		51.00%	18.10%	28%	96.90%		
59	Lack of teacher's experience working with computer	39	25	90	154	3.37	1.207
		25.20%	16.10%	58.00%	99.30%		

≠ Responses Reversed

***Source**: Own Survey result (2018) SPSS Output*

It is notable from table 4.13, item 54, nearly 101(65.10%) of teachers to respond on the lack of appropriate ICT training for them disclose agreement on the issue. This data shows that teachers lack appropriate ICT training including educational plasma instruction which enhance their teaching methodology further.

In table 4.13 above, item 55, teachers were requested to express their concern on lack of interest in using plasma for subject teaching, 58 (37.40%) of the teachers disagree that they were not interested teaching using plasma TV. Based on this data one can conclude that the teachers were not interested in teaching using plasma TV. This shows that teachers agree on lack of interest in using plasma for subject teaching with a slight margin and tend to agreement. The item had a mean of 2.92 with a standard deviation of 1.302, which highlights divergence among teachers to this viewpoint.

It is notable from table 4.13, item 56, teacher's response on lack of teachers computer Competency show 84 (54.20%) of them agree. This shows that teachers agree on the lack of teachers' computer/ICT Competency.

With regard to item 57, nearly 89 (58.10%) of teachers respondents express their concern on their attitude and perception about teaching and learning with ICT goes to disagreement. This shows that teachers disagree on their attitude being negative about teaching and learning with ICT.

In table 4.13, item 58, teachers' response on teachers' frustration of technology/ICT use show disagreement by 79 (51.00%). This shows that teachers disagree on frustration of technology/ICT use. One can conclude that teachers were not frustrated using ICT use except the skill gap.

It is notable from table 4.13, item 59, response on lack of teacher's experience working with computer show 90 (58.00%) teachers agree on this issue. This shows that teachers were in agreement with their lack of experience working with computers.

Table 4.13b Challenges on School Net implementation (teachers)

S. No	Item	Disagree	Neutral	Agree	Total	Mean	SD
60	Absence of support from school leaders.	41	24	88	153	3.37	1.309
		26.50%	15.50%	56.80%	98.80%		
61	Shortage of the technology supplies (number of computers,) in the school.	41	17	94	152	3.41	1.297
		26.50%	11.00%	60.70%	98.20%		
62	Absence of IT technicians in the school	57	21	73	151	3.06	1.491
		36.80%	13.50%	47.10%	97.40%		
63	Absence of School Net continuous monitoring and evaluation system	25	21	107	153	3.75	1.225
		16%	13.50%	69%	98.80%		
64	Interruption of electricity supply	20	16	95	131	3.34	1.806
		12.90%	10.30%	61.30%	84.50%		
65	Teachers lack of Knowledge in using plasma for subject teaching	92	29	27	148	2.18	1.418
		58.10%	18.70%	17.40%	94.20%		

≠ Responses Reversed

***Source**: Own Survey result (2018) SPSS Output*

With regard to item 60, teachers response on absence of support from school leaders in teaching with technology/ICT show 88(56.80%) agreement. This shows that teachers agree on the lack/absence of support from school leadership in teaching with technology. Obviously leadership matters for the success of an organization or institution. Here teachers showed their dismay by their leaders on supporting their lesson by ICT.

With regard to item 61,nearly 94(60.70%) of teachers response on shortage of the technology supplies (number of computers and plasma spare parts) in Secondary Schools show agreement of their shortage on those supplies. This shows that teachers agree on Shortage of the technology supplies (number of computers and plasma spare parts) in their schools.

In table 4.13, item 62, teachers' response on absence of IT technicians in both secondary schools in Addis Ababa shows 73 (47.10%) agree on the issue. This shows that teachers were in agreement with the lack/absence of IT/plasma technicians in their schools.

It is notable from table 4.13, item 63, nearly 107(69.10%) of teachers responded on the continuous monitoring and evaluation system of School Net witness agreement. This shows that teachers were in agreement with the absence/lack of School Net continuous monitoring and evaluation system.

With regard to item 64, teachers response on the Interruption of electricity supply (grid) show agreement by 95 (61.30%). This shows that teachers agree on interruption of electricity supply (grid) as triggering challenge for School Net implementation. The item had a mean of 3.34 with a standard deviation of 1.806, which highlights a less divergence among teachers from this viewpoint. The mode was very agreed where the percentage response rate was 36.1%.

In table 4.13, item 65, nearly 92 (58.10%) of teachers requested to respond on their response/concern on speed of internet connection for receiving educational plasma subject contents in the School Net show agreement. This shows that teachers disagree with their lack of knowledge in using educational plasma for subject teaching.

Table 4.14a School Net implementation (Students)

S, No	Items	Disagree	Neutral	Agree	Total	Mean	SD
45	lack of access to satellite television content materials	169	32	125	326	2.78	1.511
		50.00%	9.50%	37.00%	96.50%		
46	Interruption of electricity supply	113	43	165	321	3.13	1.567
		33.40%	12.70%	48.80%	94.90%		
47	students lack of interest in learning subjects through educational plasma	113	43	165	321	3.1	1.54
		33.40%	12.70%	48.80%	94.90%		
48	Teachers' skill gaps in teaching and learning with ICT	120	59	145	324	2.96	1.447
		35.50%	17.50%	42.90%	95.90%		
49	lack of teachers collaboration with school leaders and students	135	55	135	325	2.87	1.483
		39.90%	16.30%	40.00%	96.20%		

≠ Responses Reversed

***Source**: Own Survey result (2018) SPSS Output*

In table 4.14a, item 45, 169 (50.00%) of the respondents disagree on response on they lack of access to satellite television content materials. This shows that students disagree on the lack of access to satellite television content. Therefore access on the plasma contents is not the challenge to the implementation of the School Net from the data above.

As can be seen in the table, item 46 and 47, 165 (48. 80%) of the students accept the problem of interruption of electricity supply and lack of the interest in learning subjects through plasma TV transmission in the schools. This shows that both interest of students and electric power supply for the plasma TV transmission and locally networked School Net in the schools. Both problems are challenges for plasma TV lesson transmission both in local network and via satellite.

With regard to item 48, nearly 145 (42.90%) of students response disclose the teachers' skill gaps in teaching their subjects using ICT This shows that students agree on their teachers' skill gap in teaching their subjects with ICT.

In table 4.14a, item 49, students response on lack of teachers collaboration with school leaders and students on the implementation of School Net show the following result. 135 (40.00%) of students

agree that the problem of cooperation between school leaders, teachers, students and the community are crucial for the success and quality of education in general and School Net in particular.

Table 4.14b School Net implementation (Students)

S, No	Items	Disagree	Neutral	Agree	Total	Mean	SD
50	Absence of support from school leaders.	156	46	115	317	2.64	1.537
		46.20%	13.60%	34.00%	93.80%		
51	Shortage of plasma technology supplies of spare parts in the school.	91	47	183	321	3.32	1.558
		26.90%	13.90%	54.20%	95.00%		
52	Absence of IT technicians in the school	119	56	150	325	3.07	1.45
		35.20%	16.60%	44.40%	96.20%		
53	Absence of School Net continuous monitoring and evaluation system	110	45	170	325	3.35	1.62
		32.50%	13.30%	50.30%	96.10%		
54	Interruption of Internet connection	99	35	190	324	3.15	1.494
		29.30%	10.40%	56.20%	95.90%		

≠ Responses Reversed

***Source**: Own Survey result (2018) SPSS Output*

It is notable from table 4.14b; item 50; nearly 156 (46.20%) students witness their disagreement on the lack of School Net implementation support from school leaders. Leadership is crucial and their respective School leadership are doing their part as found in interview but the result from students also acknowledge School leadership effort but more is expected from them. Over all the result shows that students disagree on the lack/ absence of School Net implementation support from school leaders.

With regard to item 51, from all respondents 183 (54.20%) of the students agree the problems of shortage of educational technology supplies including computer and educational plasma spare parts in their respective schools. Here the infrastructure is not the problem but simple like spare part makes the plasma nonfunctional in teaching and learning activity. This shows that students were in

agreement with the existence of Shortage of educational technology supplies including computer and educational plasma spare parts in their schools.

In table 4.14b, item 52, nearly 150 (44.40%) of students witness the existence of lack/absence of IT/plasma technicians in your school. Here IT technicials lack in school labs and plasma technician for School Net server and plasma maintenance and for its proper function. This shows that students were in agreement with the a lack/absence of IT and plasma technicians in their schools.

It is notable from table 4.14b, item 53; data collected from all students' respondents disclose there were no continuous School Net monitoring and evaluation system in both Secondary Schools in Addis Ababa. As all know if plan is set, it will be tested and practiced in the specific area like the School Net. Hence it has to be tested on regular bases and remedies have to be made. This shows that students were in agreement with the problem of lack/absence of School Net continuous monitoring and evaluation system on sample schools.

With regard to item 54, from all students respondents 190(56.20%) of them agree on the interruption of Internet connection for School Net for learning. Here internet is not a must to receive VOD (video on demand) on local area network but it is important to enrich teachers' preparation for better instruction on the classroom bases. This shows that students were in agreement with the problem of internet interruption for teaching and learning through School Net.

4.2.5 Test of significance

To examine for significance, T-tests was performed. The T-test results show the following.

Table 4:15 T-test on Teachers perception of plasma contents,

Variables	Sex	Mean	SD	t	p
Plasma TV contents	M=134	2.4831	.59194	2.419	0.017*
	F=21	2.1554	.46794		
Content for intended purpose	M=134	2.4888	.66579	2.118	.036*
	F=21	2.1667	.51370		
Attractiveness of content	M=134	2.5075	.75651	2.809	.006*
	F=21	2.0238	.55848		
Ease of use and Functionality	M=134	2.7736	.78478	.835	.405
	F=21	2.6190	.81844		
Quality of Content	M=134	2.3582	.72093	1.847	.067*
	F=21	2.0476	.68675		

***Source**: Owen Survey result (2018) SPSS Output*

The T-test results of teachers for plasma contents show that for both "Ease of use and Functionality" and "Quality of Content "the difference in means was significant. However, for "Plasma TV contents", "Content for intended purpose" and "Attractiveness of content" these difference were not significant'

Table 4.16 T-test Students perception on plasma TV content,

Variables	Sex	Mean	SD	t	p
Plasma TV contents	M=137	2.4831	.69128	-.069	945
	F=201	2.1554	.68616		
Content for intended purpose	M=137	2.4888	.83847	-.434	.665
	F=201	2.1667	.94140		
Attractiveness of content	M=137	2.5075	.72126	-1.015	.311
	F=201	2.0238	.77197		
Ease of use and Functionality	M=137	2.7736	.77100	.070	.944
	F=201	2.6190	.80539		
Quality of Content	M=137	2.3582	.82065	.317	.751
	F=201	2.0476	.76126		

Source: *Owen Survey result (2018) SPSS Output*

The T-test results of students for plasma TV contents show that for all above variables the differences in means were significant.

Table 4.17 T-test Teachers perception on challenges of School Net implementation,

Variables	Sex	Mean	SD	t	p
Implementation Challenges	M=134	3.1306	.72457	0.491	0.624
	F=21	3.0476	.68697		
Teachers' IVT Competence	M=134	2.9520	.76379	0.909	0.365
	F=21	2.7891	.76348		
Supply of inputs	M=134	3.3806	.99044	-0.124	0.901
	F=21	3.4095	1.00494		

Source: *Owen Survey result (2018) SPSS Output*

The T-test results for plasma TV contents School Net implementation challenges show that for all three variables the difference in means was significant.

4.2.6 Chapter summary

This research tries to find the current practices, perceptions and challenges in School Net implementation. The above results show that school community including teachers, School leadership, students, curriculum experts and supervisors were not performing their expected duties per the intended purpose and goal of the School Net implementation. For these failures different challenges were raised and respondents mentioned from different perspectives such as infrastructure, training and plasma contents. The major challenges to mention few include commitment of the leadership, plasma technicians, electricity interruption, shortage of small plasma spare parts, interest of teachers and students using plasma lessons, behavioral problems of some students on preventing school property from stolen and destruction including plasma TV.

Chapter Five

Summary, Conclusions and Recommendations

Introduction

This chapter presents the summary of the findings, conclusions and recommendations of the research. The title of the research is: "practices, challenges and prospects of School Net implementation in Secondary Schools of Addis Ababa city administration". The main objective of the study is to examine the practices, challenges and prospects of School Net Implementation in selected sample Secondary Schools in Addis Ababa City Administration. It has also three basic research questions.

To answer these research questions the researcher derived five sub-questions, all of which were addressed through the questionnaire and supplemented by the use of interview including educational technology infrastructure, equipment and services, perception and engagement in School Net, teachers ICT training, educational plasma contents and challenges face the School Net implementation.

This section summarizes major findings, draws conclusions and forwards possible recommendations to overcome the problems mentioned in the previous sections.

5.1 Summary of the major findings

The findings revealed that the practices, challenges and prospects of School Net implementation in Secondary Schools of Addis Ababa city administration. This summary is in agreement with the basic research question. These include the extent of School Net implementation in the sample schools, the perceptions of teachers', students' and school leadership on School Net and the challenges for successful implementation of School Net. There is implementation of School Net in the secondary schools in Addis Ababa City but this process is hindered by so many factors.

1) **Inadequate infrastructure**: this includes inadequate number of computers in the schools, inadequate power supply and limited internet connectivity. The number of computer student ratio is low in schools. On average there is 1:10 computer student Ratio. Concerning the available services, internet connectivity and availability for teaching and learning teachers responded 211(62.4%) disagree. This shows that there are availability and connection problems of Internet for teaching learning activity.On the other hand the educational plasma Television, which is important element of School Net are enough in number. The problem is lack of material management by the students,

teachers and school management. Though there is no scarcity of plasma TV agreed both by teachers 129(83.2%) and students 327(96.7%), Here the problem lies the functionality of the available plasma TV less supported by teachers 93(60.0%) and students 183(54.1%).

2) **Teachers' lack of ICT skills**: Teachers have poor training in ICT because only very few have taken training in ICT. Concerning Computer and school Net training, teachers responded 96(61.9%) of them disagreement receiving computer training.89(57.4%) of those teachers dis agree on receiving school Net training. Hence one can conclude that teachers have computer and School Net training gaps.There is coupled by lack of enough time for in-service training. There is lack of plasma technicians in schools. Technical help is inadequate despite regular plasma and computer breakdown of the old computers. This not only wastes time but also leaves the teachers unable to continue using ICTs in class including plasma transmission. These are supported by the following data.

3) **Poor administrative practices**: The administrative practices include leading the teaching learning activities. The School Net is an element of it. This makes principals a part and giving less attention to the project. Most schools lack ICT policies that would enable proper integration of ICTs in teaching and learning. From interviews from supervisors and curriculum implementation experts raised the issue of server failure, computer and plasma maintenance problems.

This research tried to find the current practices, perceptions and challenges in School Net implementation. The above results show that school community including teachers, School leadership, students, curriculum experts and supervisors were not performing their expected duties per the intended purpose and goal of the School Net implementation. For these failures different challenges were raised and respondents mentioned from different perspectives such as infrastructure, training and plasma contents. The major challenges to mention few include commitment of the leadership, plasma technicians, electricity interruption, shortage of small plasma spare parts, interest of teachers and students using plasma lessons, behavioral problems of some students on preventing school property from stolen and destruction including plasma TV.

5.2 Conclusion

The ICTs has great advantage in improving all sphere of life including education. The School Net were not implemented adequately hence slowed the use of ICTs in teaching and learning in secondary schools. The above data suggestthe unavailability and inappropriate ICT infrastructure, teachers training and educational plasma contents in the secondary schools; limited ICT knowledge and skills for both the teachers and the students characterized by inadequate time for in-service courses for teachers; limited technical support during teaching and learning process, and restrictive administrative practices mainly limited budgetary allocations and lack of proper ICT policies in the secondary schools. Therefore there has been limited use of ICTs in class presentation in secondary school. The researcher therefore concludes that the inadequate practice, poor perception and the mentioned challenges hindered School Net implementation in the schools.

5.3 Recommendations

Based on the findings of the study, it is recommended that:

The government has invested to his capacity to provide adequate number of computers in schools and also enhance internet connection in the schools to ensure easy access to teaching learning. Electrification should be diversified in the schools to enhance the use of plasma transmission and computers for the teaching learning. Alternative sources of energy can be used in places where it is very expensive to provide adequately. Power back up system can help solve the problem of power interruption. To make this effective coordinated effort of four stakeholders including Ethiopia Electric Service Authority, Ethiopian Telecommunication Corporation, Ministry of Communication and Information Technology and CEICT-MOE should cooperatively work for the successful implementation of School Net not only in Addis Ababa but also other regions throughout the country.

The ministry of education should enhance teachers'in-service staff training programs that are tailored to the school programs to keep teachers up to date with the technological changes which will promote proper integration of ICTs in teaching and learning. More teachers should be encouraged to the schools to train it. Teachers should be encouraged to use educational technology including plasma television and computers to increase their confidence when using ICTs in teaching. The students also should be encouraged to use educational technology including plasma television and computers for more to increase the confidence of teachers when using ICTs in teaching. There should be strengthening plasma and ICT technician at the regional education levels

to help teachers with the available plasma and computer hardware or the software. They would also assist the teachers handle any plasma and computer breakdown. Moreover, teachers ICT competency framework has to be developed to make teachers capable to integrate ICT in their teaching and learning activities at the classroom setting.

The school leadership should inform themselves with the national ICTs policies and especially in education in order for them to develop school ICT policy that would enable them integrate use of ICTs in teaching and learning.

The last but not the least, based on these findings, the researcher has made the following recommendations

Auditing Schools' technological resources what resource we have in our hand and what is left to fill the gap. This gap can be filled by school administration and concerned education offices in each level of administration from Wereda Education Office (WEO), Sub City Education Office (SCEO) and AACEB (Addis Ababa City Education Bureau). This will help to transfer technological resources from surplus schools to scarce ones.

Continuous monitoring and evaluation of the School Net implementation After setting the goals for the project and make things ready for implementation, and then continuous monitoring and evaluation should be part of the process.

Moving from Skills to the Classroom and make plasma lessons as part of daily and weekly plan of the teaching and learning activity by teachers. School leadership should communicate effectively with teachers and sub city and regional education offices should lead in the same way.

Putting the Student at the Heart of Learning Teachers should build symbiosis relation with technology. This will help them communicate well with available educational resources through technology and then to their students. Because it is not the technology, what matters is the pedagogy.

Finally some Suggestions for further studies

1. This study was carried out in three sub-Cities only; a similar study could be carried out in the other sub-Cities.
2. A study could be carried out to find out teachers and students level of satisfaction using School Net.

3. A comparative study can be carried out on the impact of School Net in secondary school students' academic performance.

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APENDICES

APENDIX A

Addis Ababa University

College Of Education and Behavioral Studies

Department of Curriculum and Instruction

Interview Guidelines for Regional and Sub city educational experts

Dear Sir/Madam

This interview is designed to study **"practices, challenges and prospects of SchoolNet implementation in Addis Ababa"**, The effectiveness of the interview relies on your genuine and reliable response to each of the questions. Thus, you are kindly requested to share your perceptions, feelings and ideas. You do not need to mention your name. And be informed that your responses will be kept confidential.

I appreciate your concern and willingness to share time for the interview.

February 2018

Interview guideline for educational experts

This semi-structured interview will be held with sample educational experts at Addis Ababa City Administration Educational Bureau ICT work process coordinator, and Sub city education offices.

1. Is there documented schoolNet project plan? Is there the implementation plan?
2. What do you think are the expected goals of the project?
3. Are equipment and infrastructure, teachers training and the educational satellite plasma contents enough (quality and quantity) for proper implementation of the project?
4. What major activities have been under taken to implement ICT in general and School Net in particular in the sub-city schools?
5. Could you tell me those major achievements you think have been attained so far in implementing School Net in your school?
6. What major challenges have you been facing while implementing School Net/ ICT?
7. Can you tell me the relationship you have with the stakeholders concerning ICT?
8. What is the gap between the program at hand and the reality at the ground?
9. What should be done in the future to implement SchoolNet in the schools effectively? What do you think is the prospect of schoolNet implementation in the future? What do you suggest?

APENDIX B

Addis Ababa University

College Of Education and Behavioral Studies

Department of Curriculum and Instruction

Interview Guidelines for school principals

Dear Sir/Madam

This interview is designed to study **"practices, challenges and prospects of SchoolNet implementation in Addis Ababa"**, The effectiveness of the interview relies on your genuine and reliable response to each of the questions. Thus, you are kindly requested to share your perceptions, feelings and ideas. You do not need to mention your name. And be informed that your responses will be kept confidential.

I appreciate your concern and willingness to share time for the interview.

February 2018

Interview guidelines for School Principals

This semi-structured interview will be held with sample schools principals' in three sub-cities.

1. What do you think are the expected goals of the schoolNet project?
2. In your opinion are equipment and infrastructure, teachers training and the educational satellite plasma contents enough for proper implementation of the project?
3. What type of ICT equipment (services) does your school have?
4. What major activities have been under taken to implement ICT in general and SchoolNet particularly in your school?
5. How does your school receive the educational satellite plasma lessons transmission?
6. Could you tell me those major activities/ practices in using schoolNet in your schools? Do you give training to teaching staff? For how much time?
7. Could you tell me those major achievements that have been attained so far in implementing SchoolNet in your school?
8. What major challenges have you been facing while implementing SchoolNet/ ICT such as plasma television, Computer and internet services in the schools?
9. How do you compare the use of plasma lessons/ contents with schoolnet and satellite plasma transmission in the classroom?

10. What have been done so far for the teachers to access contents with schoolnet and plasma television lessons?
11. How do students get access to those resources?
12. What are gaps between the program at hand and the reality at the ground?
13. Can you mention the measures that have been taken to solve the problems?
14. What should be done in the future in order to implement SchoolNet in the schools effectively? What do you think is the prospect of schoolNet implementation in the future? What do you suggest?

APENDIX C

Addis Ababa University

College of Education and Behavioral Studies

Department of Curriculum and Instruction

Questionnaire for Secondary and Preparatory Teachers

Dear Sir/Madam

This questionnaire is designed to study **"practices, challenges and prospects of SchoolNet implementation in Addis Ababa"**, The effectiveness of the questionnaire relies on your genuine and reliable response to each of the questions. Thus, you are kindly requested to share your perceptions, feelings and ideas. You do not need to mention your name or any personal identity. Please note that your responses will be kept strictly confidential.

I kindly request you to fill up this questionnaire and return at your earliest time.

Thank you in advance for sharing your time to complete the questionnaire.

February 2018

SECTION A: Personal details

Instruction: Please, read the statements carefully and put '✓' Mark for your response in the box for each question and write your response in open space for open questions.

1. Age

20-30 ☐ 31-40 ☐ 41-50 ☐ 51-60 ☐

2. Gender

Male ☐ Female ☐

3. Educational Qualification

Certificate ☐ Diploma ☐ BA/BSC Degree ☐ MA/MSC or above ☐

4. Your position as a teacher

Beginner teacher ☐ Junior teacher ☐ Teacher ☐ Higher teacher ☐

Leader teacher ☐

5. Teaching experience:

5 years or less ☐ 6 –10 years ☐ 11-15 years ☐ 16-20 years ☐

21-25 years ☐ 26 years and more ☐

6. The subject you are currently teaching…….

7. What grade do you teach? (Select more than one if necessary)

9 ☐ 10 ☐ 11 ☐ 12 ☐

8. Name of the school you are currently teaching ……

9. Sub city of your school

Arada ☐ Gulelle ☐ Nifas Silk Lafto ☐

SECTION B: Educational technology Infrastructure, equipment and/or service

10. Is the number of available plasma TV or Samsung TV enough for the school?

Yes ☐ No ☐

11. Is the electricity supply to the school adequate for educational plasma television transmission?

Yes ☐ No ☐

12. Does the internet connectivity support you for teaching learning activity?

Yes ☐ No ☐

13. Do the educational technology infrastructure, equipment and/or service have capacity to support the school technology need?

Yes ☐ No ☐

SECTION C: Teachers perception and engagement in school Net project

Instruction: This section assumes that your school is connected to the school net and internet could be accessed from it. If not kindly answer only the possible questions. Please read the description section carefully and put '✓' mark in the box.

14. Did you participate in planning and implementation of satellite plasma television program to School net project?

Yes ☐ No ☐

15. Did you participate in planning and implementation of School net project?

Yes ☐ No ☐

16. Do you use SchoolNet for your teaching and learning activities?

Yes ☐ No ☐

17. Do you think SchoolNet can be implemented in your school for learning and teaching activities?

Yes ☐ No ☐

18. Do you use the internet in your school to get educational information for teaching and learning activities?

Yes ☐ No ☐

SECTION D: Teachers educational technology training

19. Did you receive any computer training?

Yes ☐ No ☐

20. If the response for question 25 is "**yes**", who gave you the training or awareness? (Select more than one if necessary)

Your school ☐ Your sub city ☐ Addis Ababa Education Bureau ☐

Other (please specify)----------

21. If the response for Question 25 above is "Yes", how many times did you take?

1 time ☐ 2 times ☐ 3 times ☐ 4 times ☐ More than 4 times ☐

22. If the response for Question 25 above is "Yes", for how long did you take?

8 hours or fewer ☐ 9 to 16 hours ☐ 17 to 24 hours ☐

25 to 32 hours ☐ More than 33 hours ☐

23. How much is that training useful for your learning and teaching activities?

Highly useful ☐ Useful ☐ Undecided ☐ Less useful ☐ Not useful ☐

24. Did you receive training about SchoolNet?

Yes ☐ No ☐

25. If the response for question 30 is "yes", who gave you the training? (Select more than one if necessary)

Your school ☐ your sub city ☐ Addis Ababa Education Bureau ☐

Other (please specify)----------

26. If the response is "Yes" for Question 30 above, how many times did you take?

1 time ☐ 2 times ☐ 3 times ☐ 4 times ☐ More than 4 times ☐

27. If the response for Question 30 above is again "Yes", for how long did you take?

8 hours or less ☐ 9 to 16 hours ☐ 17 to 24 hours ☐

25 to 32 hours ☐ More than 33 hours ☐

SECTION E: Educational Satellite plasma television Contents

Instruction: Indicate the extent to which you agree with the following statements using the indicators given below

5 SA= strongly agree, **4 A**= Agree, **3 N**= Neutral, **2 D**= Disagree and **1 SD**= strongly disagree

No	In my opinion,	5	4	3	2	1
34	Educational plasma TV contents given in my subject are clear and educationally useful					
35	Educational satellite plasma TV contents in the school net can easily be accessed					
36	Educational satellite plasma TV contents available are up to date					
37	Presentation of Educational satellite plasma TV contents are attractive					
38	Educational satellite plasma TV contents can help me develop my teaching skills					
39	Teachers really like to use Educational satellite plasma TV contents in the teaching and learning activities					
40	Students really like to use Educational satellite plasma TV contents in the learning activities					
41	Educational satellite plasma TV contents can be used for learning difficult parts of the subjects					
42	Speed of internet connection for receiving Educational satellite plasma TV contents is satisfactory					
43	Educational satellite plasma TV contents can be accessed only during school time					
44	Support from the school leadership to use Educational satellite plasma TV contents is satisfactory					
45	Educational satellite plasma TV contents can be used to improve the learning skills of students					
46	Educational satellite plasma TV contents can be used to improve the learning abilities of students					

47	Educational satellite plasma TV content is gender-neutral and non-discriminatory					
48	Educational satellite plasma TV content is interesting and motivating for target audience (teachers, students)					
49	Educational satellite plasma TV contents enhance cooperation and interaction with others					
50	Educational satellite plasma TV contents Language, word choice; organization and sentence length in my subject are suited to the students.					
51	The speed of Educational plasma TV lesson presentation is easy for students to follow					
52	Educational plasma TV lesson is very important to support learning activities					
53	Educational plasma TV lesson has good audio-visual quality and clarity					

SECTION F: Challenges for SchoolNet Implementation

The factors that affect implementation of school Net project in the schools are given in the table below. You are kindly requested to rate the barriers.

5= strongly agree, **4**= agree, **3**= undecided, **2**= disagree, and **1**= strongly disagree (reversed response)

No	**In my school, there is**	**5**	**4**	**3**	**2**	**1**
54	Absence of appropriate ICT training for teachers					
55	Teachers lack of interest in using plasma for subject teaching					
56	Lack of Teachers computer Competency					
57	Teachers' negative attitude (beliefs about teaching and learning with ICT)					
58	Teachers' frustration of technology/ICT use					
59	Lack of teacher's experience working with computer					
60	Absence of support from school leaders.					
61	Shortage of the technology supplies (number of computers,) in the school.					
62	Absence of IT technicians in the school					
63	Absence of School net continuous monitoring and evaluation system					
64	Interruption of electricity supply					
65	Teachers lack of Knowledge in using plasma for subject teaching					

65. Are there any other challenges that affect school Net project implementation in your School? Please specify

……
……

66. What is your suggestion to improve the quality of school Net project implementation in the class?

.....

.....

67. If you have more to say about School net, please write them here

……

……

Thank You

APENDIX D

Addis Ababa University

College Of Education and Behavioral Studies

Department of Curriculum and Instruction

Questionnaire for Students

Dear Students

This questionnaire is designed to study **"practices, challenges and prospects of SchoolNet implementation in Addis Ababa"**, The effectiveness of the questionnaire relies on your genuine and reliable response to each of the questions. Thus, you are kindly requested to share your perceptions, feelings and ideas. Do not write your name in any part of this questionnaire. Please note that your responses will be kept strictly confidential.

The researcher hereby kindly requests your cooperation to fill up this questionnaire and return at your earliest time.

Thank you in advance for sharing your time to complete the questionnaire.

February 2018

Section A: Personal details

Instruction: Please read the statements carefully and put '✓' Mark for your response in the box for each question and write your response in open space for open questions.

1. Name of your school ……..

2. Gender

Female ☐ Male ☐

3. Your age in years

Below 14 years ☐ 14-15 ☐ 16-17 ☐ 18-19

Above 19 years ☐

4. Your grade

9 ☐ 10 ☐ 11 ☐ 12 ☐

5. Your School level:

Secondary school ☐ Preparatory ☐ Secondary school and preparatory ☐

6. Your stream

Natural science ☐ Social science ☐ General ☐

7. Sub city of your school

Arada ☐ Gulelle ☐ Nifas Silk Lafto ☐

SECTION B: Equipment and Infrastructure (Service)

Instruction: Please read the statements carefully and put '✓' Mark for your response in the box for each question and write your response in open space for open questions.

8. Is the number of available plasma TV or Samsung TV enough for the school?

Yes ☐ No ☐

9. Is the available plasma in the school working properly?

Yes ☐ No ☐

10. Is the electricity supply to the school adequate for educational plasma television transmission?

Yes ☐ No ☐

11. Does the internet connectivity support you for teaching learning activity?

Yes ☐ No ☐

12. Do the educational technology infrastructure, equipment and/or service have capacity to support the school technology need?

Yes ☐ No ☐

SECTION C: School net Perception and practice

Instruction: Please read the statements carefully and put '✓' Mark for your response in the box for each question and write your response in open space for open questions. This section assumes that your school is connected to the school net and internet could be accessed from it. If not kindly answer only the possible questions. Please read the description section carefully and put √ mark in the box.

13. Do you learn your subjects by utilizing educational technology?

Yes ☐ No ☐

14. Do you learn your subjects by utilizing educational satellite plasma television broadcast?

Yes ☐ No ☐

15. Do you use SchoolNet for your learning activities?

Yes ☐ No ☐

16. Did SchoolNet implement in your school for learning activities?

Yes ☐ No ☐

17. Do you think that SchoolNet can be helpful /useful for learning activities?

Yes ☐ No ☐

18. Do you have access to the following in your school? (Select more than one if necessary)

Computer ☐ Satellite plasma transmission ☐ Internet ☐

19. Do you use the internet to get educational information for learning activities?

Yes ☐ No ☐

20. Did you participated in workshop and training in implementation and evaluation of satellite television instruction and School net project?

Yes ☐ No ☐

SECTION D: Instructional Satellite plasma television Contents in schoolNet

Instruction: Indicate the extent to which you agree with the following statements using the scale given below

5 SA= strongly agree, **4 A**= Agree, **3 N**= Neutral, **2 D**= Disagree and **1 SD**= strongly disagree

No	**In my opinion,**	**5**	**4**	**3**	**2**	**1**
25	Educational plasma TV contents given are clear and educationally useful					
26	Educational satellite plasma TV contents in the school net can easily be accessed					
27	Educational plasma TV contents available are up to date					
28	Educational plasma TV contents are used to develop students cognitive, affective and Psychomotor skills					
29	Teachers really like to use Educational plasma TV contents in the teaching and learning activities					
30	I really like to use Educational satellite plasma TV contents in the learning activities					
31	Educational plasma TV contents can be used for learning difficult parts of the subjects					

32	Speed of internet connection for receiving Educational plasma TV contents is satisfactory					
33	Educational plasma TV contents can be accessed only during school time					
34	Support from the school leadership to use Educational plasma TV contents is satisfactory					
35	Educational plasma TV contents can be used to improve the learning abilities of students					
36	Educational plasma TV contents are helpful for students learning ability					
37	Educational plasma TV content is gender-neutral and non-discriminatory					
38	Educational plasma TV content is interesting and motivating for target audience (teachers, students)					
39	Educational plasma TV contents enhance cooperation and interaction with one another in the class					
40	Educational plasma TV contents Language, word choice; organization and sentence length are suited to the students.					
41	The speed of Educational plasma TV lesson presentation is easy for students to follow					
42	Educational plasma TV lesson has good audio-visual quality and clarity					
43	School Net improves the delivery of educational plasma TV lessons at any possible time and pace					
44	Educational plasma TV contents can be used to improve my learning abilities					

PART D: Challenges for SchoolNet Implementation

The factors that affect implementation of school Net project in the schools are given in the table below. You are kindly requested to rate the barriers.

5= strongly agree, 4= agree, 3= undecided 2= disagree, and 1= strongly disagree

No	**In my school, there is**	**5**	**4**	**3**	**2**	**1**
45	Lack of access to Satellite television content materials					
46	Interruption of electricity supply					
47	Students lack of interest in learning subjects through plasma					
48	Teachers' skill gap in teaching and learning with ICT					
49	Lack of Teachers collaboration with school leaders, other teachers and students.					
50	Absence of educational technology support from school leaders.					
51	Shortage of the plasma technology spare parts in the school.					
52	Absence of IT technicians in the school					

53	Absence of monitoring and evaluation system to school net project					
54	Interruption of internet connection					

Thank You

APENDIX E

አዲስ አበባ ዩኒቨርስቲ

ሥነ ትምህርትና ባህሪ ጥናት ኮሌጂ

ሥርዓተ ትምህርትና ማስተማር ትምህርት ክፍል

ለሁለተኛ ደረጃ ተማሪዎች የተዘጋጀ የፅሁፍ መጠይቅ

ውድ ተማሪዎች

ይህ መጠይቅ የተዘጋጀው "በትምህርት ቴክኖሎጂ የተደገፈ ትምህርት (School net) **አተገባበር ላይ ያሉ ክንውኖች/ተሞክሮዎች ተግዳሮቶችና የወደፊት አቅጣጫ" የሚያመላክት ጥናትና ምርምር አስመልክቶ መረጃዎችን ለመሰብሰብ የተዘጋጀ ነው። የመጠይቁ ውጤታማነት በተማሪዎች ግልጽና ትክክለኛ ምላሽ መሰረት ያደረገ ነው። በመሆኑም በእያንዳንዱ ጥያቄ ግልጽ ምላሽ እንዲታካፍሉኝ ስጠይቅ ለጥናቱ በሚሰጠው ምላሽ ስም የማይገለጽና ሚስጥራዊነቱ የተጠበቀ ነዉ። በመሆኑም መጠይቁ ላይ ስምህን/ስምሽን በየትኛዉም ቦታ መፃፍ አይጠበቅም። ይህን መጠይቅ በመሙላት ለጥናቱ መሳካት የማይተካ ሚና ስላለዉ የሚሰጠዉ መልስ በጣም አስፈላጊ ነው።**

መጠይቁን በመሙላት ስለተባበራችሁኝ ከወዲሁ አመሰግናለሁ !!

2010 ዓ.ም

<u>ክፍል አንድ</u>፡ የተማሪዎች አጠቃላይ መረጃ

መመሪያ: **ጥያቄዉን በሚገባ በመረዳት ትክክለኛ መልስ የምትለዉን/ የምትይዉን በተሰጠው ክፍት ቦታ ዉስጥ የ 'ˇ' ምልክት በማስገባት ወይም ትክክለኛዉን መልስ በመስጠት መልስ/መልሽ**

1. **የትምህርት ቤቱ ስም**.....
2. *ፆታ*

   ወንድ ☐ **ሴት** ☐

3. **እድሜ**

   ከ 14 **ዓመት በታች** ☐ 14-15 ☐ 16-17 ☐ 18- 19 ☐

   ከ20 **ዓመት በላይ** ☐

4. **ክፍል ደረጃ**

   9 ☐ 10 ☐ 11 ☐ 12 ☐

5. **የትምህርት ቤቱ ደረጃ**

   ሁለተኛ ደረጃ ት/ቤ ☐

መሰናዶ ት/ቤ ☐

ሁለተኛ ደረጃ እና መሰናዶ ት/ቤ ☐

6. የትምህርት ዘርፍ

የተፈጥሮ ሳይንስ ☐ የማህበራዊ ሳይንስ ☐ አጠቃላይ ትምህርት ☐

7. ትምህርት ቤቱ የሚገኝበት ክፍለ ከተማ

አራዳ ☐ ጉለሌ ☐ ንፋስ ስልክ ላፍቶ ☐

<u>ክፍል ሁለት</u>፡ የትምህርት ቴክኖሎጂ መሰረተ ልማት፣ ቁሳቁሶችና አገልግሎት

መመሪያ: ጥያቄዉን በሚገባ በመረዳት ትክክለኛ መልስ የምትለዉን/ የምትይዉን በስኩዌሩ ዉስጥ የ'✓' ምልክት በማስገባት ወይም ትክክለኛዉን መልስ በመስጠት መልስ/መልሽ

8. በትምህርት ቤታችሁ ባሉ ሁሉም መማሪያ ክፍሎች ፕላዝማ ቴሌቪዝኖች አሉ?

አዎ ☐ አይደለም ☐

9. በትምህርት ቤታችሁ ያሉት ሁሉም ፕላዝማ ቴሌቪዝኖች ይሰራሉ?

አዎ ☐ አይደለም ☐

10. በትምህርት ቤታችሁ የኤሌክትሪክሁ ሀይል /መብራት/አቅርቦት ለትምህርት ቴክኖሎጂ መማር ማርተማር ስራዉ በቂ ነዉ?

አዎ ☐ አይደለም ☐

11. በትምህርት ቤታችሁ ያለዉ የኢንተርኔት ግንኙነት ሳይቆራረጥ ለመማር ማስተማር ስራዉ ትጠቀሙበታላችሁ?

አዎ ☐ አይደለም ☐

12. ከላይ በተራ ቁጥር 13 የቀረቡት የትምህርት ቴክኖሎጂ መሰረተ ልማት፣ ቁሳቁሶችና አገልግሎቶች የመማር ማስተማር ስራችሁን ለማከናወን በቂ አቅም አላቸዉ?

አዎ ☐ አይደለም ☐

<u>ክፍል ሶስት</u>፡ በስኩል ኔት / School Net / *ዙሪያ የተማሪዎች የግንዛቤና የክንውን ሁኔታ*

መመሪያ: ጥያቄዉን በሚገባ በመረዳት ትክክለኛ መልስ የምትለዉን/ የምትይዉን በባዶ ቦታ የ '✓' ምልክት በማስገባት ወይም ትክክለኛዉን መልስ በመስጠት መልስ/መልሽ። ስኩል ኔት ማለት በትምህርት ቤታችሁ የትምህርት ሳተላይት ቴሌቪቨዥንን በመተካት በአማራጭነት የትምህርት ሳተላይት

ቴሌቪቨዥን የትምህርት ይዘቶችን በትምህርት ቤት ዉስጥ ከትምህርት ቤታችሁ ትምህርቶችን ለማገኘት የሚጠቅም የቴክኖሎጂ ፕሮጀክት ኑዉ።

13. በትምህርት ቤታችሁ ትምህርቶቻችሁን በትምህርት ቴክኖሎጂ በመጠቀም ትማራላችሁ?

አዎ ☐ አይደለም ☐

14. በትምህርት ቤታችሁ ትምህርቶቻችሁን በትምህርት ፕላዝማ ቴሌቪዥን ስርጭት በመጠቀም ትማራላችሁ?

አዎ ☐ አይደለም ☐

15. በትምህርት ቤታችሁ ስኩል ኔት/ School Net / በመጠቀም ትማራላችሁ?

አዎ ☐ አይደለም ☐

16. በትምህርት ቤታችሁ ስኩል ኔት/ School Net / ፕሮጄክት ተተግብራል?

አዎ ☐ አይደለም ☐

17. በትምህርት ቤታችሁ ለመማር ማስተማር ስራ ስኩል ኔት / School Net / መተግበሩ ይጠቅማል?

አዎ ☐ አይደለም ☐

18. በትምህርት ቤታችሁ የትውን የትምህርት ቴክኖሎጂ በመጠቀም ትማራላችሁ?

ደስክ ቶፕ ኮምፒውተር ☐ ትምህርታዊ ፕላዝማ ስርጭት ☐

የኢንተርኔት አገልግሎት ☐

19. ኢንተርኔትን በመጠቀም ለውጤታማ መማር ማስተማር መጠቀም ይቻላል?

አዎ ☐ አይደለም ☐

20. በትምህርት ፕላዝማ ቴሌቪዥን ስርጭትም ሆነ ስኩል ኔት/ School Net / አተገባበር ዙርያ ስልጠና ተሳትፈው ያውቃሉ?

አዎ ☐ አይደለም ☐

ክፍል አራት፡ የትምህርት ሳተላይት ፕላዝማ ቴሌቪዥን ይዘቶች በስኩል ኔት

መመሪያ፡ በሚከተሉት አጫጭር ዓ/ነገሮች እናንተ ምን ያህል የምትስማሙባቸዉመሆናችሁንና ከዚህ በታች በተመለከተዉ ሰንጠረዥ በየቁጥሩ ያስቀምጡ።

5 በጣም እስማማለሁ፣ 4 እስማማለሁ፣ 3 አልወሰንኩም፣ 2 አልስማማም እና 1 በጣም አልስማማም

ተ.ቁ	በእኔ አስተያየት መሰረት	5	4	3	2	1
25	የትምህርት ሳተላይት ፕላዝማ ቴሌቪዥን ይዘቶች ግልፅና ትምህርታዊ ናቸው					

26	የትምህርት ፕላዝማ ቴሌቪዥን ይዘቶች በስኩል ኔት በቀላሉ በማገኘት እንጠቀምበታለን					
27	የትምህርት ሳተላይት ፕላዝማ ቴሌቪዥን ይዘቶች ወቅታዊነታቸዉን የጠበቁ ናቸዉ					
28	የትምህርት ሳተላይት ፕላዝማ ቴሌቪዥን ይዘቶች በእዉቀት፣ ክህሎትና ተግባር ለማሳደግ ረድቶኛል					
29	የትምህርት ሳተላይት ፕላዝማ ቴሌቪዥን ይዘቶች መምህራን ተጠቅመዉ ለማስተማር ፍላጎት አላቸዉ					
30	የትምህርት ፕላዝማ ቴሌቪዥን ይዘቶች በመጠቀም የመማር ፍላጎት አለኝ					
31	የትምህርት ሳተላይት ፕላዝማ ቴሌቪዥን ይዘቶች ከበድ የሚሉ ፅንሰ ሀሳቦችን ለመረዳት ጠቅሞኛል					
32	የትምህርት ሳተላይት ፕላዝማ ቴሌቪዥን ይዘቶች በስኩል ኔት ለመጠቀም የኢንተርኔት ግንኙነት ፍጥነት በቂ ነዉ					
33	የትምህርት ሳተላይት ፕላዝማ ቴሌቪዥን ይዘቶች የምንጠቀመው በትምህርት ሰዓት ብቻ ነዉ					
34	የትምህርት ፕላዝማ ቴሌቪዥን ይዘቶች ለመጠቀም የትምህርት ቤቱ አስተዳደር የሚያደርግልን ድጋፍ በቂ ነዉ					
35	የትምህርት ፕላዝማ ቴሌቪዥን ይዘቶች የተማሪዎችን የመማር ክህሎት ለማሻሻል ይረዳል					
36	የትምህርት ፕላዝማ ቴሌቪዥን ይዘቶች የተማሪዎችን የመማር ችሎታ ለማሻሻል ይረዳል					
37	የትምህርት ፕላዝማ ቴሌቪዥን ይዘቶች ከፆታዊ ልዩነት የፀዱና ማንንም የማያገሉ ናቸዉ					
38	የትምህርት ፕላዝማ ቴሌቪዥን ይዘቶች ለተማሪዎች ሳቢና የሚያነቃቁ ናቸው					
39	የትምህርት ፕላዝማ ቴሌቪዥን ይዘቶች የተማሪዎችን በክፍል የርስ በርስ መረዳዳትና ግንኙነትን የሚያጠናክር ነዉ					
40	የትምህርት ሳተላይት ፕላዝማ ቴሌቪዥን ይዘቶች የቋንቋ፣ የቃላት አመራረጥ፣አደረጃጀትና የዓ/ነገር ርዝመት ለተማሪዎች ተስማሚ ነዉ					
41	የፕላዝማ ቴሌቪዥን ትምህርት አቅራቢዎች ፍጥነት ትምህርቱን በተገቢው ለመከታተል ያስችላል					
42	የትምህርት ፕላዝማ ቴሌቪዥን ይዘቶች የድምፅና የምስል ጥራት ትምህርቱን በሚገባ ለመጨበጥ ያግዛል					
43	የስኩል ኔት አገልግሎት የትምህርት ሳተላይት ፕላዝማ ቴሌቪዥን ይዘቶች ለተማሪዎች በተፈለገ ጊዜዉና በአመቺ ፍጥነት በቀላሉ ለማገኘት ይጠቅማል					
44	የትምህርት ፕላዝማ ቴሌቪዥን ይዘቶች የመማር ችሎታየን አሳድጎልኛል					

ክፍል አምስት፡ ስኩል ኔት/School Net/ አተገባበር የሚያጋጥሙ ችግሮች

መመሪያ፡ **የሚከተሉት አጫጭር ዓ/ነገሮች የስኩል ኔት አተገባበር ላይ የሚጋጥሙ ችግሮች በትምህርት ቤታችሁ ያለበትን ሁኔታ የሚገልጹ ናቸዉ። ለእያንዳንዳችዉ ሉበትን ደረጃ ከዚህ በታች በተመለከተዉ ሰንጠረዥ በየቁጥሩ ያስቀምጡ።**

5 **በጣም እስማማለሁ፣** 4 **እስማማለሁ፣** 3 **አልወሰንኩም፣** 2 **አልስማማም እና** 1 **በጣም አልስማማም**

ተ.ቁ	በእኔ አስተያት…	5	4	3	2	1
45	**የመምህራን የትምህርት ፕላዝማ ቴሌቪዥን ተጠቅሞ ትምህርትን ማስተማር የፍላጎት ማነስ**					
46	**የኤሌክትሪክ ሀይል / መብራት መቆራረጥ**					
47	**የትምህርት ቤት አመራር በቴክኖሎጂ የተደገፈ ትምህርትን ትኩረት ሰጥቶ አለመምራት፣ድጋፍ አለመስጠት**					
48	**የመምህራን በ** ICT **የተደገፈ የመማር ማስተማር ሁኔታ እንዲኖር የግንዛቤ ችግር**					
49	**በኮምፒዉተር የተደገፈ ትምህርት ለመስጠት የመምህራን ስልጠና እና ልምድ አለመኖር**					
50	**በትምህርት ቤት የ** IT **ቴክኒሻን አለመኖር**					
51	**ስኩል ኔትን በተመለከተ ተከታታይ የሆነ የድጋፍና ክትትል አግባብ አለመኖር፣ ፈጣን የሆነ ግብረ መልስ አለመስጠት**					
52	**ለትምህርት ፕላዝማ የሚያገለግሉ ጥቃቅን መለዋወጫዎች በቅርብ አለማገኘት**					
53	**የሳተላይት ትምህርት ፕላዝማ ቴሌቪዥን ይዘቶችን በቀላሉ አለማገኘት**					
54	**የትምህርት ቤቱ አመራር፣ የመምህራን ና የተማሪዎች በጋራ አለመስራት**					

አመሰግናለሁ!