



HAWASSA UNIVERSITY
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EVALUATION AND UTILIZATION OF INFORMATION
COMMUNICATION TECHNOLOGY
(ICT) INFRASTRUCTURE IN SECONDARY SCHOOLS OF
SILTI WOREDA,
SILTE ZONE, SNNPR

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JANUARY, 2023

Hawassa

Hawassa University School of Graduate Studies

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MSC Thesis on:

Evaluation and Utilization of Information & Communication
Technology (ICT) Infrastructure in Secondary Schools of Silti
Woreda, Silte Zone, SNNPR

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A Thesis Submitted to Hawassa University Department of
Information Technology in Partial Fulfillment of the Requirements
for the Degree of, Master Science in Information Technology.


January, 2023 Hawassa

Hawassa University Institute of technology
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Evaluation and Utilization of Information & Communication
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ACKNOWLEDGMENT

First and foremost, I thank the Almighty God, for enabling me to accomplish this task. Then, I would like to express my sincere appreciation and thanks to my advisor Mr BerhaneWolde–Gabriel (Asst. Professor)for his constructive comments, advice, support and encouragement in writing my thesis. I am indebted to all teachers of Silti, Gensilte and Gerebiber Secondary schools for their support and kind cooperation in my course of study. I am also thankful to the principals, vice principals, IT department heads & IT subject teachers at Silti, Gensilte and Gerebiber Secondary schools. I would also like to express my gratitude to Silte zone education office and silti woreda education Office IT department team and educational materials supply and distribution team for their kind cooperation during data collection. I would like to extend my heartfelt thanks to all my colleagues & friends for giving me moral & technical support in my course of study. Last but not least, I would like to express my gratitude to my family for the patience they exhibited during my course of study.

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Acronyms

AED: Academy for Educational Development.

ETP: Ethiopian Education and Training policy

ICDR: Institute for Curriculum Development and Research.

MoE: Ministry of Education.

SNNPRS: South, Nations, Nationalities and Peoples Regional State

UNESCO: United Nations Educational, Scientific and Cultural organization.

USAID: United State of America International Development

SPSS: Statistical Package for the Social Sciences

NGO: Non - Governmental Organization

FGD: Focus Group Discussion

ICT: Information Communication Technology

DECLARATION

This research is my original work and it has not been presented and submitted for a degree or any other award in any other university or college and that all source of material used for the thesis have been duly acknowledged.

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ABSTRACT

The purpose of this study was to evaluate the status of availability and utilization of ICT infrastructure for teaching and learning purpose in selected secondary schools of Silti woreda in silte zone. Descriptive survey method was used where both quantitative and qualitative methodologies were employed. The study was conducted in 3 selected secondary schools, which contained 70 teachers, 5 principals, 86 students and 2 ICT personnel. The teachers were selected by simple random sampling technique, and students were selected by convenience sample technique, school principals and IT personnel participated in the interviews were selected by purposive sampling technique. The instruments employed to collect data for the study were using a closed and open ended questionnaire, semi structured interview, and checklist based observation, FGD and document analysis. The data collected were analyzed by SPSS 26 version of computer program to compute percentages, mean and pie-chart also used referential statics (reliability test, regration , Anova test were employed). It was found that the availability and utilization of ICT facilities for teaching purpose in secondary schools of the woreda was very low and for effective utilization of ICT facilities different factors were observed. There were no differences in perception among teachers and students to use ICT facilities for teaching and learning purpose. The Major challenges observed by schools were poor perception of ICT facilities and the utilization of ICT facilities, shortage of computers, absence of internet access, lack of finance (budget for maintenance), weak management of ICT infrastructure, absence of training offered to teachers, lack of computer laboratory rooms, absence of school based ICT policy, lack of qualified IT teachers and technical assistants. It was concluded that the availability of ICT infrastructure in silti woreda is not in adequate level and ICT facilities were not effectively utilized in the teaching and learning processes, school leaders, woreda, zone & regional government had not fully supported the ICT program to integrate ICT in teaching and learning processes. It is thus recommended that, the schools administrative bodies, woreda, zone and regional government should support the schools by supplying necessary ICT facilities for schools. They should also provide technical support and training opportunities for principals, & teachers through workshop, in-service training.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Education is a milestone of economic and social development of any country; it enhances the productive capacity of societies, their political, economic and scientific institutions. These overall changes of a country can be achieved through continuous problem solving and research activities in education. Information and Communication Technology /ICT/ can play a central role in transforming teaching, learning and assessment practices for teachers and students, in a high quality 21st century education system[1]. Information and communication technologies (ICT) play a transformational role in education. ICT helps to address key challenges of the educational sector of the developing world, namely access, equity, management, efficiency, pedagogy, and quality of education [2]. Globally, it is recognized that teachers and school experts are constantly engaging in enhancing the teaching, process, evaluating how their students learn and how learning is assessed. It is essential to embed ICT in the education system at all levels. ICT has the potential to support transformation in teaching, learning and assessment practices in schools and it can connect educational policy with economic and social development. Similarly, there is growing evidence that digital technologies change the way students learn, the way teachers teach, and where and when learning takes place. ICT has necessitated the need for development of new skills and competencies among teachers, school heads and learners. ICT can support more powerful and complete knowledge building experiences for learners if integrated with well-designed ICT infrastructure[3]. It provides learning environment that allows students to learn by solving problems, to think for themselves and to collaborate with others create learner-centered environment by motivating learners through combining text, sound, color and moving images that enhance content for easier learning and facilitate acquisition of basic skills through practice. However in silti woreda selected secondary schools ICT infrastructures does not well managed by school societies. [Silti woreda annual report]

So it is essential to evaluate infrastructure of information communication technology in order to improve the quality of education. This study is focused on evaluation and utilization of information communication technology infrastructure in secondary schools of Silti woreda.

1.2 Statement of the Problem

The FDRE government has been attaching a top priority and increasingly allocating huge resources for the expansion of equitable, relevant and quality education at all levels and quantitative progress has been made [4].

There were national efforts in Ethiopia since the turn of the century to integrate ICT in education both in schools and higher learning institutions [2]. Since the issue of quality of education is as important as that of quantitative expansion, there is a great debate among educators at all levels of Ethiopian education system about the quality of education [5]. To address the problem, various measures are being made and efforts are exerted to transform educational system and thereby improve educational quality. Consequently, an initiative called ‘General Education Quality Improvement Package GEQIP has been started in 2007 to improve the quality of education. One of the main areas of intervention of quality of education is the provision and utilization of information and communication technology (ICT) facilities in secondary schools all over the country, which focuses on continued improvement of quality of teaching and learning through targeted interventions which bring about long lasting change in Ethiopian education system [6].

According to Silti woreda educational office annual report in ICT use /2012-2013/ ICT infrastructure and programs (plasma TV, e-learning , computer laboratory, school net program) in all secondary schools yet have not been effectively utilized and implemented because, of different problems . There for the study intended to investigate the availability of ICT Infrastructure and the utilization of ICT infrastructure. Good ICT infrastructure in education increases access, to education maintains quality of education, and enables one to evaluate information from different sources so as to enhance teaching and learning[3]. However, Schools in Silti Woreda like other sub-counties in Ethiopia have limited use of the ICT infrastructure in teaching and learning as evidenced by silti woreda educational office report, low perception of school principals and teachers on ICT infrastructure, lack of enough computer labs and computers in schools, absence of qualified ICT technicians are among others.

However, the above mentioned information communication technology problems in the schools have not yet been systematically studied and solved in Secondary Schools of Silti woreda. There is no data that showing the availability and utilization of information communication technology infrastructure in secondary schools in the Woreda. However school teachers and students does not effectively utilized ICT infrastructure on their schools,

reported by woreda education office annual report, therefore, the evaluation of the availability & utilization of information and communication technology infrastructure in Silti woreda selected, Secondary Schools is the focus of this study. It further provides recommendations to improve the status of ICT infrastructure, and its utilization to enhance the quality of education in the stated woreda.

1.3 Research Questions

- Do schools have adequate ICT infrastructure available for the teaching and learning purpose at secondary school of silti woreda?
- Do teachers have positive attitude to utilize ICT and to what extent does ICT facilities utilize to enhance teaching and learning processes in Silti woreda secondary schools?
- What factors are hindering effective utilization of ICT infrastructure on Silti woreda secondary schools?

1.4 Objectives

1.4.1 General Objective

The General objective of the research is evaluating the availability and utilization of information and communication Technology (ICT) Infrastructure in Silti Woreda selected three Secondary Schools.

1.4.2 Specific Objective

The specific objectives of the research are to:-

1. To assess the availability of ICT Infrastructure in Silti Wordea Secondary Schools.
2. To rate the level ICT integration and utilization in Silti woreda Secondary school teaching and learning processes.
3. To assess the perception of teachers and students in integration of ICT facilities in the teaching and learning processes.
4. Recommend the implementation of ICT infrastructure and its management style
5. To identify the major challenge's affecting the availability and utilization of ICT facilities in silti woreda secondary schools.

1.5. Significance of the Study

The study could have important benefits for educational administrators, curriculum planners and those involved in implementation of information communication technology Studies in National Policy on Education for Ministry of Education Ethiopia [2]. The information from this study should help MoE to understand and identify problems facing implementation of ICT infrastructure in Ethiopian secondary schools.

The significance of the study includes:-

- The availability of ICT infrastructure in siliti woreda secondary school were analyzed
- ICT Infrastructure management problems in Silti woreda secondary schools were identified
- Possible solutions for proper utilization of ICT Infrastructure in Silti woreda Secondary schools were provided
- Factors for effective utilization of ICT where identified
- ICT Infrastructure in Silti woreda Secondary schools will be evaluated and possible mechanisms for its improvement were recommended
- Upon implementation of the recommendations teaching and learning through ICT Infrastructure in Silti woreda Secondary schools were improved

1.6 Scope of the study

The scope of this study were focuses on evaluating the availability, utilization, and the management part of information communication technology infrastructure in secondary schools of Silti Woreda of the SNNPR state. The area of the study was limited to that of Silti , Geribiber and Gensilti secondary schools. The research findings are thus restricted to the area under study.

1.7 Limitations of the study

The limitations of the study were Lack of adequate information in each schools and woreda office were other problem that influenced the comprehensiveness of the study. Also the unwillingness of some teachers to fill questionnaires and interview were another area of challenge.

However, in spite of these limitations, the study has uncovered the problem associated with the ICT infrastructure in the stated schools and by extensions to other schools in the woreda and come up with recommendations to alleviate these problems.

1.8 Operational Definition of Terms

This section presents operational definition of terms that are frequently used in this study.

- **ICT Infrastructure:** refers to the hardware, software, services and content and services provided, or facilitated by infrastructure to share ICT capabilities that provide service for the system of organization.
- **Communication:** is the sending and receiving of information by using communication device, it can be one to one or between group of people.
- **Digital Lab:** is an interactive and online tool in which students and teachers are make experiments (simulation) by using digital platform.
- **e-Learning:** is electronic a means of delivering course digitally by using electronics or a way of acquiring knowledge by using electronic device like CD, DVD, networks
- **Internet:** is a network of network that connects computers or network of computers all over the world. It is used to exchange information and communicate from anywhere within network connection.
- **Technology:** is the usage of and knowledge of tools, crafts, techniques or system or method of organization.
- **Satellite TV(Plasma Tv):** is a service that delivers television programs to the viewers by communicating it from a communication satellite that orbiting the earth directly to the viewer's location
- **Server:** - is a Networked computer program or a device that processes and manages network resource, for other computer programs or users called clients.
- **Computer Network:** is a technology that used to connect two or more computers for the purpose of communicating hardware, software and data.
- **Software:** is the set of instruction or program that keep the computer working needed. It is further divided in to application software and system software. Application software enables the computer perform a specific task , system software is responsible for the normal running of the computer and acts as an interface between the computer hardware on one hand and application software and peripherals device on the other.
- **Utilization of ICT infrastructure:** - Refers to using different types of ICT facilities in the classroom and in different educational setting for the purpose of teaching and learning process.

CHAPTER TWO: REVIEW OF RELATED LITERATURE

This unit presents a review of available literature related to ICT and ICT Infrastructure. Literature related to the concept of ICT, History and use of ICT in education, Impact of ICT, ICT Infrastructure types of ICT ICT infrastructure management in schools, importance of ICT, status of ICT infrastructure in Ethiopia and factors that affect ICT infrastructure in the schools are briefly reviewed.

2.1 The Concept of ICT

A part from explaining an acronym, there is no universally accepted definition of ICT because the concepts, methods and applications involved in ICT are constantly evolving on an almost daily basis. However, several authors have defined ICT in numerous ways.

According to IMPICT [7], ICT is the process of gathering, creating, processing, and storage of information by using hardware, software, as well as the internet and global system of mobile communication (GSM). However, the communication aspect of ICT is assuming more significance now than ever before, hence, it is now more appropriate to use the expression ICT rather than mere information technology which has become the back bone of the new information based global economy [7]

ICT stands for “Information and communication technology”. It refers to technologies that provide access to information through telecommunication. It is similar to Information Technology (IT) but focuses primarily on communication technologies[8].

According to UNESCO [9]“ICT is a scientific, technological and engineering discipline and management technique used in handling information, its application and association with social, economic and cultural matters”. ICT is the use of technology in managing and processing information with the use of electronic computer system and computer software to convert, store, protect, process, transmit and retrieve information.

The implementation of ICT strategy serves to enhance continuous applications and improvement of education. Similarly, in the recent past there has been achievement in various curricula reforms taking account of the key role ICT can play in helping transform the education system so that the learners are equipped with the knowledge and skills required for the challenges posed by a rapidly changing world [10].ICTs are drastically changing schools syllabus in a number of ways, demanding that teachers focus on new teaching methodologies instead of relying on traditional methodologies. As Hare [11]puts it, the successful integration of technology in education is not simple, because it depends on such inter linking

variables. The development of ICT itself dictates that in order for teachers and students to adjust to modern society and the global economy, the way in which teachers teach and students what to be taught requires modifications to and around ICT [4], also express that though many teachers are comfortable with the emergence of technology in general, they still cannot be ready or capable to integrate these technology into their classrooms.

Information and Communication Technology as tools within the school environment include use for school administration and management, teaching and learning of ICT related skills for enhancing the presentation of classroom work, teaching/learning repetitive tasks, teaching/learning intellectual thinking and problem solving skills, stimulating creativity and imagination, for research by teachers and students and as communication tool by teachers and students [12].

ICT is computer-based tools used by people to work with the information and communication processing needs of an organization. It comprises the computer hardware and software, the network and several other devices like video, audio, photography camera, that convert information (text), images, sound, and animation etc... into common digital form[13].

The literature above discusses ICT is a technology that encompasses of hardware and software which used to store , processes , dissimilate different electronic information in all over the world through telecommunication technologies so this enhances the social ,political, and cultural interaction of the society .

In the education system it plays a vital role by giving accesses of information anywhere, anytime, from any geographical location , this makes the education system more addressable , more efficient , more interactive , more accessible , more practical , more affordable , more enjoyable and give opportunity for self-based learning for teachers and students, this makes education system more affordable and smart. However, silti worda annual report (2012-13) [28] shows that ICT facility that are found in secondary schools does not effectively utilized because of different factors like lack of operational skill in ICT, perception of teachers, absence of ICT facilities are the most common.

2.2 Impact of ICT on Teaching and Learning Process in the 21stCentury

Today's the learning environment is needed in which students; teachers, administrators, and parents can easily communicate and collaborate with each other, share secure information around the globe, and ultimately, access a world of knowledge beyond classroom.

ICT is very useful to society, especially to students in colleges and university. An ICT-rich educational experience brings benefits to the students. Technology is an important part of student's everyday lives. Necessary software and hardware have been made available for students to use, while also helping them develop their own ICT skills[14].

Therefore, ICT is provided for the students to have quick and easy access to learning and doing research. It has a great impact for students to have an easier way to do research and get information, compared to the earlier period. For example, without ICT student have to go to the library to collect or gather information. It is not only a waste of time but also there is a limit to the information they can get. But now, ICT is saving time in doing the work and there is no limit to the information which they can get [15]

On the other hand, students can have self-tested before the exam. Besides buying the books for exercise, students can get sample questions from the Internet. It makes students more comfortable to have a test. ICT is also like a learning center that could help to share ideas and understanding to the students. It teaches students some basics grammar and improves the use of English by themselves. Using ICT, students can experience collaborative learning with their peers. ICT supports local needs for the learners which mean social information can be found easily. In fact, [16] in the learning process and give them an interest in their personal education. By integrating ICT into the classroom, students have the ability to learn more effectively, collaborate with each other, and explore the world around them. Anytime, anywhere access to internet-based tools is necessary to encourage learning inside the classroom and beyond. For example, students who are always on line, having face book, will always explore something and share it with their friends. It unknowingly makes them more collaborate with each other... [17]

Learning becomes flexible to those who are busy in their own ways. For example, some people are busy working since their early ages in order to support their family financially. Indeed, they are the people who want to work and study at the same time. E-learning is a way for them to study at home. It is useful and benefit for them. Other than that, hints and tips are the best practice for them to share their knowledge and opinion if they have their own ideas. Today, ICT brings many benefits to the younger generation, especially for students. For example, some of the students who work part-time can also find some time to do their class works. In addition, most of the time students like to use word processing from the computer itself. It is also quick and easy to edit their work and improve their presentation by using ICT [17].

Based on the research of Sutherland et al., [4], students who used educational technology in colleges are more successful because they are more active in learning and in increasing their skills. When ICT was first being introduced in schools, they were considered so 'new' that some policy makers and practitioners ignored theoretical foundations central to all learning with or without ICT. In addition to learning theories, other design aspects of curriculum integration were not considered, such as the type of ICT resources and how they are specifically used in a particular subject [16] and the design and curriculum implementation of ICT use in the classroom [16]

ICT presents a range of tools that teachers or lecturers use to present and display as part of their teaching and help educators interact with students as well as engage them in a more meaningful way. These technological tools can be purposefully designed for education, for example, software or hardware used in the context such as word processors and spreadsheets. Computer tools help students and teachers manipulate complex data-sets. This then provides the context for effective discussion that help to develop subject understanding. ICT is beneficial for teachers to share resources, expertise and advice. It is also easier to plan and prepare lessons and design materials for students. ICT also helps teachers to update students and school data, anytime from anywhere. From a teaching point of view, teachers used ICT infrastructure to deliver lecture to a whole class, and could use the digital content, that was available to them more effectively[8].

2.3 Importance of ICT in education

Information Communication Technologies ICTs have dynamic and positive impacts to changing education systems around the world. For instance, ICTs are dependable tools in facilitating the attainment of one of the millennium development goals (MDGs), which is achievement of universal primary education by the year 2015, [3]. It is also believed that, information and communication technology ICT facilities play an important roles to enhance the quality of education all over the world.

The most important role of ICT in education is transforming of the educational system from the traditional way of learning in to the digital way of learning style. It gives a lot of benefits for the educational sectors like:

- I. Save time:** The most important aspects of utilizing ICT in the education system is saving of time. Teachers and students can interact anywhere and any geographical area. It gives an opportunity for students and teachers to accesses any course material from different source. Jacobson and Levin [12] also noted that teachers have a firm conviction that the use of the technology

will help students in their education, and they concluded that the use of electronic mail, for example, in research and communication will help teachers and students to save time.

II. Communication and collaboration: Using ICT in the classroom and outside the classroom increase interaction and collaboration between teachers and students. As it is indicated by Almaghlouth [12], students were said to be seeking to engage with teachers' lesson materials in different ways and teachers were more easily able to share teaching notes and exemplary work with students via CD and email. Furthermore, teacher and student experiences have been improved when working around a computer or using ICT tools.

III. Give learning opportunity to anywhere: using of ICT in the education system gives opportunity to learn anytime, anywhere, and any geographical area.

Almaghlouth (2008)[12] emphasized that, learning opportunities for everyone will become more accessible and fun for all students, teachers, parents, schools, library users, employees etc. With the rapid growth and potential usage of ICT as a learning tool, teachers are now being challenged by how to avoid reinventing strategies for ICT use[17]. They are also added that, "current pedagogy is subject-centered, and uses ICT for differentiation and project based teaching in more advanced cases. ICT has excessive importance especially in secondary education and takes place in many curricula starting from elementary schools.

2.4 ICT in Education in Ethiopia

Ethiopian government regards education as an essential component of national development and highly priorities (UNESCO 2004)[2]. For example, in terms of the national budget allocation, education has been the second sector followed by 'national defense and public order and security' in the period from 1997/98 to 2000/01 [18].

Information and Communication Technology (ICT) is an electronic means of capturing, processing, storing, and communicating information. The use of ICT in the classroom teaching-learning process is very important for it provides opportunities for teachers and students to operate, store, manipulate, and retrieve information. It also encourage independent and active learning, and self-responsibility for learning such as distance learning, motivate teachers and students to continue using learning outside school hours, plan and prepare lessons and design materials such as course content delivery and facilitate sharing of resources, expertise and advice.

The Ethiopian ICT policy states that ICT is particularly crucial to Ethiopia because the vast majority of its population lives in remote areas and continues to be disadvantaged educationally' [18].

The importance the Government of Ethiopia has placed on education for national development is evident from the urgency with which the transitional government adopted the Education and Training Policy in 1994. This document outlined the mission and goals for the education system of Ethiopia to achieve the present[19] and future national economic and social development goals. It has been the foundation of all the sector policies that have followed, including the Education Sector Development Programmed I and II and the ICT in Education Implementation Strategy and Action Plan (Education and Training Policy in [20] The ICT in Education Implementation Strategy and its corresponding Action Plan are components of a wider Ethiopian national e-education initiative. This initiative forms one of the pillars of the ICT for Development 2010 Plan. [19]

The strategy is built on three main streams:

- Ethiopian National School Net Initiative
- The National ICTs in Higher Education Initiative
- The National ICT Education, Training and Awareness Initiative

These three streams form the basis for the implementation of the strategy across the education sector. The National School Net initiative, for instance, is aimed at the deployment and the exploitation of ICTs to facilitate the teaching and learning process within primary, secondary, technical and vocational schools. The ICTs in Higher Education Initiative focuses on deploying ICTs within the universities, colleges and research institutions. And, finally, the National ICT Education, Training and Awareness initiative promotes ICT awareness and literacy, lifelong and adult education, and distance and virtual education and learning. The strategy also identifies strategic goals and draws up a program and activities for each initiative. [21]

Both the national ICT4D 2010 Plan and the ICT in Education Implementation Strategy recognize ICT as an enabler for widening access to education for the Ethiopian population, for supporting literacy education, and for facilitating educational delivery and training at all levels. [12]

Ethiopia's national ICT policy has set the stage for growth within the ICT sector despite the country having one of the lowest penetration rates in the region. Tele-density in 2005 was 0.83 per 100 inhabitants, exclusive of mobile telephony. If the 410,630 mobile subscribers are included, the penetration rate shoots up to 1.39 per 100 inhabitants in the same period. In 2004 the country recorded 225,000 personal computers to be in use, but

mainly in the capital city Addis Ababa.[12]

The number of Internet users rose from 75,000 in 2003 to 113,000 in 2004 with 88 Internet hosts. The usage numbers were again skewed for the urban community, which forms only 15% of the total population. This trend is indicative of the country's infrastructure development with most of the communication infrastructure concentrated around the capital city. [12]

Ethiopia Telecommunication Corporation (ETC) was licensed by the regulator, Ethiopia Telecommunications Agency (ETA) as the national operator to provide public switched telecommunication services, GSM 900Mhz mobile telecommunication service, Internet service, and digital data communication. Table 1 gives a statistical overview of the infrastructure available.

Table 1: ICT Infrastructure in Ethiopia

Telephone lines	610,300 (2005)
Mobile telephones	410,630 (2005)
Internet users	113,000 2005)
Internet hosts	88 (2006)

Source: (Ministry of Capacity Building, National ICT4D Action Plan for Ethiopia. 2006)

2.5 ICT in Teaching and Learning

Before discuss the use of ICT in the teaching and learning process, the study list and explain the main components of ICT that found in secondary schools used to enhance the teaching and learning processes.

2.5.1 ICT Facilities

The most common ICT facilities that found in secondary schools of Ethiopia are listed below:

- ❖ Desktop Computer
- ❖ Internet
- ❖ E-mail
- ❖ Video conferencing
- ❖ Digital projector
- ❖ Mobile Phone
- ❖ Multimedia
- ❖ Plasma Tv
- ❖ Gestner (Copy machine)

2.6 Integration of ICT in education

Integration of ICT is the processes of using any ICT (including information resource on internet, multimedia programs by CD-ROMS, learning objects and other tools) used to enhance students learning and the integration of ICT is the use of ICT by classroom teachers to introduce, reinforce, extend, enrich and assess and remediate students mastery of curricular targets.

Technology integration is viewed as the use of computing devices such as desktop computers and Internet in schools for instructional purposes [14]. Technology can be used for other school management activities such as managing school information and communicating with students and parents.

The integration of ICTs in education offers several benefits: sharing of resources and learning environments as well as the promotion of collaborative learning and a general move towards greater learner autonomy [14]. However, technology integration is more than providing computers and an internet connection; it contains the instantiation of learning activities with pedagogically informed use of ICT tools[14].

ICT Integration must pass through different stages of development to get the maximum benefit of ICT in learning. There are different models of ICT integration developed by researchers. These are Model of instructional transform with five stages (familiarization, utilization, integration, reorientation, evolution) ([14]), stages of concern with seven stages of ICT integration (awareness, informational, personal, management, consequence, collaboration and refocusing) (Anderson,1997) and ICT Development model with four stages (emerging, applying, infusing and transforming) (UNESCO,2002). Jomezai [14] investigated the status of teachers with regard to ICT integration in Pakistani secondary school using stages of concern model. They argued that teachers are at the heart of ICT integration in the schools. Their level of knowledge in ICT has a direct impact on the use of ICT in the classroom. The researcher used stages of concern to assess the level of ICT integration. The research finding indicated that majority of the teachers are at the unconcerned, informational or personal stages on use of ICT in their instructions.

Studies show that few educators have effectively integrated ICTs in the classroom [14]).

The following digital tools have been cited with respect to ICT integration in the classroom: word processors, data projectors, Power point spreadsheets, search engines, interactive whiteboards, mobile technologies, smart phones (emails, blogs, videos etc.), tablets, instant messaging, podcasts, CD-ROMs, Wikipedia, simulations, animations and e-books [14]). Accordingly, these studies do indicate that ICTs are being used in the classroom; however, more in-depth knowledge is required towards understanding the categories of technologies used and how this facilitates pedagogy and content knowledge.

2.7 ICT in schools

With the existing infrastructure, there are obvious challenges to the survey of ICT and education in Africa: Ethiopia country report: 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[20]

A related challenge is that most schools have limited or low access to the Internet. Those schools that are connected generally use e-mail only, and it is available only to the administration. Access to ICTs by teachers is also limited, especially to computers and the Internet, which makes it difficult to assume that educators can integrate ICT into their teaching [10]

These challenges notwithstanding, the Ministry of Education, through the ICT in Education Implementation Strategy, has drawn up an action plan that consists of 15 programs and initiatives. These programs include the formation of a National Task Force for ICT in Education and a Secretariat under the Ministry of Education that will co-ordinate the activities.

To address the connectivity challenges, the Ethiopian Telecommunication Corporation, with assistance from the government, the World Bank, the African Development Bank, and the International Monetary Fund has established a state-of-the-art multimedia broadband backbone infrastructure with a core nucleus of 4,000 kilometers of optical fiber [10].

It is this same network that has provided a backbone for the first phase of the School Net initiative. Classrooms in schools are equipped with plasma screens and receive lessons via video broadcast for eight hours a day by satellite TV with content from the Educational Media Agency Local area networks have also been established in 181 schools, which have also received computers from the project [10].

2.7.1 ICT in universities

In a baseline survey conducted by the Ministry of Education, it emerged that most universities and institutions of higher learning in Ethiopia have computers. However, these computers are few and, therefore, shared at a student-computer ratio of 10:1 in most cases. The study also showed that despite the presence of computers, most of the institutions lack a network infrastructure and have limited connectivity. The lecturers are yet to adopt ICT as a

teaching tool, and only a small number of students use computers and the Internet as a learning resource. [20]

One of the key roles that ICT has played in the higher education sector is that of distance learning through the Internet. In Ethiopia, however, most of the nation's universities have indicated they are not involved in electronic distance education (EDE) initiatives; in fact, only 15% of private universities have indicated that they use EDE. [10]

However, there has been some movement from some universities. The University of Addis Ababa, for instance, has an ICT development office charged with the sole responsibility of implementing ICT initiatives.[10]

At the school level, the co-ordination seems to be centralized at the Ministry of Education through the Regional Education Bureau. However, at the university and college level, it appears most activities are carried out and coordinated by the universities themselves. Other players in government include the Ministry of Finance and Economic Planning, the Ministry of Capacity Building, the Ministry of Defense, and the Ethiopia ICT for Development Agency. [10]

2.8 Current Trends in ICT Initiatives and Projects

Every school needs to analyze its present position with regard to ICT integration and to develop a plan that will allow it to progress to the next stage([8].

United states of America(USA) also has a long history about technological innovations revolutionizing education in the US since the mid-1800 starting with the introduction of textbooks, and moving through technologies such as films ,radio, television and computer [22]. The first national educational technology plan, getting America students ready for 21st century, meeting technology literacy challenge was developed including of four key goals , for educational technology:- giving all teachers in the nation the training and support they needed to help students learn using computers, all teachers and students were to have modern multimedia computers in their classroom , every classroom to be connected to the information super highway and making effective of software and on-line learning resource an integral part of every school's curriculum. Integration of ICT in schools in developing countries especially in Africa is slow and uneven [23]

2.8.1. Woreda Net Initiative

This is a major e-government initiative that connects all 600 of Ethiopia's local councils (*woredas*) to 11 regional capitals through Internet telephone and video-conferencing. .) Half the links are by cable, and half by satellite the initiative also provides connectivity to the School Net, eHealth, and the soon-to-be launched AgriNet. Woreda Net is implemented by

the Ethiopia Telecommunication Agency with funding from the World Bank and the African Development Bank through the [20]

2.8.2 School Net Ethiopia

School Net is the student centric educational network that offers equal opportunity for students to acquire accesses to the internet, and the contents and delivery of educational service school net has become a strong voice for ICTs in school and the education sector, its wide contacts with a key actors in the ICT and education sectors provide it with influence and power. The main objective of school net is to exchange and support the development and implementation of national initiatives through knowledge exchange focused on the implementation and integration of educational technologies in schools[21].

Ethiopian government has spent great amount of money since the school net project is a cross point of two prioritized sectors such as education and ICT , the aim of school net is to provide students in rural school with access to equal learning opportunities to urban school.

The joint initiative by the Ministry of Education and UNDP is probably the most visible project in the country with a total of 181 schools equipped with a minimum of 15 networked computers per lab all connected to the Internet. An additional 15 schools were to be equipped with computers and a printer by the end of February 2007. There are new programmers around this initiative in the planning stages, including creating an extranet that will connect the schools.

According to silte zone educational office report 2012 and 2013 E.C there are four secondary schools were covered by school net project, however there are only two secondary schools are effectively utilizing the school net ICT infrastructure.

2.8.3 Distance Learning

The Ministry of Education has initiated a distance learning initiative using video-conferencing with the Indira Gandhi National Open University in India. The project has started accepting students, mostly teachers, and offering master's degrees in economics, marketing, and business administration. The project is in collaboration with the University of Addis Ababa, Alemaya University, and St Mary's.

2.9 Benefits of ICT use in Secondary Schools

Many research studies have revealed the enormous benefits that can be achieved by students, teachers and administrators where technology is applied in education [24]. ICT is used to improve the delivery and access to education. According to, Peeraer and Peerage ([24], ICT

benefits schools in enhancing learning in classroom, improved management of school. It helps in time tabling, record storage, secretarial work like typing staff meeting minutes, examinations and letters, improves accountability, efficiency and effectiveness In school activities, use of PowerPoint presentations and internet, make the teaching processes more productive and entertaining. This approach to ICT in education can improve education on the margin by increasing the efficiency by which instructions are given [24].

ICT can be used to develop students accepting improve the quality of education by increase the impact of education on the economy. Using ICT in education to produce ICT-literate students and a versatile, adaptable staff is also consistent with the human capital theory of education. Hawkins [24] State that workers must learn how to quickly acquire new skills. Adding the skills of the workforce in this way has the potential to benefit the economy at large and also improve the individual student's learning and chance of getting employed. Its use in education also contributes to knowledge creation, technology and technological innovativeness, and knowledge sharing. All these contribute to the transformation of education system and to sustain economic growth and social development [24]. Evidence shows that the use of ICT and its increasing acceptance and adoption by the society has provided opportunities and is seen as potential for promoting education on a large scale [20]. Education sector in some countries in Africa have benefited from the use of ICT to improve the efficiency of their operations. A case in Kenya is the automation of the selection and placement of secondary schools form one admission. The automation of the delivery of primary and secondary schools national examination results through posting of the results on the Ministry of education website [24].

The use of ICT is changing schools and classrooms by bringing in new curricula based on real world problems. It is providing platform to strengthen learning, giving students and teachers more opportunities for feedback and reflection. ICT is making the world a global community that includes students, teachers, parents, practicing scientists, and other interested parties [16].

ICT can improve the quality of education by increasing learner inspiration and commitment by facilitating the achievement of basic skills. It use in schools to facilitates the transmission of basic concepts and skill, it is a foundation of higher thinking skills and innovations. This will only be achieved by implementing ICT fully in a secondary schools.

The greatest contribution of ICT use in classroom is transformation of learning environment into a learner centered one [24]. Dzidonu (2013)[24], indicated that students report higher attendance, motivation and academic accomplishment as a result of ICT programs. This creates new ways of teaching and learning rather than simply allow teachers and students to

do what they had done before in the same way. These new ways of teaching and learning are underpinned by constructivist theories of learning and constitute a shift from a teacher centered pedagogy, which in its worst form, is characterized by memorization and rote learning – to one that is learner centered [24].

Using ICT in the teaching and learning processes established that children enjoy learning using technology. This motivation may discourage students from dropping out of school because it makes school curriculum more interesting. A research finding by Rebecca and Marshall, [24] established that the use of Internet in schools for street children in Colombia enticed a higher than usual number back to classroom.

ICT implementation in education increases the benefits in schools like depressing the cost of education. It increases efficiency in terms of manpower for example one teacher can reach many learners through internet, interactive white board and use of video technologies this can enhance the teaching and learning processes. This would spare parents the suffering of buying many textbooks because many of them would be available online. While these are the benefits of ICT integration and collaboration in schools, there are factors which hinder the implementation of ICT policy so that schools are not realizing these benefits.

The literature shows effective use of the existing of ICT infrastructure in schools have a lot of benefits for school teachers ,students, and school managements, by improving students understanding ,by delivery and accesses of education ,improve management work efficiency ,and increase impacts of education in the economy .

ICT has a vital role in the teaching and learning process's by new curricula based on real world problem and increases learner motivation and engagement and transform learning environment in to learner centered approach, and makes the teaching system more attractive, interactive, accessible , enjoyable.

The majority of the literatures are discussing about the benefits and roles of using ICT in the teaching and learning processes. However in selti worda selected secondary schools the application of ICT facilities is not effectively utilized. This study focuses on the availability and the factors that hinder ICT in the teaching and learning processes in silti worda

2.10 Function of ICT in Education

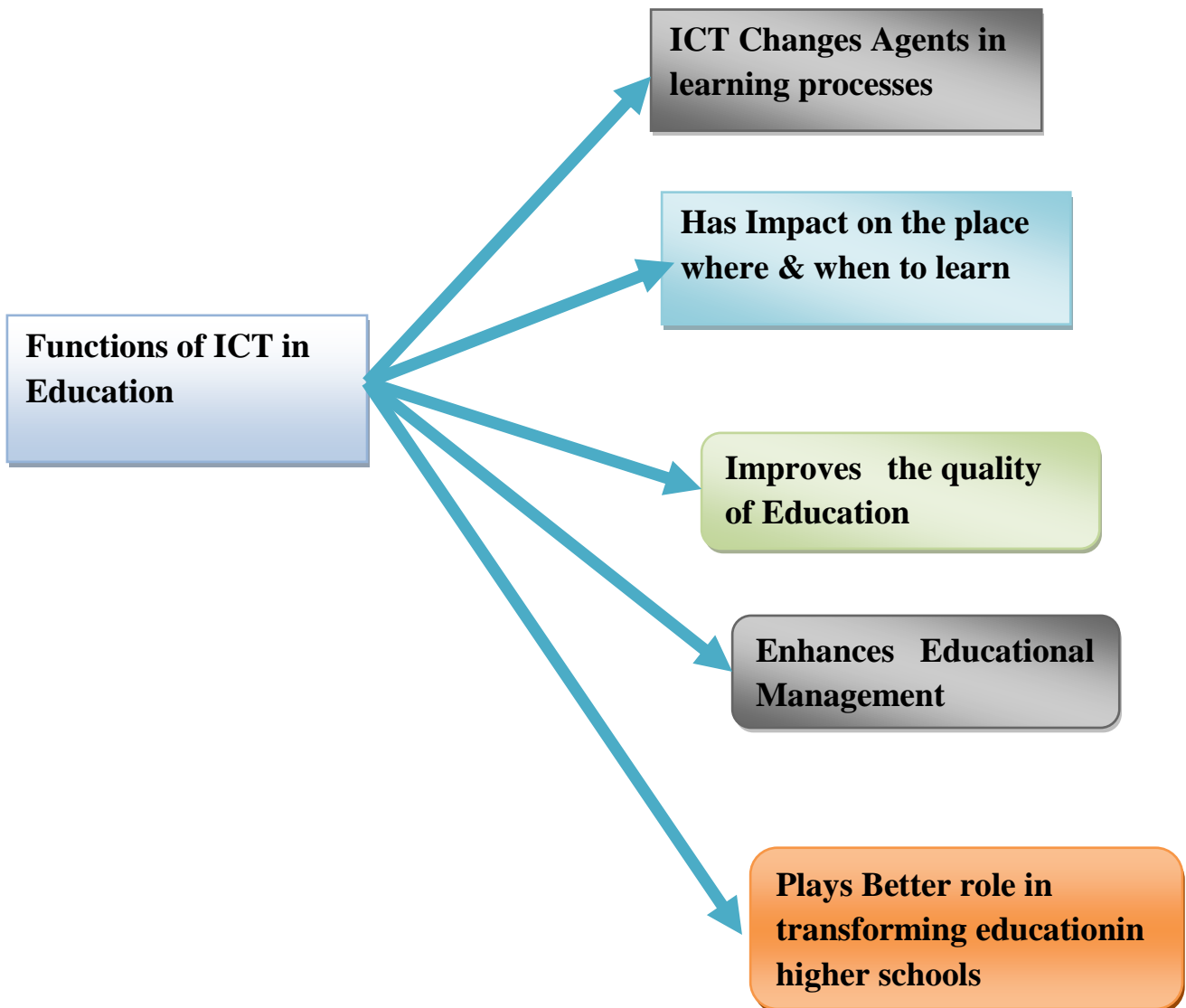


Figure 1 Function of ICT in Education (source www.google.com)

In the figure above ICT brings magnificent improvement in the field of education, it provides opportunity for innovations in the processes of teaching and learning, it transforms the education system from teacher centered class to student centered class, students actively engage in learning processes.

It gives the opportunity for students to learn any place and anywhere thus increases students' participation in the education system and also increases students' performance.

It transforms the education system from traditional to digital system and improves quality of education. ICT plays a key role in higher education by transforming education to digital system, it gives learning opportunity for students like on-line education, distance learning, E-library. It also increases the performance of education.

2.11 Teachers' Perception of ICT and ICT Integration in Resource

Planning

Teachers' Perception towards new technologies in secondary schools and its effects in integration and use shows that if teachers perceive use of ICT as either satisfying their own needs or their students' needs, it is likely they would implement it in school. Attitude is brought about by other factors like teachers' competency, skills, knowledge and perception towards ICT [25]. A literature suggests that teachers' perception, attitude, and skill in ICT influence successful implementation of ICT in schools teaching and learning processes. If teachers' perceptions are positive to use ICT, then they can easily use it or provide useful insight about its implementation.

A study by Huang and Liaw [26] showed that teachers' perceptions are influenced by their acceptance of the usefulness of ICT and its implementation in schools. A survey by EU School net in 2010 [15] involving teachers' use of ICT in six European Union countries, revealed that a large number of participants perceived use of ICT had positive impact on their learning, elicited interest, promoted individualized learning and helped to lengthen study beyond school day. However, a study by [17] suggested that small number of teachers perceived benefits of ICT in schools were not clearly identified. Some teachers viewed ICT as waste of time and expensive. A similar study by Andoh [24] revealed that teachers' skills, perception and attitudes were related to their use of ICT in resource planning. The more skilled teachers are in ICT, the more likely they were to use it. Further study by Drent & Meelissen [15] revealed that positive attitude, personal entrepreneurship and computer experience had a direct positive influence on adoption and use of ICT by teachers. For successful transformation of ICT in education schools practice teachers need to develop positive attitudes toward innovations and technologies this results positive attitude on the teacher's perception and it makes easy to implementation of ICT in schools. However skills, attitude and perceptions of teacher influence adoption and use of ICT in schools.

The literature's shows that ICT have a great impact on the education system it is a milestone that used to change the existing education system in to the global world by improving quality of education in the teaching learning processes , ICT plays a significant role in enhancing educational quality of education , increases students self-learning , give opportunity for teachers to teach their lesson in interactive way. Therefore the perception of teachers has a great impact for ingratiate ICT in the education system.

2.12 Factors which Hinder Use of ICT in Secondary Schools

Some institutions have well formulated policies with achievable objectives and implementation framework. However, policies failures continue to be prominent in many schools, thus indicating that policy implementation puzzle remain unsolved (Kipsoi, Chang'ach,& Sang, [24]). Factors which affect implementation of policies should be addressed during policy formulation, at implementation level and after implementation.

There are factors which affect the implementation of ICT policy in schools. These factors are categorized as external and internal factors [24]. The external factors can affect the implementation of any type of policies. They include lack of equipment, unreliable equipment and lack of technical support [20]. The other factor that affect the effective implementation of technology in schools are include, technology availability, accessibility to ICT equipment, time to plan for instruction, school vision on ICT and administrative support, understanding of ICT use, beliefs and attitude towards ICT integration, teachers' intention and motive to use ICT, technological skills and readiness to use ICT. Cost of ICT infrastructure, school vision on ICT use and teachers' skills and attitude to ICT use have been identified as major factors which influence effective ICT implementation in schools[24].

Using of ICT in school is cost effective especially in terms of manpower as one teacher can reach many learners through internet, interactive white board and video. However, the entire cost of achievement of ICT tools including software, hardware, upgrading, maintenance and development remains high. Investing in ICT for schools might be perceived as an additional cost, and supporting significant ICT implementation is a problem experienced by many schools in developing countries [15]. Farrell [12]argues that the high cost and maintenance of ICT infrastructure are the biggest challenge that has continued to affect adoption and implementation of ICT in schools. Lack of adequate funds to carry out educational activities in schools remains a reality in many schools in Kenya [15]. [24] testifies that one of the greatest challenges in implementation of ICT in school is balancing educational goals with economic realities. School managers gamble with what is the priority when funds are not adequate [24]. In the face of increased demand for educational resources, a number of schools are facing difficulties in supporting and meeting educational obligations like buying textbooks, feeding children, employing adequate qualified teachers [24]. This means that some schools have difficulties in devoting their limited educational budget to facilitating ICT infrastructure.

The implementation of ICT policy in schools demand resources, such as computers, printers, multimedia projectors and scanners and other accessories. These tools are not available in all the educational institutions. Besides, ICT requires up-to- date hardware and software and high-speed Internet connection [24]. These are key features in implementation of technology

but they are not available in most public schools. In view of this, [24] observed that lack of funds to obtain the necessary hardware and software is one of the reasons why teachers do not use technology in their schools.

According to National ICT in Education Strategy [6], most secondary schools have some computer equipment; however, due to high cost, this more often consists of one computer in the office of the school head. Very few secondary schools have sufficient ICT tools for teachers and students.

Dzidonu (2010) [24] noted that very few African schools and colleges provide free access to Internet for their teachers and students. However, without reasonable access to the Internet and improved bandwidth and wide spread access, most schools mainly never implement ICT policy.

While most of the research findings show that the high cost of ICT tools is a barrier to ICT implementation in school [24], others take a different position and consider cost of infrastructure as a less important factor. Some ICT infrastructure was acquired through initiatives supported by parents, the government, NGOs, or other development agencies and the private sector.

2.13 Research gaps

Based on the review of literature's the researchers work the majority of the literature's were studied that about the integration and utilization of ICT infrastructure and about the perception of students and teachers, however they did not studied the managing and maintaining part of the existing ICT infrastructure in Ethiopia and that of silte zone, and also there are literature's that shows the effective utilization and integration of the ICT infrastructure to enhance the teaching and learning processes in the Ethiopian.

In addition to this .The finding of this study can fill the gap of availability, utilization and perception of ICT infrastructure in silti woreda selected secondary schools and give recommendation for the effective utilization of schools ICT infrastructure and also provide information on the level of availability of schools ICT infrastructure in the selected secondary schools of silte zone silti woreda.

CHAPTER THREE: RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

The purpose of this chapter was to identify the appropriate methodology that was undertaken for this study. This methodology part would demonstrate the entire process of this study during the conduct of the research. Therefore, this chapter highlights the Research design, Research methodology, and description of the study area, data source, sampling techniques, data collection, data analysis methods and reliability and validity of data.

3.2 Research Design

In this study the researcher used mixed research approach. The mixed research approach would open a door for the researcher to use multiple methods. The advantages of using mixed method approach provides a unique advantage to triangulate results that are driven from different research methods, complementary “seeks elaboration, enhancement, illustration, clarification of results from one method with the results from another” [14] Therefore, the researcher employed both qualitative and quantitative approaches to undertake the research. Using this research approach data was collected through different instruments and from different sources to ensure an in-depth analysis of the data .The study uses descriptive survey design type which involves the use of questionnaires for collection of data as the main goal to evaluating ICT infrastructure in Silti Woreda Secondary Schools. The survey method was employed to collect data from teachers and Student through questionnaire, Interviews, and observation (check list based) in order to collect data from school directors, School ICT personnel’s, teachers and students of selected Silti Woreda secondary schools. The study was carried out in four stages. The first one was the preparatory stage. It involved proposal development, review of related literature, development of instruments of data collection and selection of samples. The second phase was the administration of instruments and collection of data. In third stage, data organization, coding, entering, cleaning, analysis and interpretation were accomplished. In the fourth, stage draft report writing, provision of feed-back to the draft, finalization of the draft, publication of the final report and submission of final report were accomplished.

3.3. Description of the study area

Silti woreda is one of the eight woredas in Siltie Zone of SNNPR state. It is located at 7⁰55”N and 38⁰12”E. The Woreda is found in the North east part of Siltie Zone and located South of MeskanWoreda of Guraghe Zone, North of Dalocha and Ulbareg, East of Alichowiriro and West of LanfiroWoreda of Siltie Zone and Adami-Tulu Woreda of Oromiya region, Kibet is the administrative center of the woreda which is found 27 km from the Zone center, Werabe, 177 km from the region capital, Hawassa, and 147 km from the Federal center, Addis Ababa. The Woreda has a total of 290 Secondary school teachers (193 male and 97 female) and 4669 (2657 male and 2012 female) Students. There are nine secondary schools in Silti woreda.

3.4. Variables of the Study

ICT infrastructure can support more powerful and complete knowledge building experiences for learners if there are integrated and well-designed technologies. ICT infrastructure provide learning environment that allow students to learn by solving problems, to think for themselves and to collaborate with others They create learner centered environment by motivating learners through combining text, sound, color and moving images that enhance content for easier learning and facilitate acquisition of basic skills through practice. ICT infrastructure also provides teachers with improved educational content and more effective teaching methods that improve the quality of education. They facilitate access to information and increased interest in teaching where teachers get more time to engage with students leading to greater productivity in the learning process.

The Study focuses on the evaluation of the availability and utilization of ICT Infrastructure, what effectively were the ICT Infrastructures in enhancing education and what factors are hindering effective use of ICT Infrastructure in Silti woreda Secondary schools. Moreover, it comes up with recommendations to upgrade the infrastructure, improve its perception and utilization to enhance the teaching-learning process.

3.5. Data Sources

To achieve the objective of the study, primary and secondary data sources were used. Multi-level data sources from school teachers, directors, students and School ICT Personnel’s were taken as primary data sources to represent the different levels of analysis within the system for the same purpose. Relevant and available reports and printed materials were used as secondary data sources to supplement the data collected from the primary sources.

3.6 Population and Sample size

The target populations for this study include Silti woreda secondary schools. Three secondary Schools (Silti, Gerbiber and GenSilties) were selected from nine secondary schools, to select three secondary schools the study uses purposive sampling technique. According to silti woreda 2010 and 2011 E.C [28] report the selected three schools have better ICT facilities from the other secondary schools. A sample is the smaller group that researchers study(Gall,1996)[27]. Sample size is the number of observations in a sample (Evans, 2000)[27].

Regarding to respondents from selected secondary school the total sample size 109 male and 46 female (155) teachers, 77(49.67%) respondents were selected by using simple random sampling techniques. As (Anderson 1998)[12] stated that “random sampling technique allows ensuring all member of defined population have an equal opportunity of being selected. To select student respondents the researcher uses a convenience sampling method, convenience sampling has no pattern for selecting sample and it gives opportunity to the researcher, the researcher selects convenient respondents for the study, therefore 45 students respondents were selected from four grade levels, from grade nine 9,(20%), grade ten 11, (24.4),grade eleven 5,(11.1) and grade twelve, 20(44.4%) for close ended or quantitative data. And also 41 student’s respondents were selected for open ended or qualitative (FGD) questioners. To select school principals and school ICT personnel the study uses purposive sampling technique and 5 Principals and 2 schools’ ICT Personnel’s (department heads) were included on interview in this study. In order to determine the sample size of teachers the study uses Taro Yamane (Yamane, 1973)[28]

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

N= total population

e = level of precision (0.08)

n = sample size

$$= \frac{155}{1 + 155(0.08)^2}$$

$$\frac{155}{1.992} = 77$$

Teachers Respondent Sample

Table 2 Sample Teachers from Silti woreda Secondary Schools

No	Name of Secondary Schools	Total Number			Total Sample				Sampling technique
		M	F	T	M	F	T	%	
1	Silti Secondary School	57	23	80	16	14	30	43.75	Simple random
2	GenSiltie Secondary School	22	13	35	13	7	20	57.1	Simple random
3	Gerbiber Secondary school	20	10	30	13	7	20	66.6	Simple random
4	School principal	8	-	8	5	-	5	62.2	Purposive (for Interview)
5	School ICT personnel's	2	-	2	2	-	2	100	Purposive (for Interview)
Total		99	56	155	49	28	77	49.67	

Students Respondent Sample

Table 3: Sample Student from SelltiWoreda Secondary Schools

No	Name of Secondary Schools	Total Number			Sample For questioner			Sample For FGD	Sample %	Method
		M	F	T	M	F	T			
1	Silti Secondary School	245	165	410	12	8	20	21	10%	Convinent
2	GenSiltie Secondary School	165	65	230	9	4	13	10	10%	Convinent
3	Gerbiber Secondary school	180	40	220	8	4	12	10	10%	Convinent
Total		590	270	860	29	16	45	41	100%	

3.7 Methods of Data Collection

In order to gather information, the researcher used variety of data collecting instruments.

Interview was used to collect data from secondary schools' principals and school ICT Personnel's. And, questionnaires were used to gather data from secondary school teachers

and Students and checklist based observation used to observe Schools ICT Infrastructure's. The instruments used for data collection in this study are described below:

3.7.1. Data collection procedures

Before distributing the instruments, the researcher contacted the selected schools' principals to introduce the purpose of the study and to facilitate the data collection activities. As per the agreed schedule the questionnaires were distributed to 77 teacher's respondents and 45 students' respondents on the selected three secondary schools in Silti woreda and interview conducted with principals and ICT personnel's. The response rate of the questionnaire was 100%.

3.7.1.1. Questionnaire

The questionnaire was prepared in English. It contains the likert scale questions with five scales with five categories and this used five ranges for the purpose of analysis - In order to answer the research questions and achieve objectives of the study, the questionnaire was distributed to secondary school teachers and Students.

3.7.1.2. Interview Guides

A semi-structured interview guide was prepared to gather complementary information from school principals, and school ICT personnel's (department heads). The guides include items that reflect the basic research questions. The interview questions were developed in Amharic.

The interview was held according to the convenience of the interviewees at their working places. Semi-structured interview was conducted to obtain information about the status of ICT infrastructure in the study.

3.7.1.3. Document Analysis

Documents like minutes and files about ICT infrastructure were analyzed. The researcher tried to use documents for two purposes. First, in order to get factual information about the ICT infrastructure in all secondary schools in Silti Woreda, the researcher consulted the documents of schools. Second, for examining and analyzing the teachers work, the researcher directly contacted principals of sample schools.

3.7.1.4. Checklist Based Observation

Observation was conducted to evaluate the status of information communication technology infrastructure, by preparing check list in selected secondary schools of Silti Woreda. Adequate information concerning the evaluation status of ICT infrastructure and the experience of the school was gathered.

3.7.1.5 Focus Group Discussion (FGD)

Focus Group Discussion was conducted with selected schools top ten students based on the availability, effective utilization and management of the existing ICT infrastructure in their schools.

Focus Group Discussion was held among three groups from silti secondary schools having 21 members, from Gensilti secondary school having 10 members from Geribiber secondary school having 10 members. Adequate information concerning on availability and effective utilization of ICT infrastructure and the experience of the schools in teaching and learning processes in ICT facility was gathered.

3.8 Methods of Data analysis

The data, which were collected from different sources were analyzed and interpreted using both qualitative and quantitative techniques. The qualitative data which was gathered from open ended questionnaire; interviews, document analysis, observation and FGD were organized and analyzed using content analyses techniques. While the quantitative data that was gathered from closed ended questionnaire was analyzed by simple statistical method, using SPSS version 26 software through percentage, pie-chart and mean were the common ones in this study and also referential statics were applied. Thus, to analyze the data collected from different sources statistical, descriptive and thematic analysis techniques were applied. Some of the computer software such as MS-excel, MS-word and other applications software's were used.

3.9 Ethical Consideration

Critical endeavor in finalizing the paper was make the research process professional and ethical. The research will be clearly inform the respondents about the purpose of the study purely for academic and will confirm the subjects confidently to be kept protected. In Furthermore the respondents have to be informed about their right of giving the response or not. But the researcher will tell them their honest participation within the study is very important to make change and improvement in overall process of ICT infrastructure

availability, utilization and effective management of existing ICT facilities in secondary schools. All the data was kept in secret and apply for this research propose only.

3.10 Validity and reliability of Instruments

Validity is an important consideration in research. Validity refers to the extent to which an empirical measure adequately reflects the real meaning of the concept under consideration. Validity refers to what the test or measurement strategy measures and how well the measurement approach measured [22]. Content validity is judged on the basis of the extent to which statements or questions represent the issue they are supposed to measure, as judged by you as a researcher, your readership and experts in the field. The content of the questionnaire was checked by the advisors, colleagues, the researcher and other experts and was taken corrective measure on the contents as well as errors of the instruments. Reliability refers to consistency. This means that the same results would be achieved when repeated at a different time, situation or place. Cronbach’s Alpha was developed in 1951 by Cronbach Lee to meet the need of finding an objective way of measuring the internal consistency reliability of an instrument used in a research work [29]. The value of Cronbach’s Alpha is usually expressed as a number between .00 and 1.0. A value of .00 means no consistency in measurement while a value of 1.0 indicates perfect consistency in measurement. The acceptable range or the critical values are >0.90 excellent, 0.80 to 0.90, very good 0,70 to 0.79, Good 0.60 to 0.69 acceptable for explanatory studies only and 0.50 to 0.60 poor <0.50 is unacceptable.

Table 4 the general reliability of the instruments

Variables	Teachers	N	Students	N
	Cronbachs Alpha		Cronbachs Alpha	
Perception on ICT infrastructure	.841	14	.810	6
Perception on the use of ICT infrastructure	.898	14	.746	10
Factors hindering effective utilization of ICT	.771	12	.795	10

Note. N is Number of items

Accordingly the reliability of this study instruments are accepted for their value is greater than 0.7.

3.11 Conceptual frame work

Conceptual frame work refers to how a researcher conceptualizes relationship between variables in a study and shows them graphically or diagrammatically. It shows independent variables and dependent variables and how they are related or influences one another [24]

Availability of ICT Infrastructures

ICT infrastructure refers to the hardware such as computers, scanners, photocopiers, mobile phones, printers, projectors and broadcasting technologies which include radio and TV as well as essential software that enhances teaching and learning.

The availability of ICT materials like modern computers, peripherals, networking and resources within an increasingly diverse range of technologies was an essential part of school planning in the 21st century [24]. ICT constitutes an input in the teacher planning process that should help produce better learning output. The availability of ICT resources can enhance proper planning by making education less dependent on differing teacher quality and by making early education planning possible [18]

Factors to Utilize ICT in the schools

There are a lot of factors that hinder the effective utilization of ICT in schools.[12]) portrayed that, there are a variety of boundaries, such as, the lack of ICT skills that could limit teachers in using ICT tools. One impeding factor of ICTs integration in education systems is the skill gap of people implementing it [12].

There are factors which affect the implementation of ICT policy in schools. These factors are categorized as external and internal factors[24]. The external factors can affect the implementation of any type of policies. They include lack of equipment, unreliable equipment and lack of technical support [20]. The other factor that affect the effective implementation of technology in schools are include, technology availability, accessibility to ICT equipment, time to plan for instruction, school vision on ICT and administrative support, understanding of ICT use, beliefs and attitude towards ICT integration, teachers' intention and motive to use ICT, technological skills and readiness to use ICT.

Indicators for Effective use of ICT

For effective utilization of ICT facilities, in schools, the collaboration of different stakeholders where basic like administrative support, interest and commitment to utilize ICT technical support, participation and involvement of stakeholders, provision of equipment, training, development and qualified staffs have been identified as indicators to enhance the availability and utilization of ICT facilities for teaching and learning purpose.

The attitude of school principals and administrators on the schools ICT infrastructures has a great impact on the effective utilization of schools ICT facilities, so they take responsibility and commitment and encourage school teachers to use ICT facilities in their teaching. The perception, attitude, interest and commitment of teachers has a big challenge to utilize ICT facilities, so for effective utilization of ICT Facilities the teachers take in service skill building training on ICT. The involvement of stakeholders ensures the availability of ICT infrastructure and increases the availability and accessibility it gives the opportunity to utilize ICT infrastructure in regular manner.

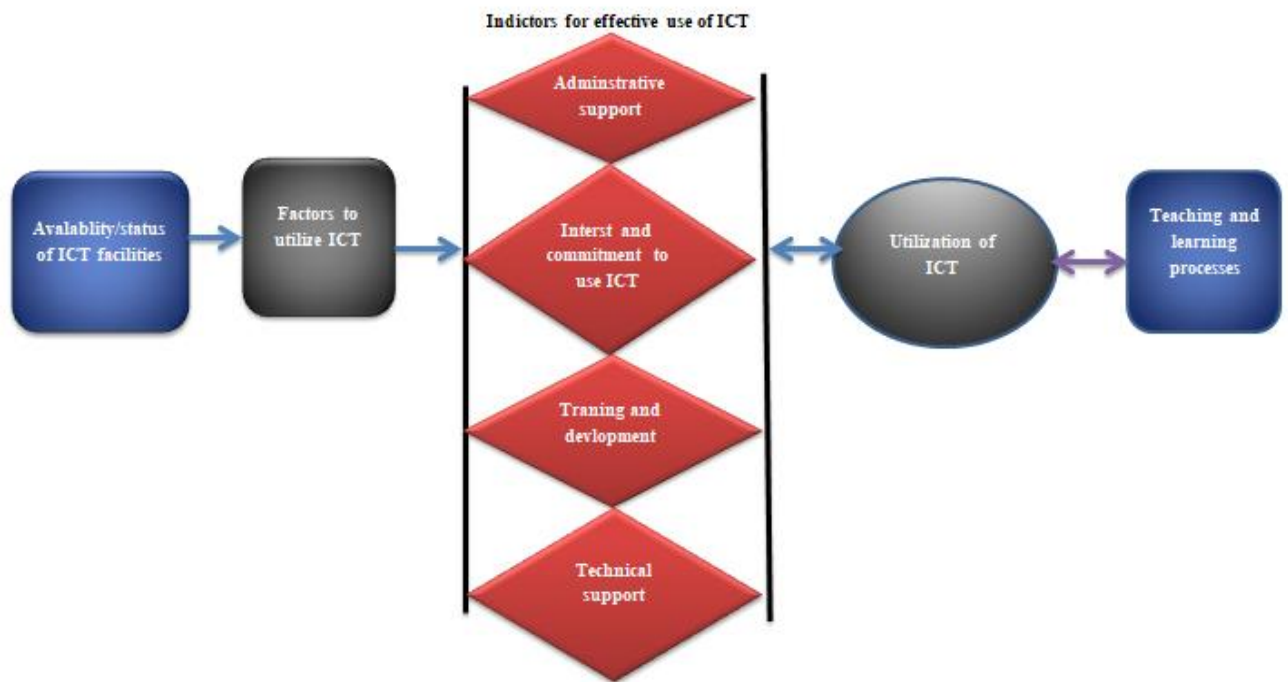


Figure 2 the frame work of availability and utilization of ICT facilities (source: conceptualized by Research's)

On the above conceptual framework the study focused on the interaction of variables on the availability and utilization of ICT in secondary schools of silti woreda. The dependent variable are the variables that has a direct factor on dependent variables , availability of ICT infrastructure like computer labs, plasma Tv, Internet accesses, etc this type of ICT infrastructure can determines the level of availability in secondary schools.

On the other hand there are a lot of factors that hinder the effective utilization of ICT in secondary schools like lack of ICT skill, lack of technical support, lack of ICT equipment, lack of administrative support, beliefs & attitude towards ICT integration

For the effective utilization of ICT in the schools there are a lot of indicators which supports the effective use of ICT in the schools. School administrative should organize in service skill building training and set budget for ICT related activity.

School administrative plays a major role to increase the interest and commitment of teachers and students. By encouraging and creating a favorable climate for ICT use and the school ICT technicians provide technical support for ICT related use. So the result of this relationship provides the effective utilization of ICT in the schools.

CHAPTER FOUR: DATA ANALYSIS AND PRESENTATION

The purpose of this study was to evaluate the availability and utilization of ICT facilities for teaching and learning purpose in secondary schools of Silti woreda in Silte Zone. So, this chapter deals with presentation, analysis and interpretation of the data gathered from the respondents through questionnaires, interview, observation, and document analysis. Thus, both quantitative and qualitative analysis of data was incorporated. The quantitative data was gathered from teachers through questionnaires whereas qualitative data was gathered from school principals, deputy principals, IT subject department heads and IT teachers through interview and other qualitative data were also gathered through observation and document analysis by researcher. The chapter consists of two sections. The first section deals with the characteristics of the respondents, and second section deals with analysis, interpretation and presentation of both quantitative and qualitative data of the study.

4.1 Background Information of Respondents.

4.1.1. Gender of Respondents.

This study involved 70 teachers, in 3 higher secondary schools. Findings showed that, there were more male teachers 60% (N=42) than females in the school covered by the study. All three schools were found to have fewer number of female teachers 40% (N=28) than male teachers participated in the study. This implies that the participation of female teachers in the secondary schools of Silti woreda in Silte Zone is low.

This study involved 45 students, in 3 higher secondary schools. Findings showed that, there were more male students 64.4% (N=29) than females in the school covered by the study. All three schools were found to have fewer number of female students 35.6% (N=16) than male students participated in the study. This implies that the participation of female students in the secondary schools of Silti woreda in Silte Zone is low. (See Table.4).

4.1.2. Age of Respondents.

The finding of the study indicated that, there were four categories of teachers concerning their age. These are 21-24 years; 25-34 years; 35-44 years, and 45 or more years). As a result, the majority of the respondents, 71.4% (N=50) are found in the age ranges of 25-34 followed by 28.6% (N=20) in the age ranges of 35-44. This indicates that a large number of teachers were found in the young age i.e. between the ages of 25-34.

The age of respondent students in this thesis was 14-17 years 51.1% (23), 18-21 years 44.4% (20) and 22-25 years 4.4% (2). This analysis shows that most of the respondents of students were between the ages of 14-17 years. (See Table.4 and chart 3).

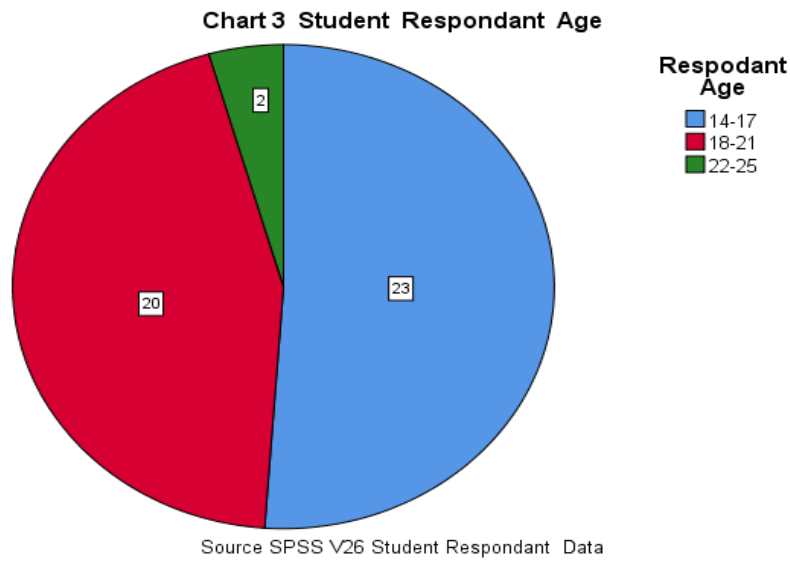


Figure 3 Students Respondent Age

4.1.3. Teacher Service Years.

The finding of the study showed that, there were four categories of teachers concerning number of service years in teaching. These are 1-5 years; 6-10 years; 11-15 years; and 16 and above). It was found that, 28.6% (N=20) of all participated teachers in the study were between 16 and above years of service in teaching; 34.3% (N=24) of teachers are found between 6-10 years of service in teaching; as well as 35.7% (N=25) of them are found in the range of most experienced (11-15 years) teachers. The analysis shows that most of the teachers in Silti woreda were 11-15 experience's in teaching services. But, 1.4% (N=1) teachers represented 1-5 years this shows that 1-5 years experienced teachers were minimal insiltiworedasecondaryschools.

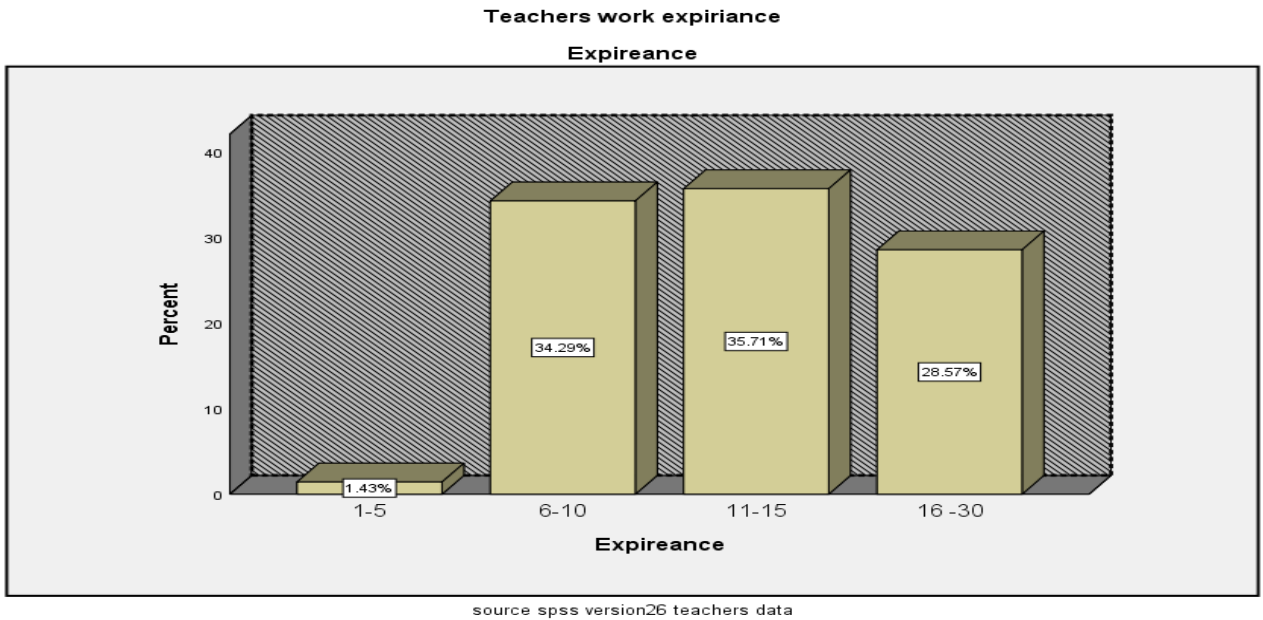


Figure 4 Respondents work experience

The grade levels of the respondent of the questionnaires were grade 9, 20% (9), grade 10, 24.4% (11), grade 11, 11.1% (5) and grade 12 44.4% (20). The analysis indicated that most of respondent students were grade 12 because of their responsibility. (See Table.4).

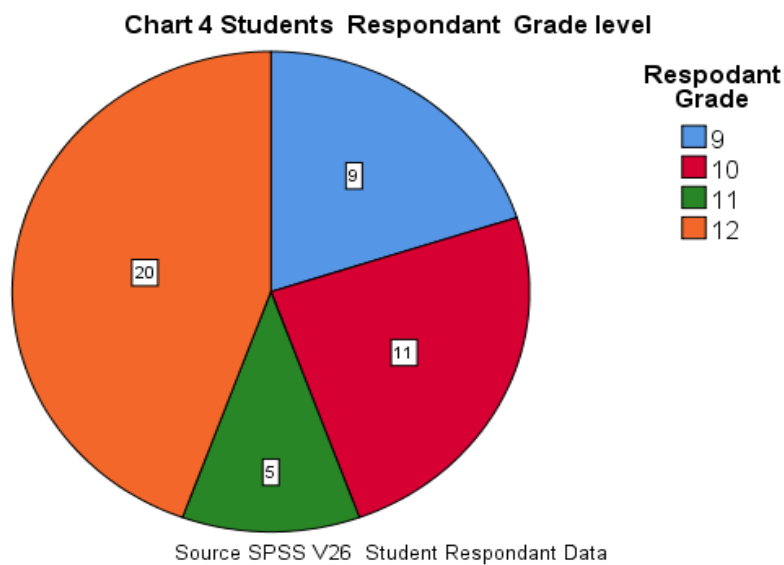


Figure 5 Respondents Grade level

4.1.4 Respondents Academic Qualification.

The finding of the study revealed that, majority of teachers 94.3% (N=66) who are participated in this study had higher education qualifications of Bachelor's degree. Whereas

the rest 5.7% (N=4) of teachers who are participated in the study are Master holders. Thus, from the data; it is possible to infer that, almost all of those teachers who working in secondary schools of Silti woreda in Silte Zone are achieved minimum academic qualification to teach in secondary school level in line with the standards set by Ministry of Education of Ethiopia. (See Table.4).

Table 5 Characteristics of Respondent's

Respondent Information		Teachers Respondent		School principal and ICT personnel's respondent		Respondent Information		Student Respondent		Students respondents for FGD	
		N	%	N	%			N	%	N	%
Gender	Male	42	60	5	62.2	Gender	Male	29	64.4	29	70.73
	Female	28	40	2	100		Female	16	35.6	12	29.26
	Total	70	100	7	70		Total	45	100	41	100
Age In years	25-34	50	71.4	2	100	Age	14-17	23	51.1		
	35-44	20	28.6	5	62.2		18-21	20	44.4		
	Total	70	100	7	100		22-25	2	4.4		
Qualification	PhD	-	-	-	-	Grade	9	9	20		
	Masters	4	5.7	-	-		10	11	24.4		
	Bachelors	66	94.3	7	100		11	5	11.1		
	Diploma	-	-	-	-		12	20	44.4	41	100
Service in Years	1-5 years	1	1.4	-	-	Total	45		100	41	
	6-10 years	24	34.3	-	-						
	11-15 years	25	35.7	3	42.5						
	16 and above	20	28.6	4	57.14						

4.2. Presentation, Analysis, and Interpretation Main Data of the Study.

The purpose of this study was to investigate the level of availability and the extent utilization of ICT facilities for teaching and learning purpose in secondary schools of Silti woreda in silte zone. Therefore, to achieve the purpose of the study, teachers were asked to rate their schools on the issue of availability ICT infrastructure in their school by using a three point rating scales such as Adequate(1) , Not Adequate(2) , and Not available (3) , the score of teachers response analyzed by SPSS Version 26.0 software to compute descriptive statics. Frequency analysis and percentage were undertaken to determine the Status of ICT Infrastructure in Silti woreda Selected Secondary schools.

4.2.1 Questionnaires Filled by Secondary School Teachers

4.2.1.1 Availability of ICT Infrastructure in the school

Table 6 Availability of ICT Infrastructure in the school

NO.	ITEMS	N	Adequate		Not adequate		Not Available	
			N	%	N	%	N	%
1	Desktop computers	70	24	34.3%	44	62.9%	2	2.9%
2	Laptop, Tablet pc or note book	70	3	4.3	25	35.7 %	42	60%
3	Internet Accesses	70	11	15.7%	28	40%	31	44.3%
4	Printer and Scanner, Fax	70			28	40%	42	60%
5	Photo copiers	70	9	12.9%	21	30%	40	57%
6	e-reader-lesson or e-learning	70	13	18.6%	43	61.4%	14	20%
7	Plasma TV	70	28	40%	30	42.9%	12	17.1%
8	Video Conference	70	3	4.3%	12	17.1%	55	78.6%
9	LCD Projector	70			18	25.7%	52	74.3 %
10	Digital Library	70	2	2.9%	16	22.9%	52	74.3%
11	Computer (ICT) Library	70	18	25.7	33	47.1%	19	27.1%
12	Website	70	1	1.4%	13	18.6%	56	80%
13	Fax Machine	70			9	12.9	61	87.1%

On the above table the teachers are asked to respond on the availability of ICT infrastructure in their schools by their agreement level 1 (adequate), 2 (Not adequate) and 3 (not available), the finding was analyzed by percentage and the percentage was undertaken to determine the availability of ICT infrastructure in the selected secondary schools.

As indicated in table 5 respondents were requested to rate whether there are enough ICT Infrastructures in their School, or not, the finding of the respondent are discussed below.

As seen in the analysis, majority of ICT infrastructures are not available like , Fax machine 61 respondents (87.1%), website, 56respondants , (80%), video conference, 55 respondents (78.6%), LCD Projector,52 respondents (74.3%), Digital Library, 52 respondents (74.3%) laptop ,Tablet PC or Note book,42 respondents (60%), internet assesses, 31 respondents (44.3%) and printer, scanner and fax 42 respondents (60%) were answered the above ICT infrastructures are not available. This shows that most of ICT infrastructures in average (69.9 %) were not available at Silti woreda secondary schools, Interview was conducted with school principals and school ICT Personnel's also shows that each school are not well equipped by computers for teaching and learning purpose.

With the existing infrastructure, there are obvious challenges to the survey of ICT and education in Africa: Ethiopia country report: 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(Harry Hare June 200[20]).

Most ICT Infrastructures are Partially available including Desktop computers, 44 respondents (62.9 %), e-learning computers, 43 respondents (61.4%), computer ICT laboratory, 33 respondents (47.1%), Plasma Tv, 30 respondents (42.9 %), were answered "Not Adequate" this indicates some ICT infrastructures are found in minimal level in average (53.57%) this indicates some ICT facilities are partially available In Silti woreda high schools.

Most ICT Infrastructure is sunken level available like, Internet accesses (40%), Printer and Scanner, (40%). Photo copier (30%), this shows some ICT Infrastructure are found in sunken (minimal) level. This indicates ICT facilities are not available in sufficient level for access and utilization of ICT facilities in the teaching learning processes in silti woreda selected secondary schools.

A lot of literature's shows that huge benefits achieved by students, teachers and administrators when technology is applied in the education system and it used to enhance the delivery and access of the teaching and learning processes.

4.2.1.2 Teachers Perception of ICT Infrastructure

The researcher used to evaluate the perceptions of Teachers on ICT infrastructures by using the likert scales with five category scale used for the purpose of analysis. In order to make the data analysis convenient and manageable, the mean values were interpreted. The respondent response is rating by assigning nominal value to the response categories in five point likert-type scales, Strongly Agree (SA)-1, Agree (A) -2, I don't know-3, Dis-agree-4 and Strongly Dis-Agree (SD)-5. For the convenience of analyzing data, the study uses cutoff point. The cutoff point which is 2.50 will be selected, all the means value in the table below less than or equal to 2.50 are taken as "AGREED" and the mean value greater than or equal to 2.50 are taken as "DIS-AGREE". The perception of teachers for ICT infrastructures analyzed in the following tables 6.

Table 7 Teachers perception on ICT Infrastructure

No	Item	N	SA		A		NK		D		SD		Mean	Category
			N	%	N	%	N	%	N	%	N	%		
1	Your school is conscious about the need of ICT training for teachers.	70	9	12.9	24	34.3	1	1.4	28	40	8	11.4	3.03	DISAGREED
2	Your school often provides ICT training to teachers.	70			13	8	8	11.4	28	40	21	30	3.81	DISAGREED
3	Your school motivates teachers to participate in ICT training initiatives.	70	6	8.6	21	30	8	11.4	27	38.6	8	11.4	3.14	DISAGREED
4	Your ability to provide ICT-supported teaching is significantly increased through trainings given by the school.	70	12	17.1	16	9	9	12.5	22	31.4	11	15.7	3.06	DISAGREED
5	Your school has enough ICT tools and facilities to support ICT integrated pedagogy.	70	9	12.9	12	17.1	8	11.4	36	51.4	5	7.1	3.23	DISAGREED
6	Your school is adequately staffed with trained teachers capable of effectively providing ICT-supported training.	70	7	10	8	11.4	14	20	38	43	3	4.3	3.31	DISAGREED

7	Your school keeps budget for the implementation/maintenance of ICT infrastructure.	70	1	1.4	8	11.4	32	45.7	26	37.1	3	4.3	3.31	DISAGREED
8	ICT is necessary in supporting the teaching process.	70	34	48.6	19	27.1	6	8.6	8	11.4	3	4.3	1.96	AGREED
9	Students' achievements are positively influenced by the integration of ICT in the teaching/learning process	70	29	41.4	26	37.1	5	7.1	7	10	3	4.3	1.99	AGREED
10	The attitude of teachers in integrating ICT in the teaching process is positive.	70	22	31.4	24	34.3	6	8.6	15	21.4	3	4.3	2.33	AGREED
11	The attitude of teachers has a huge impact on the integration of ICT in the teaching process	70	28	40	22	31.4	8	11.4	7	10	5	7.1	2.13	AGREED
12	ICT infrastructure is effectively used in supporting the teaching/learning process	70	10	14.3	32	45.7	12	17.1	16	22.9	-	-	2.49	AGREED
13	Your school encourages teachers and students to use the ICT infrastructure.	70	13	18.6	30	42.9	10	14.3	17	24.3	-	-	2.44	AGREED
14	ICT facilities are maintained on a regular basis	70	14	20	18	25.7	17	24.3	13	18.6	8	11.4	2.8	DISAGREED

Table 7 above shows the perception of Teachers on ICT Infrastructure in the secondary schools of Silti woreda in silte zone. The finding was interpreted in the following ways.

Most of the teacher Respondent's ,28(40%) of the teacher respondents Dis-agreed, and 8(11.4%) of the teacher respondent, strongly dis-agreed on school's is conscious about the need of ICT training for teachers, and the mean weight value reached 3.03, this shows majority of the respondent "dis-agreed" on the item. And 28(40%) of the teacher respondent dis-agreed and 21(30%) of teacher respondent "strongly disagreed" on the school often provide ICT training to teachers, and the mean value shows 3.81 this indicates majority of the respondent "Dis-agreed" on the item, And 27(38.6%) of the teacher respondents dis-agreed and 8(11.5%) of the teacher respondent strongly dis-agreed on school motivates teachers to participate in ICT training and initiatives, the mean value shows 3.14 this indicates majority

of the respondent “Dis-agreed” on the item, And 22(31.4%) of the teacher respondent dis-agreed and 11(15.7%) of the teacher respondent strongly dis-agreed , on ability to provide ICT-supported teaching is significantly increased through training given by the school, the mean value shows 3.06, this shows majority of the respondent “Dis-agreed” on the item, And 36(51.4%) of the teacher respondent dis-agreed and 5(7.1%) of the teacher respondent strongly dis-agreed on school has enough ICT tools and facilities to support ICT integrated pedagogy, the mean value shows 3.23 this shows majority of the respondent “Dis-agreed” on the item, And 38(43%) of teacher respondent dis-agreed and 3(4.3%) of the teacher respondent strongly dis-agreed on school is adequately staffed with trained teachers capable of effectively providing ICT-supported training, the mean value shows 3.31 this indicates majority of respondent “Dis-agreed” on the item, and 26(37.1%) of the teacher respondent dis-agreed and 3(4.3%)of the teacher respondent strongly dis-agreed on school keeps budget for the implementation /maintenance of ICT, the mean value shows 3.31 this indicates majority of the respondent “Dis-agreed” on the item, However, 32(45.7%) of the teacher respondents answered “I don’t know” this indicates majority of teachers have no information that school keeps budget for the implementation /maintenance of ICT infrastructure.

This shows that majority of Silti woreda selected Secondary school Teachers have Negative perception on ICT Infrastructure and School principals does not allocate budget for ICT accessories replacement and maintenance this causes ICT facilities have not maintained on a regular basis. However some respondent of teachers responded that they have Agreed in some items such as ICT is necessary in supporting the teaching processes 19(27.1%) agreed and 34(48.6%) strongly-agreed, the mean reaches 1.96, this indicates “Agreed” in the item. students achievement are positively influenced by integration of ICT in the teaching – learning processes 26(37.1%) agreed and 29(41.4%) strongly agreed, the mean reaches 1.99, this indicates “Agreed” in the item, the attitude of teachers in integrating ICT in the teaching processes is positive, 22(31.4%) of the respondents strongly-agreed and 24(34.3%) of the respondents agreed, the mean reaches 2.33, this indicates “Agreed” in the item. this implies Integrating ICT in teaching-learning processes has a positive impact on education sector.

4.2.1.3 Perception of Teachers on the use of ICT Infrastructure In schools

The other objective of the study is evaluating the perception of teachers on the use of ICT Infrastructure in secondary schools. The analyzes is described on the following Table

Table 8 Perception of Teachers on the use of ICT Infrastructure in Education

No	Item	N	SA		A		NK		D		SD		Mean	Remark
			N	%	N	%	N	%	N	%	N	%		
1	Improves quality of course delivery	70	35	50	20	28.6	6	8.6	7	10	2	2.9	1.87	AGREED
2	Makes education more affordable and accessible	70	37	52.9	24	34.3	5	7.1	4	5.7	-	-	1.60	AGREED
3	Increases enrollment	70	28	40	35	50	1	1.4	6	8.6	-	-	1.79	AGREED
4	Encourages self-learning	70	29	41.1	33	47.1	-	-	8	11.4	-	-	1.81	AGREED
5	Makes learning more enjoyable	70	31	44.3	31	44.3	4	5.7	4	5.7	-	-	1.73	AGREED
6	Increases learning efficiency	70	32	45.7	29	41.4	6	8.6	3	4.3	-	-	1.71	AGREED
7	Makes teachers more efficient in delivering their courses	70	27	38.6	32	47.7	4	5.7	4	5.7	3	4.3	1.91	AGREED
8	It is a powerful tool to contribute to educational change	70	33	47.1	31	44.3	3	4.3			3	4.3	1.70	AGREED
9	It better prepares students for the information age	70	32	45.7	31	44.3	2	2.9	5	7.1	-	-	1.71	AGREED
10	It improves learning outcomes and competences of learners	70	28	40	32	45.7	3	4.3	7	10	-	-	1.84	AGREED
11	Equips students with survival skills for the information society	70	32	45.7	28	40	5	7.1	5	7.1	-	-	1.76	AGREED
12	Positively impacts on students motivation, achievement, critical thinking & problem solving	70	22	31.4	42	60	6	8.6	-	-	-	-	1.77	AGREED
13	Assists in preparing attractive presentation	70	29	41.4	30	42.9	5	7.1	3	4.3	3	4.3	2.13	AGREED
14	Makes administrative work easier and more efficient	70	30	42.9	34	48.6	6	8.6	-	-	-	-	1.66	AGREED
15	Makes learning more expensive	70	25	35.7	34	48.6	5	7.1	4	5.7	2	2.9	1.91	AGREED

The finding in the table 8 above, ICT improves quality of course delivery,35(50%) of respondents “strongly agreed” and 20(28.6%) respondents “agreed” the mean reaches 1.87 this indicates “Agreed” and ICT makes education more affordable and accessible 37(52.9%)

respondents “strongly agreed” “the mean reaches 1.60 this indicates “Agreed” in the item and ICT encourages self-learning 29(41.1%) respondents “strongly agreed” and 33(47.1%) respondents “agreed” the mean reaches 1.81 this indicates “Agreed” in the item.

In the table 8 above all the teachers respondents are “agreed” in all items 1-15 this shows that all teachers have positive perception on ICT Infrastructure in education, this indicates using ICT in teaching learning processes enhances the quality of education. However the finding of interview and observation shows Majority of teachers have No skill to operate ICT facilities, like computer , plasma , E-learning , Internet , etc that found on their school.

Teachers' Perception towards new technologies in secondary schools and its effects in integration and use shows that if teachers perceive use of ICT as either satisfying their own needs or their students' needs, it is likely they would implement it in school. Attitude is brought about by other factors like teachers' competency, skills, knowledge and perception towards ICT [23].

4.2.1.4 Factors Affecting Effective use of ICT Facilities

There are different factors that may affect effective use of ICT Infrastructure in the education system, to achieve the purpose of the study respondent's asked to answer in five level agreement on factors affecting effective use of ICT Infrastructure. This discussed in table 9

Table 9 Factors affecting effective use of ICT Infrastructure in Education

No	Item	N	SA		A		NK		D		SD		Mean	Remark
			N	%	N	%	N	%	N	%	N	%		
1	Number of working/operational ICT facilities	70	23	32.9	41	58.6	2	2.9	4	5.7	-	-	1.81	AGREED
2	Institutional support	70	19	27.1	44	62.9	3	4.3	2	2.9	2	2.9	2.40	AGREED
3	Availability of funds and budget allocation	70	20	28.6	47	67.1	2	2.9	1	1.4	-	-	1.89	AGREED
4	Training	70	20	28.6	47	67.1	2	2.9	1	1.4	-	-	1.77	AGREED
5	Computer anxiety	70	13	18.6	37	52.9	16	22.9	4	5.7	-	-	2.16	AGREED
6	Skill on the use of ICT infrastructure	70	16	22.9	43	61.4	8	11.4	3	4.3	-	-	1.97	AGREED
7	Level of confidence in the use of ICT infrastructure	70	13	21.4	42	60	11	15.7	2	2.9	-	-	2.00	AGREED
8	Teachers' beliefs and attitudes	70	28	40	31	44.3	7	10	4	5.7	-	-	1.81	AGREED
9	Students' beliefs and attitudes	70	17	24.3	39	55.7	10	14.3	4	5.7	-	-	2.01	AGREED
10	Availability of educational software	70	21	30	38	54.3	9	12.9	2	2.9	-	-	1.89	AGREED
11	Administrative support	70	16	22.9	45	64.3	9	12.9	-	-	-	-	1.90	AGREED
12	Technical support	70	18	25.7	47	66.1	3	4.3	2	2.9	-	-	1.84	AGREED

In the above table 9 the respondents are asked to indicate their level of agreement, the respondents answer analyzed as by percentage, strongly agree and agree were merged in order to make data manageable and convenient, The items were factors or not in utilizing ICT facilities in the education, the respondents response discussed below.

Number of working/operational computer 23(32.9) respondents were strongly agreed, and 41(58.6%) respondents agreed in the item the mean reaches 1.81, this indicates “Agreed” in the item, Institutional support 19 (27.1%) respondents strongly agreed, and 44(62.9%) respondents agreed in the item, the mean reaches 2.4, this indicates “Agreed” in the item Availability of fund and budget allocation 20(28.6%) respondents strongly agreed, 47(67.1%) respondents agreed in the item the mean reaches 1.89 this indicates “Agreed” in the item, ICT Training 20 (28.6%) respondents strongly agreed, and 47(67.1) respondents agreed, the mean reaches 1.77, this indicates “Agreed” in the item, Computer anxiety 13(18.6%) respondents strongly agreed, and 37(52.9%) respondents agreed in the item, the mean reaches 2.16 this indicates “Agreed” in the item, skill on the use of ICT Infrastructure 16(22.9%) respondents strongly agreed, and 43(61.4%) respondents agreed in the item, the mean reaches 1.97 this indicates “Agreed” in the item, level of confidence in the use of ICT infrastructure 13 (21.4%) respondents strongly agreed, and 42(60) respondents agreed in the item, the mean reaches 2.00 this indicates “Agreed” in the item, Teachers belief and attitude 28(40%) respondents agreed, and 31(44.3%) respondents agreed in the item, the mean reaches 1.81 this indicates “Agreed” in the item, Students belief and Attitude 17(24.3%) respondents strongly agreed, and 39(55.7%) respondents agreed in the item, the mean reaches 2.01 this indicates “Agreed” in the item, Availability of educational software 21(30%) respondents strongly agreed, and 38(54.3) respondents agreed in the item, the mean reaches 1.89 this indicates “Agreed” in the item, Administrative support 16(22.9%) respondents strongly agreed, and 45(64.3%) respondents agreed in the item, the mean reaches 1.90 this indicates “Agreed” in the item and Technical support 18(25.7%) respondents strongly agreed and 47(66.1%) respondents agreed in the item the mean reaches 1.84 this indicates “Agreed” in the item. This indicates that all the above Items are factors for effective use of ICT facilities in Silti woreda secondary schools.

The study conclude that There are factors that affects the effective ,utilization and implementation of ICT infrastructure in secondary schools of silti woreda, this factors categorized in to external factors and internal factors. The external factors include, lack of ICT equipment, unreliable of ICT equipment and lack of technical support, awareness of school principals on ICT facilities management.

The internal factors include understanding of ICT use, beliefs and attitude towards ICT integration, teachers’ intention and motive to use ICT, technological skills and readiness to use ICT. These are the core factors in secondary schools to utilize ICT effectively in the teaching and learning processes.

The other objective of the study were to analyzing ICT Infrastructure management problems and its utilization in Silti woreda secondary school, The observation and observation based checklist where undertaken in this study the finding shows that most of ICT facilities that are found in selected secondary school where not supporting the teaching learning activity effectively , Most of the ICT facilities are damaged and Broken by students , like plasma Tv, setoff box, network cables , switches, computers and some facilities are stolen like Plasma , computers, mouse , cables , beside the interview was conducted with school ICT personnel's *“The school principals have a poor attitude and perception on ICT infrastructure’s, and they have no enough knowledge on ICT device, this results they never encourage techers to use ICT in their teaching method, they have no skills on ICT facilities found on their schools and they have a skill gap on operating ICT facilities this makes difficult to manage and utilize ICT facilities in their schools this results school principal never allocate budget for ICT related issues.”*

PHOTO GRAPH EVIDANCE ON MANGIMENT PROBLEM OF ICT INFRASTRUCTURE



Plasma Tv full of dust



Damaged schoolnet Network cable



Broken switch



Damaged Plasma Tv network cable



Damaged Non POE Switch



| Lab Computers full of dust and found in stores(nonfunctional)

Figure 6, problem in Management of ICT facilities

The figure 5 shows that there is a big problem in management and proper use of ICT Facilities in silti worda secondary schools. Most ICT facilities that are found in school were did not effectively achieving their own purpose, and a big number of computer , plasma , e-learning computers are found in school stores, and some computers have did not operational in a simple technical error and in shortage of hardware accessories this implies the school does not utilize ICT Facilities effectively .However the study finds that in selected three secondary school there is no ICT technician's , that Maintain ICT Facilities during problem were happen (break down) .

ICT teachers have never take ICT related training, workshop, and , Maintenance for Managing and repairing ICT facilities this implies that there is a great skill gap to maintain & troubleshoot computers , and ICT facilities does not repair (maintain) in regular basis and school principals does not allocate budget for maintenance and Hardware replacement of ICT Facilities.

Implementation of ICT policy in education needs resources like, computers, printers, multimedia projectors and scanners and other accessories. These tools are partially available in silti worda secondary schools. Also, ICT requires up-to- dating hardware and software and high-speed Internet connection. These are key features in utilization of technology but they are not fully available silti worda secondary schools. Whereas shortage of budget to get the necessary hardware and software are one of the reasons why teachers do not utilize technology in their schools.

According to National ICT in Education Strategy [30] most secondary schools have some computer equipment; however, due to high cost, this more often consists of one computer in the office of the school head. Very few secondary schools have sufficient ICT tools for teachers and students. Even schools that do have computers, the student-computer ratio is very low.

4.2.2 Questionnaires Filled by Secondary School Students

The objective of this questionnaire was to evaluate students perception on ICT Infrastructure, perception of students to use ICT infrastructure in education and to find out which factors are affecting effective use of ICT infrastructure in education . The study uses likert scales questionaries' with five category scale were i.e1 SA (strongly agree), 2 A(agree) , 3 NK (I don't know) , 4 D (disagree), and 5, SD (strongly dis agree)

Table 10 perception of Student in ICT Infrastructure

No	Item	N	SA		A		NK		D		SD		Mean	Remark
			N	%	N	%	N	%	N	%	N	%		
1	Students' achievements are positively influenced by the integration of ICT in the teaching/learning process	45	26	57.5	5	11.1	-	-	8	17.8	6	13.3	2.18	AGREED
2	The attitude of teachers in integrating ICT in the teaching process is positive.	45	5	11.1	9	20	5	11.1	23	51.1	3	6.7	3.2	DIS-AGREED
3	The attitude of teachers has a huge impact on the integration of ICT in the teaching process	45	11	24.4	14	31.1	3	6.7	13	28.9	4	8.9	2.67	DIS-AGREED
4	ICT infrastructure is effectively used in supporting the teaching/learning process	45	7	15.6	3	6.7	6	13.3	21	46.7	8	17.8	3.44	DIS-AGREED
5	Your school encourages teachers and students to use the ICT infrastructure.	45	5	11.1	2	4.4	8	17.8	21	46.7	9	20	3.60	DIS-AGREED
6	ICT facilities are maintained on a regular basis	45	2	4.4	2	4.4	4	8.9	19	42.2	18	40	4.09	DIS-AGREED

In table 10 above ,the students are asked to rate their response on the perception of using of ICT infrastructure in education, the finding shows 51.1% of the student respondent are dis-agreed and 6.7% of respondent strongly dis-agreed on the attitude of teachers in integrating ICT in the teaching processes, and the mean weighted reached 3.2, this indicates majority of the student respondent “Dis-agreed” on the item, and 46.7%of student respondent dis-agreed and17.8% of the respondent are strongly dis-agreed on, ICT infrastructure is effectively used in supporting the teaching/learning process the mean weighted reached 3.44, this indicates majority of the students respondent “Dis-agreed” on the item and 46.7% of students respondent dis-agreed and 20% of student respondents strongly dis-agreed , the mean weighted value reached 3.60, this indicates majority of the respondent “Dis-agreed” on the item, and 42.2% of student respondent dis-agreed and 40% of the student respondent strongly dis-agreed on the item, the mean weighted reached 4.09 this indicates majority of the student respondent “DIS-agreed” on the item this shows that majority of the student respondent have negative perception in using of ICT infrastructure in the teaching/learning processes.

However the other finding shows that, 57.5% of the student respondent strongly agreed and 11.1% of student respondent agreed, on Integrating ICT in teaching and learning is activity has positive impacts on student's achievement, the mean weighted value reached 2.18, this indicates majority of the student respondent "Agreed", this shows using ICT infrastructure in the teaching/learning processes can enhance students achievement, and has positive impact on students result and attitude.

The study concludes that the negative perception of students in ICT is resulted from the schools and teachers attitude and motives to integrate ICT in the teaching-learning processes. i.e. the attitude of teachers to integrate ICT is minimal, the existing ICT facilities are not linked in the teaching-learning processes and school principals does not encourage teachers and students to use ICT.

Depending on the finding above table 9, for utilizing ICT infrastructure in the teaching and learning processes of the selected secondary schools there are different factors are hindering like:

- ❖ The attitude of teachers for integrating ICT in their teaching processes is very low
- ❖ The attitude of school principals in integrating ICT in the teaching-learning processes is very low; they did not encourage teachers to use ICT facilities.
- ❖ Skill gap on teachers and students to operate ICT facilities
- ❖ Lack of skilled man power in ICT

Different literature's shows that Teachers' Perception to new technologies in schools effects in integration and use, if teachers perceive use of ICT either satisfying their own needs or their students' needs, it is likely they would implement it in schools.

Attitude is brought about by other factors like teachers' competency, skills, knowledge and perception towards ICT [23]. If teachers' perceptions are positive toward use of ICT, then they can easily use it or provide useful insight about its implementation.

Table 11 perception of Student in ICT Infrastructure in education

No	Item	N	SA		A		NK		D		SD		Mean	Remark
			N	%	N	%	N	%	N	%	N	%		
1	Improves quality of course delivery	4 5	17	37.8	17	37.8	6	13.3	3	6.7	2	4.4	2.02	AGREED
2	Makes education more affordable and accessible	4 5	21	46.7	20	44.4	1	2.2	3	6.7	-	-	1.69	AGREED
3	Encourages self-learning	4 5	20	44.4	20	44.4	2	4.4	2	4.4	1	2.2	1.76	AGREED
4	Makes learning more enjoyable	4 5	13	28.9	26	37.8	1	2.2	5	11.1	-	-	1.96	AGREED
5	Increases learning efficiency	4 5	18	40	17	37.8	7	15.6	3	6.7	-	-	1.89	AGREED
6	It better prepares students for the information age	4 5	22	48.9	17	37.8	4	8.9	2	4.4	-	-	1.69	AGREED
7	It improves learning outcomes and competences of learners	4 5	21	46.7	19	42.2	5	11.1	-	-	-	-	1.64	AGREED
8	Equips students with survival skills for the information society	4 5	16	35.6	26	57.8	2	4.4	-	-	1	2.2	1.76	AGREED
9	Positively impacts on students motivation, achievement, critical thinking & problem solving	4 5	12	26.7	26	57.8	2	4.4	4	8.9	1	2.2	2.02	AGREED
10	Makes learning more expensive	4 5	18	40	20	44.4	3	6.7	2	4.4	2	4.4	1.89	AGREED

In the above table 11 the students are asked to rate their response on the perception of students on ICT infrastructure in education, the finding shows that in item, ICT Improves quality of course delivery,38% of the respondent's where strongly agreed and 38% of respondents agreed the cutoff point (the mean value) is2.02,this indicates majority of respondents are agreed in the item, on item 2 ICT Makes education more affordable and accessible, 47% of respondents strongly agreed and 45% of respondents agreed the mean value reaches 1.69,this indicates majority of respondents are agreed in the item, on the item 5, ICT increases learning efficiency, 40% of respondents are strongly agreed and 39% of respondents agreed in the item, the mean value reaches 1.89this indicates majority of

respondents are agreed on the item, on the item 6 ICT better prepares students for the information age, 49% of respondents strongly agreed and 38% of respondents agreed the mean value reaches 1.69 this indicates majority of respondents are agreed on the item, on item 7, ICT improves learning outcomes and competency of learners, 46.7% of respondents strongly agreed and 42.2% of respondents agreed, the mean value shows 1.64 this indicates majority of respondents are agreed on the item, on the item 8, ICT equips students with survival skill in the information society, 35.6% of respondents are strongly agreed and 57.8% of respondents are agreed, the mean value shows 1.76 this indicates majority of respondents are agreed in the item, in item 10, ICT makes learning more expensive, 40% of the respondents are strongly agreed and 44.4% of respondents are agreed on the item ,the mean value shows 1.89, this indicates majority of the respondents are agreed on the item .

The finding of table 10 shows that majority of the students respondents have a positive perceptions on ICT infrastructure in education, i,e using ICT facilities in the education system has a positive impact on the teaching learning processes of secondary schools.

This implies that using ICT Infrastructure in education has play a central role in transforming teaching, learning and assessment practices for teachers and students.

Different literature's suggests that utilizing of ICT infrastructure effectively in the education system provides a lot of benefits for teachers and students like:

- ❖ It improves quality of course delivery
- ❖ It makes education more affordable and accessible
- ❖ It increases learning efficiency
- ❖ It allows students to learn by solving problem to think themselves and collaborate with others

The literatures argue that ICT infrastructure can support more powerful and complete knowledge building capabilities for students if there are linked and well-designed technologies.

Generally ICT infrastructure in education provide learning environment more conformable and enhance the education system by creating learner centered environment by motivating learners through combining text, sound, color and moving images.

Table 12 factors affecting effective use of ICT infrastructure

No	Item	N	SA		A		NK		D		SD		Mean	Remark
			N	%	N	%	N	%	N	%	N	%		
1	Number of working/operational ICT facilities	45	21	46.7	13	28.9	2	4.4	4	8.9	5	11.1	2.09	AGREED
2	Institutional support	45	14	31.1	23	51.1	1	2.2	4	8.9	3	6.7	2.09	AGREED
4	Skill on the use of ICT infrastructure	45	7	15.6	24	53.3	9	20	3	6.7	2	4.4	2.31	AGREED
5	Level of confidence in the use of ICT infrastructure	45	11	24.4	21	46.7	5	11.1	6	13.3	2	4.4	2.27	AGREED
6	Teachers' beliefs and attitudes	45	15	33.3	23	51.1	2	4.4	2	4.4	3	6.7	2.00	AGREED
7	Students' beliefs and attitudes	45	11	24	25	55.6	5	11.1	4	8.9	-	-	2.04	AGREED
8	Availability of educational software	45	12	26.7	26	57.8	4	8.9	2	4.4	1	2.2	1.98	AGREED
9	Administrative support	45	21	46.7	20	44.4	2	4.4	1	2.2	1	2.2	1.69	AGREED
10	Technical support	45	15	33.3	27	60	1	2.2	1	2.2	1	2.2	1.80	AGREED

In the above table 12, on factors affecting the effective use of ICT infrastructure, on item 1, Number of working/operational ICT facilities 46.7% of respondents are strongly agreed and 28.9% of respondents are agreed in the item the mean value shows 2.09, this indicates majority of respondents are agreed on the item, on item 2, institutional support, 31.1% of respondents are strongly agreed and 51.1% of respondents are agreed, the mean value reaches 2.09, this indicates majority of respondents are agreed on the item, on item 3, skills on ICT infrastructure, 15.6% respondents are strongly agreed and 53.3% respondents agreed in the item, the mean value 2.31, this indicates majority of respondents are agreed on the item, on the item 4, level of confidence in use of ICT infrastructure, 24.4% Of respondents are strongly agreed and 46.7% of respondents are agreed on the item, the mean value reaches 2.27, this indicates majority of respondents are agreed on the item, on the item 8, availability of educational software, 26.7% of respondents are strongly agreed and 57.8 % of respondents are agreed on the item, the mean value reaches 1.98, this indicates majority of respondents are agreed on the item, on the item 9, administrative support, 46.7% of respondents are strongly agreed and 44.4% of respondents are agreed on the item, the mean value shows 1.69, this indicates majority of the respondents are agreed on the item, on item 10, technical support, 33.3% of respondents are strongly agreed and 60% of respondents are agreed in the

item, the mean value shows 1.80, this indicates majority of respondents are agreed on the item.

The finding of table 11, indicates that there are different factors that affects the effective utilization of ICT infrastructure's in the secondary schools.

The Skill on the use of ICT infrastructure and attitude to use ICT facilities is another factor for effective use of ICT Infrastructure in the education system. For integrating ICT infrastructure in teaching and learning processes the skill of teachers has a great impact.

Research suggests that teachers' adequacy, skills, and attitudes influence successful implementation and use of ICT in schools [25]. If teachers' perceptions are positive toward use of ICT, then they can easily provide useful insight about its implementation.

The availability of educational software the mean value reached 1.98, (84.5%) response of respondent indicates Strongly agreed in the item , Administrative support the mean value reached 1.69 (91.1%) response of respondent indicates Strongly agreed in the item ,and technical support the mean value reached 1.80 (93.3%) response of respondent Strongly agreed in the item , this ensures that the above three Items are the major factors for effective use of ICT facilities in teaching and learning processes.

In general the finding table 11 above indicates that for utilizing ICT facilities in secondary schools teaching and learning processes there are different factors that hinder the effective utilization of ICT in the schools like:

- ❖ Number of operational computers in the schools
- ❖ Teachers attitude to use ICT facilities in their teaching method
- ❖ Skills of teachers and students to operate ICT facilities
- ❖ Availability of educational software and electric power
- ❖ Lack of technical support, skill building training, and budget for ICT facilities

Literatures suggest that, teachers need to be equipped with necessary skills to effectively utilize ICT facilities in their teaching method and schools takes responsibility in ICT facilities to replace and maintain in a regular bases. Schools prepare a skill building training on ICT facilities for teachers and students because of teacher's perception influences the successful implementation of ICT in the schools.

Generally the finding of the shows that students have negative perception on ICT infrastructure's that are found in the schools, and teachers have negative attitude in integrating ICT infrastructure's in the teaching and learning processes, this results schools

ICT infrastructure is not effectively utilized in the teaching/learning processes. School principals do not encourage teachers and students to use ICT facilities in their teaching/learning and the ICT facilities doesn't maintain in a regular basis.

4.3 Linear Regression

Linear regression analysis is used to predict the value of a variable based on the value of another variable. The variable that used to predict is called the dependent variable. The variable you are using to predict the other variable's value is called the independent variable; it used to describe the correlation of the explanatory variables with the dependent variable.

Table 13 linear regression table (dependent and independent variable)

Model Summary					
Model	R	R Square	Adjusted Square	R	Std. Error of the Estimate
1	.404 ^a	.163	.144		.40272

a. Predictors: (Constant), Factors affecting effective use of ICT Infrastructures

ANOVA TABLE

ANOVA ^a						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1.362	1	1.362	8.401	.006 ^b
	Residual	6.974	43	.162		
	Total	8.336	44			

a. Dependent Variable: Perception on the use of ICT Infrastructures in education

b. Predictors: (Constant), Factors affecting effective use of ICT Infrastructures

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.218	.220		5.540	.000
	Factors affecting effective use of ICT Infrastructures	.301	.104	.404	2.898	.006

a. Dependent Variable: Perception on the use of ICT Infrastructures in education

4.4 The relationship between Independent and Dependent variable

The relation between the dependent (Utilization of ICT) and independent (factors affecting the utilization of ICT) analyzed by SPSS the finding shows dependent and independent variables has a direct relation.

The finding of table on SPSS model summery shows that the coefficient of R is .404 values this shows there is a strong positive relationship between independent variables and the value of R square shows the value of 1.63 this ensures there is a positive relation between the dependent and independent variable.

The finding from ANOVA table the value of F 8.401 and the P value is 0.006 this shows the model is statically significant.

The result on the coefficient table the value of beta is .401 and the standardized coefficient column and sig is .006 this shows using ICT infrastructure has a significant on explaining the dependent variable and has a direct relation on independent variable.

5. Observation checklist

No	ICT facilities (infrastructure) in the schools	Silti Secondary school				Gen silti secondary school				Gerbiber Secondary school						
		Operational		Not-Operational		operational		Not-Operational		operational		Nont-Operational				
1	Server center															
	Server Accessess	yes	1	100%	-	-	No	-	-	-	-	NO	-	-	-	-
	Internet accessess	yes	4mb/s	100%	-	-	No	-	-	-	-	No	-	-	-	-
	ICT Technisian	NO					NO					NO				
2	Out side the class room															
	Satillite installation	Yes			1	100	Ye s			1	100%	yes			1	10 0
	Wi-fi accessess	Yes	4mb/s	100%			NO					NO				
3	Inside the class room															
	Plasma Tv accessess	yes	20	50%	20	50%	Ye s	25				yes	18			
	Computer and projector accessess	NO	-	-	-	-	NO	-	-	-	-	NO	-	-	-	-
	Network accessess	yes	33	100%	-	-	NO					NO				
4	Pedagogical centere															
	Computer accessess	yes	1	100%	-	-	NO					NO				
	Internet accessess	NO					NO					NO				
	ICT Laboratory															
	IT Lab Rooms	yes	2	75%	1	25%	Ye s	1	100%	-	-	yes	1	100	-	-
5	Desktop Computer accessess	yes	160	66%	80	33.5	Ye s	12	17.1	58	82.8	yes	8	16	42	84 %
	Laptop computer accessess	No	-	-	-	-	NO	-	-	-	-	NO	-	-	-	-
	Internet accessess	NO	-	-	-	-	NO	-	-	-	-	NO	-	-	-	-
	E-learning center															
6	E-learning labs	yes	1	50%	1	50%	Ye s	1	100	-	-	yes	1	100	-	-
	e-lerning computers	yes	20	40%	30	60%	Ye s	25	83%	5	17%	yes	20	60%	10	40 %
	Intenet accessess	NO	-	-	-	-	NO	-	-	-	-	NO	-	-	-	-
	School Departments															
7	Desktop computers	yes	3	30%	7	70%	No	-	-	-	-	NO	-	-	-	-
	Laptop computers	NO	-	-	-	-	NO	-	-	-	-	NO	-	-	-	-
	Printers	NO	-	-	-	-	NO	-	-	-	-	NO	-	-	-	-
	LCD Projectors	NO	-	-	-	-	NO	-	-	-	-	NO	-	-	-	-
	Internet accessess															
	School administrative office															
8	Desktop computers	yes	3	100%	-	-	Ye s	2	100%	-	-	yes	1	100%	-	-
	Laptop computers	NO					NO					NO				
	Printers	yes	1	50%	1	50%	1	100 %	-	-	-	yes	1	100%		
	Internet accessess	yes					NO					NO				

Table 14 : Observation cheklist

Another tools that was drawn to check the availability of ICT infrastructure by using a checklist based observation in the selected secondary schools of silti woreda.

The Observation and document analysis result showed that there is a huge difference were identified and observed among schools in computer-student ratio , The computer –student ratio of the three school were, Silti Secondary School 1:11, and have 160(66%) operational desktop computers, Gen silti 1:40, and have 12(17.1%) operational desktop computers and that of Gerbiber 1:47, and have 8(16%) operational desktop computers. Depending, on the

ratio Silti Secondary school has more desktop computers relatively and had a good status in terms of computer –student ratio.

In observation checklist the finding shows that Most computers are not operational (functional), in the selected secondary schools. Like Silti secondary school out of 240 desktop computers 80computers (33.5%), Gensilti secondary School, out of 70 desktop computers, 58 computers (82.8%), and Gerbiber secondary School out of 50 desktop computer 42computers (84%), of the schools desktop computers are not operational , this shows there is a great gap in managing , troubleshooting ,and maintaining, desktop computers.

The finding of checklist based observation on the availability of ICT infrastructure shows that, silti secondary school has a better ICT infrastructure than other schools of the study area and it has different lab rooms that used for the teaching and learning processes like e-learning, school net lab, regular computer lab that equipped with a desktop computers and have better ICT facilities that used for the teaching learning processes. On the other hand in Gensilti and Gerbiber secondary schools the availability of ICT infrastructure is very low and the majority of desktop computers found in the lab where not operational.

Depending on the observation data majority of desktop computers that found in the schools have not operational within a simple technical errors. *Besides this the ICT department heads respond during their interview that school principals have poor perceptions on ICT facilities that found in the schools that they never allocate budget for maintenances and replacements. There are no ICT technicians in the schools. .*

6. Qualitative Data analysis

Interview was conducted with two school principals and two school ICT Personnel's the interview report is analyzed by using the content analyzing technique, the finding is discussed below.

What is the status of ICT infrastructure in your school and by what extent ICT infrastructure support the teaching and learning?

The availability of ICT in the schools were not in sufficient level, majority of the schools ICT infrastructure were not support the teaching and learning processes, however the administrative staff are relatively well equipped by desk top computers than other

departments found in the schools. Majority teachers were not ready to utilize ICT infrastructure in their subject. This results Most of ICT facilities like computers, plasma Tv, and recorded educational videos are found in the schools store in a simple technical errors and the teachers attitude is a big challenge for effectively utilizing ICT infrastructure in the schools.

The existing ICT facilities in the schools does not effectively utilized by school teachers and students because of different factors like attitude of teachers and students, and majority of teachers have no skill to operate ICT facilities this makes difficult to use ICT in the teaching and learning processes.

What are the major factors influencing ICT infrastructure to implement for educational purpose in your school?

“The major factors that influence the utilization of ICT in the school were the absence of sufficient ICT infrastructure and skill, attitude and perception of teachers, students to integrate ICT in their teaching and learning method are the core factors. The absence of technical support and shortage of skilled ICT technician in hardware and software and electric power fluctuation are the big challenges and also there is shortage of schools budget for maintenance and replacement of ICT infrastructure.

Are ICT trainings are given for school community to encourage the ICT infrastructure management practice in your school?

There is no any ICT related training were given for school principals and teachers, and all school principals never take any ICT related training on their work experience, this results school principals have a low perception and attitude on schools ICT facilities, this results school ICT infrastructure does not well managed and utilized in the schools.

Interview with School ICT personnel's

By what extent schools principals encourage teachers to utilize ICT infrastructure and to manage ICT facilities on your school?

The school principals have a poor attitude and perception on ICT infrastructure's, this results they never encourage teachers to use ICT in their teaching method, they have no skills on ICT facilities found on their schools and they have a skill gap on

operating ICT facilities this makes difficult to manage and utilize ICT facilities in their schools this results school principal never allocate budget for ICT related issues.”

What is your suggestion on availability and utilization of ICT facilities in your schools?

On availability majority of schools ICT infrastructure found in the schools were not operational, like plasma, internet, computers etc, from the school labs a big number of desktop computers were not operational (functional) in a minor errors or problems and there is no ICT technician's to maintain the computer during breakdown (Fail) this makes difficult to use ICT in the teaching and learning processes.

The schools principals do not give attention for ICT facilities and they does not allocate budget for maintenance and repairing the computer this makes difficult to utilize ICT facilities in the teaching and learning processes.

7. Focus Group Discussion

Another tool that the study uses to evaluate the availability and effective utilization of the existing ICT infrastructure in the study area is focus group discussion (FGD) with purposively selected students.

On the status of ICT infrastructure in the secondary schools

The finding of FGD shows on the availability of ICT infrastructure majority students participant's respond that desktop computers, plasma TV, computer labs are available in a lower level on their schools and majority of desktop computers found in the computer labs are not operational this shows desktop computers does not repair in a regular manner.

On network and Wi-Fi accesses only silti secondary school uses Wi-Fi network accesses and most of the time the network used for the teaching and learning processes and for communication purpose of schools. Whereas Gensilti secondary school and Geribiber secondary school has No network accesses, this indicates majority of study area schools has no network accesses.

For what purpose the schools use ICT infrastructure's

On the effective utilization of ICT facilities in the teaching and learning processes majority of teachers are using plasma tv, Pcs, desktop computers, Wi-Fi and cell phones, Most of the

times schools students use e-learning lab. Majority of schools uses ICT facilities for communication; project based learning, support for assignment and for skill building especially computer labs in ICT subject.

Students have opportunity to accesses ICT infrastructure in anytime

On the accesses of ICT facilities the schools computer lab and e-learning lab where open only on school hour and only for ICT practical work this indicates students have less opportunity to found ICT facility, this makes difficult to use ICT facilities in their schools.

Schools have set policy and rule for utilization of ICT facilities

The secondary schools have no policy and rule to connect ICT facility with their students after class and over the weekend. However silti secondary school has set opportunity for the students to accesses e-learning lab after the class hour.

Are training given for school community to utilize ICT infrastructure

There is no any skill building training has given for students and teachers to link ICT facilities with their teaching method. This results majority of the schools teachers are using the traditional way of teaching method (theory based teaching style) including ICT subject and also students are feeling comfortable in this type of teaching style this makes that teachers and students have negative perception on adoption and adaption of existing ICT facilities in their school and to use ICT facility in the teaching and learning processes.

What are the major factors that hinder the effective implementation of ICT Infrastructures in the education?

There are a lot of factors that hinder the effective implementation of ICT infrastructure in the secondary schools the major factors that listed by the students are:

- Skill of teachers and students
- Shortage of ICT facilities
- ICT facilities does not repaired immediately
- Lack of skill building training in ICT

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

The main purpose of this study was to evaluate the availability and utilization of Information and Communication Technology Infrastructure in Silte zone Silti woreda in selected secondary schools. The study evaluates the availability of information and communication technology infrastructure in the selected secondary schools and how much of the infrastructures were utilized by school teachers and students. This part deals with the summary and finding, conclusion and recommendations in which the recommendations forwarded on the basis of findings.

5.1 Finding and Discussion

This part focuses on the discussion of the finding of the study and comparing the findings with other literatures.

On the issue of the availability of ICT infrastructure the respondents from the selected school the finding generally shows that majority of ICT infrastructure are not available in Siliti Woreda selected secondary schools and the schools are not well equipped by ICT facilities this makes the teaching-learning processes difficult. However most of the ICT facilities were used for schools administrative purpose. Different literatures suggest that using ICT in the teaching and learning processes improve the delivery and accesses to education.

According to [12] teachers reported less use of internet and e-mail, results is due to the fact that these facilities are not available for accesses or perhaps the teacher lacks skill to accesses them, if ICT are available but not in sufficient quantity and quality. [12]) found that in most schools covered by his study do not have computer hence are not connected to the internet and those who have computer do not use them for teaching purpose solely for administrative purpose.

According to Perrier and Peerage (2011), ICT benefits schools in enhancing learning in classroom, improved management of school. It helps in time tabling, record storage, secretarial work like typing staff meeting minutes, examinations and letters, improves accountability, efficiency and effectiveness in school activities, use of PowerPoint presentations and internet.

The finding of the study on the teachers perception of ICT infrastructure showed that majority of the selected schools teacher have negative perception on ICT infrastructure however school teachers beliefs integrating ICT in the education improves quality of

education. This indicates school teachers have adoption and adaption problem in silti woreda secondary schools.

According to NEPAD [25], teachers' Perception towards new technologies in secondary schools and its effects in integration and use shows that if teachers perceive use of ICT as either satisfying their own needs or their students' needs, it is likely they would implement it in school. Attitude is brought about by other factors like teachers' competency, skills, knowledge and perception towards ICT.

On the issue of teacher's perception in using of ICT infrastructure in schools the finding show that all the respondents "Agreed" on the whole item. This shows teachers attitude towards ICT in education have positive and utilizing of ICT in the education have a lot of benefits like: improves quality of education, encourage self- learning, makes education more affordable and accessible...etc

However teachers skill to use ICT, number of operational ICT facilities, availability of fund(budget), shortage skill building training, lack of technical support, electric power, students beliefs and acceptance, shortage of educational software's were factors to effectively utilize ICT in the education.

Research suggests that teachers 'Perception impact successful implementation of ICT in schools, If teachers' perceptions are positive toward use of ICT, then they can easily use it or provide useful perception about its implementation.

According to And [24]revealed that teachers' skills, perception and attitudes were related to their use of ICT in resource planning. The more skilled teachers are in ICT, the more likely they were to use it. Positive attitude, personal entrepreneurship and computer experience had a direct positive influence on adoption and use of ICT by teachers.

For effectively utilizing ICT infrastructure in secondary schools there are different challenges found in the schools such as:-

- Inadequate ICT infrastructure (hardware and software)
- Lack of skilled man power especially in the field of ICT
- Resistance to change from traditional teaching to digital (technology based) teaching and learning method by both students and teachers
- Lack of budgets and funds to repair and purchase ICT facilities
- Lack of technical supports
- School principals have lack of skill on managing and integrating ICT facilities in the teaching learning processes

According to National ICT in Education Strategy (MoE, 2006), most secondary schools have some computer equipment; however, due to high cost, this more often consists of one computer in the office of the school head. Very few secondary schools have sufficient ICT tools for teachers and students. Even schools that do have computers, the student-computer ratio are 150:1 [24].

Generally schools to benefit from use of ICT infrastructure in teaching and learning processes, ICT skilled teachers are needed. A major challenge identified in many developing countries regarding adoption and use of ICT in schools is that there is no qualified enough staff, and where they are, most likely IT professionals without any education experiences, skills, and/or qualifications. To effectively link ICT for school purposes requires nonstop investments in supporting teachers training in order to create new learning environment.

5.1.1 Summary on key finding of availability of ICT infrastructure

- ❖ On the availability of ICT infrastructure majority ICT infrastructures that used to integrate ICT facility in to the teaching and learning processes were not available, like: LCD projector (74.3%), laptop computer (60%), scanner (60%), fax machine (87.1%), website (80%), video conference (78.6%), digital library (74.3) etc... this indicates there is a big problem in the availability of ICT infrastructure in silti woreda secondary schools.
- ❖ Some ICT infrastructures are partially available in silti woreda selected secondary schools, like plasma Tv (42.9%), Radio, Television, e-learning labs (61%), Computer labs (47.1%), photocopier (30%), recorded plasma Tv.
- ❖ The other method that used to ensures the availability of ICT facilities is providing technical support for ICT facilities, however On the maintenance and replacement of ICT infrastructure, 87.1 % of the respondents dis-agreed, This indicates that school principals never allocate budget for repairing, and maintenance, of ICT related training, this makes difficult to integrate ICT infrastructure in the teaching and learning processes.
- ❖ In general the status of silti woreda secondary school, have in average 45% of ICT infrastructure are partially available in secondary schools of silti woreda schools and 55% of ICT infrastructure in silti woreda secondary schools were not available. This indicates that the ICT infrastructure found in silti woreda selected secondary school is not in adequate level and this makes difficult to utilize ICT in the teaching and learning processes in silti woreda selected secondary schools.

5.1.2 Summary on key finding of perception and utilization of ICT infrastructure

- ❖ Regarding to perception of teachers on ICT infrastructure, schools provide ICT training for teachers, 13(8%) respondents agreed and 57(92%) respondents “disagreed” and schools encourage teachers to participate in ICT training 27(38%)agreed and 35(50%) disagreed and school has adequately staffed with trained teachers capable of effectively providing ICT supported training, 15(21%) of respondents are agreed and 55(79%) of respondents are disagreed on the item, on the availability of ICT facilities school keeps budget for implementation and maintenance of ICT supported teaching and learning, 9(12%) of respondents agreed, 29(53%) of respondents disagreed, and 32(45%) of respondents respond I don’t know this indicates most of teachers respondents in average 57% of respondents have negative perception on ICT infrastructures, this results ICT facilities where not effectively utilized in the schools. The finding from Interview shows that the negative perception of teachers resulted from , different factors such as lack of awareness how to use of ICT infrastructures, teachers have lack of skill in operation and implementation of ICT infrastructures ,and the schools have not provided ICT related training and motivation for teachers and students so as to integrate ICT infrastructure in the teaching and learning processes.
- ❖ In all selected secondary schools the finding shows that 59(85%) teachers’ respondents have skill gap on ICT and shortage of skilled manpower especially in the department of ICT, this makes, ICT infrastructures are not effectively utilized in silti woreda secondary schools.
- ❖ The perception of teachers in the utilization of ICT infrastructure in education, all the respondents are “Agreed” 70(100%), this indicates that teachers have positive perception for the integration of ICT in teaching and learning processes and used to improve the education system from local teaching system (chalk and talk) to digital and interactive mode of teaching system , as a result this improves the learning out comes and competencies of learners and prepares students better in the year of globalization. However there are a lot of factors to effectively utilize ICT in the teaching and learning processes.
- ❖ The finding from interview of ICT personnel shows *the perception and attitude of school principals has a great impact in using ICT infrastructure effectively in the teaching and learning processes, the interview finding shows that school principals have a huge gap in managing, implementing and controlling of the ICT*

infrastructures in the schools compound this makes difficult to utilize ICT in the teaching and learning processes.

- ❖ The other finding of the study is the perception of students on ICT infrastructure, the attitude of teachers in integrating ICT in the teaching process is positive, 14(30%) of respondents are agreed and 26(64%) of respondents disagreed on the item, the schools encourage teachers and students to use ICT infrastructure, 7(15%) of respondents are agreed and 30(67%) of respondents are disagreed on the item, ICT facilities are maintained in regular basis, 4(9%) of respondents are agreed and 37(83%) of respondents are disagreed, this indicates majority of students have negative perception related to ICT infrastructure, this is because of the attitude and acceptance of teachers in utilizing ICT facilities in their teaching is very low and majority of teachers did not use the ICT facilities in their teaching method. School principals did not encourage teachers to use ICT facilities in the teaching and learning processes this makes low perception and attitude of ICT facilities on students.

5.1.3 Summary on key finding of factors hindering effective utilization of ICT infrastructure

- ❖ The majority of the respondents in the questionnaires and interview indicated that, there are many organizational or school based factors that seriously affect effective utilization of information communication technology ICT for teaching and learning purpose. The most important school based major factors includes, number of operational computers, skill of teachers and students ,lack of skill building training, availability of fund and budget allocation ,computer anxiety ,skills on the use of ICT infrastructure, teachers and students beliefs administrative support, lack of technical support, absence of school based ICT policy, absence of computer accessories for maintenance, lack of maintenance to ICT facilities in school, and absence of instructional software in different subject areas.
- ❖ The finding from interview shows *“The major factors that influence the utilization of ICT in the school were the absence of sufficient ICT infrastructure and skill, attitude and perception of teachers, students to integrate ICT in their teaching and learning method are the core factors. The absence of technical support and shortage of skilled ICT technician in hardware and software and electric power fluctuation are the big challenges and also there is shortage of schools budget for maintenance and replacement of ICT infrastructure.*

In general to integrate the ICT in teaching and learning processes the perception of teachers, students and school principals has a great impact, and there are different factors in schools for effectively utilization of the ICT infrastructure in the education system like, Number of working computer, skills on ICT facilities, lack of administrative support and lack of technical support etc.

The other finding of study conclude that for effective utilization of ICT infrastructure in the selected secondary schools that, the attitude, skill and belief of school principals has a great impact, however selected secondary school principals were not ICT related experience and never take in-service training in ICT infrastructure, this indicates school principals did not allocate budget and manage ICT infrastructure in their schools this results ICT facilities does not utilize effectively.

The Selected secondary schools principals are failed to plan and did not considering ICT related issues in their day to day activities, this results many computers, plasma tv, setofbox in the selected secondary schools were damaged and failed to functioning because of poor management of school principals. Selected secondary school principals did not considering about maintenance and purchasing of ICT facilities on their budget plan.

5.3 Conclusion

The purpose of this study was to evaluate the status of ICT facilities for teaching and learning purpose in selected secondary schools of Silti woreda in silte zone. The study was conducted in 3 selected secondary schools, which encompassed of 70 teachers, 5 principals, 86 students and 2 ICT personnel. The teachers were selected by simple random sampling technique, and students were selected by convenience sampling technique, school principals and IT personnel participated in the interviews were selected by purposive sampling technique. The instrument used to collect data for the study was a closed and open ended questionnaire, semi structured interview, and checklist based observation, FGD and document analysis were held on this study.

The findings obtained from the analyses of the data gathered in the study indicated that majority ICT infrastructures in average 55% are not available in Silti woreda secondary schools, however some ICT infrastructures are partially available in average 45% this results majority of teachers and students has a limited accesses of ICT facilities in their schools. The perception and attitude of teachers, students and school principals has a great impact on effective utilization of ICT infrastructure in teaching and learning processes.

There are different factors that hinder to effectively use ICT facilities in school such as lack of skills, lack of confidence, insufficient knowledge of ICT equipment on the part of teachers, unavailability of infrastructure, insufficient knowledge of appropriate software like SMIS, Ms-office (power point and excel), school net software's and lack of knowledge of how to evaluate the usage, and the role to played by ICT in teaching and learning are factors affecting the utilization of ICT for instructional purposes. The finding further shows that teachers' lack of ICT skills hinders the effective implementation of ICT in secondary schools. The study also shows that majority of teacher's respondents in average 57% of the respondents have a negative perception on ICT infrastructure, this results ICT facilities found in the schools were not effectively utilized in the schools.

Moreover the finding shows that the School principals have big problem in planning, managing, and implementing ICT related issues within their day to day activities. The study found out that most computers in the schools damaged and hence (not operational) and some are found in store without functioning, and this resulted from poor management and supervision.

Irregular arrangement of ICT facilities in students, computer laboratory, and poor control and inventory system of ICT facilities observed in the selected schools.

Schools principals do not allocate budget for purchasing, repairing, and ICT related thus, ICT infrastructure is not effectively utilized in Silti woreda secondary schools.

5.4 Recommendation

Depending on the findings of the research the researcher has the following recommendations for regional, zonal and woreda education office and also secondary school principals, teachers and students should make effective utilization of schools ICT infrastructure as given below.

❖ FOR REGIONAL EDUCATION OFFICE

1. The office should provide enough funds for secondary school to purchase ICT facilities' for the teaching and learning purpose
2. The office should organize ICT supervision team that monitors the implementation and utilization of ICT in the teaching and learning processes in secondary schools.
3. The office should ensure that there are enough ICT trained technicians to repair ICT infrastructure facilities when they break down. This ensures that once ICT facilities break down the maintenance team gives immediate solution

❖ FOR ZONAL AND WOREDA EDUCATION OFFICE

1. Employ ICT Professionals and ICT technicians to teach and maintain ICT facilities in secondary schools regularly, thus ensuring that ICT facilities are maintained regularly and broken ICT materials are repaired immediately.
2. By collaborating with different stakeholders, like NGOs, donors, religious institutions and others provide fund school for ICT facilities and ensuring the availability of ICT facilities.
3. Zone and woreda education office should organize workshop, training, and conference related to school ICT facilities for school principals and school supervisors including the management and implementation of ICT facilities in the education system.
4. Zonal education office should set mechanism to share the accumulation of ICT facilities in some schools with other secondary schools.

❖ FOR SECONDARY SCHOOL PRINCIPALS AND TEACHERS

1. All the teachers in service to be taken for refresher course in utilization and implementation of ICT facilities, this makes the perception of teacher become positive on ICT infrastructure.
2. School principals should make an inventory of computers in their school to determine which one needs to be repaired and which one needs to be replaced.
3. School principals should create conducive and suitable computer environment (computer labs) and allocate budget for maintenance and replacement of ICT facilities this helps that the ICT facility should be kept safely
4. ICT teachers should organize trainings for school teachers on how to utilize ICT facilities in their teaching and learning processes.
5. School principals should encourage teachers and students to utilize ICT facilities in the teaching and learning processes and aware school societies on the usage and application of ICT facilities, this ensures the protection of ICT facilities from theft and damage.
6. Teachers should include issues of ICT with their continuous professional development (CPD) program.

❖ FOR SECONDARY SCHOOL STUDENTS

1. Schools should give awareness to their students on the rights and responsibility of utilizing ICT facilities in the school compound.
2. School students should take responsibility and keep ICT facilities' from damage and stolen.
3. Students should utilize ICT facilities in effective manner without breaking, steeling and damaging network cables and schools set policy and rule in utilization of ICT infrastructure.

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APPENDIX

Appendix A: Questionnaire to be filled by Secondary School Teachers

The purpose of this questionnaire is to collect data for a thesis research on the “Status of Information Communication Technology Infrastructure in Silti woreda high schools” and come up with recommendations on possible solutions for further improvement of the ICT Infrastructure. Thus, your cooperation in responding to the questions honestly and timely is very essential to the success of the study. Your response will be kept confidential and will never be used for other purposes.

Do not write your name or that of your school anywhere on this questionnaire.

Thank you in advance

for your cooperation!

Section I – Information about respondents

Fill the required information by putting a tick mark (✓) in the appropriate box.

1. **Gender:** Male female
2. **Age (in years):** 25-34 35-44 45-54 55 and above
3. **Qualification:** PhD Masters Bachelors Diploma
4. **Services in year:** 1-5 6-10 11-15 16 and above

Section II Availability of ICT Infrastructure in the School

Indicate the degree of availability of each of the following ICT infrastructures facilities/services for the use by teachers, by putting tick mark (✓) in the appropriate cell.

No.	Items	Scales		
		Available		Not Available
		Adequate	Not Adequate	
1	Desktops computers			
2	Laptops, tablet pc or note book computers			
3	Internet access			
4	Printers			

5	Scanners			
6	Photo copiers			
7	e-reader, e-lesson or e-learning			
8	Plasma TV			
9	Video conference			
10	LCD projectors			
11	Digital library			
12	Computer (ICT) laboratory			
13	Website			
14	Fax			
15	Plasma Television			

Section III – Teachers’ Perception of ICT Infrastructure

Indicate your response to each question by putting tick mark (✓) in the appropriate cell. SA= Strongly Agree, A = Agree, NK = I do not know, D = Disagree, SD = Strongly Disagree

No.	Item	SA	A	NK	D	SD
1	Your school is conscious about the need of ICT training for teachers.					
2	Your school often provides ICT training to teachers.					
3	Your school motivates teachers to participate in ICT training initiatives.					
4	Your ability to provide ICT-supported teaching is significantly increased through trainings given by the school.					
5	Your school has enough ICT tools and facilities to support ICT integrated pedagogy.					
6	Your school is adequately staffed with trained teachers capable of effectively providing ICT-supported training.					
7	Your school keeps budget for the					

	implementation/maintenance of ICT infrastructure.					
8	ICT is necessary in supporting the teaching process.					
9	Students' achievements are positively influenced by the integration of ICT in the teaching/learning process					
10	The attitude of teachers in integrating ICT in the teaching process is positive.					
11	The attitude of teachers has a huge impact on the integration of ICT in the teaching process					
12	ICT infrastructure is effectively used in supporting the teaching/learning process					
13	Your school encourages teachers and students to use the ICT infrastructure.					
14	ICT facilities are maintained on a regular basis					

Section IV – Perception of Teachers on the use of ICT infrastructure in education.

Teachers have different perceptions on the use of ICT infrastructure in education. Indicate your response to each question by putting tick mark (✓) in the appropriate cell. SA= Strongly Agree, A = Agree, NK = I do not know, D = Disagree, SD = Strongly Disagree

No	Item	S	A	NK	D	SD
1	Improves quality of course delivery					
2	Makes education more affordable and accessible					
3	Increases enrollment					
4	Encourages self-learning					
5	Makes learning more enjoyable					
6	Increases learning efficiency					
7	Makes teachers more efficient in delivering their courses					
8	It is a powerful tool to contribute to educational change					

9	It better prepares students for the information age					
10	It improves learning outcomes and competences of learners					
11	Equips students with survival skills for the information society					
12	Positively impacts on students motivation, achievement, critical thinking & problem solving					
13	Assists in preparing attractive presentation					
14	Makes administrative work easier and more efficient					
15	Makes learning more expensive					

Section V – Factors affecting Effective Use of ICT Infrastructure

The following factors have direct or indirect impact on the effective use of ICT infrastructure.

Indicate your response to each question by putting tick mark (✓) in the appropriate cell. SA= Strongly Agree, A = Agree, NK = I do not know, D = Disagree, SD = Strongly Disagree

No.	Item	SA	A	NK	D	SD
1	Number of working/operational ICT facilities					
2	Institutional support					
3	Availability of funds and budget allocation					
4	Training					
5	Computer anxiety					
6	Skill on the use of ICT infrastructure					
7	Level of confidence in the use of ICT infrastructure					
8	Teachers' beliefs and attitudes					
9	Students' beliefs and attitudes					
10	Availability of educational software					
11	Administrative support					
12	Technical support					

Section VI – General Questions

Answer the following questions to the best of your knowledge.

1. How many computers are in the school? _____
2. How many of the computers are operational? _____
3. How many computer labs are there? _____
4. Are the computers networked? Yes No
5. How many computers are connected to the Internet? _____
6. Do you have ICT tools for ICT integration in teaching /learning in your school?
 Yes No

If your answer to question 6 above is Yes, which are the tools available?

7. In your opinion, what is ICT infrastructure used for by teachers? Tick all that apply.

ICT used by teachers for	s
Communication	
Content development	
Instruction purposes	
Lesson preparation	
Personal use (e.g. emails, social media)	
Professional development (online courses)	
Project based learning	
Research	
Support for assignment	
Other	

8. Is the computer lab open after school hours or over the weekends?

	s	s
After school hours		
Over the weekends		

Appendix B - Questionnaire to be filled by Secondary School Students

The purpose of this questionnaire is to collect data for a thesis research on the “Status of Information Communication Technology Infrastructure in Silti woreda high schools” and come up with recommendations on possible solutions for further improvement of the ICT Infrastructure. Thus, your cooperation in responding to the questions honestly and timely is very essential to the success of the study. Your response will be kept confidential and will never be used for other purposes.

Do not write your name or that of your school anywhere on this questionnaire.

Thank you in advance for your
cooperation!

Section I – Background Information

Fill the required information by putting a tick mark (✓) in the appropriate box.

- 1) Gender: Male Female
- 2) Age: 14-17 18-21 22-25 26 and above
- 3) Grade: 9 10 11 12

Section II – Students’ Perception of ICT Infrastructure

Indicate your response to each question by putting tick mark (✓) in the appropriate cell . SA= Strongly Agree, A = Agree, NK = I do not know, D = Disagree, SD = Strongly Disagree

No.	Item	SA	A	NK	D	SD
1	Students’ achievements are positively influenced by the integration of ICT in the teaching/learning process					
2	The attitude of teachers in integrating ICT in the teaching process is positive.					
3	The attitude of teachers has a huge impact on the integration of ICT in the teaching process					
4	ICT infrastructure is effectively used in supporting the teaching/learning process					
5	Your school encourages teachers and students to use the ICT infrastructure.					
6	ICT facilities are maintained on a regular basis					

Section III – Perception of Students on the use of ICT infrastructure in education.

Teachers have different perceptions on the use of ICT infrastructure in education. Indicate your response to each question by putting tick mark (✓) in the appropriate cell. SA= Strongly Agree, A = Agree, NK = I do not know, D = Disagree, SD = Strongly Disagree

No.	Item	SA	A	NK	D	SD
1	Improves quality of course delivery					
2	Makes education more affordable and accessible					
4	Encourages self-learning					
5	Makes learning more enjoyable					
6	Increases learning efficiency					
7	It better prepares students for the information age					
8	It improves learning outcomes and competences of learners					
9	Equips students with survival skills for the information society					
10	Positively impacts on students motivation, achievement, critical thinking & problem solving					
11	Makes learning more expensive					

Section IV – Factors affecting Effective Use of ICT Infrastructure

The following factors have direct or indirect impact on the effective use of ICT infrastructure. Indicate your response to each question by putting tick mark (✓) in the appropriate cell. SA= Strongly Agree, A = Agree, NK = I do not know, D = Disagree, SD = Strongly Disagree

No.	Item	SA	A	NK	D	SD
1	Number of working/operational ICT facilities					
2	Institutional support					
5	Computer anxiety					
6	Skill on the use of ICT infrastructure					
7	Level of confidence in the use of ICT infrastructure					
8	Teachers' beliefs and attitudes					
9	Students' beliefs and attitudes					
10	Availability of educational software					
11	Administrative support					
12	Technical support					

Part V – General Questions

1. How many computer labs are there? _____
2. How many operational computers does each lab have? _____
3. Are the computers networked? Yes No
4. How many computers are connected to the Internet? _____
5. In your opinion, what are ICT used by students for? Tick all that apply.

ICT used by students for	Yes
Communication	
Personal use (e.g. emails, social media)	
Project based learning(lab)	
Support for assignment	
Other	

6. Is the computer lab open after school hours or over the weekends for students' use?

	s	
After school hours		
Over the weekends		

Appendix C - Questionnaire to be filled by ICT Personnel and Management

The purpose of this questionnaire is to collect data for a thesis research on the “Status of Information Communication Technology Infrastructure in Silti woreda high schools” and come up with recommendations on possible solutions for further improvement of the ICT Infrastructure. Thus, your cooperation in responding to the questions honestly and timely is very essential to the success of the study. Your response will be kept confidential and will never be used for other purposes.

Do not write your name or that of your school anywhere on this questionnaire.

Thank you in advance for your cooperation!

Section I – Information about respondents

Fill the required information by putting a tick mark (✓) in the appropriate box.

- 5. **Gender:** Male Female
- 6. **Qualification:** PhD Masters Bachelors Diploma
- 7. **Position (responsibility)** school director Vice director
Technician (IT personnel)

Part I – General Questions

- 1. How many computers are in the school? _____
- 2. How many of the computers are operational? _____
- 3. How many computer labs are there? _____
- 4. How many computers are connected to the Internet? _____
- 5. How were the computers acquired? Select all that are applicable.
NGO(s) Private Vendors School
Religious institutio Private Donors
PTA*
Donations I do not know
Others _____ (specify)

* PTA stands for Parent-Teacher Association

Part II – Available Software

Which of the following software are used in your school?

Software in use	Yes (please name some)	No
Word processing application		
Spreadsheet application		
Presentation software		
Educational software		
School management software		
Statistical software		
Engineering software		
Accounting software		
Any other		

Part III – Connectivity

1. Are the computers networked?

Yes

No

2. Is there a central server?

Yes

No

3. If yes, what is it used for? Tick all that apply.

Data storage

Content and software storage

Proxy server

Security

Data cache

Centralized network mgmt

Content filtering

I do not know

Others

(specify)

4. Are the computers connected to the Internet?

Yes

No

5. If your response to 4 above is yes, tick all that apply.

All computers have access

some of the PCs have access

Only teachers have access

only admin staff have access

Access is available only for some days or limited time

I do not know

6. If your response to 4 above is Yes, what technology is used?

Internet Connection Technology	Speed/Bandwidth (in Mbps)
---------------------------------------	----------------------------------

Dialup (telephone)	
Leased line (fiber optics)	
Cell phone	
ISDN/ADSL	
Wireless	
Satellite	
Other (specify)	

Part IV – Policy

Does your school have formal policy regarding each of the following?

Policy, Plan or Guideline Regarding	Yes	No
User password, security recommendations, etc.		
Content filtering		
Correct use of the equipment		
Rules for the use of equipment (e.g, teachers have priority, etc.)		
Preventive maintenance		
Users' rights and duties		
IT technicians' duties		
Use of ICT in subjects other than ICT		

Part V – Maintenance

1. How often are the computers maintained (tick below as appropriate)

Routine schedule	Preventive maintenance	Curative maintenance
Monthly		
Quarterly		
Half yearly		
Yearly		
When a breakdown occurs		
Never		

2. Who repairs/maintains the equipment? (Tick as appropriate)

- Me / My team
- An external Company
- The hardware provider

Part VI – ICT Usage

1. Do you have ICT tools for ICT integration in teaching /learning in your school?

Yes No

If your answer is Yes, which are the tools available?

2. In your opinion, what are ICT used by teachers for? Tick all that apply.

ICT use in teaching and learning	By teachers	By students
Communication		
Content development		
Instruction purposes		
Lesson preparation		
Personal use (e.g. emails, social media)		
Professional development (online courses)		
Project based learning		
Research		
Support for assignment		
Other		

3. Is the computer lab open after school hours or over the weekends?

	s	p
After school hours		
Over the weekends		

[Appendix D – Observation Check-lists](#)

The following information was gathered by personal observation of the researcher.

No	Evaluation Standard Lists	Silti Secondary School		Gensilte Secondary School		Gerbibier Secondary School	
		Yes	No	Yes	No	Yes	No
1	Server center (room)						
1.1	There is server in school						
1.2	Internet Accesses						
1.3	There is ICT technician						
1.4	Material Accesses in the room						
2	Outside the class room (School compound)						
2.1	Full satellite installation						
2.2	Wi-fi Accesses						
3	Inside the class room						
3.1	Plasma Tv Accesses						
3.2	Network Accesses						
3.3	Computer & Projector Accesses						
4	Pedagogical center						
4.1	Is there Computer accesses						
4.2	LCD & Projector						
5	ICT laboratory						
5.1	Is there computers lab rooms						
5.2	Is there enough computers for student						
5.3	Is there computer lab Assistance						
5.4	Is there an Internet Accesses						
5.5	Computer lab have enough furniture's						
6	E-learning center						
6.1	Is there E-learning lab Assistance						
6.2	Is there Internet Accesses						
6.3	Is there Enough E-learning computers						
6.4	Is there E-learning lab						
7	School's administrative						
7.1	Computer & printer Accesses						
7.2	Internet Accesses						
8	School's department						
8.1	All department have computer & printer Accesses						
8.2	Internet Accesses						

Appendix E – Questions for Focus Group

(Consisting of ICT Instructors and Technical Personnel and selected school students)

The purpose of this focus group discussion is to collect relevant information on ICT infrastructure use in Selti Woreda Secondary Schools. It also looks the status, usage, training of ICT, availability and factors affecting implementation in secondary schools.

1. What is the status of ICT infrastructure in your school?
2. For what purpose the schools use ICT infrastructure?
3. Students have an opportunity to accesses ICT infrastructure in any time?
4. Schools have set policy and rule in utilization of ICT facilities?
5. What do you suggests about the usage of ICT infrastructure in your school?
6. Are ICT training is given for the school community to encourage the ICT infrastructure management practices in your school?
7. To what extent the ICT infrastructure facilities are available to support teaching-learning process in your school?
8. What are the major factors influencing ICT infrastructure to implement for educational purpose in your school?

Funding of ICT related activities at school level.

Is there budget line for ICT related activities? Yes No

If yes, for which ones?

Software acquisition Hardware maintenance

Hardware acquisition Professional development

Other I do not know