



**THE ROLE OF INSTRUCTIONAL TECHNOLOGY TO ENHANCE QUALITY
EDUCATION SELECTED GOVERNMENTAL HIGH SCHOOLS IN ADDIS ABABA**

COLLEGE OF EDUCATION AND BEHAVIORAL STUDIES

DEPARTMENT OF EDUCATIONAL PLANNING AND MANAGEMENT

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OF EDUCATIONAL PLANNING AND MANAGEMENT

**THE ROLE OF INSTRUCTIONAL TECHNOLOGY TO ENHANCE QUALITY
EDUCATION IN ADDIS ABABA CITY SPECIALLY IN ARADA, LIDETA AND
YEKA SUB CITIES SELECTED GOVERNMENTAL HIGH SCHOOLS**

BY

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Approval Sheet

Approval of Board of Examiners

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DECLARATION

I, Mohamed Sitotaw declare that this thesis titled “the role of instructional technology to enhance quality education in Addis Ababa city, especially in Arada, Lideta, and Yeka Sub Cities selected governmental high schools” is carried out independently with the guidance and support of the research advisor, Dr.Yekunoamlak Alemu. Therefore, I assure you that it is my original work and all sources of the materials in the research paper have been duly acknowledged. And also this research paper has not been submitted earlier for an award of any degree or diploma to the best of my knowledge and belief in this and other universities.

Name Mohamed Sitotaw Sign _____ Date June, 2022

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Lists of Acronyms/ Abbreviations

ETB= Ethiopian birr note

ICT = Information Communication Technology

IT= Information Technology

MoE= Ministry of Education

OCL = Online Collaborative Learning

SPSS= Statistical Package for Social Sciences

SMS= School Management System software

UNCST = Uganda National Council of Science and Technology

UNICEF= United Nations Children's Fund

FDRE = Federal Democratic Republic of Ethiopia

IJCRT = International Journal of Creative Research Thoughts

WWII= World War II

Abstract

The development of technology makes the world become one village. The main aim of this research was to investigate the roles of ICT to enhance quality education in nine selected governmental high schools of Addis Ababa, Ethiopia. To achieve this, explanatory sequential mixed method design was used. Geographically stratified random sampling methods to select Sub cities, simple random sampling to select nine governmental high schools and systematic random sampling to select teachers' respondents and purposive sampling were used to select nine students and four cluster supervisors. The target teachers' populations were 1044 and all selected high school principals. Yemane's formula was used to determine the samples and accordingly 289 teachers were used. Then, the questionnaires were distributed 289 teachers and 33 principals. In addition, conducted face to face interviews with nine students' representative and three cluster supervisors. The document and school observations also took place. Quantitative data were analyzed by SPSS V.26 and used descriptive statistics like frequency, percentage, mean and standard deviations. Qualitative data were synthesized thematically based on research questions. The results indicated that internet connection, smart phone, and electric source availability in each class were the most available and implemented instructional technology. The challenges that affected implementation of ICT were teachers not using plasma TVs effectively, students' and teachers' skills on technology, and teachers' motivation. Most respondents gave the response that ICT had a great role in education. The role of ICT on quality education helped students, teachers, principals, and supervisors to search instructional materials, seek knowledge and manage their organizations. Finally, it was recommended that Addis Ababa Education Bureaus need to train and assign experienced laboratory and IT technicians and also purchase required equipment.

Key words: Communication, Implementation, Instruction, ICT, Instructional Technology, and Technology

CHAPTER ONE: INTRODUCTION

Education has a key role in the development of society as well as the country. It is a continuous process. The quality of our education is in question. This chapter is focused on the background of the study, statement of the problem, objective, significance of the study, and delimitation of the study.

1.1 Background of the research

The development of technology makes the world become one village. Instructional technology is one of the basic educational technologies used in schools to improve the quality of instructional delivery. It is used to do different activities in the school such as recording students and other profiles, delivering lessons online, preparing students' progress cards, or doing different statistical analyses in different countries.

Instructional technology (IT) has been defined as the ability to share information using media-based technology (audio, text, video, image, etc.) to facilitate enhanced interaction between educators and targeted learners (Jedlicka et al., 2002). The term instructional media has been defined as the physical means via which instruction is presented to learners (Reiser & Gagné, 1983). In the United States, the use of media for instructional purposes has been traced back to as last as early as the first decade of the 20th (Saettler, 1990).

According to Prensky (2008), technology can improve the teaching and learning process through different ways, for instance: with greater enthusiasm by learners, enriched communication skills, assessable to learners of all levels and capabilities, excellent research tools, good assessment tools, better preparation of students for education.

According to Alves, et al. (2015), technology provides a wide spectrum to learn and possesses an enormous power to alter traditional pedagogical environments. Various scholars have proposed the idea of transition to a modern educational environment rather than restricting to the traditional setup because this way students would learn to contribute and become active participants hence adding up to building a nurturing environment (Altbach et al., 2009; Vlieghe, 2014).

According to Vlieghe (2014), today the use of technological tools in education and their remarkable effects on student achievement is a great upturn for students in the preparation of their future careers. Hussain et al. (2011) stated that to reach diversity in learning styles, the

integration of technology into the classrooms proves very beneficial. Roger (2004) asserted that the purpose of the integration of ICT to improve quality studying and educating experience in educational institutions implies a succession of various physical mediums of transmission such as communication channels.

Bhasin (2012) notes the role of ICT in education to support the following: students' learning process, the acquisition of the subject matter, achieving the highest skill in teaching and learning, and supporting the different learning styles of students. A report by World Bank in 2003 stated that ICT has the power to boost the accessibility of quality teaching and learning resources through interaction and international reach. It provides a suitable environment for sharing information, resources, and stored records rapidly, and at a low cost without considering distances between locations (World Bank, 2003).

The earliest attempt at ICT policy formulation in Kenya dates back to the 1980s, but the process remained incomplete by 2000 (Nduati & Bowman, 2005). The formation of ICT policy in Kenyan education has its roots in the Ministry of Research of the time. The Kenya National ICT policy was adopted in 2006 after several years of effort in trying to put it in place. The policy aimed to improve the livelihoods of Kenyans by ensuring the availability of accessible, efficient, reliable, and affordable ICT services as reported in the ICT in Education options paper (Kenyan. MoEST, 2005).

In Uganda, the national ICT policy development process was initiated in 1998 by the Uganda National Council of Science and Technology (UNCST) (Torach, et al.2006). Five years later in 2002, the UNCST submitted a draft national ICT policy framework to the cabinet which was approved the following year.

As in many developing countries, Ethiopia has embraced the use of information communication technology (ICT) in education and has recognized ICT as an enabler for widening access to education, supporting literacy education, and facilitating educational delivery and training at all levels, as stipulated in the 2016 National ICT Policy and Strategy (Government of Ethiopia, 2016). The strategy envisages the integration of ICT into the learning, teaching, and administration of school systems through the establishment of ICT networks in schools.

The latest updated Ethiopian ICT Policy and Strategy (Government of Ethiopia 2016) takes education as one of its strategic pillars for transforming the Ethiopian economy, including

through the use of ICT. According to the policy document, ICT can enhance the education system by facilitating access to a wealth of information and online coursework and by developing digital skills in schools, thereby enhancing access to and quality of education, in support of the development of human capital.

The latest reform initiative put in place in this regard is the Ethiopian Education Development Roadmap for 2018–2030. The document contains several proposed reforms and suggested paradigm shifts in the education system. The Roadmap mentions ICT as one of the cross-cutting areas that are generally overlooked in the education sector. Concerning the use of ICT in teacher preparation and development, the Roadmap underscores that pre-service teachers should be trained not only on how to use a computer but also on how to design high-quality, technology-enhanced lessons. It states that both student teachers and teacher educators should have access to ICT infrastructure (Government of Ethiopia, 2018a).

Today, there is an increased pressure on education to respond to a technology-driven society and the broad use of technological tools i.e., information communication technology (ICT), mobile technology, multimedia technology, etc. The role of technology in teaching is very significant because the use of technological tools improves the quality of education. Learning and teaching with the help of technological tools is an organized way of conceptualizing the execution and evaluation of the education system (Richey, Silber, & Ely, 2008).

This research conducted in Ethiopia specifically in Addis Ababa and Yeka Sub cities in Addis Ababa selected governmental high schools. Education is vital for the development of a given society and country. The quality of education is a hot issue in Ethiopia as well as the Addis Ababa City. The role of instructional technologies and quality education is not well studied. This enforced the researcher to conduct this research.

In the city, there are different schools. Some of them are governmental, private, international community schools, and like. According to 6 months report (2021/22) of the Addis Ababa City Administration education bureau, the number of high schools increased from 251 to 291 and 36,401 students took the national exam in November 2021. The instructional technologies used in the high school are Plasma, computer, smart mobile, and internet.

With the existing infrastructure, there are obvious challenges to the proposed strategy. For instance, the strategy envisages the integration of ICT into the learning, teaching, and administration of the school system through education information management systems. But

with only 40% of schools in Ethiopia having computers, this may be a daunting task. And of the schools that do have computers, most of them are in Addis Ababa, thereby creating a major rural-urban divide should the strategy be implemented within the current context (ICT in Education in Ethiopia by Harry 2007).

1.2 Statement of the problem

The development of technology contributes to education in many ways. In Ethiopia, there is a shift in teaching methods and instructional technology has great contribution. It contributes to distance education, getting reading materials, following class online, computing, and checking results.

There are researches conducted on educational technology application, challenges, and its importance. For instance, the implementation of plasma TV in Civic and Ethical education in Hadiya Zone (Bekele, 2020). Challenges of Instructional Technology Implementation in Haramaya University Community School Grade 11-12 in Focus. Fantu(2021) also investigated the practice and challenges of using instructional technology in Bole Sub City. According to Gurmassa (2019) factor that affects the quality of education is the availability of instructional materials. To carry out the teaching -learning process effectively, and efficiently, an adequate supply of equipment, textbooks and other learning, materials is necessary.

But in this research, the researchers connected instructional technology with quality education and also includes other instructional technology not studied yet. From researcher experience, instructional technology had a high contribution to quality education. But the infrastructure, facilities, and implementation have problems in Ethiopia even in Addis Ababa. If someone wants information about education like the number of students, schools, employees, and their results it is difficult to get access online. As far as the researcher knows, there are no research conducted about role of instructional technology to enhance quality education in Arada, Lideta, and Yeka Sub City. These and other factors triggered to research on this topic.

Research questions

1. How is the status of implementation of instructional technology in selected schools?
2. To what extent instructional technology is contributing to enhancing quality education?
3. What are the factors that affect the implementation of instructional technology?

1.3 Objectives

1.3.1 General Objective

The general objectives of this study will be:-

- ✓ To assess the roles of instructional technology for quality education

1.3.2 Specific Objectives

- To identify types of instructional technology used in the selected school.
- To differentiate factors that affects the implementation of instructional technology.
- To assess the effectiveness of ICT technologies in bringing quality education.

1.4 Significances of the study

Quality education is unquestionable and the first issue in the education sector of our country. In Ethiopia, the teaching paradigm shifts from teacher center to student center, and also the assessment system also changes from summative to formative. The advancement of technology is one of the tools to modify the teaching and learning process. The main significance of this study was creating awareness for teachers, students, parents, school coordinators, and the Addis Ababa Education office at large about the role of instructional technology for quality education.

For teachers, this study creates awareness about the role of IT to facilitate the learning-teaching process and to use effectively. Students are aware of the role of IT to improve their learning outcomes and parent how to guide their children to use IT. School coordinators how to use IT effectively, and efficiently to improve the teaching-learning process and improve students' results and different skills. Education office aware of challenges and its role for quality education and propose a solution.

It helps to identify challenges and implementation of IT. It also serves as a source of information for policymakers to include solutions for the problems of instructional technology and innovation in their policies. It serves as the source of information about selected schools, Sub cities, and the role of instructional technology for quality education. It helps for other researchers as the secondary data source and starting points in quantitative studies to repeat this study in the future.

1.5. Delimitations of the study

The study was conducted in Addis Ababa City Administration, Ethiopia. In this research, explanatory mixed type of research design was used. The city has 11 Sub-cities and then to wide up generalization of the finding, the researcher geographically stratified these Sub cities into three groups and selected Arad, Lideta, and Yeka governmental high schools as the research site. It was difficult to collect data from 22 governmental high schools in the three sub-cities. As a result, the researcher selected nine governmental high schools three from each sub cities through simple random sampling for regular students in the 2021/22 academic year.

This study focuses on issues related to role of instructional technology to enhance quality education. Instructional technology is a wide concept and the researcher focused on computers, the Ministry of education (MoE) educational channel, plasma TV, computer, smart mobile phones, laboratory, and the internet. From the researcher experience, the above IT materials are necessary to deliver the lesson in interactive way.

1.6 Limitation of the Study

The researcher used his maximum efforts to successful complete this study. But there were some limitations faced during this study. Unwillingness of some teachers to fill the questionnaire, not return and gave incomplete question papers, difficulty to get and interview cluster supervisors'. The other limitations were difficulty to get permission to distribute questionnaire and also to get research site/schools. These factors affect time of completion of data collection and reduce its validity. The researcher used some methods to overcome the challenges like tried to convince them, searching their mobile phone number and calling, took the filled data only, searching the sub cities location on Google map, and ask peoples to tell the location of the schools.

1.7 Definition of key terms

The key terms in this study are: - Instruction, technology, IT, communication, ICT, Implementation

Instruction: it is a process of giving order or direction in learning.

Technology: is the result of accumulated knowledge and application of skills, methods, and processes used in industrial production and scientific research.

Instructional Technology: it is a system of delivering lessons with support of displaying audiovisual materials

Communication: exchanges of idea/learning by demonstrating, observing, telling/lecturing

ICT: refers to transferring of information/knowledge with the aid of technology.

Implementation: putting technology in action for teaching-learning process.

1.8 Organization of the study

This study is organized in to five units. The first unit presented about background of the study, statement of the problem, objectives, significance of the problem, delimitation, limitation of the study and definition of key terms used in this study.

Second unit deals about Concept of instructional technology and quality education, Historical development of information technology, Types of instructional technology used in School, The role of instructional technology to enhance quality education, Negative impacts of instructional technology on education, Challenges to use instructional technology in classroom, theoretical framework and summary of literature review.

The third unit deals about research site, approaches used in the study and data collection tools and methods of data analysis. The fourth unit presented about data analysis and descriptions. The fifth unit deals about conclusion of the study and recommendation.

Chapter Two

2. Review of Related Literature

Information and communication technology (ICT) has become an important part of most organizations and businesses these days (Zhang & Aikman, 2007). This chapter deals with concepts of instructional technology, historical development, challenges to use instructional technology, usage of instructional technology in teaching and learning, its importance for quality education, and theoretical framework.

2.1 Concept of instructional technology and quality education

Instructional technology is not a new concept but it changes its form. The term instructional technology is simultaneously used as educational technology, instructional media, and instructional materials. In this research, the researcher mainly used ICT or IT. Different authors defined ICT and IT in different ways. Some of them are mentioned below.

Information communication technologies are defined, as a diverse set of technological tools and resources used to communicate, create, disseminate, store, and manage information. These technologies include computers, the Internet, broadcasting technologies (radio and television), and telephone (Blurton, 2002). ICT defined as: “combination of computer, video and telecommunication technologies, as observed in the use of multimedia computers and networks and also services which are based on them” (Van Damme, 2003).

Brown et al. (1973) defines instructional technologies as a systematic way of designing, carrying out and evaluating the total process of teaching and learning, using a combination of human and non-human resources to bring about effective instruction. Human resource includes developers and users (students, teachers, directors and other stakeholders) of the technology while non-human resource includes hardware and facilities (room with furniture, electricity, and time). The end result is bringing change on delivering lessons.

On the other hand, Educational technologies are instructional media that are used to enhance learning (Earle, 2002). These technologies can include a variety of media like a textbook, chalk and blackboard, radio, instructional TV, computer, and the Internet. The electronic form of educational technology started through the broadcast of educational messages through radio. Educational technology means that, they are media used to delivering a lesson effectively.

In general, instructional technology is a kind of technology used to deliver, manage and control a lesson. It used to deliver a lesson online, distance and face to face. It includes audiovisual, visual, internet, and projector.

2.2 Historical development of information technology

The growth of the audiovisual instruction movement slowed in schools during World War II (WWII), but a wide variety of audiovisual materials and equipment, such as training films, film projectors, and overhead projectors, were extensively used to train U.S. military personnel and to prepare U.S. civilians to work in industry (Reiser, 2018; Saettler, 1990). The term multimedia was coined in the 1950s to describe early combinations of various media used to enhance teaching and learning (Heinich, et al. 1999).

2.2.1 Personal Computers, Hypermedia

The interest in using computers for instructional purposes increased in the 1980s, even though computers were used in education much earlier (Reiser, 2018). In the 1980s, the computer began to combine some of the distinct media, such as textbooks, audio, visuals, and motion media. Know a day, Computer development has started from old and big hardware generation up to simple and fast. It is easily move from place to place and used for research purpose and business center in different institution.

Hypermedia systems, such as HyperCard, were widely used in schools. Hypermedia refers to computer software that uses elements of text, graphics, video, and audio connections in such a way that the user can easily move within the information (Heinich, et al. 1999).

Software like school management system used to register students' data, to check grade reports and ranks, Microsoft office, SPSS use to analyze research data and others are some of the developmental stages of hyper card.

2.2.2 Development of mobile technology as instructional material

Mobile is one of technological product used to communicate one another in the same and also different country in the form of emailing, video and audio call by using internet. Before the development and accessibility of mobile phone network and internet people were in Dark Age and less communicated each other. Thanks for the development of this technology every things become simple and also learning takes place.

In 1908, Professor Albert Jahn and the Oakland Transcontinental Aerial Telephone and Power Company claimed to have developed a wireless telephone. They were accused of fraud and the charge was then dropped, but they do not really seem to have proceeded with production (Wireless Phone Cases Dismissed, 2013). In 1917 the Finnish inventor Eric Tigerstedt successfully filed a patent for a "pocket-size folding telephone with a very thin carbon microphone". Beginning in 1918, the German railroad system tested wireless telephony on military trains between Berlin and Zossen(deutsches-telefon-museum.eu. 29 December, 2007).

Mobile technologies and advancements help to mobile learning, which is often called m-learning. Crompton (2013) defined m-learning as “learning across multiple contexts, through social and content interactions, using personal electronic devices.” Most studies define m-learning as an extension of e-learning which is performed using mobile devices such as mobile phones, laptops etc. (Sad & Goktas, 2013; Motiwalla, 2007).

Brink (2011) divided m-learning in three main types, formal, informal and well-directed or self-directed. Formal learning includes normal learning, which is triggered by notifications and reminders such as short messages. There are some schools delivering formal class online and students can follow their class by using their mobile.

Informal learning encompasses two-way message exchange, hence an interactive relationship, such as Facebook, blogs, Twitter etc. Means that there are bidirectional interactions between students- instructor, students-parents, and teachers- directors, and like to share their lessons by using email, telegram and other social media. Finally well-directed or self-directed learning uses reference and media-based materials such as videos and podcasts.

2.2.3 Development of ICT in Ethiopia

Ethiopia is found in the horn of Africa. The development of ICT in Ethiopia, it started using radio, Cassette, Plasma, TV channels, and computers. Ethiopia used radio to supplement its teaching-learning process through aid obtained from US Agency for International Development in the 1950s (Damitew, 2005).

Ethiopia is committed to developing policies that incorporated ICT to bring change in the education sector. One of the reform agendas is making educational practices relevant to the contemporary social and ecological challenges of the country, achieving the education-for-all Millennium Goal, ICT to schools, and constructivist pedagogy (Transitional Government of

Ethiopia, 1994). Specifically, learner-centeredness, learning by doing, collaborative learning, and continuous assessment are among the central visions of the new secondary school education policy (MOE, 2003). To implement this policy and active teaching-learning methods, incorporation of ICT in education became crucial.

Since the year 2004, the secondary school (Grades 9 and 10) lessons have been transmitted across the country's classrooms through a live TV link from a studio in the capital city, Addis Ababa. According to Negash (2006, p.32), it was "beamed from South Africa". Customarily, this teaching model is called plasma, named after the modern Panasonic flat plasma screen that decodes the lesson. Based on plasma distribution, some manuals and books were developed. But the effectiveness of this instructional media is in question.

In most parts of the country, in zone, capital city of the region there is radio transmission satellite, Tvs channel and telegram during pandemic Covid-19. In Ethiopia education policy includes information technology as a subject from grade 9-12 and common course in colleges and universities. Ethiopia has trying to implement new education road map and include IT in primary class. But now day, most private primary schools especially in Addis Ababa they are giving ICT as a subject or as supplementary. Generally, the development of technology started in American military camps and expanded all over the world into different sectors. Now a day, examination, online or distance education, student data management, application of different software and other activities are relies on technology.

2.3 Types of instructional technology used in School

Based on the country's economic level, there are different instructional technologies used in a school. Some of them are listed and explained. Ayot (1986) cited in Omariba, 2012 has categorized instructional technologies into three broad groups. The first category comprises software resources such as books, periodicals, newspapers, posters, flashcards, charts, cartoons, globes, maps, flannel boards, chalkboards, exhibits, and bulletin boards. The second category consists of resources such as projectors record players, radios, films, televisions, magnetic tapes, slides, aural aids, sound, and still projectors and the third category is of community resources like field trips, environment and people.

On the other side, according to Kemp and Dayton (1985), instructional technologies are categorized into nine kinds of media. They include; print media, display media, overhead

transparencies, audio-tape recordings slide series, filmstrips, multi-image presentations, video recordings, and computer-based instruction.

There are different instructional technologies used in Addis Ababa, Ethiopia. Some of them are the MoE Tv channel, email, plasma, computer, internet, radio, projector, displaying screens, smart mobile phone, and telegram channels are used in the city education system. Specially, during pandemic Covid 19 most parts of the city used printed notes, worksheets, television and telegram channel were used to transmit lessons and also smartphone, computer, and internet were used to access online tests.

2.4 The role of instructional technology to enhance quality education

2.4.1 Quality Education

According to United Nations Children's Fund (UNICEF) “A quality education is defined by five elements: the learner's outside experiences, learning environment, content of education, learning processes, and education outcomes. Learners must be healthy, well-nourished and supported by their families and communities. The learning environment should be safe, healthy and stimulating. Appropriate education content is relevant to the learner and presented in a well-managed classroom. Learning outcomes should meet promote participation in society?”

2.4.2 The relationship of IT and quality education

IT has many roles in education. It used to deliver the instruction in the same ways for all educators at the same level and filled knowledge gaps between teachers. IT used to demonstrate different reactions and systems in the form of animation and 3D forms. It is also used to kept data safe and accurate.

Ndwiki and Thinguri (2017) in a study on the impact of ICT on teaching and learning, note the role of ICT as the major player for quality education in 21st century, and its positive role in teaching-learning and research activities. The integration of technology (that is, ICT) in education, supports learning through different teaching-learning modes, student centered learning and provides various teaching and learning options for educators (Ertmer et al., 2012).

The role of technology in the field of education is four-fold. It is included as a part of the curriculum, as an instructional delivery system, as a means of aiding instructions and also as a

tool to enhance the entire learning process. Because of the development of technology, education has gone from passive and reactive to interactive and aggressive (Raja and Nagasubramani, 2018).

ICT is used as means of delivering the lessons in interactive and attractive ways. As Yusuf (2005) asserted that ICT can enhance teaching and learning through its dynamic, interactive, and engaging content, and it can provide real opportunities for individualized instruction. ICT is a boom for students today as it has a significant and positive effect on student achievement. The use of computers and the internet for enhancing the quality of education by making learning more relevant to life.

According to the Federal Democratic Republic of Ethiopia (FDRE) policy document (2002) the key role of ICT (Radio, plasma-TV) in education is to improve the educational delivery system, delivery of quality education, and students' intake. ICT is particularly crucial to Ethiopia because the vast majority of its population lives in remote areas and continues to be disadvantaged educationally (FDRE, 2005).

2.4.3 ICT helps to access educational resources

ICT helps to easily access learning materials like E-books, revision guides, and past examination papers that are available on World Wide Web. Continuous learning, sharing of knowledge and experiences all over the world without geographical distances barriers. IT also helps as a learning aid by using audio and visual materials to put some practical aspects to the theory taught in class. Proper record-keeping in safe ways unlike in the past. (Budhwar, 2017)

Again according to Kumari (2021), ICT has the following roles in education. It is used as a tool when students do self-study, encourages activities in small groups of learners, also pace of these activities is determined by learners. ICT encourages interaction and cooperation among students and teachers. ICT enhances integrative learning that is transforming theories to practice, provides greater opportunity for teacher-to-teacher and student-to-student communication and collaboration. ICT provides additional resources to assist constructivist learning.

ICTs which include radio, television, digital technologies such as computers and the internet have powerful enabling tools for educational change and reform. It enhances educational quality by increasing learners' motivation, engagement, facilitating the acquisition of basic

skills that are the foundation of higher-order thinking and creativity by using videos and television (Victoria, 2002). It helps the student actively involves and learn by doing, listening, and observing.

Today, mobile phones have a small fraction of the size, portability, mobility, and ubiquity significantly reducing the dependence on fixed locations for learning and work. They enable students to “learn the right thing at the right time at the right place” (Peng, et al. 2009, p. 175). Mobile devices also have the potential to provide learner-centered learning experiences that are situated, authentic, and personalized (Traxler, 2011). This means that it is not needed to travel long distances and wait for teachers to attend a class. This saves time and money.

In general, ICT has great contribution for quality education. For example when all grade 9-12 students learn the same topic at the same time by the same teacher through radio, plasma or, TV channel they have the following advantage. There is no problem about content coverage, they will get the same information or explanation and example about a particular topic (fill teachers’ knowledge gap) and they will use their time effectively because they are not dependent on class teachers.

The other importance of ICT is save data safe and accurately. if natural(like flood, earthquake) or human(war, burning) disasters are happen on the institution students or employees’ data will not loss and if we give the input correctly for different software can analysis data correctly. It also important to make rank in excel sheet and school management system software.

In addition to above points, ICT helps to access educational materials to update the teacher, leader and learners. It shows theories and different models in animation and 3D form to clarify the lesson. Specially mobile and other technology used for online lesson delivery system sharing or sending reports, check online tests help to save time and money. Thanks to the development of IT, it is not need to traveling two hours to attend three hours class

2.5 Negative impacts of instructional technology on education

IT has a great role in quality education but also it has negative effects too. Some researchers point out more on impacts of instructional technology on students’ academic achievement. Some of their negative impacts are: when people are attached to their screens almost 24/7, Cyber bullying traps inevitable cheating. Cell phones have made cheating easier than ever.

Attentiveness drops drastically in the classroom when students have their cell phones or other technologies out. (International Journal of Engineering Applied Sciences and Technology, 2017)

Impacts of ICT on students achievement

According to Raja and Nagasubramani (2018), the negative impacts of technology on students are: - first, Declining Writing Skills. Second, Increasing Incidents of Cheating: Technological developments like graphical calculators, high-tech watches, mini cameras, and similar equipment have become great sources to cheat in exams.

Generally, some of the negative impacts of ICT are: when radio is used as instructional media not include kinematics and visual learner and less effective to attract students' attention. Plasma and Tvs channels might distorted the lesson due to lack of electricity and time given for activities and not includes slow listeners. They are susceptible to disturbance if class teacher is not there and no any access to ask plasma or radio teacher for clarification.

Most students might not have digital competency due to dominant by other students. Most learner use internet and their smart phone for game and social media that is not inter-related to learning teaching process. Online test are susceptible for cheating. On the other hand, internet might use only for watching films and music instead of learning teaching process.

2.6 Challenges to use instructional technology in classroom

Different scholars wrote about factors that affect the integration of technology into classroom instruction.

2.6.1 Classification of barriers to integrate ICT in education

According to Zhao et al. (2002), those are factors associated with the: (a) school environment or the Context in which technology will be implemented, (b) the teacher who serves as the innovator, and (c) the technology-enhanced project or Innovation.

Most researcher findings show that there are two barriers or challenges to use IT. These are extrinsic and intrinsic barriers but the researcher gave them different meanings. Ertmer(1999) extrinsic factors first order and cited access, time, support, resource, training and intrinsic factors related to attitude, beliefs, practices, and resistance.

But Hendren(2000, as cited in Al-Alwani 2005) extrinsic related to organization and intrinsic related to teacher, individual and administrator. Ertmer related extrinsic barriers to facilities and skill but Hendren related to the organization means that the lack of available input. When we come to intrinsic both Ertmer and Hendren related to individual skill and attitude.

Additionally, another group of researchers refer to the barriers as those pertaining to two types of conditions: material and non-material. As Pelgrum(2001), classifies, the material conditions refer to the insufficient number of computers or copies of software . The non-material barriers refer to teachers' insufficient ICT knowledge and skills, the difficulty of integrating ICT in instruction, and insufficient teacher time.

According to Debela (2019), studies in Challenges of IT in Haramaya University Community school, educational technology can be very challenging to implement. There are many possible barriers. For instance, equipping schools with technology can be expensive; teachers sometimes are resistant to technology adaptation. Additionally, parents may see technology as a diversion from academic learning.

In fact, in the case of the School Net project in Ethiopia, similar problems such as poor infrastructure, availability of sustainable power, low skills for maintenance, low motivation of teachers, and language used in the contents are mentioned (World Bank, 2008).

Generally, the problem can be grouped in to three. These are technical, facilities and human related problems. Each of themes is explained below.

2.6.2 Technical related problem

In Sicilia (2005), technical problems were found to be a major barrier for teachers. These technical barriers included waiting for websites to open, failing to connect to the internet, printers not printing, malfunctioning computers, and teachers having to work on old computers. Korte and Hüsing (2007) argued that ICT support or maintenance contracts in schools help teachers to use ICT in teaching without losing time fixing software and hardware problems.

According to Gomes (2005), ICT integration in teaching needs a technician and if one is unavailable the lack of technical support can be an obstacle. In Turkey, Toprakci (2006), found that the lack of technical support was one of the top significant barriers to ICT integration in science education in schools. In Saudi Arabia, science teachers would agree to

introduce computers into teaching, except that they believe they will encounter problems such as technical service or hardware problems (Almohaissin, 2006).

Similarly in Philippines, one of the major obstacles to optimizing computer use in high schools has been the lack of timely technical support. In some extreme cases involving schools in remote areas, disabled computers take months to be repaired since no technician is available in the immediate vicinity and so the computers have to be sent to the nearest city hundreds of kilometers away (Tinio, 2002b). The same problem is existing in Ethiopia. Many high schools are built in remote area and difficult to get technical assistant to fix the problems on the spot. The problem is also found in the city even in Addis Ababa.

2.6.3 Facilities

Various research studies indicated several reasons for the lack of access to technology. In According to Becta (2004), the inaccessibility of ICT resources is not always merely due to the non-availability of the hardware and software or other ICT materials within the school. It may be the result of one of a number of factors such as poor resource organization, poor quality hardware, inappropriate software, or lack of personal access for teachers.

The challenges related to the accessibility of new technologies for teachers are widespread and differ from country to country. Pelgrum (2001) explored practitioners' views from 26 countries on the main obstacles to ICT implementation in schools includes barriers were insufficient unit of computers, insufficient peripherals, insufficient numbers of copies of software, and insufficient immediate Internet access.

Toprakci (2006) found that low numbers of computers, oldness or slowness of ICT systems, and scarcity of educational software in the school were barriers to the successful ICT implementation in Turkish schools. Similarly, Al-Alwani (2005) found that having no access to the Internet during the school day and lack of hardware were hampering technology integration in Saudi schools. Recent research on Syrian schools indicated that insufficient computer resources were one of the greatest impediments to technology integration in the classroom (Albirini, 2006).

In Ethiopia the number of high schools are a lot and difficult to fulfill all required ICT materials. The number of high schools and universities are increasing from time to time. Not only that they are built in remote area. Therefore, they have lack of electricity, ICT teachers,

pedagogy center, laboratory chemicals, and computer, or sufficient plasma are the main challenges to integrate

2.6.4 Teachers related problem

The teachers' thoughts on the way to and proficiency with technology have regularly been acknowledged as the key factor connected with the utilization of technology (Mundy et al.2012). If not a teacher cling to affirmative thoughts to technology and not expected of using it in teaching. Teacher's instructive attitude and teaching philosophy put into practice are in addition factors that appear to persuade the proper utilization uses of technology in education.

The most foreseeable hurdle for teachers implementing technology into their classrooms is their lack of computer knowledge and experience. Those teachers with prior computer experience are more likely to learn new necessary skills quickly and seamlessly than those who have no prior experience. They are also more adaptive to use technology for instructional purposes (Hanks, 2002). There is limited capacity for effective use and maintenance of instructional technology in learning institutions (Dahiya 2004).

Meenakshi (2013) explains the benefit of ICT in teaching and learning from the perspective of teachers and notes the reluctance of teachers to use ICTs, especially computers and the internet. Some of the reasons for this reluctance include: poor software design; skepticism about the effectiveness of computers in improving learning outcomes; lack of administrative support; increased time and effort needed to learn the technology and how to use it for teaching; and, the fear of losing authority in the classroom as it becomes more learner-centered.

Some other factors which were more internal to the teachers such as resistance to change and lack of awareness of the benefits of the ICTs for learning were reported in Jones' study. In the New Zealand, lack of time for professional development to learn about the new technologies and lack of time to explore technologies such as the internet and social networking services were repeatedly reported by teachers as the significant barriers for using ICT in the classroom (Billowes, 2001).

To sum up, there are challenges to integrating IT into education. One is low awareness of teachers, students, and parents about IT. Teachers expect themselves as a teacher only and only they are using talk and chalk methods. Parents thought that technology has only drawbacks. The other factors are lack of infrastructure and digital literacy.

2.7. Evaluating the integration of ICT in education

ICT play a transformational role in education. Here were national efforts in Ethiopia since the turn of the century to integrate ICT in education both in schools and higher learning institutions (Ethiopia-Gov, 2006; Hare, 2007; Mesfin, 2004). As part of this effort, a national School Net initiative was launched for secondary schools with strategic priorities of developing a wide-area network linkage and making Internet and online education accessible in the schools (Ethiopia- Gov, 2006).

The Government of Ethiopia proposed the integration of ICT to support teaching and learning, promote and facilitate access to education and resources, and ensure efficiency and effectiveness in educational delivery, learning management, and administration.

ICT sector of Ethiopia remains underdeveloped compared to that of many African countries (Adam, 2012). There is a significant delay in the installation and commissioning of cloud computing infrastructure in the prioritized 300 secondary schools at least up to March 2019 (World Bank, 2018).

Mobile cellular subscriptions reached 59.7% in 2017 (ITU, 2018b). The 3G coverage of the country was also extended to 85% of the population in the same period. Likewise, a substantial increase was seen in the number of households with Internet access, that is, 18%, which was closer to the African countries' average of 19.4%.

According to Anteneh and Tesfaye (2020), the survey results from students, teachers, and school leaders show that the existing practice in the integration of ICT in Education is not at a satisfactory level. percentage of teachers who claimed using ICT for preparation or class teaching of language, science, and other (social science) subjects was below 40% .In the status of Internet access of teachers indicates that the majority of the teachers (257 out of 415 or 62%) had no internet access at school. Those having on-demand access to internet-connected computers were 114 (or 27.5%) and those who have permanent access (PA) were only 40 (or approximately 10%).

On the other side, The level of integrated use of ICT in class lessons was revealed a higher never or seldom response of students in the use of computers for learning non-ICT subjects and for independent works by the students 41.38% and 35%, respectively. In the survey of urban and semi-urban secondary schools, the response indicated that around 26% of the students were not using computers for learning ICT subjects.

Argaw (2018) reported on the status of usage of ICT in secondary schools in Addis Ababa, the capital city of Ethiopia. Over 60% of his teacher respondents confirmed the availability of functioning ICT facilities and the Internet. The challenge identified was electric power interruptions.

Summary, over all the above data shows that the integration ICT and expansion of mobile network low in the country. Even in the capital city around 2015 and still there are some areas which have no network. Most of high school teachers use traditional methods of teaching and have resistance to integrate their lesson with ICT.

2.8 Theoretical framework of instructional technology

There are different learning theories. Some of them are the following. Behaviorist learning theories emphasize changes in behavior that result from stimulus-response associations made by the learner. An individual selects one response instead of another because of prior conditioning and psychological drives existing at the moment of the action (Parkay & Hass, 2000).

Behaviorism dominated the psychology of learning, and behaviorist theories were used as the basis for designing many of the early audiovisual materials (Edgar, 2012; and Ertmer, 2013). For examples Pavlov experiment was associated bell sound with food. In this case he used bell sound as a means of teaching. Along with behavioral objectives, teaching machines, programmed instruction, and computer-assisted instruction (CAI) were among the major works influenced by behaviorism (Saettler, 1990).

Further studies by Anderson, et al. (2001) model supports the design of online and blended courses as active learning environments dependent on instructors and students sharing ideas, information, and opinions. Of particular note is that “presence” is a social phenomenon and manifests itself through interactions among students and instructors. The community of inquiry has become one of the more popular models for online and blended courses that are designed to be highly interactive among students and faculty using discussion boards, blogs, wikis, and videoconferencing.

Siemens describes connectivism as the integration of principles explored by chaos, network, and complexity and self-organization theories where learning is a process that occurs within nebulous environments of shifting core elements – not entirely under the control of the individual. Learning can reside outside of ourselves, is focused on connecting specialized

information sets, and the connections that enable us to learn more and are more important than our current state of knowing (Siemens, 2004). This learning theory regards to exploring the topics by self-development by reading or searching from Google and you tubes.

Online collaborative learning (OCL) is a theory proposed by Linda Harasim that focuses on the facilities of the Internet to provide learning environments that foster collaboration and knowledge building. Harasim (2012) describes OCL as a new theory of learning that focuses on collaborative learning, knowledge building, and Internet use as a means to reshape formal, non-formal, and informal education for the Knowledge Age. (p. 81). It focuses on, internet is as a means of delivering lessons in the form of formal (online learning), non-formal as distance education and informal as self-development.

Harasim sees the benefits of moving to teach and learning to the internet and large-scale networked education. In OCL, there exist three phases of knowledge construction through discourse in a group Idea generating, is the brainstorming phase, where divergent thoughts are gathered. Idea organizing the phase where ideas are compared, analyzed, and categorized through discussion and argument. Intellectual convergence the phase where intellectual synthesis and consensus occurs, including agreeing to disagree, usually through an assignment, essay, or another joint piece of work (Harasim, 2012, p. 82).

To sum up, different learning theory shows as learning takes place in different ways by using different instructional media. For example, behaviorist learning takes place by audiovisual, software developer use constructivism theory and self-development by connectivism.

Summary of literature review

In this review of literature tried to address global issues related to ICT and quality education. Today, the development of technology is very essential in all sectors like business, military and education as well. So in review discussed the meaning and the development of ICT. ICT is a tool or a means of media to plan, manage, analysis, keep the data and delivering a lesson interactive ways. On the other, as the literate indicated ICT development starts in 19930s in America military camp and expanded to other sectors. For example, audiovisual technology develops during World War II, computer for instructional purpose around 1980s, hypermedia and mobile technology.

Other points were discussed in this literature, the role and negative impact of ICT. These are contrast ideas but the role of ICT in education has more focus than negative impacts. The

researcher attention also focuses on role than impact. Some of the roles of ICT for quality education are present the lesson in the form of 3D and animation, access educational materials, save educational data more accurately and safely, save time and students actively participate. But the negative impact of ICT on students' achievement is the problem of the user. Therefore, we have to use technology properly and effectively.

This literature also presented challenges to use ICT in education. As discussed in above, ICT has great role in education. But there are different challenges to implement in the classroom. So the researcher grouped the barrier in two. These are intrinsic (internal) or human related and extrinsic (external) or non-human factors. The intrinsic includes: teachers attitude or motivation to use, lack of digital literacy, and lack of self-development or self-preparation. Extrinsic challenges include: lack of facilities like room, electricity, Hardwar and software, and insufficient numbers of technological products.

ICT in education also presented. As the literature review shows the integration of ICT in Ethiopia is under developing to compare to other African countries and also not satisfactory level. The relationship of ICT and different learning theories also discussed.

Finally, ICT has great roll in educational quality. The researcher will identify types of ICT used, challenges to use, impacts and roles in selected high schools in Addis Ababa. The researcher also discussed the finding with other researcher and recommended the possible solutions.

CHAPTER THREE

3 RESEARCH DESIGN AND METHODS

This chapter deals with the research design and methodologies used for data collection and validation aspects. The main sub-topics included the research site, research design, sampling techniques, data collection methods and procedure, validity, and data analysis.

3.1 Description of the Study Area

Ethiopia is found in horn of Africa and its capital city is Addis Ababa. According to the 2007 census, the city's population is estimated at 2,739,551 inhabitants. These populations need different infrastructure like mobile networking and also source of electricity. As a result, Ethiopia Telecommunication lunches 4G and 5G networks and different electric line expantions are takes place. Currently Addis Ababa has 11 Sub cities. Among these, Arada, Lideta, and Yeka selected for this research. (en.wikipedia.org/wiki/Addis_Ababa).

3.2 Research approach and design

There are different research approach methods. Some of them are: - quantitative, qualitative and mixed methods approaches. Mixed methods research approach combines quantitative and qualitative approaches by including both quantitative and qualitative data in a single study. The purpose of mixed methods research is to build on the synergy and strength that exists between quantitative and qualitative research methods to understand a phenomenon more fully than is possible using either quantitative or qualitative methods alone. Three types of mixed methods research designs are common: the QUAL–quan(exploratory) model, the QUAN–qual(explanatory) model, and the QUAN–QUAL(triangulation) model (Gay, I.R et al.,2012).

A research design is a conceptual structure within which research is conducted; it constitutes the blueprint for the collection, measurement, and analysis of data. Decisions regarding what, where, when, how much, and by what means concerning an inquiry or a research study constitute a research design (Kothari, 2004). In this study, a survey design with an explanatory sequential mixed (QUAN-qual model) type of research approach used. Explanatory sequential mixed method is collect and analysis quantitative data and then explains its result with qualitative data. Their name also indicated that those written in capital letters (QUAL) gave priority in collection and analysis than in small letters(qual). QUAN-

qual used in this study because both quantitative and qualitative data were available and strength its result. One method of research design would not give full information and cross-check for their data validity.

Sources of Data

This research used primary as well as secondary data sources. Primary data were collected from four cluster supervisors, 33 principals, 289 teachers, nine students', and observation representatives. Secondary data source includes from documents like related literature, teachers attendance or list, laboratory reports, and educational policies and manuals.

3.3 Sample and Sampling Technique

Addis Ababa City has 11 Sub cities. The three Sub cities selected by stratified random sampling methods. This was conducted by grouping the 11 Sub cities into three by their geographical location. This gave equal chance to the stratified group to have a representative sample.

Group A contained East, North-East, and South-East parts of the city like Bole, Yeka, Akaki kality, and Lemi Kura Sub cities. Group B contained Western and Waste-central parts of the city like Cherkos, Kolfa Keranyo, and Lideta Sub cities. Group C Northern and North-central parts of the city include Gullele, Addis Ketema, and Arad. From these three groups Yeka, Lideta, and Arada Sub Cities were selected, respectively through simple random sampling from stratified groups. The researcher again selected three governmental high schools from each Sub-city.

The sample populations include all students, teachers, principals, and cluster supervisors of selected high schools in Addis Ababa. In Arada Sub City, there are seven governmental high schools. These are Dejazmach Belay Zeleke, Meskerem, Menelek II, Tikur Anbesa, Agaziyan No.3, Weizero Kelemwork and Bethelham Secondary Schools. From these, the researcher selected Agaziyan No.3, Menelek II, and Meskerem in simple random sampling.

In Lideta Sub City there are 6 governmental high schools. These are Dejazmachch Balcha Aba Nefso, Ewuket Lefre, Ewuket lehbret, Kefteng 23, and Hidase Lideta Secondary Schools. The researcher selected Dejach Balcha, Ewuket Lefre, and Hidase Lideta in simple random sampling.

In Yeka Sub City, there are seven secondary schools. Brhan Guzo, Karalo, Higher 12, Kokeb Atsbeh, Millennium, Tesfa Birhan, and Dejazmach Wondirad. The researcher selected Keftegna 12, Tesfa Birhan, and Dejazmach Wondirad in simple random sampling.

The sample size was determined by Yamane's formula (Yamane, 1967).

$$n = \frac{N}{1+N(e)^2}$$

Where N= is the total/target population for the study

n=sample size and

e=is margin of error

Table 1 population size and sample population

No.	High School's Name	Sub Cities	Total Population(Teachers)	Sample Population(teachers)	No. of sampled principals
1	Agaziyan No.3	Arada	67	19	4
2	Menelik II	Arada	133	37	4
3	Meskerem	Arada	74	20	4
4	Dejazmach Balcha AbaNefso	Lideta	164	45	4
5	Ewuket Lefre	Lideta	97	27	3
6	Hidase Lideta	Lideta	79	22	3
7	Higher 12	Yeka	107	30	3
8	Tesfa Birhan	Yeka	193	53	4
9	Dejazmach Wondirad	Yeka	130	36	4
Total			1044	289	33

$n=1044/(1+1044(0.05)^2)= 1044/(1+1044 \times 0.0025)= 1044/(1+2.61)= 289$ teacher for samples are needed. Assume 95% confidential level and $e= 0.05$. Means that $1044=100\%$, what is the percentage of 289 sample size? It is equal to $= 289 \times 100/1044= 27.68 \%$ ($=0.2768$). To get total sample from each school= the number of teachers*0.2768

Purposive sampling techniques were used to collect qualitative data. The purposive sampling technique was used to select nine student representatives, and four cluster supervisors. Observations took place for one day for each school and data were collected and recorded.

On the other hand, 27.68 % or 289 teachers were selected through systematic random sampling to maintain representations. The principals' (33) number is low and all of them were included in the study. According to Cohen et al 2007, to decide frequently to make systematic sampling by a simple statistic the total number of the wider population being represented divided by the sample size required:

$f = N/sn$ f = frequency interval N = total number of the wider population,

sn = the required number in the sample $1044/289 = 3.6$ approximately 4. Since the frequency interval was 4, the researcher would pick out every fourth name on the list of cases.

3.4 Methods of data collection

For the study, tools are used to collect data to answer the research questions. In this research, the researcher mainly used interviews, questionnaires, documents, and observation tools for data collection. Each of them explained below.

3.4.1 Questionnaire

The questionnaire is a widely used and useful instrument for collecting survey information, providing structured, often numerical data, being able to be administered without the presence of the researcher, and often being comparatively straightforward to analyses (Wilson and McLean 1994). Although there is a large range of types of questionnaires, there is a simple rule of thumb: the larger the size of the sample, the more structured, closed, and numerical the questionnaire may have to be, and the smaller the size of the sample, the less structured, more open and word-based the questionnaire may be (Cohen et al., 2007)

The questionnaire is one of the tools used to collect data in quantitative and qualitative research. In this study, both close and open ended questionnaires were used because of collecting both quantitative and qualitative data. The like Likert scale and open ended questionnaires' were prepared in English and both in Amharic and English language respectively. Then, the Amharic questionnaires translated in to English for data analysis. The close ended Likert scale in English and yes/no in Amharic language questionnaires were

used to collect quantitative data in number and the open-ended questionnaire was used to collect qualitative data in the form of word. The researcher used the close ended Likert scale (5= Strongly Agree (SA), 4= Agree (A), 3= Moderately Agree (MA) 2= Strongly disagree (SDA) and 1= Disagree (DA)) questionnaire to collect data from principals and teachers. 289 and 31 questionnaires were distributed to teachers and principals respectively. From these, 261 (90.31%) and 26 (83.87%) were filled and collected. From four, three cluster supervisors and all (nine) students representative data were collected through a face-to-face interview.

3.4.2 Interview

The interview was another tool used to collect data. There are different forms of interviews. In this research, the researcher used face-to-face individual interviews in Amharic language in their school compounds and in supervisors' office and then translated in to English for data analysis. This tool was used to collect depth data on role of IT in quality education. The question types were semi-structured and open-ended. This tool was used to collect data from purposively selected, nine student representatives and four cluster supervisors.

MoE (2012) indicated that cluster supervisors are not part of the line managers but they play a role in monitoring, supporting, evaluating and linking schools vertically and horizontal. Student representative is represented all students from grade nine (9)-12 and choice/voted by students like students president in the university. Therefore, there was one students representative in each school one of nine-12 classes and taken as a representative sample of the whole class.

3.4.3 Document

Documents which show implementation of instructional technology (materials list), students result, teachers list, and related literature were used.

3.4.4 Observation

Observations occurred in the selected high school compound, in the classroom, and service center through check lists. Observation took place to check the availability of 27 laboratories (Physics, Biology and Chemistry, nine pedagogy, 27 ICT, and nine library classes in each school. And also check the availabilities of sufficient inputs.

3.5 Validity and reliability

Validity refers to how well an instrument as measures what it is intended to measure. To ensure the content validity of data collection first, questions were prepared and checked by experts (thesis adviser PhD), Abrar Awol (MA)) and a pilot test conducted and some questions added as well as removed. To ensure qualitative data validity honesty, approach in smooth/volunteer way and depth interview took place. In addition, to maximize its validity stratified sampling to select Sub cities, simple random sampling to select high schools and systematic random sampling techniques were used. To measure central tendency, statistical tools such as mean, frequency, percentage, and standard deviation used.

Reliability refers to the consistency of a measure what it to be measure. To check internal consistency of the closed ended questionnaires pilot test took place in Keranyo Medihanyalem secondary school. According to this test, 0.947 Cronbach Alpha was recorded. The researcher selected this school for the pilot test because the researcher knows the school teachers well experienced and gave fruitful feedback for the final study. The detail result before and after final study was presented in the table below.

Table 2 Table Cronbach Alpha for internal consistency to pilot test and after final study

Items Category	No. of Items	No. of population (teachers)		Percentage (%)		Cronbach's Alpha	
		pilot test	After Study	Pilot Test	After final Study	pilot test	After final Study
Identification of IT materials	12	21	252	80.8	96.6	0.909	0.792
Implementation of IT materials	12	22	252	84.6	96.6	0.818	0.814
Factors affect the use of IT materials	11	23	254	88.5	97.3	0.845	0.799
Role of IT to enhance quality education	12	24	255	92.3	97.7	0.925	0.844

For pilot study, 30 and 289 questionnaires were distributed for teachers and 26 and 261 of them were collected from pilot test and final studies, respectively. Some of the had incomplete response as a result SPSS counted as invalid. After the pilot test, the researcher got feedback and remove two questions like internet package has high cost and TV room

available in the school and two questions were added (School net program is available and ICT technician is available in your school). As presented in table two, in both case means that pilot test and after final study all item categories scored Cronbach Alpha more than 0.7 and had internal consistency. Then, the final data collection took place and calculated Cronbach Alpha and got 0.913. This indicates that the pilot and final studies were nearly the same internal consistency.

3.6 Procedure of Data Collection

Before the data collection, the following steps occurred. The question was prepared to open and close-ended for both the questionnaire and interview. A pretest took place by the thesis adviser, some senior teachers, and principals and finalizes the questions. The open-ended and semi-structured questionnaires were translated into a second language (like Amharic) and typed and duplicated.

During the data collection process, the researcher was gotten the consent of the respondents and reminds them to give back the question paper and collect it. Observational data were collected from the school compound, in the classroom for nine days, and in other activities. A notebook and tape recorder (smart phone) were used to collect data from interviews and field observation.

3.7 Data Analysis

After data collection took place, the data analysis continued. The process of coding instruments was done that converting responses to numbers for the data entry. Quantitative data entry and descriptive statistical analysis were done using Statistical Package for Social Sciences (SPSS) v.26 and discussed the results with other researchers. Frequency, percentage, mean, and standard deviation used to measure central tendency. Then, interview, observation, and open ended questions (qualitative data) were organized according to basic questions, analyze the contents and narrated.

3.8 Ethical Consideration

The numbers of participant in the study were 261 teachers, 26 principals, three cluster supervisors, and nine students representative. To hidden 299 people and nine governmental high schools (nine -12) the researcher used the following techniques. First, explain the purpose of the study in oral and written form. Second, used codes such as CS1, CS2, and CS3

andSR1.....SR9 to cluster supervisor and students representative respectively. Lastly, convincing them to tell and fill the questionnaires honesty and selected their free time for interview and distributed the questionnaires.

CHAPTER FOUR

4 PRESENTATION, DATA ANALYSIS AND INTRPRETATION

Under this chapter, background information, identification of IT in selected high schools, implementation of IT, challenges that affect the implementation of ICT and roles of ICT were explained. Quantitative and qualitative data were collected through questionnaires, observation, documents, and interviews. 289 and 31 questionnaires were distributed to teachers and principals respectively. From these, 261 (90.31%) and 26 (83.87%) were filled and collected. From four, three cluster supervisors and all (nine) students representative data were collected through a face-to-face interview.

4.1 Background Information of Respondents

The background information of respondents was presented in the table below.

Table 3: Background information of respondents

Variables		Teacher's	%	Principal's	%
		N		N	
Sex	Male	201	77.0	24	92.3
	Female	55	21.1	2	6.7
	Total	256	98.1	26	100
	Missing	5	1.9	0	0
Age	22-27	21	8	0	0
	28-33	119	45.6	3	11.5
	34-39	71	27.2	12	46.2
	40-45	25	9.6	7	26.9
	46-51	11	4.2	3	11.5
	More than 52	10	3.8	1	3.8
	Total	257	98.5	26	100
	Missing	4	1.5	0	0
Qualification	Diploma	0	0	0	
	Degree	165	63.2	2	7.7
	Master	90	34.5	24	92.3
	Other	0	0	0	0
	Total	255	97.7	26	100
	Missing	6	2.3	0	0
Experience	1-5	26	10	0	0
	6-10	68	26.1	0	0
	11-15	95	36.4	10	36.5
	16-20	36	13.8	11	42.3
	21-25	2	0.8	1	3.8
	26 and more	19	7.3	3	11.5
	Total	246	94.3	25	96.2
	Missing	15	5.7	1	3.8

Most of the respondents in all cases were dominated by males with 77.0% and 92.3% teachers and principals respectively. The Ethiopian Federal Democratic Republic (EFDR) government gave different affirmative actions to balance the sex ratio, but not has been achieved yet. Of 26 principals only two of them were females. Most of the respondents were dominated 28-33 and 34-39 years old of teachers and principals respectively. This means that most of them are young and productive aged.

The qualification requirement for a high school teacher is master's holder in each subject. But the qualification of respondents as shown in Table 1 was 34.5% of teachers and 92.3% of principals were masters and the remaining 62.2% of teachers and 7.7 principals were degree holders. This indicates as a factor that affects quality of education in researched schools.

4.2 Identification of Instructional Technology

The types of instructional technology used in the school presented in table four and five. To check the implementation and role of IT, first and the most their availability should be checked. In part one availability of plasma, language and school science laboratory inputs, over headed projector, tape recorder, number of computers, and pedagogy class were presented below.

Table 4: Types of instructional technologies used in selected high schools part one

Note: F=Frequency, %= percentage, SA =Strongly Agree, A = Agree, MA= Moderately agree, SDA =Strongly disagree, DA= Disagree, M= mean, SD=standard deviation

N o.	Description of Item	Res pon se	Respondent				No	Description of Item	Res pon se	Respondent			
			Teacher		Principals					Teacher		Principals	
			F	%	F	%				F	%	F	%
1.	Plasma TVs are available in your school	SA	6	2.3	0	0	2.	The school language and science laboratory have sufficient inputs	SA	17	6.5	2	7.7
		A	10	3.8	3	11.5			A	26	10	4	15.4
		MA	28	10.7	8	30.8			MA	72	27.6	7	26.9
		SDA	60	23	12	46.2			SDA	74	28.4	6	23.1
		DA	156	39.8	3	11.5			DA	71	27.2	6	23.1
		M	2.86		3.65				M	1.95		2.6	
		SD	1.58		1.38				SD	1.18		1.26	
3.	Overhead Projectors are available in the school	SA	13	5	1	3.8	4.	The school has a tape recorder	SA	15	5.7	2	7.7
		A	20	7.7	6	23.1			A	24	9.2	4	15.4
		MA	33	12.6	5	19.2			MA	37	14.2	4	15.4
		SDA	66	25.3	5	19.2			SDA	43	16.5	7	26.9
		DA	126	48.3	9	34.6			DA	140	53.6	9	34.6
		M	1.95		2.4				M	1.96		2.35	
		SD	1.18		1.3				SD	1.26		1.32	
5.	The school has sufficient computers	SA	19	7.3	1	3.8	6.	The pedagogy class has necessary inputs	SA	16	6.1	1	
		A	37	14.2	15	19.2			A	32	12.3	4	
		MA	76	29.1	11	42.3			MA	52	19.9	9	
		SDA	66	25.3	5	19.2			SDA	55	21.1	6	
		DA	62	23.8	4	15.4			DA	103	39.5	6	
		M	2.56		2.78				M	2.24		2.54	
		SD	1.21		1.07				SD	1.28		1.14	

Moidunny (2009), grouped mean score values into five. 1.00-1.80 very low, 1.81-2.60 low, 2.61-3.20 medium, 3.21-4.20 high, and 4.21- 5.00 very high. In the table four above six questions were presented. Regarding Item 1, on availability of plasma: 32% & 11.5% disagreed by teachers and principals respectively. But on another side, 43 % of teachers and 65.4% of principals showed their agreements. Accordingly, it was rated 2.87 (medium) and 3.65 (high) mean values for teachers and principals respectively.

1. Does your school have sufficient computer, internet, pedagogy, and laboratory equipment? **Write Yes/No**

A. Plasma_____

The availability of plasma (yes/no question) responding teachers were 125(47.9%) yes and 129(46.4%) no. In this semi-structured question, the result was somehow different from the above because the plasmas were present in the class but an incomplete part, and almost all them were not functional. As a result, some measured existence with their function, and their result seems similar.

Observation and interview results confirmed that almost plasma TVs were available in each school and class. The problem was most of them not functional. But some teachers used other alternatives like their smart phone, personal laptop and flash to integrate their lessons with the technology (CS1, May 10, 2022, CS2, May 12, 2022, and CS3, May 11, 2022).

In item 2 (The school language and laboratory have sufficient inputs), among respondent principals, 46.2% disagreed and 23.1% agreed. Of most teachers, 55.6% disagreed. The mean value was also 2.4 (low) and 2.6 (low) for teachers and principals respectively.

Agaziyan No.3 was not organized before this year but now it is on processing (CS1, May10, 2022.) in some governmental high schools like Higher 23 and Dejzmach Balcha laboratory facilities but in some like Ewket Lefre and Hidase Lideta High Schools not well organized (CS2, May 12, 2022also mentioned Dejzmach Wondirad High School had good lab facilities than others (CS3, May 13, 2022)

The observation supports the above data means that there were insufficient inputs for science (physics, biology, and chemistry) laboratories. Dezaxmach Wondirad Senior Secondary School had different books in their department office and has online access. Meskerme,

Ewket Lefre, and Tesfa Bran Secondary Schools the laboratory class materials were not well-organized.

For Item 3, the result showed on the availability of projector 145 (73.6%) of teachers and 14 (53.8%) of principals were disagreed. The mean value was 1.95 (low) for teachers and 2.42 (low) for principals. From nine researched schools, the researcher observed a projector in Menelik II high school at the office level. Almost all I can conclude that there was no projector in other schools.

Item 4, the availability of tape recorders, among respondents teacher 140(53.6%) disagree and 43(16.5%) strongly disagree, from principals nine (34.6%) disagreed and seven (26.9%) were disagree. The mean value also indicated 1.96 (low) and 2.35(low) from teachers and principals. During this study, researchers didn't find a tape recorder but they can use their smart phone to record and teach.

Item 5, the availability of sufficient computers was recorded from teachers as 62 (23.8%) disagree, 66 (25.3%) strongly disagree, 76 (29.1%) moderately agree, 37 (14.2%) agreed, and 19 (7.3%) strongly agreed. four (15.4%) disagree, five (19.2%) strongly disagree, 11 (42.3%) moderately agree, five (19.2%) agree and three (1.8%) strongly agree. This means that 49.1% of teachers disagree and strongly disagree the number of computer in the schools were insufficient. The mean value was also 2.56 (low) and 2.77 (medium) respectively.

The researcher observed that in most schools there were no sufficient computers and ICT lab centers. Some of the desktops were not functional and special in Meskerem Secondary School all computers in the lab were not functional and also in Agaziyan No.3 started using in the second semester of the 2021/22 academic year. In most school, one desktop nearly to five students to learn computer skill also support that no sufficient computers in each school.

Item 6 deals about pedagogy class. As presented in Table four, from participant teachers 103 (39.5%) disagreed, 55 (21.1%) strongly disagreed, 52 (19.9%) moderately agreed, 32 (12.3%) agreed, and 16 (6.1%) strongly agreed. In data collected from principals, six (23.1%) disagreed and six (23.1%) strongly disagreed. Mean value also indicated 2.24 (low) and 2.54 (low).

Agaziyan No.3 was a pedagogy center before but now declining. But the fact on the ground totally there was no pedagogy center (CS1, May10, 2022). Regarding to pedagogy center, it is

not as a standard for high schools. Instead of pedagogy center, there are physics, biology, and chemistry lab rooms (CS2, May 12, 2022). There was no pedagogy center in selected high schools (CS3, May 13.2022).

The researcher observed that there weren't any pedagogy centers in all researched schools. In Ewket Lefre, Researcher observed that students preparing different posters in a group as an assignment and posted them on the wall. In any of the nine researched schools, I didn't observe any teacher who used or held a teaching aid. Generally, all analyses showed that there is no pedagogy center and sufficient facilities.

Table 5 types of instructional technologies used in selected high schools part two

Note: F=Frequency, %= percentage, SA =Strongly Agree, A = Agree, MA= Moderately agree, SDA =Strongly disagree, DA= Disagree, M= mean, SD=standard deviation

No	Description of Item	Response	Respondent				No	Description of Item	Response	Respondent			
			Teacher		Principals					Teacher		Principals	
			F	%	F	%				F	%	F	%
7.	Internet connections are available in the school	SA	57	21.8	9	34.6	8.	Teachers have a smartphone	SA	37	14.2	7	26.9
		A	85	32.6	10	38.5			A	65	24.9	7	26.9
		MA	60	23	5	19.2			MA	63	24.1	6	23.1
		SDA	46	17.6	1	3.8			SDA	43	16.5	4	15.4
		DA	13	5	1	3.8			DA	52	19.9	2	7.7
		M	3.49		3.96				M	2.97		3.5	
		SD	1.16		1.04				SD	1.34		1.27	
9.	There is sufficient electric sources in each class	SA	38	14.6	2	7.7	10.	There is an alternative source of electric power in the school	SA	21	8	4	15.4
		A	63	24.1	9	34.6			A	38	34.6	1	3.8
		MA	79	30.3	12	46.2			MA	42	16.1	6	23.1
		SDA	45	17.2	3	11.5			SDA	37	14.2	6	23.1
		DA	36	13.8	0	0			DA	121	46.4	9	34.6
		M	2.23		3.38				M	2.23		2.42	
		SD	1.24		.80				SD	1.38		1.42	
11	The school has DV-D and CD player	SA	14	5.4	1	3.8	12	The school net program is available in your school	SA	18	6.9	4	15.4
		A	20	7.7	3	11.5			A	34	13	8	30.8
		MA	42	16.1	4	15.4			MA	56	21.5	4	15.4
		SDA	67	25.7	8	30.8			SDA	52	19.9	7	26.9
		DA	117	44.8	10	38.5			DA	98	37.5	3	11.5
		M	2.03		2.12				M	2.31		3.12	
		SD	1.19		1.18				SD	1.29		1.31	

With regard to Item 7 in Table five (availability of internet), data analysis from teachers shows that 13 (5.0%) disagreed, 85 (32.6%) agreed, and 57 (21.8%) strongly agreed. Similarly, among principals one of them (3.8%) disagreed, 10 (38.5%) agree, and nine

(34.6%) strongly agreed. Mean values were 3.49 (high) and 3.96 (high) from teachers and principals. From yes/no question (Sufficient internet available in your school) 168 (64.4%) and 85 (32.6%) replied yes and no respectively.

I also observed that there was an internet connection (Wi-Fi) in each of researched schools. In Dejzmach Wondirad Senior Secondary School, the ICT lab classes and language department heads had internet access. But it had capacity limitations and also students assured (during the interview) that accessibility for them was less. All analysis shows the availability of internet in each school. This implies that, principals, teachers, students, and the schools are started globalization. In addition, they can update with new knowledge, skill and also have a potential to change their teaching and assessment methods. The students also become a global citizen.

For Item 8 (teachers have smart phone): data analysis shown in table five from teachers' responses 52 (19.9%) disagreed, 63 (24.1%) moderately agree, and 65 (24.9%) agreed. And from principals four (15.4%) strongly disagreed and seven (53.8.9%) agree and strongly agreed. Mean values of 2.97 (medium) and 3.5 (high) were reported from teachers and principals respectively. This result shows that most teachers had smart phone. I also observed most teachers were watching you tubes with their smart phones.

Concerning to Item 9 (sufficient electric source): again the data collected from principals show that three (11.5%) strongly disagree, 12 (46.2%) moderately agreed, and nine (34.6%) agreed. And 36(13.8%) disagreed, 45(17.2%) strongly disagree, 79(30.3%) moderately agree, 63 (24.1%) agreed, and 38 (14.6%) strongly agree. 41% of data from teachers and 57.7% principals show disagreement and slightly agree about the availability of electric sources in each class.

Principals were asked: Is the following things are challenge in your school to implement ICT? Write yes/No A. There is sufficient electricity. _____ yes/no questions about the availability of sufficient electricity and answered 19 (73.1 %) yes and seven (26.9%) no. In addition, 3.38 (medium) and 3.08 (low) mean values from principals and teachers indicate the availability of electric source. I also observed most classes had electric access.

Regarding Item 10 (alternative electric source): data collected from teachers 121 (46.4%) disagree, 37(14.2%) strongly disagree, 42 (16.1%) moderately agree, 38 (14.6%) disagree, and 21 (8.0%) strongly agree. From principals nine (34.6%) disagree, six (23.1%) disagree,

and four (15.4%) strongly agree. 60.6% of teachers and 57.7% of principals disagree and disagree with the availability of alternative electric sources in high schools.

The mean scores of 2.23 (low) and 2.42 (low) were reported from teachers and principals respectively showing low in availability of alternative electric source. As I observed, I didn't see any alternative electric source in all researched schools. During observation in Meskerem and Higher 12 Secondary Schools, the light was gone but not an alternative source.

As to Item 11 (school has DV-D and CD player): from respondent principals 10 (38.5%) disagree and eight (30.8%) strongly disagree and from teachers 117 (44.8%) disagree and 67 (25.7%) strongly disagree. The mean scores also indicated 2.12 and 1.75 principals and teachers low and very low respectively. Observation most of the desktops had a CD player. But the analysis shows no DV-D player in most schools.

Item 12 (The school net program is available): being the last analysis in the same Table five shows 98 (37.5%) disagree and 52 (19.9%) strongly disagreed with teachers and principals three (11.5%) disagree and seven (26.9%) strongly disagreed and eight (30.8) moderately agree about the availability of school net program. 2.17 mean from teachers and 2.62 from principals show that the availability of the school net program was very low and low respectively. The researcher observed there was a center-to-school net program in Dejzmach Balcha, Menelik II, and Dejzmach Wondirad high schools but in some schools like Higher 12 and Meskerem they format the application and they used as normal desktops.

The school net program was developed by Chinese Huawei Company and it costs 230 million birr. It is a real technology that connected each school's activity in a network. It helps to share activities and reports. As a system, it is not functional in all researched schools. Related to this, the accessories are not found on the market and difficult to fix the problems (CS3, May 12, 2022). Addis Ababa Education office is processing to change Huawei by another company (CS3, May 13, 2022). The school net program was not available under his supervision schools. Addis Ababa Education Office not following their mandate to fix the problems related to school net program. Even the technician did not know the technology and can't fix it (CS1, May 10, 2022).

The following ICT materials like plasma, laptop, smart phone, plasma, internet, and desk top computers were available in their school. Especially, plasma was available in 56 sections and school net program also available in the school. Most of the students had smart phone and TV

in their home (SR4, April 27, 2022). Desktop computer, internet, TV in their home, plasma, and smart phone were available in their school (SR5, April 28, 2022), (RS6, April 29, 2022), (SR2, May 03, 2022), (SR3, May 04, 2022), (SR8, May 06, 2022), (SR9, May 09, 2022), (SR, 7 May 10, 2022), and (SR1, May 11, 2022).

4.3 Implementations of ICT in selected high schools of Arada, Lideta, and Yeka Sub Cities

The table given below indicated the implementation of ICT materials in Agaziyan No.3, Menelik II, Meskerem, Dejazmach Balcha Abanefso, Ewket Lefre, Dejazmach Wondirad, Higher 12, and Tesfa Birhan Secondary Schools.

Table 6 : Implementations of IT materials part one

Note: F=Frequency, %= percentage, SA =Strongly Agree, A = Agree, MA= Moderately agree, SDA =Strongly disagree, DA= Disagree, M= mean, SD=standard deviation

N o.	Description of Item	Res pon se	Respondent				No	Description of Item	Res pon se	Respondent			
			Teacher		Principals					Teacher		Principals	
			F	%	F	%				F	%	F	%
1.	Most teachers use Plasma TVs in your school	SA	6	2.3	0	0	2.	The language and Science teachers use the school	SA	13	5	2	7.7
		A	10	3.8	3	11.5			A	26	10	3	11.5
		MA	28	10.7	8	30.8			MA	59	22.6	9	34.6
		SDA	60	23	12	46.2			SDA	79	33.3	10	38.5
		DA	156	59.8	3	11.5			DA	84	32.2	2	7.7
		M	1.65		2.42				M	2.25		2.73	
		SD	0.98		0.86				SD	1.16		1.04	
3.	Overhead Projectors well used in the school	SA	5	1.9	0	0	4.	Teachers use a tape recorder in the school	SA	2	0.8	0	0
		A	17	6.5	6	23.1			A	12	4.6	2	7.7
		MA	35	13.4	7	26.9			MA	27	10.3	4	15.4
		SDA	66	25.3	6	23.1			SDA	47	18	4	15.4
		DA	138	6	7	26.9			DA	171	65.6	16	61.5
		M	1.79		2.46				M	1.55		1.69	
		SD	1.03		1.14				SD	0.91		1.01	
5.	The school staffs used computers effectively for planning, preparing assessment, and recording results	SA	31	11.9	6		6.	The pedagogy class is well functional in the school	SA	16	6.1	2	
		A	59	22.6	8				A	16	6.1	2	
		MA	54	20.7	5				MA	42	16.1	5	
		SDA	54	20.7	2				SDA	67	25.7	10	
		DA	63	24.1	5				DA	120	46	7	
		M	2.77		3.31				M	2.00		2.31	
		SD	1.35		1.44				SD	1.19		1.19	

With regard Item 1 (usages of Plasma): as a result indicated from teachers 156 (59.8%) disagree, 60 (23.0%) slightly agree, and six (2.3%) strongly agree, and from principals three (11.5%) disagreed, 12 (46.2%) strongly disagreed, eight (30.8%) moderately agreed and three (11.5%) agreed.

In Addition, the mean score also indicated 1.65 from teachers and 2.42 from principals very low and low respectively. The researcher observed except Meskerem Secondary School, other ICT teachers used plasma screens connected to monitor and taught students in ICT lab

classes. On the other side, Agaziyan No.3 was not used at all, and the remaining school on, and off and interviewed students also confirm very a few teachers were used laptops or flash or directly access plasma Tv as instructional material.

The researcher assured that there was no plasma transmission at all. The transmission modes in Addis Ababa and country side are different. In Addis Ababa, teachers can select and pause the plasma lesson. But teachers used the plasma screen connected to flash, computer system units, and laptop to deliver their lesson (CS2, May12, 2022).

The researcher also observed that not all plasma in all blocks or buildings were worked. Such as Menelik II, Dejzmach Balcha and Wondirad Balcha Secondary School cluster supervisor also told me that teachers weren't using plasma TVs effectively.

Item 2 (language and science teachers use laboratory effectively): the analysis shows us 84 (32.2%) disagree, 79 (30.3%) strongly disagree, 59 (22.6%) moderately agree, 13 (5.0%) strongly agree data from teachers and totally, 12 (73.1%) principals strongly disagree 10 (38.5%) and moderately agree nine (34.6%) about usages of practical section. 2.25 of teachers and 2.73 principals mean value indicated low and medium usage of a laboratory respectively.

Observation and interview data also indicated that no practical laboratory section in all of the researched areas. In Hidasa Lideta high school, the researcher observed 2010E.C students' laboratory report documents. After that even enough there were some apparatus and chemicals not used practical section. Even most of them were disorganized and classes were dirties.

Regarding to Item 3 (overhead projector used well in the school): as presented in the above Table six, 204 (78.2%) of respondent teachers and 13 (50%) of principals disagreed about the implementation of the projector. As the researcher explained in Table 6 in Item 3 there wasn't a projector and therefore there was no implementation. Teachers mean value also indicated 1.79 (very low) on the usage of overhead projector.

Concerning to Item 4 (Teachers used a tape recorder in the school) the analysis indicated that 171 (65.5%) of teachers and 16 (61.5%) principals disagree about the usage of the tape recorder in researched schools. The mean score also indicated 1.79 for teachers and 2.46 for principals very low and low respectively.

As to Item 5 (staffs use the computer for planning, preparing the assessment, and recording results) the respondent teachers' results indicated 117 (44.8%) disagreement, Results from principals five (19.2%) disagree, two (7.4%) strongly disagree, five (19.2%) moderately agreed, eight (30.8%) agreed and six (23.1%) strongly agreed. Generally, 44.8% of teachers indicated their disagreement on the usage of computers for planning, assessing, and recording student results. In contrast, principals result show 14 (53.9%) agreement on usage of computer for planning, assessing, and recording student results.

On the other said teachers were asked “To what extent you are using instructional materials in your school/እርስዎ ተክኖሎጂን ለማስተማሪያነት ምን ያክል ይጠቀማሉ?(circle only one)

- A. Usually/አብዛኛውን ጊዜ,
- B. often/ብዙ ጊዜ,
- C. sometimes/አንዳንድ ጊዜ,
- D. Rarely/ባዶታ
- E. never/ምንም አልጠቀምም

Among 261 teachers 34 (13.0) usually, 48 (18.4%) often, 101 (38.7%) sometimes, 54 (20.7) rarely and 17 (6.5%) never used instructional technology and mean value 2.88 (medium). It indicated that 38.7% (sometimes) of the participant from researched school were used technology.

The researcher observed that, al-most all teachers were typed and duplicated their second-semester mid-exams. In addition to that, they also typed and printed some quizzes and assignments. Directors also had computers and printer. They wrote letters and had lists of students and employees. On the other side, the researcher observed that teachers recorded students' results on a manual mark list means they have not used computer to record the result. I observed also teachers prepared weekly plans on hard papers.

Item 6 (pedagogy class is well functional in the school): 71.7 % of teachers and 65.4 % of principals disagreed on proper using of pedagogy class in researched schools. As a researcher explained in Table four Item six, the pedagogy class was also not available and its functionality was unexpected.

Table 7: Implementations of IT materials part two

Note: F=Frequency, %= percentage, SA =Strongly Agree, A = Agree, MA= Moderately agree, SDA =Strongly disagree, DA= Disagree, M= mean, SD=standard deviation

N o.	Description of Item	Response	Respondent				No	Description of Item	Response	Respondent			
			Teacher		Principals					Teacher		Principals	
			F	%	F	%				F	%	F	%
7.	Students and staffs are used broad band or Wi-Fi in the school	SA	39	14.9	8	30.8	8.	Teachers browse resources by using their smartphone	SA	35	13.4	7	26.9
		A	76	29.1	5	19.2			A	63	24.1	5	19.2
		MA	84	32.2	10	38.5			MA	68	26.1	8	30.8
		SDA	42	16.1	2	7.7			SDA	57	21.8	51	19.2
		DA	19	7.3	1	3.8			DA	67	14.2	1	3.8
		M	3.32		3.65				M	3.00		3.46	
		SD	1.30		1.13				SD	1.26		1.21	
9.	There is sufficient electric sources in each class	SA	26	10	3	11.5	10.	Teachers used an alternative source of electric power in the school like generator	SA	14	5.4	3	11.5
		A	66	25.3	9	34.6			A	18	6.9	2	7.7
		MA	69	26.4	11	42.3			MA	33	12.6	5	19.2
		SDA	45	17.2	3	11.5			SDA	41	15.7	3	11.5
		DA	53	20.3	0	0			DA	15	59.4	13	50
		M	2.87		3.46				M	1.83		2.19	
		SD	1.28		0.17				SD	1.21		1.44	
11	DV-D and CD player well used in the school	SA	7	2.7	1	3.8	12	Teachers use school net program to delivering their	SA	19	7.3	1	
		A	18	6.9	2	7.7			A	24	9.2	5	
		MA	31	11.9	7	26.9			MA	52	19.9	8	
		SDA	50	19.2	5	19.2			SDA	52	19.9	7	
		DA	15	59.4	1	42.9			DA	11	42.9	5	
		M	1.75		2.12				M	2.17		2.62	
		SD	1.08		1.18				SD	1.28		1.34	

Concerning Item 7 (Staff and Students use the internet in the school), the analysis show from respondent teachers that 19 (7.3%) disagreed, 42 (16.1%) strongly disagreed, 84 (32.2%) moderately agree, 76 (29.1%) agreed and 39 (14.9%) strongly agreed. In addition to teachers, principals’ data indicated that one (3.8%) disagreed, two (7.7%) strongly disagreed, 10 (38.5%) moderately agreed, five (19.2%) agreed, and 8 (30.8%) strongly agreed. More than half percent of respondents show teachers were used the internet in the school.

Teachers, students, and others used internet. He used to update, share, and collect information and reports (CS2, (May 12, 2022)). Most of the students used internet for instructional purpose. Even some students read before the actual class and became challenges for teachers (CS3, May 13, 2022). The internet service was not satisfactory under supervision schools (CS1, May10, 2022).

During the researcher observation, in all researched schools were internet connections and teachers used it. But the students had less access to use the internet. In some schools like Dejazmach Wondirad high school ICT classes had internet and students used it. Interviewed students especially, in Higher 12 Secondary School they were used internet during Saturday tutorial class. Some students' representative like Menelik II, Agaziyan, and Dejazmach Balcha Abanefso use their smart phone in the school.

Item 8 in Table seven (Teachers browse resources by using their smart phone): 68 (26.1%) of teachers and 8 (30.8%) of principals said teachers browse resources by their smart phone moderately. Their mean value was 3.00 teachers and 3.46 principals teachers browse resources with medium and high score values respectively. As explained in Table five, most teachers had their own smart phone and I observed teachers like an English teacher in Hidase browse vocabulary words, Dejazmach Balcha Mathes teacher, and others also Google and watch videos.

But they were browse more on recreational and chat than instructional purpose. The interviewed students and supervisors also told me that most students used the internet for social media purposes than educational. But also they used the internet to do their assignment and also most of the interviewed students prefer to read online or downloaded materials than hard paper.

In Item 9 Table 7 (there is a sufficient electric source in each class): 11 (42.3%) of principals said strongly disagreed and 69 (26.4%) teachers said moderately agreed. Observational data also supported that there was an electric source in all nine researched schools since they are found in Addis Ababa. However, there were track or on and off is as usual.

For Item 10 (Teachers use an alternative source of electric power): as the analysis showed 155 (59.4%) of teachers and 13 (50%) principals were disagreed about the usage of alternative electric power sources in researched schools. Observation data confirmed that no alternative source of power in school. In addition, students told me that, they have two periods per week, and in some schools like Tesfa Birhan, Ewket Lefre, and other ICT teachers divided the section into two because of a lack of sufficient computers. As a result, if the light was off, they were missed the period.

With regarding Item 11 in Table 7 (DV-D and CD player well used): out of 261 teachers 154 (59.0%) said disagreed and from 26 principals 11 (42.3%) were disagree about the

implementation of CD. In Dejazmach Balcha Abanefso Secondary School, they were prepared a CD receiver for most classes to facilitate teachers' use of the Plasma TV effectively. But they were not functional as expected. In some schools, teachers use their laptops and flash to deliver their lessons through Plasma (CS2, May 12, 2022).

Item 12 in Table 7 (Teachers use school net program to deliver their lesson): from the total of 261 teachers 112 (42.9%) disagreed, and from 26 principals 12 (46.1%) disagreed about the effectiveness of school net program. The school net program was started two years ago in Addis Ababa governmental high schools to connect each school in a network. But now it stops in all researched schools. Instead of that motivated teachers use other mechanisms to deliver their lessons. In some schools such as use flash and in another school they were format the network and used desktops as normal computers and a like.

Finally, principals asked (Rate the implementation of ICT in your school.(**circle one**)

A. Excellent B. Good C. Poor) to rate the implementation of ICT in their schools as two (7.7%) were excellent, 22(84.6%) good, and 2(7.7%) poor. But the mean value indicated 2.00 low implementation of ICT in researched schools. During researcher observation, Dejazmach Balcha Abanefso, Dejazmach Wondirad, and Menelik II Secondary School were somehow good. But there is no excellent school in this study. Smart phone, desktop, internet, telegram, and email were used by, and (CS1, May 10, 2022, CS2, May 12, 2022, and CS3, May 13, 2022).

In this school the following points on implementation of ICT were mentioned. A, most teachers weren't used plasma properly and he was not sure about school net whether functional or not. In fact it was not functional at all. B, teachers used internet to watch videos and read their subject matters. C, students also used computer lab class and internet for funny things and also for educational purpose. D, some teachers used plasma to deliver their lessons (SR4, April 27, 2022).

There were plasmas in each class but teachers not used it properly. Students used their smart phone, computer, and internet for different activities (SR5, April 28, 2022 and SR6, April 29, 2022). Mini-media was used in school to transmitted programs like poems and facts during morning and break time (SR5, April 28, 2022). But in other school, they used mini-media more of for entertainment than educational purpose.

Similarly reported, except SR3 in other schools teachers used plasma and computer classes to deliver their lessons. In addition, teachers and students used their mobile phone and also tablets for teaching-learning process (SR2, May 03, 2022, SR3, May 04, 2022, and SR8, May 06, 2022).

Some of ICT materials includes: plasma, white board, flash, laptop and desktop were used in the school. Students were search different topics and also did their assignment online. ICT member use computer class during their free time. Their history teacher show them caves prepared during World War II. Interviewed student by using his mobile and laptop start to develop web and also used for online business (SR9, May 09, 2022).

Plasma, white board, smart phone, flash, laptop and desktop were used this school. Teachers sometimes used these technologies like biology teacher used plasma to deliver his lesson (SR7, May 10, 2022). Except ICT teachers, physics, and English teachers other teacher weren't used plasma screen, laptop or smart phone to deliver their lessons. Rarely, teacher used these instructional technologies (SR1, May 11, 2022).

4.4 Factors that Affect the Implementations of ICT in Selected High Schools

There are different challenges or barriers to delivering lessons with technology. Some of the challenges are presented below in two parts and discussed.

Table 8: Factors that affect the implementation of ICT

Note: F=Frequency, %= percentage, SA =Strongly Agree, A = Agree, MA= Moderately agree, SDA =Strongly disagree, DA= Disagree, M= mean, SD=standard deviation

N o.	Description of Item	Res pons e	Respondent				No	Description of Item	Resp onse	Respondent			
			Teacher		Principals					Teacher		Principals	
			F	%	F	%				F	%	F	%
1.	There is no problem with an electric city in the school	SA	29	11.1	1	3.8	2.	Teachers have enough time to use ICT in their classroom	SA	13	5	3	11.5
		A	54	20.7	7	26.9			A	33	12.6	8	30.8
		MA	77	29.5	7	26.9			MA	80	30.7	5	19.2
		SDA	44	16.9	7	26.9			SDA	68	26.1	8	30.8
		DA	57	21.8	4	15.4			DA	67	25.7	2	7.7
		M	2.82		2.77				M	2.45		3.08	
		SD	1.29		1.14				SD	1.15		1.2	
3.	Teachers have sufficient knowledge to use computer(typing, browsing)	SA	11	4.2	3	11.5	4.	Teachers are well trained to fix ICT problems	SA			0	0
		A	31	11.9	10	38.5			A			4	15.4
		MA	91	34.9	7	26.9			MA			9	34.6
		SDA	80	30.7	4	15.4			SDA			10	38.5
		DA	48	18.4	2	7.7			DA			3	4.5
		M	2.52		3.31				M			2.54	
		SD	1.05		1.12				SD			0.9	
5.	Teachers' have motivation to use ICT	SA	38	14.6	4	15.4	6.	Students' have motivation to learn by aids of ICT	SA	41	15.7	7	26.9
		A	58	22.2	4	15.4			A	61	23.4	5	19.2
		MA	88	33.7	14	53.8			MA	72	27.6	10	38.5
		SDA	53	20.3	4	15.4			SDA	49	18.8	2	7.7
		DA	24	9.2	0	0			DA	38	14.6	2	7.7
		M	3.13		3.31				M	3.07		3.5	
		SD	1.17		0.93				SD	1.28		1.21	

Item 1 Table eight (There is no problem with the electric city in the school): from 261 teachers 101 (38.7%) and among principals 11 (43.3%) reported as disagreement about sufficient availability of electric power. The researcher explained this question in Table 4 questions nine and 10 in detail.

As to Item 2 (Teachers have enough time to use ICT in their classroom): as the data analysis indicated among teachers 67 (25.7%) disagree, 68 (26.1%) slightly agree, 80 (30.7%) moderately agree, 33 (12.6%) agree and 13 (5.0%) strongly agree. Principals two (7.7%) disagree, eight (30.8%) strongly disagree, five (19.2%) moderately agree, eight (30.8%) agree and three (11.5%) strongly agree. Of the total teachers' responses, 51.8% disagreed that teachers had not enough time to use ICT. The mean value of teachers 2.45 and principals 3.08 indicated low and medium respectively.

The researcher observed there was no rule or regulation to stay teachers in school compounds. The teacher came to school only and only when they had a period and after they finished, they leave the school. As a result, they don't have time to think about and prepare the lesson in smart ways. When some minutes were left for the period, I observed some teachers reading and writing some notes. Even when they were free, they played a game.

Teachers were asked about "sufficient ICT technicians available in their school": 146 out of 261 said teachers, yes and 104 (39.8%) no. 23 (88.5) out of 26 principals said yes. This means that for a small problem there were ICT teachers and they count as the technician. And principals were asked "There is no skilled manpower" and 13 (50.0%) were yes and the remaining 50% no. At a city or sub-city level no skilled manpower to solve a series problem of ICT and also plasma. Because most of plasmas and $\frac{1}{4}$ of computers in different schools were not worked.

Regarding to Item 3 (teachers have sufficient knowledge about technology) among participant teachers 91 (34.9%) moderately agreed and 48 (18.4%) disagreed, principals two (7.7%) disagreed and 10 (38.5) agreed. Item number 4 (Teachers are well trained to fix ICT problems): from total teachers 128 (49.1%) and 13 (50%) of principals showed their disagreement on teachers skill to fix ICT problems. Teachers' mean value of 2.53 and principals' 3.30 shows low and medium respectively.

The other question was asked for principals "To what extent ICT related refresher courses provided for teachers in your school". Their answer were eight (30.8%) often, five (19.2%)

sometimes, 11 (42.3%) rarely and two (7.7%) never. The frequency of giving training was rare and it is another factor that affects the integration of lessons with technology.

The researcher also observed ICT lab classes in researched schools and ¼ of the desktop were not functional. There was also two plasma technician in most schools. But they can't fix the problem. Because one, they simply graduated from TEVET colleges and don't have experience. Their salary scale was also low and they weren't happy to work the job. I also tried to interview Ewket Lefre high School plasma technician! He told me he was not a technician.

Interviewed supervisor he told me that "most of the teachers were not familiar with technology, but some students were talented and fixed some of the problems that happened in the classroom." On the other side, they he told me that, especially in the school net program there were no accessories to fix the problems (CS2, May 12, 2022). Generally, the ICT teachers were good but other teachers were not skillful to fix problems, and the training was only given to computer teachers.

Concerning Item 5 (Teachers have the motivation to use ICT): among data collected from teachers 53 (20.3%) strongly disagree and 88 (33.7%) moderately agreed about teachers' motivation to use ICT. Of principals, 14 (53.8%) also show moderately agree. on the other side, principals were asked "Teachers have no good attitude to use ICT". This 26 principals six (23.1%) and 20 (76.9%) of them said yes and no respectively. Means result indicated that teachers had moderately motivation to use ICT.

Observation: there was awareness problem among teachers about ICT. They gave instructional technology only to ICT teachers. They were dependent on talk and chalk (traditional methods) of teaching.

During the interview, students reflect only some teachers used audiovisual materials to deliver their lessons. Such as a biology teacher for grade 12 in Dejazmach Wondirad(SR7, May 10, 2022), a History teacher in Tesfa Birhan(SR9 May 09, 2022), and a chemistry teacher in Dejazmach Balcha Abanefso Secondary schools were used(SR4, April 27, 2022). To sum up, most of computer teachers and other a few teachers had the motivation to support their lessons with technology.

For Item 6 (students have the motivation to learn by technology): from 261 teachers 102 (39.1%) and among 26 principals 12 (46.1%) show their agreement that students like to learn by technology.

Observation, interview data from supervisors, and students supported students were interested to learn through technology. In addition to that, some students from Dejazmach Wondirad and Tesfa Birhan Secondary Schools started to develop websites.

Table 9: Factors that affect the implementation of ICT part two

Note: F=Frequency, %= percentage, SA =Strongly Agree, A = Agree, MA= Moderately agree, SDA =Strongly disagree, DA= Disagree, M= mean, SD=standard deviation

No.	Description of Item	Respon se	Respondent				No	Description of Item	Respon se	Respondent			
			Teacher		Principals					Teacher		Principals	
			F	%	F	%				F	%	F	%
7.	The school is using school net program properly	SA			2	7.7	8.	The school teachers use the internet for instructional purpose	SA	40	15.3	2	7.7
		A			5	19.2			A	71	17.2	7	26.9
		MA			13	50			MA	73	28	11	42.3
		SDA			4	15.4			SDA	45	17.2	6	23.1
		DA			2	7.7			DA	31	11.9	0	0
		M			3.04				M	3.17		3.19	
		SD			0.99				SD	1.23		0.89	
9.	The school teachers have skill to use laboratory effectively	SA	22	8.4	2	7.7	10.	Teachers have got training on ICT and laboratory	SA			1	3.8
		A	41	15.7	2	7.7			A			3	11.5
		MA	87	33.3	11	42.3			MA			8	30.8
		SDA	67	25.7	11	42.3			SDA			11	42.3
		DA	41	25.7	0	0			DA			3	11.5
		M	2.75		2.81				M			2.54	
		SD	1.16		0.89				SD			0.89	
11	The teachers have an interest to use pedagogy center effectively	SA	20	7.7	1	3.8	12	Teachers use plasma TVs effectively	SA	6	2.3	2	7.7
		A	41	15.7	3	11.5			A	12	4.6	1	3.8
		MA	76	29.1	6	23.1			MA	39	14.9	9	34.6
		SDA	62	23.8	11	42.3			SDA	75	28.7	12	46.2
		DA	59	22.6	5	19.2			DA	126	48.3	2	7.7
		M	2.62		2.34				M	1.26		2.58	
		SD	1.22		1.06				SD	1.00		0.98	
13	Student Parents have a positive attitude about technology	SA	21	8	2	7.7	14	students have the skill to use the computer, plasma, and the internet	SA	15	5.7	4	15.4
		A	52	19.9	6	23.1			A	41	15.7	3	11.5
		MA	89	34.1	10	38.5			MA	91	34.9	15	57.7
		SDA	71	27.2	6	23.1			SDA	72	27.6	4	15.4
		DA	26	10	2	7.7			DA	41	15.7	0	0
		M	2.89		3				M	2.68		3.27	
		SD	1.09		1.06				SD	1.09		0.92	

With regarding Item 7 (the school is using the school net program properly): this question was asked to principals and said seven (26.9%) of them agreed and mean also 3.03 medium. But the fact on the ground, the school net program was not functional at all but some motive teachers used other means of delivering their lessons.

In Item 8 (The school teacher uses the internet for instructional purposes): among participant teachers 111 (42.5%) agreed. Among principals 11 (42.3%) and seven (26.9%) of them

moderately agreed and agreed respectively. The researcher observed teachers searching for educational material but also watching ticktack and you tubes.

Regarding Item 9 (School teachers have the skill to use laboratory effectively) from teachers 67 (25.6%) strongly disagreed and 87 (33.3%) moderately agreed and among principals 11 (42.3%) strongly disagreed and 11 (42.3%) moderately agreed. This shows that somehow there was a problem with skill.

During my observation teachers told me that, there were laboratory technicians but now not yet. As a result, they were not experienced and they were afraid to mix up chemicals. To develop teachers' laboratory skills they were adjusting experience sharing program with Dejzmach Balcha Secondary School. Another problem he told me that, the trained teachers' turnover and other new teachers came to their schools was another challenge to implement ICT (CS2, May 12, 2022). Another indication if they had skills, why doesn't use the lab effectively?

Regarding Item 10 (Teachers have got training on ICT and laboratory): it was asked only for principals and their results indicated 11 (42.3%) strongly disagreed and 8 (30.8%) moderately agreed, and 2.54 (low) mean value about teachers got training on ICT. It shows that the training was not enough to build up teachers' skills.

For Item 11 (teachers have an interest to use pedagogy center): among participant teachers 59 (22.6%) disagreed, 62 (23.8%) slightly agreed, and 79 (29.1%) moderately agreed and from principals five (19.2%) disagreed and 11 (42.3%) strongly disagree and six (23.1%) moderately agreed about teachers interest to use pedagogy center effectively. Even enough teachers had a medium interest to use but pedagogy center was not available in researched schools.

Item 12 in table nine (Teachers use plasma TV effectively: this question was discussed in Table 4 and the result 12 (46.2%) of principals and 126 (48.3%) of teachers disagreed and nearly the same means that teachers not used plasma TV effectively. The mean value reported from teachers 1.83 (low) and principals also 2.57 (low).

Item 13 deals (Student parents have a positive attitude about technology): the analysis from principals shows six (23.1%) strongly disagreed and 10 (38.5%) moderately agreed and among participant teachers 71 (27.2%) strongly disagreed and 89 (34.1%) moderately agreed. The mean score of 3.00 from principals and 2.89 from teachers indicated medium value. The

interviewed result supports that some parents were afraid of technology. But it is the problem of users not the technology.

Concerning Item 14 (Students have the skill to use the computer, plasma, and internet): Among participant principals 15 (57.7%) of them said moderately agreed, and from teachers 71 (27.2%) slightly agreed and 89 (34.1%) moderately agreed. The interview result also supported that, some students had skillful to fix technical problems in their class, they can also browse the internet on their or parents' phone. But they had less exposure to computers and had less skill to type on desktop computers.

Principals were asked, "How do you rate the ICT support provided by higher bodies to your school". Among them two (7.7%) adequate, 15 (57.7%) moderate and nine (34.6%) inadequate. Supervisors' interview result indicated that support from the higher body was less and another problem to implement technology in school. ICT is one of the six pillars to achieving quality education in Ethiopia. Especially for school improvement, teachers' development and curriculum (learning-teaching process) had their principals in high schools. But the city education bureau gave fewer enfaces for ICT.

Other factors affect to use of ICT (Interview and observation data)

Most teachers and students had a good interest to use ICT. As he observed practical computer class students had high motivation to use and learn. Factors that affect the implementation of ICT includes: less follow up from higher officer and less response, internet capacity, insufficient number of computers, teachers' lack of skill to fix problems on the spot, and training was given only for computer teachers (CS1, May 10, 2022).

Supervisor reported the following barriers to implement ICT. These are, A. video lessons are available but teachers have no motives to use them. B. directors and teachers had not committed to enforcing teachers to use technology. C. Skill gaps and as a result chemicals were expired. D. Students behavior means that they were took set of box and cables from schools. E. supervisors have no power on teachers' efficiency and had fewer acceptances by teachers (CS2, May 12, 2022).

As translation data indicated, subject teacher had skill but the laboratory demonstration took place by technician and had less skill. Some students had skill and experience to fix minor ICT problems in the class. Some of the challenges to implement ICT includes: lack of teachers' commitment, less response from higher officials, directors had less follow up to fix

technical problem, financial bureaucracy, some parts of plasma and computer took by thieves, teachers and students language ability to understand plasma teachers, and ICT technician had less experienced to fix problems (C3, May 13, 2022).

Some of the challenges like number of computers were insufficient; teachers' lack of interest to use ICT, and students had less skill to type on computer (SR4, April 27, 2022). there was no factor that affect the implementation of ICT (SR5, April 28, 2022). But the fact on the ground the number of computer and also class size, laboratory classes were disorganized and not sufficient. Students were seen unnecessary videos as a factor that affects ICT implementations in their school (SR6, April 29, 2022).

IN this school the following factors reported during the interview. Teachers time management, teachers not used active teaching methods, some teachers had negative attitudes for technology, school have no enforcement to use ICT, school rules (student not allowed to bring mobile into school), and less material managements (SR2, May 03, 2022).

Interviewed student mentioned the following challenges. Teachers motivation to use, teachers thought that plasma take more time, no alternative electric source, computers not work at all were some of challenges that affect the implementation of ICT. Even the computer class they were learns only the theory part (SR3, May 04, 2022).

Teachers' attitude (teachers recommended students to learn only text book), not organized laboratory, the plasma locked and the server were not worked were some of the challenges to implement ICT (SR8, May 06, 2022). The above factors also that affect the implementation of ICT in another schools (SR9, May 09, 2022, SR7, May 10, 2022, and SR1, May 11, 2022).

4.5 The roles of Technology to Enhance Quality Education

Technology has so many contributions to quality education. The IT materials and their importance presented in the table below.

Table 10: Roles of ICT in Education part one

Note: F=Frequency, %= percentage, SA =Strongly Agree, A = Agree, MA= Moderately agree, SDA =Strongly disagree, DA= Disagree, M= mean, SD=standard deviation

N o.	Description of Item	Res pon se	Respondent				No	Description of Item	Res pon se	Respondent			
			Teacher		Principals					Teacher		Principals	
			F	%	F	%				F	%	F	%
1.	I typed my data(students, employees, resource) with computer	SA	73	28.0	13	50	2.	My school has school management system software(SMS)	SA	58	22.2	4	15.4
		A	62	23.8	7	26.9			A	77	29.5	2	7.7
		MA	52	19.9	3	11.5			MA	58	22.2	5	19.2
		SDA	36	13.8	3	11.5			SDA	28	10.7	9	34.6
		DA	36	13.8	0	0			DA	40	15.3	6	23.1
		M	3.39		4.15				M	3.33		2.58	
		SD	1.39		1.05				SD	1.34		1.36	
3.	I shard different reports and events by using internet and computer/smartp hone	SA			11	42.3	4.	I was manage my school online during pandemic Covid 19	SA			5	19.2
		A			7	26.9			A			5	19.2
		MA			4	15.4			MA			8	30.8
		SDA			4	15.4			SDA			4	15.4
		DA			0	0			DA			4	15.4
		M			3.96				M			3.12	
		SD			1.11				SD			1.34	
5.	I facilitate technological inputs to integrated with lessons	SA			3	11.5	6.	When I used computer, information and data kept safely	SA			5	19.2
		A			5	19.2			A			13	50.0
		MA			12	46.2			MA			3	11.5
		SDA			3	11.5			SDA			4	15.4
		DA			3	11.5			DA			1	3.8
		M			3.08				M			3.65	
		SD			1.13				SD			1.09	
7.	I used the internet to integrated my lessons	SA	49	18.8			8.	When I used Instructional Technology (IT),my students understand the lesson well	SA	44	16.9		
		A	70	26.8					A	64	24.5		
		MA	70	26.8					MA	79	30.3		
		SDA	40	15.3					SDA	42	16.1		
		DA	31	11.9					DA	32	12.3		
		M	3.25						M	3.18			
		SD	1.26						SD	1.24			
9.	Plasma TVs has a great contribution to quality education	SA	68	26.1	9	34.6	10.	Students actively participate while teachers used instructional technology	SA	64	24.5	3	11.5
		A	69	26.4	8	30.8			A	56	20.5	7	26.9
		MA	59	22.6	4	15.4			MA	65	24.9	15	57.7
		SDA	26	10.0	3	11.5			SDA	43	16.5	1	3.8
		DA	39	14.9	2	7.7			DA	33	12.6	0	0
		M	3.39		3.73				M	3.29		3.46	
		SD	1.36		1.28				SD	1.34		0.76	
11	I searched different books, facts, and principles about my profession	SA	115	44.1	12	46.2	12	My students and teachers search books and videos for instructional purpose	SA	24	9.2	1	3.8
		A	75	28.7	7	26.9			A	55	21.1	13	50.0
		MA	40	15.3	3	11.5			MA	92	35.2	8	30.8
		SDA	23	8.8	3	11.5			SDA	60	23.0	4	15.4
		DA	8	3.1	1	3.8			DA	28	10.7	0	0
		M	4.02		4				M	2.94		3.42	
		SD	1.11		1.2				SD	1.12		0.81	

In Item1 (I typed my continuous assessment with a computer and have question bank on a computer): among participant teachers, 62 (23.8%) agreed and 73 (28.0%) strongly agreed and from principals seven (26.9%) agreed and 13 (50.0%) strongly agreed. The mean score also indicated 3.39 (high) and 4.15 (high) values from teachers and principals respectively.

The researcher also observed teachers typed their mid-exam and also duplicated it. The importance here is the question can be readable and remove the confusion of letters and also as a source to other times. It created an opportunity to get a soft copy for further reference.

Item 2 deals (I recorded students' results on the computer and doing ranks): from participant teachers 58 (22.2%) moderately agreed and 77 (29.5%) agreed and from principals six (23.1%) disagreed and nine (34.6%) slightly agreed. The mean value indicated 3.33 and 4.15 high from teachers and principals respectively. The difference between the two participants was the school there was no software to record students or employees data but some computer teachers and familiar teachers used excel (Microsoft office) to record students mark. The researcher also observed teachers' record students' mark on the paper (mark list).

Generally, there was no software used to record students' result in all nine researched schools. But if it were available, it saves data safely and used to store data in less space. In my six years of experience in teaching in private schools, they were well organized and experienced in using school management system (applications) to manage their schools.

With regard Item 3 in Table 10 (I shared different reports and events by using the internet and computer/smartphone): among participant principals 18(69.2%) agreed. Question four (I was managing my school online during pandemic Covid 19): Principals' reports show that eight (30.8%) moderately agree, 10 (38.4%) agreed.

Principals were asked, "How often you used technology to manage their school activities?" Out of 26 principals, seven (26.9%) usually, nine (34.6) often and 10 (38.5%) sometimes and mean value 2.12 (low) used ICT to manage their school activities. This indicated that the school principals sometimes used ICT to manage their work.

The above two data show technologies have importance in sharing reports and also managing schools. During the pandemic Covid 19 schools were closed. As a result, internet and technology products were used to deliver lessons. The managers were directing/ managing their organization through technology products. Sharing reports online helps the reporter save their time and also money. It helps to update the receiver with the latest information.

Item 5 in Table 10 (I facilitate technological inputs to integrate with lessons): from principals 12 (46.2%) moderately agreed and five (19.2%) agreed, and mean value 3.07 (medium) that

principals facilitated learning-teaching process integrated with ICT. The result indicated somehow they were facilitated.

Concerning Item 6 (When I used computer, information and data kept safely): The analysis shows that among 26 principals 13 (50.0%) were agreed and mean also 3.65 (high) indicated that technology saves data safely and permanently. Even it is simple to get and access data by entering codes/ID.

With regarding Item 7 in Table 10 (I used the internet to integrate my lessons): This question was distributed only to teachers and the analysis indicated 70 (26.8%) in each moderately agreed and agreed. This means that if they integrated lessons with the technology they simply presented and demonstrated different facts and theories. And also help to attract students' attention and good classroom management.

Item 8 (When I used Instructional Technology (IT), my students understand the lesson well): among teachers 79 (30.3%) moderately agreed and 64(24.5%) agreed. Item 10 (Students actively participate while I used instructional technology like video and animation) also related to this question and results indicated from 26 principals 15 (57.7%) moderately agreed and from teachers 120 (46.0%) show their agreement on students actively participate when teachers used ICT. The mean value from teachers 3.29 (high) and principals 3.46 (very high) indicated ICT has role to increase students' participation and also achievements.

This indicates that technology was important to deliver quality lessons and improve students' understanding and moderately increase students' participation. Students' active participation is one of the active ways of teaching methods. The communications also became bidirectional. All interviewed supervisors and students strongly support the importance of plasma.

Item 9 (Plasma TVs have a great contribution to quality education): from 261 teachers 69 (26.4%) agreed and 68 (26.1%) strongly agreed and from 26 principals eight (30.8%) agreed and 9(34.6%) strongly agreed. Al-most the analysis shows plasma has a great contribution to quality education in filling knowledge gaps between teachers, showing different chemical and biological reactions, use time effectively. But the problem was not used properly.

For Item 11 in Table 10 (I searched different books, facts, and principles about my profession): Of participant teachers in this research 115 (44.1%) and among principals 12

(46.2%) strongly agree. This means that technology helped teachers and principals to update themselves with new concepts, facts, and subject matter.

Regarding to Item 12 in Table 10 (My students and teachers (for principals question) search books and videos for instructional purpose): among participants teachers 92 (35.2%) moderately agree and principals 13 (50.0%) agreed.

Table 11: Roles of ICT in Education part two

Note: F=Frequency, %= percentage, SA =Strongly Agree, A = Agree, MA= Moderately agree, SDA =Strongly disagree, DA= Disagree, M= mean, SD=standard deviation

N o.	Description of Item	Res pon se	Respondent				No	Description of Item	Resp onse	Respondent			
			Teacher		Principals					Teacher		Principals	
			F	%	F	%				F	%	F	%
13	Internet and computer has a great role in education	SA	140	53.6	14	53.8	14	When teachers used different instructional materials like teaching aids from local and pedagogy, students understand well	SA	90	36.5	8	30.8
		A	60	23.0	9	34.6			A	64	24.5	10	38.5
		MA	40	15.3	2	7.7			MA	68	26.1	5	19.2
		SDA	14	5.4	1	3.8			SDA	26	10.0	3	11.5
		DA	7	2.7	0	0			DA	12	4.6	0	0
		M	4.20		4.35				M	3.74		3.88	
		SD	1.05		0.94				SD	1.17		0.99	
15	When I did lessons with the support of lab, my students learn well	SA	71	27.2			16	When I used language center to deliver my lesson, my students language proficiency is increased	SA	66	25.3		
		A	58	22.2					A	64	24.5		
		MA	52	19.9					MA	41	15.7		
		SDA	35	13.4					SDA	40	15.3		
		DA	44	16.9					DA	49	18.8		
		M	3.30						M	3.22			
		SD	1.43						SD	1.46			

In Item 13 (Internet and computer have a great role in education): among 261 teachers 140 (53.6%) and out of 26 principals 14 (53.8%) said strongly agree about the importance of the internet and computer in education. To get the above teaching-learning resource is impossible without the internet and technological products. The internet also has a great role to attend online or eLearning classes or trainings.

Concerning to Item 14 (When teachers used different instructional materials like teaching aids from local and pedagogy, students understand well): from participant principals 10 (38.8%) agreed and eight (30.8%) strongly agreed and from 261 teachers 90 (34.5%) of them said strongly agreed. But the problem was not functional in researched schools.

With regarding Item 15 (When I did lessons with the support of lab, my students learn well): from 261 teachers 71 (27.2%) were strongly agreed. Interviewed students assured that it was important to learn practically especially for natural students but not yet functional.

Item 16 in Table 11 (When I used language center to deliver my lesson, my student's language proficiency is increased): among 261 teachers 66 (25.3%) said strongly agreed. When students learn by doing, they had high percentage of retention rate and memorization. Now a day, students learn physics from grades seven up to 12 but they couldn't connect bulb switcher or other simple electric circuits. This show a lack of practice but in contrast to this, one who had real practice man was better than those students who learn physics for six years.

Finally, yes/no questions were asked for both teachers and principals (Do you believe that instructional technology has a role to enhance quality education?) 220 (84.3%) and 24 (92.3%) answered yes respectively. And also principals asked "Does ICT has a role to improve students' result? Yes/No" and 25 (96.2%) answered yes.

Some roles of ICT help him to update knowledge, aware about new fact and principles. It helped to save, share, and accept reports or formats within a short period of time and also save time and money. ICT helps for students understand the lessons in a simple ways and improve students' creativity (CS1, May 10, 2022).

Interviewed supervisors told that ICT had the following role for quality education. I, ICT helped to share and accept reports and also to provide different feedbacks for directors and schools. II, students understand the lessons easily while presenting lessons with animations. Such as, digestion and circulation topics are difficult to understand by lecture methods. III, it helped for him to update himself with new facts, disproved theories and also principles. IV, ICT helped to increase students' motivation for learning and creativity (CS2, May 12, 2022).

The importance of ICT translated as follows. He had experience in teaching in country side and when he compared them with Addis Ababa students, Addis Ababa students learned by more experienced, most of teachers have master degree and have technological facilities. It helped to students understand the lessons very well and increase their creativity skills. Some students in Dejazmach Wondirad Senior Secondary School started developing websites. Students, teachers, principals, and supervisors update themselves (CS3, May 13, 2022).

Most of students' representative asked about the importance of ICT in education and gave the following responses. It has role to search different facts, principles and subject matter knowledge, present lessons interactive ways and students have high retention rate when they learned in plasma or audiovisual lesson (SR4, April 27, 2022, SR5, April 28, 2022, and SR8, April 29, 2022).

ICT helped to save time to search different contents in video form, self-development like study lessons before the actual class and independent learning reported (SR5, April 28, 2022). As reported in interview data, ICT has the following importance for education. They were had a telegram channel and they shared new facts, and their knowledge (SR6, April 29, 2022). In addition to this, during the pandemic Covid 19 they were learning and access online activities (SR9, May 09, 2022, SR, May 10, 2022, and SR1, May 11, 2022).

4.6 Discussions

Kemp and Dayton (1985), instructional technologies are categorized into nine kinds of media. They include; print media, display media, overhead transparencies, audio-tape recordings slide series, filmstrips, multi-image presentations, video recordings, and computer-based instruction. As the finds in this study, print media, video recordings (plasma lessons), and computer based instruction were available in researched schools. In addition to above categories, there were internet and displaying medias like plasma Tv. But in this research not found audio-tape recorders, overhead transparencies, filmstrips, and multi-image presentation.

The research presented by Bekele (2020) in the availability and implementation of plasma TV in Civics and Ethical education in Jajura Secondary and Preparatory School at Hadiya zone, the plasma were available but not functional. The same is true in this research, the plasma TVs skeletons were available in all research school but majority of them were not functional.

Fantu (2021) research conducted in Bole Sub-City on factor affect implementation of ICT indicated that most used ICT product were plasma TVs. Another study conducted by Said (2021) in Secondary Schools in Burao District of Somaliland result indicated students mostly used mobile. In contrast, in this study the most used ICT product was the internet.

Debela.(2019) confirmed shortage of instructional technology resources and lack of teachers motivation in the school is the challenge that affect implementation of instructional technology in the Haramaya University Community School. In similarly, al-most all of material mentioned in Table 4, there were shortage of materials in selected governmental high schools in Arada, Lideta, and Yeka Sub-Cities.

Fantu (2021) lack of motivation, financial constraints, lack of commitment, lack of skilled man power and poor infrastructure were the main challenges to implement ICT in Bole governmental high schools. In addition to the above challenges, thieves were other challenges in Arada, Lideta, and Yeka selected nine governmental high schools.

Most researcher findings show that there are two barriers or challenges to use IT. These are extrinsic and intrinsic barriers but the researcher gave them different meanings. Ertmer (1999) extrinsic factors first order and cited access, time, support, resource, training and intrinsic factors related to attitude, beliefs, practices, and resistance.

This studies also supported the above two challenges to implement ICT in researched schools. The external factors includes: the number of computer lab class and their size, lack of resource (like number of computers, plasma, furniture, laboratory chemicals and equipment), the internet, computer and lab classes were less access to students and staffs, less support from higher offices. The intrinsic factors in this study includes negative attitude (of teachers to use ICT, manual thinker directors), some teachers not accepted to integrate their lessons with ICT.

Bransford et al. (2000) cited in International Journal of Engineering Research & Technology (IJERT)(2012), reported that “what is now known about learning provides important guidelines for uses of technology that can help students and teachers develop the competencies needed for the twenty-first century.” Our planet becomes one village and technology is a tool to connect each other.

This study result indicated, technology enhance individual learning, self-development and improve the teaching-learning process like students participation, students result and creativity.

CHAPTER FIVE

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This chapter mainly discussed the summary of the research, the general main points of the study, discussion, and proposed solutions to the problems.

5.1.1 General Summary

This study was conducted with the main aim of examining the role of instructional technology to enhance quality education in nine selected governmental high schools in Arada, Lideta, and Yeka Sub City. To achieve this, the following three basic research questions were formulated.

1. What is the status of the implementation of instructional technology in selected schools?
2. To what extent is instructional technology contributing to enhancing quality education?
3. What are the factors that affect the implementation of instructional technology?

To address the basic questions I used the explanatory sequential mixed (QUAN-qual model) method. Addis Ababa has 11 sub-cities. Among these researchers, three were selected by stratified random sampling methods. Then, from each sub-city, I selected three governmental high schools, which gave nine in total as a research site. Then after, from the 1044 teacher population, the researcher took 289 teachers by using Yemane's formula. All principals, nine student representatives, four cluster supervisors, observation, and document analysis were used. Then, both quantitative and qualitative data were collected and analyzed.

289 and 33 Questionnaires were distributed to teachers and principals, respectively. Among these, 261 and 28 were collected. Then the quantitative data was analyzed through SPSS V.26 and semi-structured and open-ended questionnaires were organized and presented based on the basic questions. Interviews were used to collect qualitative data from three cluster supervisors and nine student representatives, which were then analyzed.

5.1.2 Summary of the Research findings

In this section, the main findings of the research are presented on: the background information of respondents; the most available IT; the most widely used; factors that affect the use of IT; and the roles of IT to enhance quality education.

According to the analysis in chapter four, 77% and 92.3% of teachers and principals, and three of the cluster supervisors, were male. 45.6% of teachers' age group was between 28 and 33, and 46.2% of principals were between 34 and 39. And also, more than half of teachers' qualifications were below the standards.

From teachers' analysis, the most available ICT materials in the schools were internet connection, sufficient electric sources in each class, and teachers' had their own smart phones with a mean score of 3.48 (high), 3.08 (medium), and 2.9 (medium) respectively. From the principals, the most available IT materials were the internet connection and plasma TVs, with a mean value of 3.96 (high) and 3.65 (high) respectively.

Among the teachers' data analysis, the most used ICT materials in the schools were students and staff used the internet and their browsed resources by using their smart phones, with a mean value of 3.33 (high) and 3.00 (high) respectively. From principals, the most commonly used IT materials in the schools were students and staff have used the internet and students have motivation to learn by using ICT with 3.65 and 3.50 high respectively. In general, from semi-structured questionnaires, it was indicated that the implementation of ICT in researched schools principals was 2.00 and teachers' 2.88 mean values were indicated at low and medium levels.

Most factors that affect the implementation of IT: Among teachers' data analysis in table five, the greatest challenges to using ICT in the schools were that teachers did not use plasma TV effectively and didn't have enough time, with mean values of 1.83 and 2.45, respectively. Among principals' data analysis in table five, the most challenges to using ICT in the schools were teachers' lack of interest in using pedagogy centers effectively and teachers hadn't gotten training on ICT and couldn't fix its problems, with a mean score of 2.38 and 2.54 respectively.

The other challenges include: first, a lack of sufficient materials like computers, plasma accessories, laboratory chemicals, and equipment. Second, financial bureaucracy; third, lack of skilled manpower to fix a series of ICT problems; fourth, students' bad behavior like taking some parts of plasma; fifth, the number of students and laboratory classes were not matched; and lastly, lack of teachers' principals and head officers' motivation and commitment.

From respondent teachers' and principals' data analysis in table six, it was indicated that the most important ICT for quality education was the internet, with a mean value of 4.20 high and

4.35 very high, respectively. Supervisors, principals, teachers, and students search for different learning materials like books, audiovisual tutorials, and animations to update themselves.

ICT helps to reduce teachers' load, facilitate independent learning or online learning, or improve distance learning in modern ways; increases students' learning interest and also their achievement; makes the lesson interactive or active ways of teaching-learning process; saves time, money, and energy.

It is important to manage school activities online, especially during a pandemic. share and receive different reports, formats, new facts and principles, and save data appropriately and accurately. Principals' data analysis showed that they sometimes used ICT to manage their school activities. Finally, "a fish can't live without water" means that living without technology is impossible to achieve the desired educational objectives and goals.

5.2 Conclusion

Based on data analysis, the following conclusions were drawn. The most available ICT materials were plasma TV skeletons, laboratory and computer rooms, some chemicals and apparatus, the internet, and smart phones. From these technological products, the internet was widely used to search for different learning materials, and desktops were also used for writing different assessments, keeping records, saving data, and teaching computer skills to students and staff. The ICT implementation rate was low and at a research school.

The most common school factors that affect the implementation of ICT include environmental factors, facilities and resource limitations, as well as human-related factors. Finally, instructional technology has many implications for quality education. Like searching for different learning materials, presenting lessons in simple and attractive ways, saving data safely, and increasing students' language proficiency. And also, it increased students' participation and motivation. School administrators used technology during the pandemic COVID-19 to manage their school activities.

5.3 Recommendation

Based on the research findings, the researcher forwarded the following points:

- The Addis Ababa education bureau should assign experienced technicians to schools and monitor their work.

- To raise awareness and develop skills, schools should provide step-by-step training on instructional technology to all principals, teachers, and students.
- Educational policy designer; develop policy that assists supervisors involved in teachers' evaluation and development system; award and rank best IT users to motivate others; and prepare a hierarchy of administration from upper to lower levels to support, facilitate, and evaluate IT in schools.
- The schools should give permission for students to bring their mobile phones to high school by improving security systems like CCTV cameras, student police, and additional guards to reduce theft.
- The city education bureau should improve the financial bureaucracy and buy sufficient inputs.
- Schools should expand the accessibility of computer labs and the internet.

Suggestions for further studies

Because of the limitation of resources and time, the researcher conducted this research in only nine governmental high schools in Arada, Lideta, and Yeka Sub Cities. Therefore, I recommended the following further studies.

- The root causes of teachers' demotivation to use instructional technology in selected high schools
- Comparative studies on the implementation of ICT in private and governmental high schools

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Website

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<http://t.me/wwwAddisAbabaeducationbureau>

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APPENDIX -A

ADDIS ABEBA UNIVERSITY SCHOOL OF GRADUATE STUDIES

COLLEGE OF EDUCATION AND BEHAVIORAL STUDIES DEPARTMENT OF EDUCATIONAL PLANNING AND MANAGEMENT

Questionnaires for Teachers

Dear Respondent

The purpose of this questionnaire is to collect relevant data for a full-fill Master of Arts degree in educational planning and management. The researcher collect data on the roles of instructional technology to bring quality education in selected high schools in Arada, Lideta, and Yeka Sub Cities. This questionnaire has four parts .

In light of this, you are kindly requested to fulfill these questions honestly. The researcher keeps your privacy and the data will use only for educational purposes. Think about the following points before you start doing the question. You are not expected to write your name or address, read the instruction and questions carefully, try to address all questions, kindly request you to write your opinion for short essay questions clearly and briefly.

ይህንን መጠይቅ በአግባቡ በማንበብ እንድትሞሉልን በአክብሮት እጠይቃለሁ። ይህ ጥናታዊ ፅሁፍ ታማኝ እና ትክክለኛ ይሆን ዘንድ የበኩልዎን እተዋጋል ያበርክቱ።ይህን መጠየቅ ሲሰሩ ስም አይጻፍም፣ የተለየ ሀሳብ ካለዎት የሰጡትን ምላሽ “x” በማድረግ ሌላው ላይ “√” ማድረግ ይችላሉ። ለማንኛውም ጥያቄዎ ከታች ያሉትን አድራሻዎች ይጠቀሙ። ሃሳብዎን በአማርኛ መግለፅ ይችላሉ።

ለምታደርጉት መልካም ትብብር ሁሉ ከልብ አመሰግናለሁ።

Many thanks in advance

Sincerely

Mohamed Sitotaw

ID:GSE/5065/12

In any case, you can contact me

Phone Number: +251922342549, Email: mehamedsitotaw@gmail.com

Part One Background Information

Instruction:- please give your answer by using“√” in the correct box

School Name _____, Position_____ Subject teaches_____

1. Sex Male Female
2. Age 22-27 28- 33 34-39 40-45 46-51 > 52
3. Qualification Diploma Degree Master Other
4. Experience 1-5 6-10 11-15 16-20 21-25 >25

Part Two Identification of ICT

The following questionnaires will be filled out by teachers .The questions given below are related to the availability of instructional technology. Please use one of the following Likert scales to indicate your response regarding the types of ICT used in your career.

5= Strongly Agree (SA) 4= Agree (A) 3= Moderately Agree (MA)

2= Strongly disagree (SDA) 1= Disagree (DA)

No.	Description of Item	SA (5)	A (4)	MA (3)	SDA (2)	DA (1)
1.	Plasma TVs are available in your school					
2.	The school language and laboratory have sufficient inputs					
3.	Overhead Projectors are available in the school					
4.	The school has a tape recorder					
5.	The school has sufficient computers					
6.	The pedagogy class has necessary inputs					
7	Internet connections are available in the school					
8	Teachers have a smartphone					
9	There is sufficient electric sources in each class					
10	There is an alternative source of electric power in the school					
11	The school has DV-D and CD player					
12	The school net program is available in your school					

1. What are another instructional technology/ instructional media available in your school?
 ከላይ ከተዘረዘሩት ውጭ በት/ቤታችሁ ምን ቴክኖሎጂን ትጠቀማላችሁ?
-

Part Two Implementation of ICT

Please use one of the following Likert scales to indicate your response regarding the types of ICT used in your career.

5= Strongly Agree (SA) 4= Agree (A) 3= Moderately Agree (MA)
 2= Strongly disagree (SDA) 1= Disagree (DA)

Implementation

No.	Description of Item	SA (5)	A (4)	MA (3)	SDA (2)	DA (1)
1.	Most teachers used Plasma TVs in your school					
2.	The language and Science teachers used the school language and laboratory respectively					
3.	Overhead Projectors are used well in the school					
4.	Teachers use a tape recorder in the school					
5.	The school staffs used computers effectively for planning, preparing assessment, and recording results					
6.	The pedagogy class is well functional in the school					
7	Students and staffs are used broad band or Wi-Fi in the school					
8	Teachers browse resources by using their smartphone					
9	There is sufficient electric sources in each class					
10	Teachers used an alternative source of electric power in the school like generator					
11	DV-D and CD player well used in the school					
12	Teachers school net program to delivering their lesson					

1. Which types of instructional technology you are mostly using in your school? **ከላይ ከተዘረዘሩት ውስጥ በብዛት እናንተ በት/ቤታችሁ ውስጥ የምትጠቀሙት ቴክኖሎጂ የትኛውን ነው?**

_____ . How often you are using it/ **ምንያክል ጊዜ ትጠቀማላችሁ?** (Usually/አብዛኛውን ጊዜ, often/ብዙ ጊዜ, sometimes/አንዳንድ ጊዜ, rarely/በጥቂቱ and never/ምንም አልጠቀምም

2. What are other instructional technologies that are not mention in the above table you are used in your school? **እናንተ ከላይ ከተዘረዘሩት ውጭ በት/ቤታችሁ ውስጥ የምትጠቀሙት ቴክኖሎጂ ምን አለ?**

Part Four: - Factors that affect the implementation of ICT

Some factors that affect the implementation of ICT are listed below. Rate by a tick \checkmark in the appropriate box by using the Likert scale given below.

5= Strongly Agree (SA) 4= Agree (A) 3= Moderately Agree (MA)
 2= Strongly disagree (SDA) 1= Disagree(DA)

No	Description of Item	SA (5)	A (4)	MA (3)	SDA (2)	DA (1)
1	There is no problem with an electric city in the school					
2	Teachers have enough time to use ICT in their classroom					
3	Teachers have sufficient knowledge to use and fix computer problems					
4	Teachers' have motivation to use ICT					
5	Students' have motivation to learn by aids of ICT like plasma					
6	The school teachers use the internet for instructional purpose					
7	The school Science teachers have skill to use laboratory effectively					
8	The teachers have an interest to use pedagogy					

	center effectively					
9	Teachers use plasma TVs effectively					
10	Student Parents have a positive attitude about technology					
11	My students have the skill to use the computer, plasma, and the internet					

1. What are the other challenges you were faced to using instructional technology?

ለማስተማሪያነት ቴክኖሎጂን ለመጠቀም እንደ ችግር የሆኑት ምንድን ነው?

2. How do you overcome them? ችግሮችን እንዴት ማስተካከል ይቻላል?
? _____

3. What is your opinion about using plasma as instructional technology? Is it a factor or important for the teaching-learning process? የፕላዛም ትምህርት በእርስዎ እይታ ለመማር ማስተማሩ ሂደት ይጠቅማል ወይስ አይጠቅምም?

4. Which factors affect you to use ICT?(circle one)

A. electricity

B. Lack of interest

C. lack of skill to use internet and computer

D. lack of access for computer and internet

Part Five: Roles of technology for quality education

The roles of instructional technology are mentioned below. Based on the given scale, give your appropriate responses by a tick ✓ in the correct place.

5= Strongly Agree (SA) 4= Agree (A) 3= Moderately Agree (MA)

2= Strongly disagree (SDA)

1= Disagree (DA)

No	Description of Item	SA	A	MA	SDA	DA
.		(5)	(4)	(3)	(2)	(1)

1.	I typed my continuous assessment with computer and have question bank on a computer					
2	I recorded students' results on the computer and doing ranks					
3	I used the internet to integrated my lessons					
4	When I used Instructional Technology(IT), my students understand the lesson well					
5	Plasma TVs has a great contribution to quality education					
6	Students actively participate while I used instructional technology like video and animation					
7	I searched different books, facts, and principles about my subject area					
8	My students search books and videos for instructional purpose					
9	Internet and computer has a great role in education					
10	When I used different instructional materials like teaching aids from local and pedagogy, my students understand well					
11	When I did lessons with the support of lab, my students learn well					
12	When I used language center to deliver my lesson, my students language proficiency is increased					

General Questions for Teachers on Utilization and Challenges of ICT

2. Does your school have sufficient computer, internet, pedagogy, and laboratory equipment? **Write Yes/No**

B. Computer_____

C. Internet_____

D. Pedagogy equipment_____

E. Laboratory Equipment_____

F. Plasma_____

G. ICT technician _____

3. To what extent you are using instructional materials in your school/እርስዎ ቴክኖሎጂን ለማስተማሪያነት ምን ያክል ይጠቀማሉ?(circle only one)

F. Usually/አብዛኛውን ጊዜ,

G. often/ብዙ ጊዜ,

H. sometimes/አንዳንድ ጊዜ,

I. Rarely/በጥቂቱ

J. never/ምንም አልጠቀምም

4. What are the challenges to using instructional technology in your school/በት/ቤታችሁ ቴክኖሎጂን ለማስተማሪያነት ለመጠቀም ያስቸገራችሁ ነገር ምንድን ነው?

5. Do you believe that instructional technology has a role to enhance quality education/ቴክኖሎጂ ለትምህርት ጥራት ምን አስተዋፅኦ አለው? Yes አለው/No (የለውም)

Justify your answer/መልስዎን ያብራሩት

APPENDIX -B

ADDIS ABEBA UNIVERSITY SCHOOL OF GRADUATE STUDIES

COLLEGE OF EDUCATION AND BEHAVIORAL STUDIES DEPARTMENT OF EDUCATIONAL PLANNING AND MANAGEMENT

Questionnaires for Principals

Dear Respondent

The purpose of this questionnaire is to collect relevant data for a fulfillment Master of Arts degree in educational planning and management. The researcher collect data on the roles of instructional technology to bring quality education in selected high schools in Arada, Lideta, and Yeka Sub Cities. This questionnaire has four parts .

In light of this, you are kindly requested to fulfill these questions honestly. The researcher keeps your privacy and the data will use only for educational purposes. Think about the following points before you start doing the question. You are not expected to write your name or address, read the instruction and questions carefully, try to address all questions, kindly request you to write your opinion for short essay questions clearly and briefly.

ይህንን መጠይቅ በአግባቡ በማንበብ እንድትሞሉት በአክብሮት እጠይቃለሁ። ይህ ጥናታዊ ፅሁፍ ታማኝ እና ትክክለኛ ይሆን ዘንድ የበኩልዎን እተዋግኑ ያበርክቱ። ይህን መጠይቅ ሲሰሩ ስም አይጻፍም፣ የተለየ ሀሳብ ካለዎት የሰጡትን ምላሽ “x” በማድረግ ሌላው ላይ “√” ማድረግ ይችላሉ። ለማንኛውም ጥያቄዎ ከታች ያሉትን አድራሻዎች ይጠቀሙ። ሃሳብዎን በአማርኛ መግለፅ ይችላሉ።

ለምታደርጉት መልካም ትብብር ሁሉ ከልብ አመሰግናለሁ።

Many thanks in advance

Sincerely

Mohamed Sitotaw

ID: GSE/5065/12

In any case, you can contact me

Phone Number: +251922342549, Email: mehamedsitotaw@gmail.com

Part One Background Information

Instruction: - please give your answer by using“√” in the correct box

School Name _____, Position_____

1. Sex Male Female
2. Age 22-27 28- 33 34-39 40-45 46-51 > 52
3. Qualification Diploma Degree Master Other
4. Experience 1-5 6-10 11-15 16-20 21-25 >25

Part Two ICT in life career /Identification of ICT

The following questionnaires will be filled out by principals .The questions given below are related to the availability of instructional technology. Please use one of the following Likert scales to indicate your response regarding to the availability of instructional technologies (IT).

- 5= Strongly Agree (SA) 4= Agree (A) 3= Moderately Agree (MA)
 2= Strongly disagree (SDA) 1= Disagree (DA)

No.	Description of Item	SA (5)	A (4)	MA (3)	SDA (2)	DA (1)
1.	Plasma TVs are available in your school					
2.	The school language and laboratory have sufficient inputs					
3.	Overhead Projectors are available in the school					
4.	The school has a tape recorder					
5.	The school has sufficient computers					
6.	The pedagogy class has necessary inputs					
7	Internet connections are available in the school					
8	Teachers have a smartphone					
9	There is sufficient electric sources in each class					
10	There is an alternative source of electric power in the school					
11	The school has DV-D and CD player					
12	There is school net program in your school					

1. What are another instructional technology/ instructional media available in your school?

Part three Implementation of ICT

please use one of the following Likert scales to indicate your response regarding the types of ICT used in your career.

5= Strongly Agree (SA) 4= Agree (A) 3= Moderately Agree (MA)

2= Strongly disagree (SDA) 1= Disagree (DA)

Implementation

No.	Description of Item	SA (5)	A (4)	MA (3)	SDA (2)	DA (1)
1.	According to schedule, teachers are using Plasma TVs in your school					
2.	The language and Science teachers are used the school language and laboratory respectively					
3.	Overhead Projectors are used well in the school					
4.	Teachers use a tape recorder in the school					
5.	The school staffs used computers effectively for planning, preparing assessment, and recording results					
6.	The pedagogy class is well functional in the school					
7	Students and staffs are used broad band or Wi-Fi in the school					
8	Teachers browse resources by using their smartphone					
9	There is/are functional socket and bulbs in each class					
10	Teachers used an alternative source of electric power in the school like generator					
11	DV-D and CD player well used in the school					
12	Teachers school net program as a means of					

	delivering their lesson					
--	-------------------------	--	--	--	--	--

Part Four: - Factors that affect the implementation of ICT

Some factors that affect the implementation of ICT are listed below. Rate by a tick \surd in the appropriate box by using the Likert scale given below.

5=Strongly Agree (SA) 4=Agree (A) 3=Moderately Agree (MA)

2= Strongly disagree (SDA) 1=Disagree (DA)

No.	Description of Item	SA (5)	A (4)	MA (3)	SDA (2)	DA (1)
1	There is no problem with an electric city in the school					
2	Teachers have enough time to use ICT in their classroom					
3	Teachers have sufficient knowledge to use computer(typing, browsing)					
4	Teachers are well trained to fix ICT problems					
5	Teachers' have motivation to use ICT					
6	Students' have motivation to learn by aids of ICT					
7	The school is using school net program properly					
8	The school teachers use the internet for instructional purpose					
9	The school teachers have skill to use laboratory effectively					
10	Teachers have got training on ICT and laboratory					
10	The teachers have an interest to use pedagogy center effectively					
11	Teachers use plasma TVs effectively					
12	Student Parents have a positive attitude about technology					

13	students have the skill to use the computer, plasma, and the internet					
----	---	--	--	--	--	--

1. What is your opinion about using plasma as instructional technology? Is it a factor or important for the teaching-learning process?

Part Five: Roles of technology for quality education

The roles of instructional technology are mentioned below. Based on the given scale, give your appropriate responses by a tick \surd in the correct place.

5= Strongly Agree (SA) 4= Agree (A) 3= Moderately Agree (MA)

2= Strongly disagree (SDA) 1= Disagree (DA)

No.	Description of Item	SA (5)	A (4)	MA (3)	SDA (2)	DA (1)
1.	I typed my data(students, employees, resource) with computer					
2.	My school has school management system software(SMS)					
3.	I shard different reports and events by using internet and computer/smartphone					
4.	I was manage my school online during pandemic Covid 19					
5	I facilitate technological inputs to integrated with lessons					
6	When I used computer, information and data kept safely					
7	Plasma TVs has a great contribution to quality education					
8	Students actively participate while teachers used instructional technology					
9	I searched different books, facts, and principles about my profession					
10	My students and teachers search books and					

	videos for instructional purpose					
11	Internet and computer has a great role in education					
12	When teachers used different instructional materials like teaching aids from local and pedagogy, students understand well					

General Questions for Principals on ICT training, support, challenges, and importance.

1. To what extent ICT related refresher courses provided for teachers in your school? **(Circle one)**

- A. Usually
- B. Often
- C. Sometimes
- D. Rarely
- E. Never

2. How often you used ICT to manage your school activities? **(Circle one)**

- A. Usually
- B. Often
- C. Sometimes
- D. Rarely
- E. Never

3. How do you rate the ICT support provided by higher bodies to your school?

- A. Adequate
- B. moderate
- C. inadequate

4. Is their ICT technician in your school? Yes/No_____

5. Does ICT has role to improve students result? Yes/No_____

6. Is the following things are challenge in your school to implement ICT? **Write yes/No**

- A. There is sufficient electricity. _____
- B. Teachers have no good attitude to use ICT. _____
- C. There are insufficient computer. _____
- D. there is no skilled man power. _____

7. Rate the implementation of ICT in your school. **(circle one)**

- A. Excellent
- B. Good
- C. Poor

8. What are the challenges to using instructional technology in your school? How do you overcome them?

9. Do you believe that instructional technology has a role to enhance quality education? Yes/No why and how

10. What do you suggest to bring quality education in your school?

APPENDIX C

In-depth interview

In-depth interview with cluster supervisors /ክላስትረ ሱፐርቫይዘሮች የተዘጋጀ መጠይቅ

In this study data will be collected on, the role of information technology to enhance quality education in the selected high schools in Arada, Lideta, and Yeka. The researcher keeps your privacy and the data will use only for educational purposes. If you are willing to participate in this interview, I will ask you the following questions. Be free and give an appropriate information. Thank for your cooperation

Year of experience as teacher____, unit leader____, director____, and supervisor____

ይህ ጥናታዊ ፅሁፍ ኢንፎርሜሽን ቴክኖሎጂ ለትምህርት ጥራት የሚያበረክተውን አስተዋፆ በተመለከተ መረጃን ለመሰብሰብ ከተመረጡ 2ኛ ደረጃ ት/ቤቶች በተለይም ከአራዳ፣ ልደታ እና የካቲት ተዘጋጂቷል። ተመራማሪው የግል ሚስጥራችሁን በጠበቀ መልኩ ለትምህርት ስራ ብቻ እንደማስረጃነት ይወሰዳል። ለዚህ መጠይቅ ፍቃደኛ ከሆኑ የሚከተሉትን ጥያቄዎች እጠይቃችኋለሁ። ግልፅ ሁናችሁ ትክክለኛ መረጃን እንድትሰጡኝ በአክብሮት እጠይቃለሁ።

በቅድሚያ ስለትብብራችሁ አመሰግናለሁ

The following questionnaires will be answered by selected cluster supervisors.

ይህ መጠይቅ ለተመረጡ ክላስትረ ሱፐርቫይዘሮች የተመረጠ ነው።

H. Do your schools have sufficient computer, internet, pedagogy, and lab equipment? Yes/no justify your answer/ የናንተ ት/ቤት በቂ ኮምፒዩተር፣ የተሟላ የትምህርት ማበልፀጊያ ፣ ኢንተርኔት፣ እና የተሟላ ቤተ-ሙከራ አሰን አለ/የለም?

/ ቢያብራሩት

I. To what extent your teachers are using those instructional materials? Usually, often, sometimes, rarely, and never/ የናንተ መምህራን እነዚህን ምን ያክል ይጠቀማሉ? ሁል ጊዜ፣ ብዙ ጊዜ፣ አንዳንዴ፣ አልፎ አልፎ እና ምንም አይጠቀሙም

J. How Students, teachers, and directors effectively use available instructional technology? High, moderate low, and never ተማሪዎች፣ መምህራን፣ እና ርዕሳነ-መምህራን ያሉትን የማስተማሪያ ቴክኖሎጂዎች በአግባቡ ምን ያክል ይጠቀማሉ? ከፍለኛ፣ መካከለኛ፣ ዝቅተኛ፣ እና ምንም አይጠቀሙም

K. What types of instructional technology you are using in your supervision schools?
አንተ/አንቺ ሱፐርቫይዘር በምታደርጓቸው ትምህርት ቤቶች ለትምህርት አገልገሎት ምን ቴክኖሎጂ ትጠቀማላችሁ?

L. What are the challenges to using instructional technology in your supervision schools?

ሱፐርቫይዘር በምታደርጓቸው ት/ቤቶች ቴክኖሎጂን ለመጠቀም ምን አስቸጋሪ ነገር አለ?

M. Do you think that students, teachers, and principals have skill and motivation to use technology in your cluster schools? All, most, some, a few, and never

አናንተ ሱፐርቫይዘር በምታደርጓቸው ትምህርት ቤቶች ስር ያሉ ተማሪዎች፣ መምህራን፣ እና ርዕሳነ መምህራን ቴክኖሎጂን ለማስተማሪያነት ለመጠቀም ፍላጎት እና ክህሎት አላቸውን? አላቸው/የላቸውም ሁሉም፣ አብዛኛዎች፣ የተወሰኑት፣ ጥቂቶች እና ምንም

N. What are the roles of instructional technology to enhance quality education in your school? ቴክኖሎጂን እንደ-ማስተማሪያነት መጠቀም ለትምህርት ጥራት ምን አስተዋጾ አለው?

O. During your supervision, is plasma important or not for delivering a lesson? በትምህርት ቤት ዕይታህ ወቅት፣ ፕላዝማ ትምህርትን ለማስተላለፍ ጠቃሚ ነው ወይስ አይደለም?

P. Do you use internet? Yes/No if your answer is yes, in which device you are using? Smartphone, Desktop computer, or laptop. How much it is important for you to improve your profession? ኢንተርኔት ትጠቀማለህን? አዎ/አልጠቀምም አዎ ከሆነ በየትኛው? ተንቀሳቃሽ ስልክ፣ ዴስክቶፕ ኮምፒዩተር ወይም ላፕቶፕ። ሙያህን/ሽን ለማሻሻል የጠቀመህ/ሽ ነገር አለ?

APPENDIX D

In-depth interview

In-depth interview with Students /ለተማሪዎች የተዘጋጀ መጠይቅ

In this study data will be collected on, the role of information technology to enhance quality education in the selected high schools in Arada, Lideta, and Yeka. The researcher keeps your privacy and the data will use only for educational purposes. If you are willing to participate in this interview, I will ask you the following questions. Be free and give an appropriate information. Thank for your cooperation

Age_____

Grade level and section_____

ይህ ጥናታዊ ፅሁፍ ኢንፎርሜሽን ቴክኖሎጂ ለትምህርት ጥራት የሚያበረክተውን አስተዋፆ በተመለከተ መረጃን ለመሰብሰብ ከ2ኛ ደረጃ ት/ቤቶች በተለይም ከአራዳ፣ ልደታ እና የካቲት ተዘጋጂቷል። ተመራማሪው የግል ሚስጥራችሁን በጠበቀ መልኩ ለትምህርት ስራ ብቻ እንደማስረጃነት ይወሰዳል። ለዚህ መጠይቅ ፍቃደኛ ከሆኑ የሚከተሉትን ጥያቄዎች እጠይቃችኋለሁ። ግልፅ ሁናችሁ ትክክለኛ መረጃን እንድትሰጡኝ በአክብሮት እጠይቃለሁ

በቅድሚያ ስለትብብራችሁ አመሰግናለሁ

ዕድሜ_____

ክፍል_____

Questionnaires for students /ለተማሪዎች የተዘጋጀ መጠይቅ

1. What types of instructional technologies have you used in your school?
በትምህርት ቤታችሁ ውስጥ ለመማሪያነት ምን አይነት ቴክኖሎጂን ትጠቀማላችሁ?
2. How often have your teachers and you used instructional technologies like Plasma, internet, TV room, video or computer? Usually, often, sometimes, rarely, never/ እነዚህን ማለትም ፕላዝማ፣ ኢንተርኔት፣ ቲቪ፣ ቪዲዮ ወይም ኮምፒዩተር ቴክኖሎጂዎች መምህራኖቻችሁ እና እናንተ ምን ያክል ጊዜ ትጠቀማላችሁ? ሁል ጊዜ፣ ብዙ ጊዜ፣ አንዳንዴ፣ አልፎ አልፎ እና ምንም አይጠቀሙም
3. Do you have a laptop or smartphone at your home? Yes/No why?
በቤታችሁ ውስጥ ላፕቶፕ ወይንም ስማርት ስልክ አላችሁን? አለ/የለም አለ ከሆነ መልስዎ ለምን ለምን አገልግሎት ትጠቀማላችሁ?

4. Do you have a TV in your home? Yes/no በቤታችሁ ውስጥ ቴሌቪዥን አለን? አለ/የለም
5. What are the factors that affect to use of instructional technology in your school?
 በትምህርት ቤታችሁ ለመማሪያነት ቴክኖሎጂ እንዳትጠቀሙ የሚያደርጓችሁ ነገሮች ምንድን ናቸው?
6. Do you have the skill to write on the compute, search for educational materials? Yes/No why ኮምፒዩተር ላይ የመጻፍ እና ትምህርታዊ ነገሮችን ኢንተርኔት በመጠቀም የመፈለግ ክህሎት አላችሁን? አለን/የለንም
7. Do you think that instructional technology has importance for quality education? Yes/No If your answer is yes justify /ቴክኖሎጂን እንደ-ማስተማሪያነት መጠቀም ለትምህርት ጥራት ምን አስተዋፆ አለው? አለው/የለውም አለው ከሆነ ቢያብራሩልን
8. For what purpose do you use the internet? ኢንተርኔትን ለምን አገልግሎት ነው የምትጠቀሙት?
9. Do you think that your teachers have sufficient skills to use technology? Yes/No how many of them? (Most, some, and a few) justify your answer. መምህራኖቻችሁ ቴክኖሎጂን የመጠቀም ክህሎት አላቸው ብላችሁ ታምናላችሁ? አላቸው/የላቸውም ምን ያክሉ(አብዛኛ፣ የተወሰኑት እና ጥቂት) ያብራሩት
10. Do you like to learn by plasma? Yes/No justify your answer. በፕላዝማ መማር ትወዳላችሁን ?አዎ/አይ መልስዎትን ያብራሩልን
11. Did you follow the MoE TV channel at your home? በቤትዎ ውስጥ ትምህርት ሚኒስትር የሚያስተላልፈውን ትምህርታዊ ጣቢያ ይከታተላሉን?
12. Is there mini-media in your school? If yes for what purpose you used it? በግቢያችሁ ውስጥ ሚኒሚዲያ አለን? ካለ ለምን አገልግሎት ትጠቀሙታላችሁ?

APPENDIX E

Observation Check list

In this study data will be collected on, the role of information technology to enhance quality education in the selected high schools in Arada, Lideta, and Yeka. The researcher after get permission, will observe the school compounds and service centers. The researcher keeps your privacy and the data will use only for educational purposes.

School Name _____

Based on the given questions, give your observation by a tick \surd for present and “X” for absent IT materials in the correct place.

1. The school has:

- A. Internet _____
- B. Biology Laboratory _____
- C. Chemistry Laboratory _____
- D. Physics Laboratory _____
- E. Projector _____
- F. Computer class _____
- G. Plasma _____

Based on the given questions, give your observation by yes for present and no for absent response in the correct place.

2. The school has sufficient:

- A. Computer
- B. Laboratory apparatus
- C. Internet access

3. The school teachers have sufficient skill.

4. Students have skill to browse type on computer