



**HAWASSA UNIVERSITY
INSTITUTE OF TECHNOLOGY**

**FACULTY OF INFORMATICS
DEPARTMENT OF INFORMATION TECHNOLOGY**

**CHALLENGES OF ICT INTEGRATION IN ETHIOPIAN
SECONDARY SCHOOLS: THE CASE OF GURAGE ZONE
ENOR WOREDA SECONDARY SCHOOLS**

BY:

TILAHUN GERESSU

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HAWASSA, ETHIOPIA**

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A Thesis Submitted To Faculty of Informatics, Hawassa University, Institute of Technology, In Partial Fulfillment of The Requirements For The Award of Master of Science Degree In Information Technology

ADVISOR:

TEGEGN GOBANA (Ass.Prof)

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Hawassa, Ethiopia

Declaration

This thesis explores the challenges hindering the integration of ICT in Ethiopian secondary schools, specifically at Gurage Zone Enor woreda secondary schools namely; Egeze Secondary School, Garbado Secondary School, Gazanche Secondary School, Gomshe Secondary School and Terhogne Secondary School. It focuses on the lack of infrastructure, limited access to ICT equipment, inadequate teacher training, and the absence of reliable internet connectivity. The research aims to propose solutions to these challenges and assess the impact of ICT integration on the educational outcomes of both teachers and students in these rural areas. I have undertaken the study independently with the guidance and support of my research advisor Tegegn Gobana (Ass. Professor). Other sources are acknowledged by citations giving clear references. A list of references is appended. The thesis has not previously been accepted for any degree and is not being concurrently submitted an application for any degree in any university in the country.

Declared by:

Name: TILAHUN GERESSU

Signature _____

Date _____

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

Advisor: TEGEGN GOBANA (Ass.Prof)

Signature: _____

Date: ____/____/____

DEPARTMENT OF GRADUATE COMMITTEE

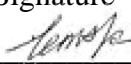
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APPROVAL SHEET

As members of the Examining Board of the final MSc open defense, we certify that we have read and evaluate the thesis prepared by Tilahun Geressu entitled the **Challenges of ICT Integration In Ethiopian Secondary Schools case of Enor Woreda Secondary Schools:** and recommended that it can be accepted as fulfilling the thesis required for the degree of masters of Information Technology.

Hawassa University school of Graduate Studies Thesis approval sheet

Approved by:

_____ Chairman	_____ Date	_____ Signature
<u>Tegegn Gobana (Ass.prof)</u>	_____	_____
Advisor	Date	Signature
_____ Internal Examiner	_____ Date	_____ Signature
<u>Temtim Assefa, PhD</u>	_____	_____
External Examiner	Date	Signature
<u>Temtim Assefa, PhD</u>	<u>25/11/2024</u>	<u></u>
SGS	Date	Signature

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Tilahun Geressu
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List of Abbreviations/Acronyms

CART	Complete, Accurate, Relevant and Timely
CD	Compact Disk
CERS	Central Ethiopia Regional State
ICT	Information and Communication Technology
ICT4D	Information and Communication Technology for Development
ICT4E	Information and Communication Technology for Education
IEEE	Institute of Electrical and Electronics Engineers
IoT	Internet of Things
IT	Information Technology
MoE	Ministry of Education
TAM	Technology Acceptance Model
UNESCO	United Nations Educational, Scientific and Cultural Organization
STEM	Science, Technology, Engineering and Mathematics
TPD	Teachers Professional Development

Abstract

This research explores the challenges of Information and Communication Technology integration in Ethiopian secondary schools. Utilizing both qualitative and quantitative approaches, data was collected through interviews, questionnaires, and observations to provide a comprehensive understanding of the difficulties faced by students and teachers. The study highlights several major findings.

Students in rural areas often exhibit limited practical ICT skills due to a lack of hands-on learning opportunities, inadequate access to functional ICT tools, and insufficient exposure to real-world applications. Confidence in using ICT is low, largely because of outdated or malfunctioning equipment and a lack of consistent teacher support. Significant gaps in digital literacy were also found, particularly in software use, online study, and digital safety. The study further identifies several infrastructure-related challenges, such as limited ICT equipment, poor internet connectivity, frequent power outages, and inadequate teacher training in ICT.

In conclusion, ICT integration in rural secondary schools is hindered by a range of factors, including financial constraints, cultural barriers, and low student motivation. The research recommends increased investment in ICT infrastructure, teacher training, and digital literacy programs. Addressing financial and infrastructural limitations through government and NGO support, enhancing community awareness, and developing localized digital content are also suggested as strategies for improving ICT integration. These measures, coupled with alternative power solutions and curriculum revisions, aim to foster an environment where students can effectively engage with technology, contributing to the overall socio-economic development of rural communities.

Keywords: ICT integration, rural education, digital literacy, teacher training, infrastructure challenges, financial constraints.

CHAPTER ONE

1. INTRODUCTION

This chapter provides an over view of the study, which consists of the back ground of the study, statement of the problem, research questions, specific objective of the study, delimitation of the study, limitation of the study, significance of the study, organization of the study and definition of key terms. Technology is possibly the most influential force transforming education today. Numerous school districts are actively supporting the integration of technology in classrooms by supplying hardware like tablets and computers, improving internet access, and launching programs aimed at boosting computer literacy among teachers and students. While educators generally recognize the advantages of educational technology, they frequently encounter difficulties in seamlessly and effectively integrating these tools (Hailye Tekleselase Michael, 2020). From acquiring new technological equipment to modifying curricula and teaching methods to incorporate new educational resources, the process of integrating technology poses considerable challenges for educators across all levels of the school system.

This chapter aims to explore the common challenges educators face when integrating technology in the classroom and to propose potential solutions to these issues. The discussion should prove useful to current and future educators, school administrators, and researchers in educational technology. The chapter starts by addressing external (extrinsic) challenges to technology integration, such as access to resources, training, and support. It then examines internal barriers, including teachers' attitudes, beliefs, and resistance to using technology in the classroom, and their knowledge and skills. The chapter concludes with a brief summary and key recommendation for successful technology implementation.

1.1 Background of the Study

Information and communications technology (ICT) refers to all the technology used to handle telecommunications, broadcast media, intelligent building management systems, audio visual processing and transmission systems, and network-based control and monitoring functions. Although teachers generally appreciate the benefits of educational technologies, they often find smooth and effective integration of new educational technologies challenging (Johson A.M, 2016). Information and Communication Technology (ICT) in education is the mode of education that use information and communications technology (ICT) to support, enhance, and optimise the

delivery of information (Id-, n.d.). The Ethiopian Government has made the development of information and communication technology (ICT) one of its strategic priorities. The majority of ICT resources including computers and Internet require stable energy resources to support ICT in education (Siddiquah, 2017).

ICT resources including: software and hardware, effective ICT professional development, sufficient time and technical support. Most developing countries like Ethiopia are characterized by limited computer applications in the public sector, inadequate infrastructure and shortage of skilled man power. In the face of all this various challenges affect the successful implementation of ICT in teaching and learning. This situation exists not merely due to lack of financial resources, but largely due to lack of management at different levels in making effective use of the technology. As the use of ICT in education add value in teaching and learning, by enhancing the effectiveness of learning, or by adding a dimension to learning that was not previously available (Legesse & Haripriya, 2021). Technology is perhaps the strongest factor shaping the educational landscape today. The ICT policy stems from the recognition by the Government of ICT as the key driver and facilitator for transforming Ethiopia's predominantly subsistence-agriculture economy and society into an information and knowledge-based economy and society, effectively integrated into the global economy (Alemu, 2017). The penetration of current ICT trends in education is very important and a priority for educational development and sustainability. Study will be conduct with the aim of understanding and presenting the general trends concerning factors affecting Teachers' ICT adoption in selected rural and disadvantaged secondary schools. Faced with the technological devices, trainers are constantly challenged with the task of preparing future teachers to use digital technologies, or ICTs, as a tool for teaching that is innovative and integrated in the students' lives (Fernandes & Ferreira, 2020). Learning in the knowledge based society is considered to be all-inclusive, as it is a lifelong activity and cuts across different learning generations and life spheres (private, public and work) (Alemu, 2017). Due to ICT's importance in society as well as in the future of education, identifying the possible Challenges to integrating these technologies in schools would be an important step in improving the quality of teaching and learning (Simin Ghavifekr, Thanusha Kunjappan, Logeswary Ramasamy, 2020). The application of ICT is creating significant changes in teaching and learning at all levels ICT use in the classroom is important for giving the students opportunities to learn and apply 21st Century skill (TANUJA SAHA, 2014). This paper therefore begins by

outlining what is known about ICT tools and related technology tools before turning to a review of the literature on ICTs relevance and appropriateness to technology practices with ICT skills for school teachers in selected rural area secondary schools.

1.2. Statement of The Problem

Studying the problems and challenges to the use of ICT in education (in teaching and learning) is very important as it may assist teachers and students to overcome these problems and become successful technology accepters in the future. Understanding this situation is essential because this knowledge could provide direction for ways to enhance technology integration and encourage greater use of ICT in the education sector.

The ability of ICT tools to be able to handle diverse kinds of problems in school through its usage has made it easy for the challenges to be overcome by users. Teacher beliefs and attitudes regarding technology's role in teaching and learning impact the manner in which technology is incorporated (Kormos, 2021). One of the major challenges is incapability of the education sector to go hand in hand with technological change (Leoulseged W/Hanna, 2010). It becomes impossible to continue with the traditional education system (Assefa, 2021). (Rahim, 2014) Stated that the traditional learning and teaching environment has been changed to new learning environment such as learner centred environment, where students actively learn and construct knowledge rather than receive information. Regarding the technology challenges of ICT for education in rural area, (Kurmangaliyev, 2021) stated that: "The problem of educational inequality seems to be a common issue in most countries. Some of the factors that raise disparities in education are unprivileged social groups, cultural inequality, and territorial inequality. Barriers to access to quality education in the countryside are the features of resettlement and the socio-economic situation of rural areas, which is usually much lower than in cities." Due to ICT's importance in society as well as in the future of education, identifying the possible challenges to integrating these technologies in schools would be an important step in improving the quality of teaching and learning (Ghavifekr et al., 2006). Teachers cannot go a bit ahead of their students with the previous teaching methods. The environment needs them to change. ICT is the main agent for this change. Though the chalkboard, textbooks, radio/television, and film have been used for educational purposes over the past years, none has quite impacted on the educational process like the computer (Adoption et al., 2022). Also (David, n.d.): Stated that "Current trends in ICT awareness in schools surveyed over a

demographic population between 13 years and 19 years shows that the rural sector has little or no exposure to ICT.”

(World Bank, 2019), the government believes that unqualified teachers lead to poor education quality, which has been a major problem in Ethiopia and especially in the remote areas of the country – where further problems relating to the difficulty of accessing education compared to urban areas exist. Hence, to improve quality and equity of education, the government decided to integrate ICT into education to help to overcome geographical disadvantages as those students would, in principle, receive via technology the same educational contents as those in urban areas (Jang, 2020).

Technology has influenced how we learn, communicate and how we do business. Many school leaders perceive the lack of ICT-related knowledge of teachers as one of the main weaknesses to the realization of their ICT-related goals (Hennessy et al., 2010). Also (Ria & Tau, 2020) stated that: Some teachers feel the urge and motivated to use ICT tools in teaching but there is lack of supports from the school top management that hinder and discourage them from using ICT. Besides, some schools are not provided with at least computer laboratory in which students will get the chances to integrate the use of ICT in their learning process.

Technology integration is viewed as the use of computing devices such as desktop computers and Internet in schools for instructional purposes (Bass, 2010). To limit the challenges of sustainability of interventions after completion of ICT interventions in school settings, students’ ICT competencies and attitudes must be assessed, based on the ICTs they have personally adopted and used, prior to the introduction of new ICT tools (Mwapwele & Marais, 2019).

Besides, (du Plessis, 2014) stated that Rural areas are characterized by various factors that negatively influence that delivery of quality education. Typically rural areas are remote and relatively underdeveloped. As a result, many rural communities and their schools are poor and disadvantaged, lacking basic infrastructure for sanitation, water, roads and other transport, electricity and information and communication technology. The socio-economic realities of rural areas put learners in rural schools at a disadvantage.

Most researchers mentioned that teachers in developing and developed countries have pedagogical and personal factors, which mostly contribute to their confidence in acceptance and use of ICT tools. Also (du Plessis, 2014) said rural education as: Poor funding in rural schools is one of the greatest challenges faced by rural education. The low proportion of funds that are

allocated to rural education is worrisome, as it has been suffering from a bigger financial shortfall over the past few years. Shrinking spending on rural schooling has caused widespread problems in both students' enrolment and teacher commitment to teaching.

Therefore, the aim of this research is to study the challenges of ICT integration in Ethiopian secondary schools in selected rural and remote area secondary schools found in Enor woreda of Gurage Zone.

1.3 Research Questions

My intention is to answer the following questions for investigation and to find a solution.

1. What challenges do students face when using ICT tools in rural public secondary schools?
2. How do using ICT tools positively impact the academic performance of students in using ICT for education?
3. What solutions can address the challenges faced by teachers and students in using ICT tools for teaching and learning in rural secondary schools?

1.4 Objectives of the Study

1.4.1 General Objectives

The general objective of this study is intended to investigate and understand the key challenges that impact the successful integration of ICT tools in Ethiopian secondary schools processes within Gurage Zone Enor Woreda secondary schools.

1.4.2 Specific Objectives

In order to achieve the general objectives, the following specific objectives are performed:

1. To identify the challenges of using ICT tools in teaching and learning among school students in selected rural secondary schools.
2. To identify the integration of ICT tools influence on the academic performance of students in education in rural public secondary schools in teaching and learning in the study area.
3. To determine potential strategies and solutions that could overcome the difficulties identified in the use of ICT tools.

1.5. Scope of The Study

The study looked at rural secondary schools in Enor woreda in Gurage zone to find the challenges facing the use of ICT tools in Ethiopian secondary schools in the classroom among

school teachers and students in schools and the possible solutions to cure the challenges facing the Gurage Zone Enor woreda secondary school students from using ICT for learning in public secondary schools in woreda. Although the issues of ICT in education are complex, this study was surrounded to the implementations of issues in terms of teachers and students ICT usage and the requirements of technology and tools available in the rural area secondary schools. However, this study is limited to disadvantaged rural public secondary schools of the Enor Woreda mainly to investigate the achievements, challenges and solutions to the challenges of the ICT in Education policy with due emphasis on the educational technology tools. Thus, for the purpose of data collection and analysis, the study will cover only rural and disadvantaged secondary schools in Enor Woreda. The implementation process in Enor Woreda is very important, for this reason, covering disadvantaged secondary schools in Enor Woreda provides the opportunity to assess the achievements and challenges of the policy. Hence, the study will cover selected disadvantaged rural public secondary schools of the Enor Woreda with due emphasis on the implementation of ICT in education system. Moreover, in order to address its objectives and for the purpose of ICT and its tools, the research would held in five selected rural secondary Schools found in Enor woreda in Gurage zone.

1.6. Significance of The Study

The findings of the study would be a huge benefit to the students, ICT teachers, Government, curriculum planners, policy makers and future researchers. There are expected benefits from this study that would be significant since it assesses the implementation process of the ICT tools in education policy and the role of Teachers' ICT experience in teaching-learning process towards education quality and factors that affect the implementation process. Theoretically, the study will point out and discuss the challenges that face use of ICT in teaching and learning in secondary schools, also how they affect students negatively. Accordingly, if there are challenges and no effective use of ICT technology and implementation of the policy, it is impossible to achieve fruitful result and quality education in disadvantaged secondary schools. Students have more choice to choose their learning style and learning activities. In other words, students take more responsibility for their own learning and assessment(Assefa, 2021).

To teachers, the knowledge from the study may serve as a guide for overcoming the challenges that teacher's face while using ICT to facilitate teaching in rural secondary schools.

To curriculum planners, it will assist them to know the level of adequate ICT facilities to be made available in school for proper teaching and learning activities and processes.

As ICTs are influencing all aspects of life, they are making dynamic changes in society. The influences are felt more and more at schools. Because ICTs provide both students and teachers with more opportunities in adapting learning and teaching from individual to a community need (Legesse & Haripriya, 2021). It is a major initiative of the Federal Government and the Ethiopian education sector launched and implemented all over the nation. However, this study is limited to disadvantaged rural public secondary schools of the Gurage zone Enor woreda mainly to investigate the achievements, challenges and prospects of the ICT in Education policy with due emphasis on the issues of ICT adoption. Thus, for the purpose of data collection and analysis, the study will cover only disadvantaged secondary schools in Enor woreda. The implementation process in Enor woreda is very important since it is rural and disadvantaged area of the entire Gurage Zone, for this reason, covering secondary schools in Enor woreda provides the opportunity to assess the achievements and challenges of the policy. Hence, the study would cover selected secondary schools in Enor woreda with due emphasis on the implementation of camara computers of education.

This study on the challenges of ICT integration in selected rural secondary school level would have numerous significances as follows:

- ICT provides more creative solutions to different types of learning studies.
- The present study helps to solve the major cause and issues of ICT and students' academic failure by accessing the use of ICT applications. "Virtual labs encourage even weak science students to participate in science activities with confidence" (Maharaj-sharma, 2017).
- ICT is used as a tool for teachers as well as students to discover learning topics, solve problems, and provide solutions to the problems in the learning process.
- ICT makes knowledge acquisition more accessible, and concepts in learning areas are understood while engaging students in the application of ICT.

Therefore, the study may indicate the capacity building gaps which may be useful in formulating a frame work to empower ICT improvement in secondary school curriculum.

1.7. Limitation of The study

The study faced several limitations that affected the scope and depth of data collection and analysis. Time constraints limited the duration of data gathering, as there was insufficient time to engage in extended interactions with participants. Financial and budget limitations also restricted the scale of the research, preventing more comprehensive coverage of schools, particularly those in remote rural areas far from the town. Additionally, the geographical distance of rural schools posed challenges in reaching them for face-to-face engagement. ICT Teacher respondents were often busy with their professional duties, which delayed or hindered their ability to punctually respond to the questionnaires. Lastly, directors and school leaders provided limited time for interviews, which constrained the depth of responses gathered, further impacting the richness of the data. These challenges collectively affected the overall comprehensiveness of the research findings.

1.8. Organization of The study

This research paper organized into five chapters. The first chapter provides an overview, presents the statement of the problem, introduces the research questions and objectives, establishes the rationale for significance of the study, and specifies the scope of the study. Moreover, chapter two has introduced conceptual and analytical tools based on which the study phenomenon assessed and analyzed. Then chapter three has clearly specified the research methodology, research design, sampling design, methods of data collection and the methods of data analysis. Discussions made based on the results of data analysis in the proceeding chapter. At the end, the conclusions and suggested recommendations provided based on the findings of the study.

1.9. Definition of Key Terms

ICT Integration: The process of incorporating Information and Communication Technology (ICT) into teaching, learning, and administrative practices to enhance educational outcomes.

ICT (Information and Communication Technology): Technology that facilitates the processing, storage, and exchange of information, including computers, the internet, and telecommunications.

ICT Tools: Digital devices and applications such as computers, tablets, smartphones, software, and internet services used for communication, data processing, and education.

Secondary School: An educational institution for students typically between the ages of 12 and 18, following primary school and before higher education.

ICT Skill: The ability to use digital tools and technologies effectively to perform tasks related to information processing, communication, and problem-solving.

Academic Performance: The measurable outcomes of a student's learning achievements, usually reflected in grades, test scores, or other educational assessments.

Influential Force: A factor or element that significantly impacts or drives changes in behavior, decisions, or outcomes in a particular context.

E-learning: A form of education where teaching and learning are conducted via electronic devices and digital platforms, often over the internet.

CHAPTER TWO

2. LITERATURE REVIEW

2.1. Introduction

Education is one of the major agents for change. ICT can play a vital role not only in urban areas but also in remote areas (Md.Mahbobor Rahaman, 2017). The impact of the changes manifested in politics, economy, social and culture of the nations. To limit the challenges of sustainability of interventions after completion of ICT interventions in school settings, teachers' ICT competencies and attitudes must be assessed, based on the ICTs they have personally adopted and used, prior to the introduction of new ICT tools (Samwel Dick Mwapwele, Sifiso Dlamini, Judy Van Biljon, 2019). However, in order to make the changes more fruitful, the education sector should developed and articulated in a way that brings the intended outcome set right at the outset (beginning). This brought into reality when the school is well equipped with the necessary and modern technology.

Technology in education is useful in making the teaching-learning process successful so that many scholars advise the professionals in the sector to use technology that facilitate the course of action (Leoulseged W/Hanna, 2020). With this regard, education should be well equipped with the necessary technology that brings changes that are useful to the society. Here, what should consider is that education and technology cannot see separately. In other word, in education, technology used to make the teaching-learning process proceed in a way that comes up with fruitful results. (Tan, 2016) States that the way in which technology incorporated into their pedagogy in relation to the classroom, planning, practicing and reflection identifies that teachers' presentation of work improved and the transmission of knowledge become more efficient with the use of technology. (Edinburgh And, 2020) 'support to teachers in the form of opportunities to learning (both formally and informally), embedding digital learning in continuing professional development and initial teacher training, direction and leadership within a school, functioning digital equipment and tools, and an environment that gives teachers the flexibility to introduce and use digital learning'. Education is one of the fundamental pillars for ensuring sustainable and fast economic development that why the Federal Government of Ethiopia gives so much emphasis not only to expand it but also to ensure the quality they offer. Tremendous progress had been made in the education sector of secondary schools since the new Education and

Training Policies (ETP) of the country were put in place in 1994. The use of ICT cuts across all aspects of economic and social life. Technological developments in ICT are very rapid. Technology quickly becomes obsolete requiring new skills and knowledge to be mastered frequently (Hailye Tekleselase Michael, 2020).

(Vladimir Kinelev, 2017) States that ‘ICTs have become a critical tool for professional training; the sooner learners know how to use ICTs, the easier they can find their way to capture the newest methods of data acquisition and transformation to knowledge. Scientific and technical progress and the global spread of technologies developed in the most advanced countries of the world constitute one of the main arguments in favor of the leading role of education in the 21st century. The level of technological development is indicative nowadays not only of the economic power and living standards of a particular country, but also of the place and role of this country in the global community, and the scope and prospects of its economic and political integration with the rest of the world. At the same time, the level of development and utilization of modern technologies in different countries is determined not only by their material resources, but, to a large extent, by the degree of society’s ability to produce, absorb and apply new knowledge. These achievements, in turn, tightly linked with the level of education. These processes are largely driven by information and communication technologies, where scientific knowledge and information increasingly determine new patterns of growth and creation of wealth and present possibilities to reduce poverty more effectively.’

ICTs have the potential to motivate and engage teachers, help to relate school experience with work practices, improve students’ digital skills for tomorrow's workers as well as transforming the learning environment in the schools (Bada, 2016). Also (Rapanta et al., 2021) investigated that ICT is used to implement a rich learning environment with multimedia information content, student centered instruction and collaborative learning environment. Science and technology occupy a vital position in the school curriculum. It is a substantial subject from primary to junior secondary to senior secondary school levels of the educational system (Sadera et al., 2020). In case of this, ICT is a key factor in improving the quality of science education (Fernandes & Ferreira, 2020). Shared vision for the use of ICT in a school may be developed through Teachers Professional Development (TPD) but will also influence the content and style of TPD (Fernandes & Ferreira, 2020).

(Rwanda 2020,) States that if challenges observed in schools with ICT tools are not addressed, it will be wasteful to continue to invest in the provision of ICT tools for schools; the process of teaching and learning will continue to be not effective and schools will not gain advantages nor achieve the expected development in the mission of education. (Charalambos & Glass, 2007) ICT allows access to knowledge and expertise that were previously unavailable, enabling new relationships and new models of Professional development.

One of the main advantages of ICT- development is that it can support reflection in ways that help teachers unlearn the old ways of thinking about teaching and learning. Generally, the journals idea shows that the teachers' skill of teaching and students learning system is should be based on ICT skill. Because of that if the teachers and students ICT skill is developed, there would be significant change come. Therefore, teachers are teaching their students by using ICT infrastructure is generally increase the quality of education and students' motivation for learning.

2.2. Theoretical review

2.2.1 The use of ICT in education

The use of Information and Communication Technology (ICT) in education has significantly transformed teaching and learning, offering dynamic and interactive tools that enhance instructional methods. ICT promotes active learning, collaboration, and critical thinking by providing customizable resources to meet diverse learning needs. It also expands access to education, particularly in remote areas, through e-learning platforms and virtual classrooms, helping bridge the gap between urban and rural education (OECD, 2019).

Furthermore, ICT supports teachers and administrators by simplifying tasks such as lesson planning, grading, and student progress tracking, allowing for more efficient teaching. It also prepares students for the digital world by fostering essential digital literacy skills, which are crucial for future employment in a technology-driven economy (World Bank, 2019).

Today's issues of most scholars are not whether the use of technology in education is an important factor or not, rather what types of technology are very useful compared with others that bring about change in the education sector. Most of the educators suggest the idea that focuses on ICT. ICT infrastructure can support more powerful and complete knowledge building experiences for learners if there are integrated and well-designed technologies. Using Information and communication technologies (ICTs) tools such as plasma television as well as

newer digital technologies such as computers and Internet in secondary school level have been touted as potentially powerful enabling tools for educational change and reform.

Lack of access to ICT education in rural areas is one of the main development challenges in education. Evidence shows that primary school enrolment rates in rural areas lag behind urban rates in most developing countries. In rural areas, learning outcomes are lower, and completion rates for girls lag behind those in urban areas. Teacher quality is lower, pupil-to-teacher ratios are higher, and teacher retention and teacher absenteeism are larger problems. This paper examines the rural teacher challenge, and highlights good practices and approaches aimed at fostering motivated and qualified teachers for rural areas.

As this study, conducted within the context of education quality through educational technology, it is important at this stage to highlight the background of ICT in education and explore options that support the education sector to achieve its quality related goals. Several studies from case studies to survey researches have been conducted about the importance of ICT in education and as why teachers and students use it. “ICT becomes an important tool (catalyst to change) for realizing a new paradigm of learner- centered education system which supports learners’ needs in a better way.

Generally ICT can enhance international and national collaboration and networking in education so as to promote teachers professional development”(Michael, 2020).

2.2.2 Concepts of Information and Communication Technology (ICT)

(Deedee Bennett, 2019) Information and Communication Technology (ICT) encompasses a range of technologies designed for telecommunications, broadcast media, intelligent building management systems, and network-based control and monitoring functions. Recent developments in ICT have significantly impacted various sectors. Digital transformation is a key area where ICT integrates technologies such as cloud computing, artificial intelligence (AI), and big data analytics to enhance efficiency and create new value. This shift is detailed in the 2023 Journal of Digital Innovation. As digital reliance increases, cyber security has become essential to safeguard data and networks from cyber threats, with advancements in encryption, multi-factor authentication, and intrusion detection systems, as outlined in the 2022 International Journal of Cyber security. The Internet of Things (IoT) connects devices and systems over the internet, facilitating data exchange and automation, with recent innovations including smart homes, wearable’s, and industrial IoT applications, as reviewed in the 2021 IEEE (Institute of

Electrical and Electronics Engineers) Internet of Things Journal. The rollout of 5G technology, which offers faster internet speeds and lower latency, supports applications like autonomous vehicles and enhanced mobile broadband, according to the 2023 IEEE Communications Surveys & Tutorials. AI, encompassing machine learning, natural language processing, and robotics, is increasingly applied for personalized services, predictive analytics, and automation, as discussed in the 2022 AI Review Journal. Lastly, e-governance leverages ICT to improve transparency, efficiency, and citizen engagement in government services through online platforms and digital tools, as examined in the 2023 Government Information Quarterly.

2.2.3 ICT in Ethiopia

(MoE, Ethiopia, 2019), In Ethiopia, Information and Communication Technology (ICT) plays a crucial role in driving development, though it faces distinct challenges and opportunities. The Ethiopian government has identified ICT as a key sector for economic growth and development, with the National ICT Policy and Strategy setting goals to expand ICT infrastructure, promote digital literacy, and attract investment. (Solomom Molla and Yilfashewa, 2022) The Digital Ethiopia 2025 strategy focuses on enhancing digital transformation through e-governance, digital infrastructure, and ICT education. Significant progress has been made in improving ICT infrastructure, including the expansion of mobile network coverage with 4G services and investments in fiber optic cables to boost internet connectivity and bandwidth. Mobile technology is widely adopted, even in rural areas, but internet access remains limited with a notable digital divide between urban and rural regions. Efforts are ongoing to expand broadband access and reduce connectivity costs. In education, ICT integration is prioritized, with initiatives to incorporate technology into teaching and learning processes and improve digital literacy among students and teachers. E-governance is advancing with the introduction of online services for various government functions, aiming to enhance transparency, efficiency, and public service accessibility. (Tesfaye Bayu and Anteneh Wasyhun, 2020) Despite these advancements, Ethiopia faces challenges such as limited access to advanced technologies, inadequate infrastructure in remote areas, and a need for more investment in digital skills and training. High internet costs and periodic network outages also pose obstacles. However, Ethiopia's potential for ICT growth is significant, driven by a young and growing population, increasing mobile penetration, and rising tech hubs and startups, particularly in Addis Ababa. Continued efforts in infrastructure

development, digital literacy, and policy implementation are essential to fully leverage technology for national development.

2.2.4 ICT in rural secondary schools of Ethiopia

ICT standards in rural secondary schools in Ethiopia reflect a range of challenges and ongoing efforts aimed at improving educational technology access and usage. (T. Bati, Anteneh Wasyhun Workneh, 2020) The Design-Reality Gap Analysis of integrated use of ICT in classroom teaching in Ethiopian secondary schools thus far revealed fewer successes and widespread challenges in the country's discourse to achieve the 2016-2020 national targets. One major issue is the significant limitations in ICT infrastructure. Many rural schools lack basic equipment such as computers and projectors, and reliable internet access is often absent or inadequate. When equipment is available, it tends to be outdated or insufficient for modern educational needs. Although there are government and NGO initiatives aimed at improving this situation, progress remains slow and uneven. (Chala Mosisa Hunduma, Yilfashewa Seyoum, 2023) Their study's results demonstrate that Integration of ICT is still in its infant stages due to a lack of infrastructure, insufficient funds, lack of technical and administrative support, lack of time, teachers' knowledge, abilities, and use of technology are lacking. Those challenges are distinguished as teachers-related challenges, students-related challenges, resource-related challenges and administrative-related challenges.

Internet connectivity is another major challenge. (Dr. Adam Mahama, 2016) Many rural schools have limited or no internet access, which hampers the integration of digital tools in teaching and learning. Expanding broadband infrastructure and providing affordable internet services are critical, but connectivity issues continue to be a significant barrier. Without reliable internet, the potential benefits of digital tools and online resources are largely untapped in these areas.

Efforts to improve ICT standards also involve teacher training and curriculum integration. Teachers in rural secondary schools often have limited ICT skills and training, which affects their ability to effectively use technology in the classroom (A. Akinlolu, R. A. Azeez, S. Ayo, 2018). Professional development programs are essential, but they are not always readily available or adequately supported in rural areas. Integrating ICT into the curriculum is a key goal, but resource constraints often hinder this process. Despite these challenges, various government and NGO programs are working to provide technology resources, training, and support. Community involvement plays a crucial role in maintaining and utilizing ICT resources,

and there are opportunities for improvement through partnerships with technology companies and international aid. While obstacles remain, ongoing efforts are essential for enhancing educational outcomes and bridging the digital divide.

2.2.5 The teacher’s main activities

The active teaching and learning combines all teaching related tasks that include lesson planning, organization of teaching resources, classroom instruction, co-teaching, field trips, remedial instruction, test related tasks, marking, grading, roster working and provision of feedbacks to learners (B. Hussain, 2021).

As instructional technologies including plasma mode education are perceived as potential to improve educational effectiveness and quality, developing countries including Ethiopia are implementing educational policies that are highly integrated with ICT for the purpose of education (Ababa, 2017). This implies that through movements of education policy, the use of instructional technologies has become a trend even if some educators are still concerned with the conventional instruction. Several recent studies indicate that many teachers have competence and confidence in using computers in the classroom, but they still make little use of technologies because they do not have enough time (Ria & Tau, 2020).

The integration of ICT in classroom is getting more important as it help student in enhancing their collaborative learning skills as well as developing transversal skills that stimulates social skills, problem solving, self-reliance, responsibility and the capacity for reflection and initiative (Ghavifekr et al., 2015). (Legesse & HariPriya, 2021) Also stated that ICT plays a crucial role in education if properly used, it can provide significant to teachers and students in the classroom.

Table 2.1 Teachers' activities and related tasks

Group or cluster	Tasks
Teachers’ activities on teaching and learning	Planning lessons, providing instructions to students and remediation, coaching or mentoring colleagues, field trips, management of tests and examination (elaboration, marking, feedback to students).
Teachers’ Administrative duties	Filling school forms, participate in co-curricular activities, mentoring, attending meeting, punctuality or other events in the school.

Principal’s Official communication	Communicating to stakeholders through e-mail or other ways, Collaborate with colleagues, experts and parents, counseling learners.
Continuous Professional development (CPD) committee	Attending trainings, courses and continuous professional development (CPD).

Source: (C., Sammons, P., Stobart, G., Kington, A., & Gu., 2007)

2.2.6 Functions of ICT for Education Quality

The use of ICTs in secondary school education requires computers, the Internet, television, laptops, and projector that can facilitate not only delivery of instruction, but also the learning process itself. The use ICTs in education improves teaching and learning at all levels of education (Michael, 2020).

Bringing ICT into the classroom can have a considerable impact on the practice of teachers, in particular when ICT is conceptualized as a tool that supports a real change in the pedagogical approach (Hennessy et al., 2010). The unavailability of or lack of adequate ICT equipment in schools, lack of continuous and effective technical and pedagogical training with regard to ICT use, technical issues, and lack of technical support are perceived as major obstacles that impede a successful integration of ICT (Yassine AIT HAMMOU, 2021). ICT provides opportunities for student-teachers, academic and non-academic staff to communicate with one another effectively during formal and informal teaching and learning (Oyediran, 2017).

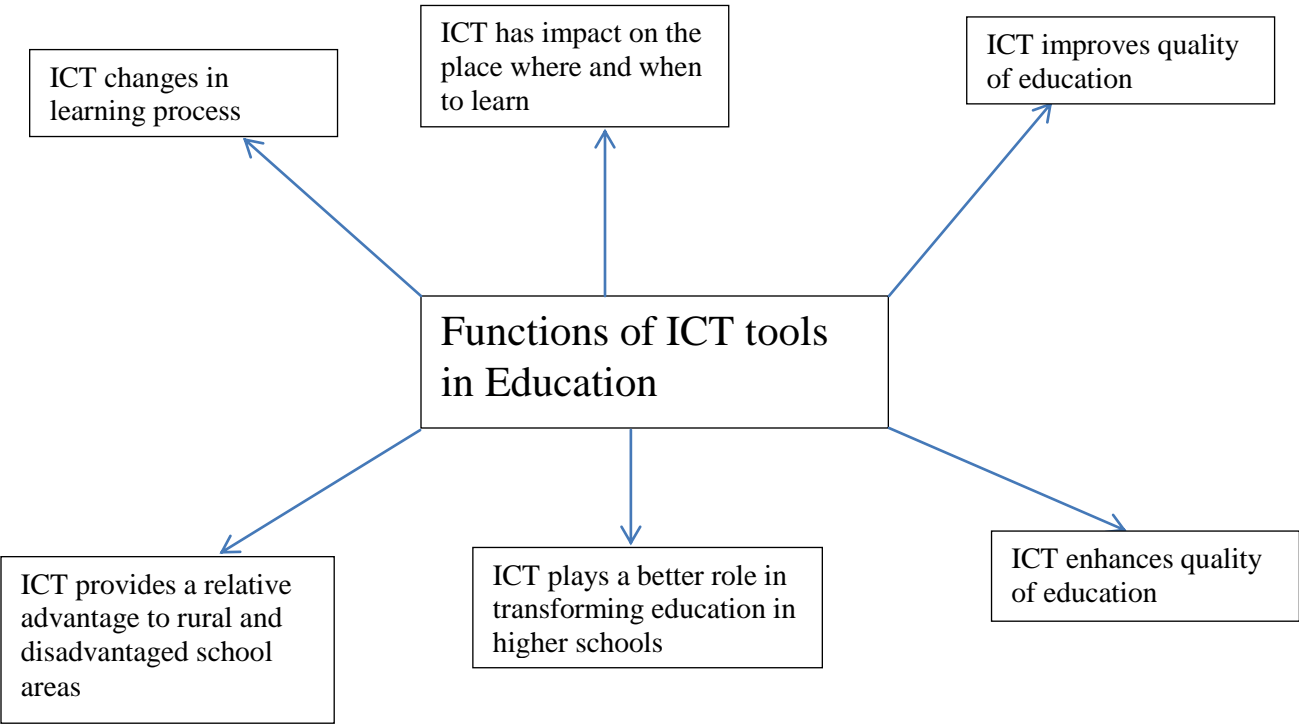


Figure 1 Functions of ICT in education

(Source: (Higgins, S., Xiao, Z., & Katsipataki, M., 2012))

In the diagram above ICT brings excellent 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 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. Besides, ICT plays critical role in rural and disadvantaged secondary schools for rural area teachers and students.

2.2.7 Factors hindering ICT tools in rural Area Secondary Schools

Rural Schools Defined: Among the researchers, who have conducted researches in rural area, (du Plessis, 2014) defined rural schools as follows:

The definition of rural still eludes us because the term is ambiguous and the distinction with urban tend to be arbitrary, thus no concrete definition has been agreed upon. It should be noted that South Africa has diverse rural areas and therefore certain social, economic, educational and cultural factors need to be considered in enhancing the definition of rural education. Rural schools are the schools in the outskirts of the country. Some use the concept synonymously with the concept farm school or small school.

The following features are examples of the rural schools profile (UNESCO, 2005):

- Distance to towns;
- Topography, (conditions of roads, bridges to school, etc);
- Access to information technology;
- Transport infrastructure (roads, buses, taxis);
- Access to services and facilities (electricity, water, sanitation);
- The health , educational and economic status of the community;

- Access to lifelong learning services;
- Social conditions in the community;
- Activities of political and civil society organization;

There are many problems and obstacles to the success of ICT in education. The following are the major problems of effective ICT implementation in rural area secondary schools:

Lack of ICT resources: Lack of adequate supportive resources is one of the main factors that challenge ICT implementation in education (Legesse & Haripriya, 2021). While the benefits of enhanced communications are not exclusive to small and remote areas, they typically bring greater benefits to these areas than to large urban centers, which are already “connected” and easily accessible. The emergence of mobile phones, personal computers, the Internet and other information and communication technologies have connected rural schools to the wider education community as never before. At the same time, the development of better, cheaper and more efficient transportation has progressively reduced the geographical isolation of many rural communities.

Lack of ICT policy: ICT facilitates the development of education and enables both individuals and countries to meet the challenges presented by the knowledge and information age. As the vast majority of Ethiopian population lives in remote areas and gets low quality of education, ICT is crucial in addressing access and quality of education. The design of education policies has much to gain from taking into account the different contexts in which schools are embedded and the ways in which they interact with and create differences in educational processes and outcomes – rural places being one such context among others (Ababa, 2013). Likewise, it is clear that education policy can only benefit from broader and more comprehensive approaches to address the challenges linked to particular places – be it building and maintaining thriving rural communities (e.g. through links with regional development, labor market and innovation policies) or reducing segregation in the case of urban areas (e.g. through links with housing and transportation policies). More contextualized policies should reflect the differences between types of rural and remote rural schools are likely to face greater difficulties in providing a good education than rural schools at an urban distant. Education policy that reflects the needs of schools in different geographical contexts therefore requires adequate statistical definitions, so resources can be targeted effectively and the use of resources can be monitored and evaluated.

Teaching and learning environment: Some of the most frequently cited features of rural education are the small size of schools and classrooms, and the low student-teacher ratios. Even in secondary education, rural schools and classrooms are typically smaller than urban ones, and there are fewer students per teacher ratio (Rahim, 2014). Creating such professional environments in rural contexts should therefore be a priority. However, rural contexts face particular challenges given the small size and nature of educator positions (Kurmangaliyev, 2021). Teachers are often isolated, especially when teaching in small one-teacher schools, and have fewer opportunities to exchange ideas, and less contact with external staff, such as teacher educators or supervisors. At the same time, teachers often cover multiple subjects and after-school programs and assume multiple roles, such as leadership and management as well as classroom teaching, creating particular pressures on teaching and learning.

Financial and material resources: The small size of rural communities makes the provision of education much more expensive per capita than in cities and implies high fixed costs to maintain small schools with low student-teacher ratios (Ria & Tau, 2020). Especially single teacher schools with few students per teacher and building can be significantly more expensive on a per-student basis. School funding systems may also put rural schools at a disadvantage (du Plessis, 2014). Allocations for current expenditure that are primarily based on student enrolment often do not sufficiently reflect the higher costs of delivering comparable programs and services in low density and remote environments.

Lack of management and technical support: Principals in rural schools face many challenges and problems every day (du Plessis, 2014). A considerable challenge that rural schools face is the lack of preparedness among Principals in rural schools face many challenges and problems every day. To overcome such problems of adaptation, some rural communities have opted for “grow your own” strategies whereby local residents are identified and hired as potential rural teachers and local students are “guided” into a teaching career.

Lack of teachers training and confidence: Rural schools are often viewed from a negative perspective. Their geographic isolation, small size and socio-economic composition are believed to increase their chances of suffering from inadequate infrastructure, a lack of quality teachers, and limited educational offerings, among other challenges (David, n.d.). However, as this section reveals, these problems are far from universal, and some of the characteristics of rural education,

such as their low student-teacher ratios, the abundance of social capital and the emergence of new technologies, open real opportunities for rural schools.

Limited Time: Several recent studies indicate that many teachers have competence and confidence in using computers in the classroom, but they still make little use of technologies because they lack the time. A significant number of researchers identified time limitations and the difficulty in scheduling enough computer time for classes as a barrier to teachers' use of ICT in their teaching (Yusupov & Suyunov, 2022).

Educational programs, specialized support and after-school activities

Students in rural schools may also have fewer options when it comes to choosing a wide range of education courses and programs, particularly in secondary education, which may affect their achievement and options for further study.

Teacher preparation, learning, and support: A considerable challenge that rural schools face is the lack of preparedness among teachers and school leaders for life and work in rural communities and teaching and learning in rural schools. (Yusupov & Suyunov, 2022) said that “Without both good technical supports in the classroom and whole-school resources, teachers cannot be expected to overcome the obstacles preventing them from using ICT”.

The integration of ICT will enable teachers to vary teaching and learning activities, to gradually change the teaching style to be more student-centered, to train students to have more active role in learning, and to access a huge range of authentic learning materials (IOSR-JRME, 2020).

Even when rural schools are staffed with good teachers and school leaders, they may be unprepared for teaching and learning in rural contexts since initial teacher preparation programs are mostly focused on practices pertaining to larger urban schools. Given the small number of staff, rural teachers may have to teach a variety of subjects, including some outside their area of expertise for which they have not received training and for which they may require additional time to prepare.

Ensuring high quality learning for rural students: The way for an excellent and equitable education is probably not that different across rural and urban settings. This may include, for example, using learning time productively, creating a positive learning environment, using multiple assessments strategically, and building a skilled and dedicated community of school professionals.

2.2.8. Education Policy Implementation and Evaluation towards Education Quality

ICT facilitates the development of education and enables both individuals and countries to meet the challenges presented by the knowledge and information age. As the vast majority of Ethiopian population lives in remote areas and gets low quality of education, ICT is crucial in addressing access and quality of education. Therefore, the Government commits itself to the exploitation and application of ICT for educational (Ababa, 2013)

2.3 Empirical Review

Technology involves the generation of knowledge and processes to change systems that solve many type of problems and cover human skills. In other words, technology can change or alter how people access gather, analyze, present, transmit and simulate information. Moreover, the use of Information Technology or ICT in secondary school creates a powerful learning environment and it transforms the learning and teaching process in which teachers deal with knowledge in an active, self-directed and constructive way. Based on this issues and challenges facing the integration of ICT tools in teaching and learning in secondary schools, the findings of others' study explained as follows:

(Kibirige, 2023): On his study entitled “Primary Teachers’ Challenges in Implementing ICT in Science, Technology, Engineering, and Mathematics (STEM) in the Post-Pandemic Era in Uganda” The study found various challenges divided into three categories: infrastructure and internet connectivity; individual factors and administrative support; and curriculum and learner support materials. A significant obstacle was the lack of computer access, internet connectivity, and ICT textbooks. Additionally, teachers lacked the ICT skills necessary to integrate technology into their teaching methods, and administrative support was insufficient. The identified challenges in this study will require a multi-pronged approach that includes increasing investment in infrastructure, providing training and support to teachers, and developing relevant and appropriate ICT curriculum materials. In conclusion, this study highlights the challenges that primary school teachers face in implementing ICT in teaching STEM subjects in Uganda. By addressing the identified challenges, policymakers and stakeholders can take steps towards improving ICT integration in primary school education and bridging the digital divide in Uganda and other developing countries.

(Chinasa, 2022): On his study entitled “challenges in the teaching and learning computer in rural secondary schools in Igboeze North L.GA of Enugu State” He found that some of the challenges

of teachers and students' lack of competence in basic computer applications and procedures. Furthermore, the level of ICT implementation and integration in secondary education is rather low due to a lack of administrative will to address ICT challenges and finally, He suggested that ICT facilities are very limited.

(Tesfaye Bayu and Anteneh Wasyhun, 2020): On their study entitled “Evaluating integrated use of information technologies in secondary schools of Ethiopia using design-reality gap analysis: A school-level study” They found that Design-Reality Gap Analysis of integrated use of ICT in classroom teaching in Ethiopian secondary schools thus far revealed fewer successes and widespread challenges in the country's discourse to achieve the national targets. Their study showed that students and teachers have better access to mobile phones and other technologies at home and outside of schools. Major school level factors for the gap observed were delay in implementation of a nationwide e-cloud based ICT infrastructure, lack of coordination for the pedagogical use of ICT, and insufficient capacity building training for teachers and school leaders. This suggests the importance of a strategy that integrates inside and outside of schools ICT resources and services for improved use of ICT in student learning.

(Dr Phiri William, 2016): On his study entitled “Factors affecting ICT implementation in selected secondary schools in Chipata district” He found that, ICT has a lot of advantages to learners and the society at large but its implementation needs much preparation. The preparation need to be done by the government in the area of training materials (books and ICT devices), school laboratories, ICT teachers and psychologically convince the learners the benefits of the new subject ICT. If these are not looked into Implementation will always fail even if they would debate about it or call people from other countries to help them it will still fail.

Dominique E. Uwizeyimana (2014) (Solomom Molla and Yilfashewa, 2022) (Solomom Molla and Yilfashewa, 2022), on his study entitled “The Challenges Facing the Integration of ICT in Teaching and Learning Activities in South African Rural Secondary Schools” The findings reveal that, with the exception of a TVs, photocopiers and laptop/desktop computers, there is a shortage of ICT resources available at schools for ICT integration, and that the teaching and curriculum administration functions of most teachers have been negatively impacted by a lack ICT equipment and/or insufficient use of these ICT resources for those schools who have them. In addition, while some teachers had received some form of ICT training, it was evident that such training has had minimal or no impact at all on the abilities and confidence of teachers to

use ICT in their teaching. These factors that negatively influence teachers' readiness for, and confidence in, using ICT; need to be dealt with by the various stakeholders including, and especially, the Department of Education and the school management and private partners.

(Solomom Molla and Yilfashewa, 2022) On their study entitled "Status of ICT Integration in Secondary Schools: Dire Dawa City Administration in Focus" Their study revealed that the lack of training and technical knowledge, the high cost of technological devices and internet service, and a lack of internet connectivity were major challenges. A shortage of computers in private schools and a lack of enthusiasm in government secondary schools were particular problems mentioned by respondents. As a result, it is critical to establish a rigorous monitoring and control mechanism to improve the current practices through the provision of necessary facilities.

2.4 Conceptual Frameworks

The conceptual framework illustrated by the figure 1 below that clarifies the relationship between variables that are Independent variables and Dependent variables. Integration of Information, Communication, and Technology (ICT) would be assisted by teachers to the global requirement to replace traditional teaching methods with a technology-based teaching and learning tools and facilities (Simin Ghavifekr, Wan Athirah Wan Rosdy, 2015). As (Sabit Rahim, Prof. Sun Tie, Afsana Begum, 2014) they found in their study, there are two categories of factors: internal (school-level) factors like teachers and students, and external factors such as infrastructure, leadership, and community involvement. (Ouyang, F., & Scharber, C. , 2021) Paper discusses the relationships between external factors such as infrastructure and government policies and their impact on school-level factors like leadership and teacher competence. It also explains how these school-level factors influence student outcomes like digital literacy and academic performance.

The integration of technology in education is not a new idea for educators, teachers, researchers, and educational institutions. Since the introduction of tools like the chalkboard and printing press, both developing and developed nations have invested significantly in incorporating ICT into education. The new and emerging ICTs, including internet applications, video technology, various computer software, and CD-ROMs, have transformed not only in their technical aspects but also in their structural characteristics.

2.5 Variables

2.5.1 Independent Variables

- ✓ **External Factors:** Infrastructure, government policies, community support
- ✓ **School level factors:** leadership and management, technical support, teachers' competence and attitudes and curriculum integration
- ✓ **Student level factors:** access and equity, digital literacy, engagement and motivation

2.5.2 Dependent Variables

- ✓ ICT Integration in rural secondary schools

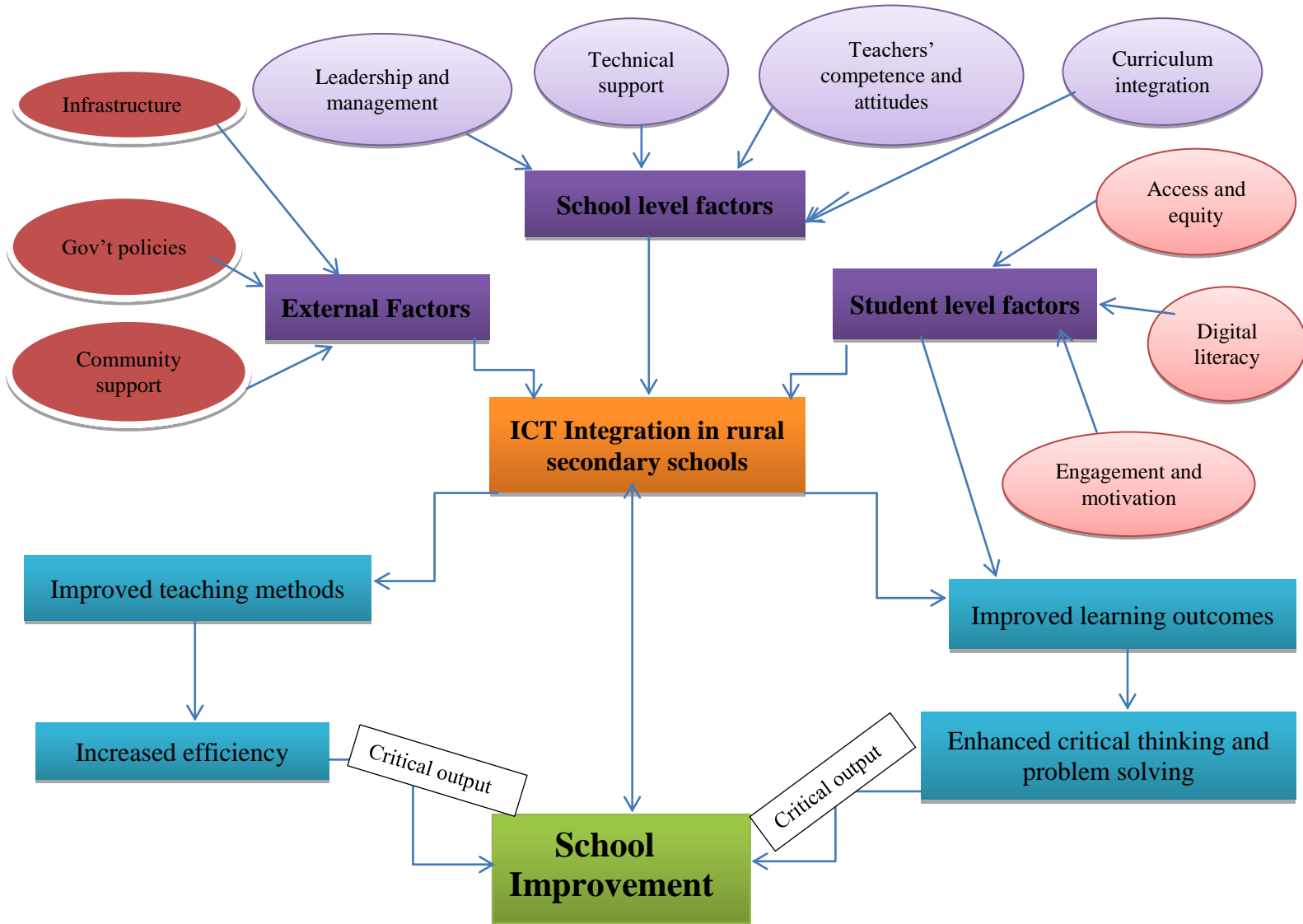


Figure 2 The Conceptual Framework

Source: Compiled by the researcher, 2024

2.6 Research Gap to be filled by the study

Findings indicate that teachers and students have strong desires to integrate ICT into education; but they encounter many difficulties. The major difficulties are lack of confidence, lack of capability and lack of access to ICT resources. Confidence, capability and accessibility are considered to be the critical components of ICT integration in rural secondary schools. Based on researchers' review of related literature, there was a methodology gap that most of the researchers used only quantitative data analysis but the researcher used both qualitative and quantitative (mixed data) analysis on issues and challenges of ICT tools and its integration in remote area secondary school study area. Hence, there is a methodology gap that this study intended to cover.

Moreover, previous studies focus more on administrative and policy perspectives rather than on the direct experiences of teachers and students. But the researcher focus on gathering and analyzing feedback directly from teachers and students to understand their personal challenges and needs. Besides, previous studies do not thoroughly address the specific technological and infrastructural constraints faced by rural secondary schools. But the researcher analyzing how infrastructure limitations (e.g., power, internet) uniquely impact ICT integration and propose targeted solutions in rural secondary schools.

CHAPTER THREE

3. RESEARCH METHODOLOGY AND PROCEDURE

3.1 Introduction

These chapter three talks all about the process that the researcher to achieve the predetermined objectives of this study. Therefore, what the researcher set out to accomplish in this chapter is to describe and discuss the research design and procedure adopted in the study as part of an attempt to generate empirical data. In doing so, the researcher particularly focused and covered the following subtopics. Research Design and Procedure, Mixed Methods research, Philosophy in mixed methods research, Mixed Methods Research and Theories, Reasons for using mixed methods, Qualitative Research and Its Evidence, Characteristics of Qualitative Research, Quantitative Research and Its Evidence, Characteristics of quantitative research and its evidence, Combination of quantitative and qualitative data, Sample Size and Sampling Techniques, Data sources and Data collection Techniques.

3.2 Description of the Study Area

As mentioned earlier, the main focus of this research was secondary schools in remote areas of Enor woreda of Gurage Zone. The data collection was conducted in five schools in rural areas, which are characterized by a low number of students and multi-grade levels, known as General secondary schools. The first school (Egeze General secondary school) is located fifteen kilometres southeast of Gunchire city and a large number of students characterize it. This is a General secondary school with grades 9-12 and it has the largest enrolment among all the sites of this study. The second research site is (Garbado General secondary school) which is seventeen kilometers drive from the Gunchire city. The school is also grades 9-12; however it is almost equal size in comparison to the first school (Egeze General secondary school).

The third one is (Terhogne secondary school) is located ten kilometers north of Gunchire city and it is characterized by a large number of students, The school is also grades 9-12; however it is almost equal size in comparison to the first school.

The fourth school is (Gazanche secondary school) was visited in another remote area of the woreda. It also located 18 kilometers northwest of Gunchire city and a medium number of students characterize it. The school is also grades 9-12. The last one is (Gomshe secondary

school) and another remote area of the woreda and located in 12km west from Gunchire city. This institution is characterized by a very low number of students and staff, poor supply and infrastructure, and the main school building is very run-down and greatly in need of major renovations. The study area map of CERS (Central Ethiopia Regional State) in Gurage Zone Enor woreda rural area secondary schools are shown below:

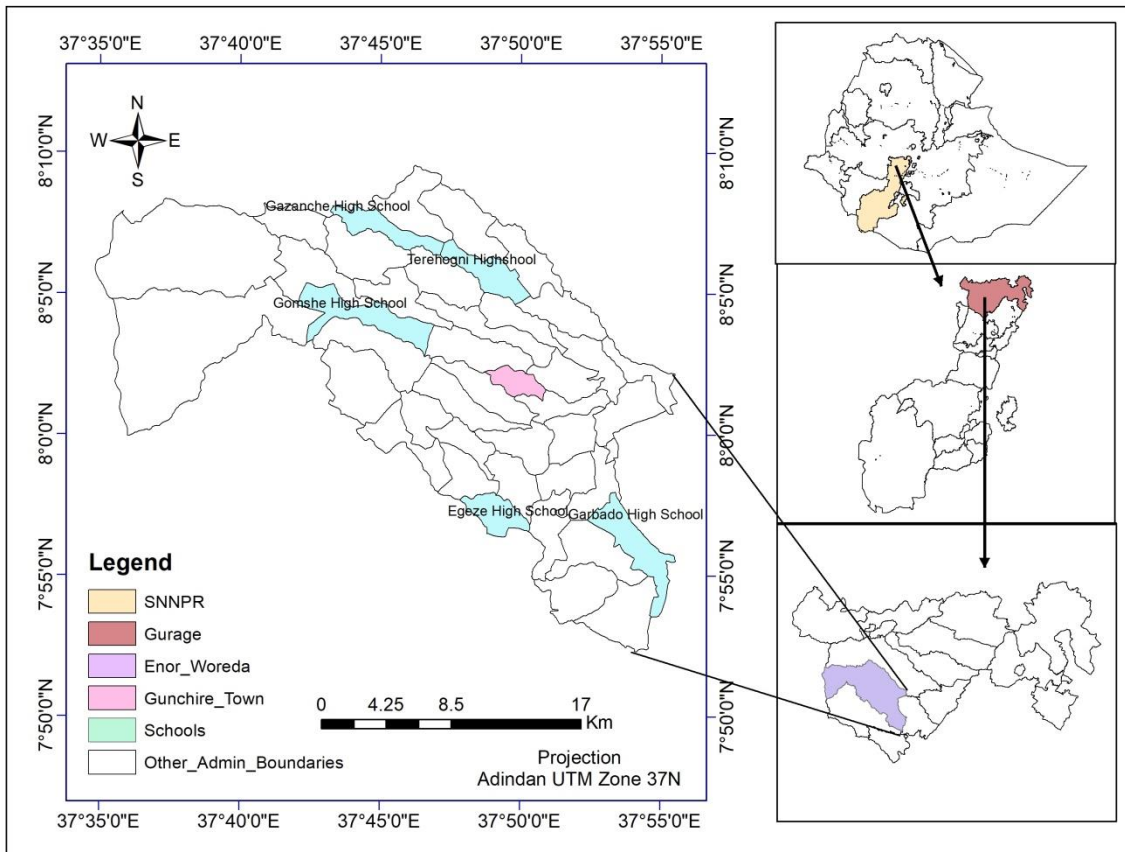


Figure 3 Map of Enor woreda and its' rural secondary schools

3.3 Research Design

The research design selected for this study is a descriptive analysis approach that frequently used to collect information. This study uses a descriptive survey study aim at challenges of ICT integration in selected rural area secondary school of Enor woreda in Gurage zone for enhanced teaching and learning processes. A descriptive study is concerned with finding the what, where and how of a phenomenon. Descriptive research is according to Saunders et al. (2007) the research for which the purpose is to produce an accurate representation of persons, events or

situation. The study also gives particular focus on the implementation process of ICT policy in education in terms of consistency and management of the ICT infrastructure in some disadvantaged rural secondary schools of Enor woreda in Gurage zone. In the researcher's attempt to analyze the extent to which secondary schools in Enor woreda are effectively implementing ICT in education policy through ICT material. To achieve the intended purpose and to answer the basic questions of the study was descriptive research design has been employed.

Descriptive research is to describe a phenomenon and its characteristics. To limit the challenges of sustainability of interventions after completion of ICT interventions in school settings, teachers and students ICT competencies and attitudes must be assessed, based on the ICTs they have personally adopted and used, prior to the introduction of new ICT tools (samwel mwapwel, 2019). This research is more concerned with what rather than how or why something has happened.

The research adopts qualitative and quantitative research design, because they describe a particular situation/problem rather than a sweeping statistical survey. They are also the methods are used to narrow down a very broad field of research into an easily researchable topic. A qualitative and quantitative design are used to describe a unit in detail (when, how, attitude, feeling, and why questions are being imposed on the investigation has no control over events and when the focus is on contemporary phenomena within some real-life context). Furthermore (Shuttle worth, 2008) states that a qualitative design provides more realistic responses than a purely statistical survey. Therefore, the researcher chooses to employ the mixed method approach, which meets or combines qualitative and quantitative research methods.

3.4 Sources of Data

3.4.1 Primary Sources of Data

Primary data can be defined as the fresh information gathered for the first time and happens to be original in character. According (Kothari, 2004), primary data is the original work of research or raw data without interpretation or pronouncements presented in official opinion or position.

3.4.2 Secondary Sources of Data

In principle secondary data are those data obtained from the literature source. These are the second-hand information included and published ones (Sunders et al, 2007). The researcher collects the data from such data are usually found in a form of document in the administration.

Therefore, the data were collected from different letters, magazines and other written materials found at Gurage Zone Education sector.

3.5 Sample size and sampling techniques

As it is difficult to collect data from all the target population a sample which can be representative of the population was selected. Creswell and Creswell's (2017) book, *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, offers comprehensive guidance on research design, covering both qualitative and quantitative sampling methods. It explains how simple random sampling ensures that every individual in the population has an equal chance of being selected, a method particularly effective in quantitative research. The book also delves into the rationale for using purposive sampling in qualitative research, especially when the focus is on gathering insights from specific individuals such as school authorities. Similarly, Taherdoost's (2016) article in the *International Journal of Academic Research in Management* outlines various sampling methods, emphasizing the importance of selecting a sampling technique that ensures the sample accurately represents the population and aligns with the research objectives. Patton's (2015) book, *Qualitative Research & Evaluation Methods*, serves as a key reference for understanding qualitative sampling methods, including purposive sampling, which is used to gather in-depth information from individuals best positioned to provide relevant insights, such as policy makers or school authorities in educational research. Together, these sources provide a solid theoretical foundation and practical examples to justify the sampling techniques employed in your study.

Therefore, respondents were selected using quantitative simple random sampling in which every target individual has equal chance of being selected as a sample since all the target groups live in and serviced by the administration. Also qualitative is used for purposive sampling method to take ideas from the school authorities.

The population of the study grouped in to secondary school teachers and school directors. Based on this, the survey carried on two hierarchical levels. In the first level, school directors and teachers will assessed as implementers. Students will be in the third hierarchical level as the end users. Purposive sampling technique is deployed at the policy maker's level, because these experts are policy, program led experts, and major policy evaluation roles are mandated for them. This is done because it enables the researcher to get more information on the background

of the policy making process (ICT in Education Implementation Strategy and Action Plan of the 2006), how well the implementation process is managed and implemented.

In the Enor woreda education bureau, five (100%) schools (Egeze, Garbado, Terhogne, Gomshe and Gazanche) purposely selected all secondary schools. This is because these schools are located in remote and disadvantaged area schools in Enor woreda. This in turn provides a chance to get bigger picture or more data on the topic. In the selected schools, they selected by random sampling technique, because these schools are the major data sources of this study. The selected five schools that indicated in Table 1 below have 71 classes. On the average, each school has 26 teachers that give 130 teachers and each school has two directors that give total of 10 directors. Total number of schools directors and teachers are 140, which are going to be covered in this study are 5 school directors (one from each school) and 10 ICTteachers (2 from each school). From students, 81 students (16 from each school) selected. Teachers selected are randomly from ICT department of the selected schools. School directors selected randomly approached since they are policy implementers at the school level. This sampling seen as follow:

Table 3. 1 sampling population and sampling techniques

Schools	Directors and v/directors		Teachers		Students	
	N	S	N	S	N	S
EGEZE	2	1	26	2	538	17
GARBADO	2	1	28	2	489	16
TERHOGNE	2	1	25	2	524	16
GOMSHE	2	1	26	2	421	16
GAZANCHE	2	1	25	2	458	16
TOTAL	10	5	130	10	2430	81

Source: Enor woreda education sector

3.5.1 Sampling Size Determination

For the purpose of the study the (from the teachers and students) the sample size with a 90% confidence level and a sampling error of 10% is determined by a formula as suggested by Yamane (1967):-

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

$$n = \frac{2560}{1 + 2560(0.1)^2}$$

$$= \frac{2560}{1 + 2560(0.01)}$$

$$= \frac{2560}{1+25.6} = 96.24 \approx 96$$

$$n = 96$$

Where;

n = Number of samples/sample size

N = Total population (2560)

e = Error tolerance, or 10% is the level of precision or sampling error (0.1)

Therefore, the sample size of teachers and students is equal to **96** participated in the study of the issues and challenges of ICT tools in teaching and learning in Enor Woreda and the five directors and v/directors are selected purposively for the interviews.

where n is the sample size, N is population size, and e is the error of 10 percentage points and a confidence coefficient of 90% are assumed for this equation. For the qualitative sample size, the researcher used purposive sampling in which he relies on his own judgment when choosing members of the population to participate in his survey. Because it allowed him to gain as much insight from as many angles as possible in his study.

3.6 Data Collection Technique

Data collection is crucial because research cannot be conducted without obtaining specific information (S. A. Mazhar, 2021). Data can be either primary or secondary. In behavioral sciences, primary data collection methods typically involve observations, interviews, questionnaires, and databases. Secondary data sources include previously published materials such as books, magazines, and journals, as well as unpublished works like autobiographies and biographies. Therefore, data collection is essential for completing the research process and is a fundamental research tool.

As mentioned earlier, this study conducted using both qualitative and quantitative data collection technique. In order to present a wide range of data, both primary and secondary data sources used are in the study. Primary data was collected by using both qualitative and quantitative data collection method such as, questionnaires, in-depth and semi-structured interviews. Both techniques enable the researcher to present numerical (quantitative) as well as qualitative in-depth information. In order to select respondents, both random and purposive sampling techniques are used. Meanwhile, secondary data gathered from different documents indicated in the document review.

3.6.1 Interview

Because of lack of willingness to be recorded, the interview was conducted through note taking that took 30 minutes each. Each interview has taken 30 minutes and the selection was scheduled for one week. The interview with five schools directors and vice directors, who has directly involvement in the study and was conducted in the selected five schools, the interview conducted in the office of directors of the schools for 30 minutes each. This enables the researcher to get more information on the background of the ICT policy, how well the ICT policy and its implementation strategy implemented in the secondary school level and to know the actual issues and challenges of the ICT usage in education process. The interview time and place were selected based on the willingness of the interview participants.

3.6.2 Questionnaires

The questionnaires designed were in semi-structured manner, which includes both open-ended and close-ended questions. For the purpose of this study a quantitative and qualitative methodology involve open and close-ended questionnaire adapted from (Yanet, 2015) used as the measuring instrument. The close-ended questionnaires were distributed among respondents. Because they are less costly and less time consuming than other measuring instruments. The Likert scale method used a range of responses: (1) “Strongly disagree”, (2) “Disagree”, (3) “Neutral”, (4) “Agree”, and (5) “Strongly Agree” and the 5-point rating scale also used a range of responses. The researcher used simple random sampling technique for teachers by using lottery method to avoid unfairness in the population. This helps the research to reach quite considerable number of respondents. Each teachers’ questionnaire has questions, which contained three parts, the first part with personal information, the second part consists students and teachers respondents towards interest and attitude of ICT tools application and the third part focusing on insights of students and teachers response towards ICT technical use and support. Each students’ questionnaire has questions, which contained also three parts, the first part with personal information, the second part consists students’ respondents towards interest and attitude of ICT usage towards technical support of teachers and the last part was left to answer other issues and challenges which were not mentioned above in the questionnaire. The questionnaire filled on the spot and it helped to the researcher to collect out of 10 questionnaires from ICT teachers and 81 questionnaires from students. All 91 (100%) filled and returned the questionnaire successfully.

3.6.3 Schools observation

The observation checklist prepared for this study assessing the issues and challenges facing students and teachers' ICT integration in teaching and learning in selected rural secondary schools, namely: Egeze General secondary school, Garbado General secondary, Terhogne General secondary school, Gazanche General secondary school and Gomshe General secondary schools of the Woreda. For observation, the researcher randomly observed teachers' staff class, students ICT lab, Natural Science laboratory class, each department's office and director's office. The observation conducted for four consecutive weeks in each teacher's staff class, students ICT lab, Natural Science laboratory class, each department's office and director's office by the researcher in person.

3.6.4 Document review

Ethiopian National Education for All 2015 Review Report, statistical and unpublished documents from Federal Ministry of Education and UNESCO, that related to technology education and quality of education are reviewed to see the findings and to compare with the results of the collected data in order to identify grey areas that need an intervention.

Availability of Information and Communication Technology (ICT) infrastructure in schools and its integration with teaching and learning processes is coming under greater focus as the country looks towards addressing the change of emerging as a knowledge economy (Sabit Rahim, 2014).

3.7 Data Analysis

As data analysis is the critical part of research regardless of its type, great care and effort would be invested by the researcher to the maximum possible extent. In the process, the collected quantitative data would be edited, coded and fit for further analysis. (Dawit Dibekulu Alem, 2020) Saying that data analysis is crucial for research is an understatement; no research can proceed effectively without it. Data analysis can be applied in both qualitative and quantitative ways, each offering valuable insights. It helps in organizing findings from various data collection methods, such as surveys, by breaking down large problems into smaller components and filtering through extensive datasets to extract meaningful insights. Researchers need to sift through the large amounts of data they collect before drawing conclusions. Simply collecting data is not sufficient; data analysis is essential for making informed decisions and developing a comprehensive dissertation proposal. Quantitative data analysis primarily involves the use of numbers, graphs, charts, and statistical methods (both inferential and descriptive). In contrast,

qualitative data is represented in verbal or narrative formats and is gathered through methods like focus groups, interviews, open-ended questionnaire items, and other less structured approaches. The study mainly would have been utilized quantitative method of data analysis. The quantitative analysis of the study would be employee both descriptive and inferential analysis. As a part of descriptive statistics, frequency and percentages would be used as a preliminary analysis. As a part of inferential analysis, description of frequency and percentages would be used to predict the dependent variable (Teachers use of ICT tools in teaching and learning) as a result of independent variable (issues and challenges of facing the integration). In order to ensure error free computation, SPSS version 23 software would be used.

A/ Descriptive analysis

The descriptive statistical results would be presented by tables, frequency distributions and percentages. Summary statistics, which includes the means, standard deviations values which are computed for each variable in this study. As (P. O'Brien, M. Shampo, P. Dyck, 1989) states descriptive analysis focuses on summarizing and presenting the key features of a dataset. It involves methods and techniques that describe the basic characteristics of the data, such as measures of central tendency (mean, median, mode), measures of dispersion (range, variance, standard deviation), and frequency distributions. The primary goal is to provide a clear and straightforward overview of the data collected from a sample or study group. This type of analysis is useful for understanding the general patterns and trends within the data but does not extend beyond the sample itself.

B/ Inferential analysis: Unlike descriptive analysis, which simply outlines the characteristics of a sample group, inferential analysis goes a step further by using sample data to make broader conclusions about the entire population from which the sample was drawn. To ensure that these conclusions are valid, the sample must be selected randomly from the population. Conducting inferential analysis with sample data is a robust method for deriving insights and telling a broader story about the population (L. Delaney, 2009). With inferential statistics, you are trying to reach conclusions that extend beyond the immediate data alone. For instance, I used inferential statistics to try to conclude from the sample data what the population might think. Or, I would have been used inferential statistics to make judgments of the probability that an observed difference between groups is a dependable one or one that might have happened by chance in this study. Thus, researcher would have been used inferential statistics to make inferences from

my data to more general conditions; researcher used descriptive statistics simply to describe what's going on in my data.

3.8 Measurements

3.8.1 Validity

Validity would be used to determine whether research measured, what it is intended to measure and to approximate the truthfulness of the results. Validity is concern with whether the findings are really about what they appear to be (Saunders et. al: 2009), p. 157 the study ensured that valid interview and questionnaire would be asked.

3.8.2 Reliability

Reliability is the consistency of measurement or the degree to which an instrument measures the same way each time it would be used under the same condition with the same subjects (Bryman, A., 2016). Reliability of the instrument according to (Amin, 2005) refers to the degree to which they said instrument consistently measures whatever it is measuring. To check for reliability one to one interview would be given to one general director of the school and vice director would be asked the same interviews.

3.9 Ethical consideration

Ethical considerations are very important for every research or study. Interviewees were informed that this work is purely for academic purposes and not for other reasons. Therefore, respondents of this study assured of confidentiality in respect of all information that they provided. As they were not volunteers recorded, to assure them further, recording devices not used in order to give respondents/ interviewees the confidence to speak all thing what they know about the issue. Ethical consideration for addressing challenges of ICT integration in secondary schools involves ensuring equitable access and safeguarding student privacy. This includes developing and implementing policies that guarantee all students have equal opportunities to access ICT resources, regardless of their socio-economic status or geographic location. Schools should provide necessary support to bridge digital divides and prevent any form of discrimination or exclusion.

Furthermore, it is crucial to establish stringent measures to protect students' personal data and ensure that their online interactions are secure. This involves complying with data protection regulations, securing consent for data collection, and educating students about online safety and privacy. By prioritizing both equitable access and privacy, schools can create a fair and secure

environment for effective ICT integration. In every case, names are kept confidential thus collective names like 'the respondents' was used in the study. All documents used properly had acknowledged and documented to avoid issues of plagiarism. The value of a given research depends on the truth and the accuracy of results it produces. The ethics in this research related to the possession of permission for conducting the research and introduce willingness among respondents.

In this research, the researcher with the approval letter from the Hawassa University Institute of Technology College of informatics department of Information Technology and the consent form school head teacher, explained to teachers about their contribution in the research: voluntary participation and the confidentiality of information they were to provide. They were well informed about the research objectives and shown that their names were not needed on questionnaires in order to preserve their privacy. The researcher believed that such explanations and clarification about the privacy in the research-motivated respondents to provide correct and accurate information. The effective utilization of technology can play an important role to engage educational leaders to share their knowledge in collaborative environment which can enhance leadership capacity to contribute a successful ICT integration in schools.

CHAPTER FOUR

4. DATA PRESENTATION AND ANALYSIS

4.1 Introduction

This chapter consists of two major parts. The first part presents the demographic characteristics of respondents, whereas the second part deals with the analysis of data which are collected from respondents to seek answers for the basic questions which are raised in the statement of the problem. Under this section the characteristics of respondents, the result of questionnaire, interview, observation, documents, the general assessment and findings are discussed. Quantitative and qualitative data analyses were also existed and detailed information was described. Furthermore, in-depth interviews were done with school directors.

4.2 Characteristics of Respondents

According to the five rural secondary schools of Enor woreda directors' information, there are 1 director and 1 v/director in each secondary school and the total of 10 directors in schools. Of those 5 directors were selected using simple random sampling techniques. The numbers of teachers in all secondary schools were 130 and from those 10 ICT teachers were selected using simple random sampling techniques. The numbers of students in all secondary schools were 2430 and from those 81 students were selected using simple random sampling techniques. Therefore, from the total of 2560 population, 96 participants were participated in this study. Because of the researcher used the sample size with a 90% confidence level and a sampling error of 10% is determined by a formula as suggested by Yamane (1967).

Table 4. 1 Number of ICT teacher's respondents

Statistics							
		Department	Age	Gender	Marital Status	Educational level	Years of service
N	Valid	10	10	10	10	10	10
	Missing	0	0	0	0	0	0

Source: Compiled by the researcher, 2024

All 10 respondents provided valid data across all demographic variables, including department, age, gender, marital status, educational level, and years of service, with no missing values. While the specific departments were not detailed, the age distribution could be explored further to reveal trends across different age groups. Gender data may offer insights into male-to-female ratios, potentially highlighting gender representation among teachers. Marital status could provide context on personal responsibilities that may influence ICT usage in teaching. The educational

qualifications of all respondents are recorded, which could help assess their readiness for ICT integration. Additionally, years of service may indicate their level of experience and how it relates to their comfort or hesitancy in adopting ICT tools in the classroom.

Table 4. 2 Demographic Characteristics of teacher respondents from ICT departments

Gender of Respondents					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	9	90.0	90.0	90.0
	Female	1	10.0	10.0	100.0
	Total	10	100.0	100.0	
Age of Respondents					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20-25	2	20.0	20.0	20.0
	26-30	8	80.0	80.0	100.0
	Total	10	100.0	100.0	
Experiences of Respondents					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-3	6	60.0	60.0	60.0
	4-6	4	40.0	40.0	100.0
	Total	10	100.0	100.0	
Departments of Respondents					
		Frequency	Percent	Valid Percent	Cumulative Percent
	ICT	10	100.0	100.0	100.0
	Total	10	100.0	100.0	
Marital Status of Respondents					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Married	1	10.0	10.0	10.0
	Single	9	90.0	90.0	100.0
	Total	10	100.0	100.0	
Educational level					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	BSC/BA	10	100.0	100.0	100.0
	MSC/MA	-	-	-	-
	Total	10	100.0	100.0	

Source: Compiled by the researcher, 2024

The descriptive statistics offer a detailed overview of the demographic and professional backgrounds of teachers involved in the study on ICT integration in teaching and learning. The gender distribution was predominantly male, with 90% of the respondents being male and 10% female, indicating some gender diversity despite the imbalance. The age profile reveals that the

majority of teachers (80%) were between 26-30 years old, with smaller percentages in the age 20-25 (20%) age ranges, and none above 30. This suggests a predominantly young teaching staff, which could lead to higher turnover rates, particularly in rural areas where younger teachers may be less likely to remain long-term.

Regarding teaching experience, 60% of the teachers had 1-3 years of experience, followed by those with 4-6 years (40%) of experience. This indicates that while the teachers are relatively young, many have acquired a reasonable amount of teaching experience. All respondents held a first degree (BSC), with no higher or lower qualifications, suggesting adequate educational qualifications but a lack of advanced degrees that could enhance ICT integration. The study also ensured ICT department teachers only comprising 100% of the respondents, providing a balanced perspective on the challenges of ICT integration. Additionally, the majority of the respondents were unmarried or single (90%), likely reflecting the younger age profile, which might impact their commitment to long-term roles in rural areas. Overall, the study involved a young, relatively experienced group of teachers with a balanced departmental representation, though the lack of advanced degrees and the high proportion of unmarried teachers could pose challenges for the sustained integration of ICT in teaching and learning.

Table 4.3 Number of student respondents

Statistics				
		Grade Level	Age	Gender
N	Valid	81	81	81
	Missing	0	0	0

Source: Compiled by the researcher, 2024

Table 4. 4 Demographic characteristics of student respondents

Gender					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	49	60.5	60.5	60.5
	Female	32	39.5	39.5	100.0
	Total	81	100.0	100.0	
Age					
		Frequency	Percent	Valid Percent	Cumulative Percent
	15-20	66	81.5	81.5	81.5
	21-25	15	18.5	18.5	100.0
	Total	81	100.0	100.0	
Grade Level					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Grade 9	17	21.0	21.0	21.0
	Grade 10	20	24.7	24.7	45.7
	Grade 11	22	27.2	27.2	72.8
	Grade 12	22	27.2	27.2	100.0
	Total	81	100.0	100.0	

Source: Compiled by the researcher, 2024

The descriptive statistics provide a snapshot of the students' demographics and educational backgrounds in the study on ICT integration in teaching and learning. The study sample showed a higher proportion of male students (60.5%) compared to female students (39.5%), suggesting a potential gender disparity in school enrollment or participation. Most of the students were within the typical secondary education age range, with 81.5% aged between 15-20 years, and a smaller portion (18.5%) aged 21-25, indicating that the majority are progressing through their education at an expected pace.

In terms of educational level, the distribution of respondents across grades revealed a slight preference for students in the higher grades, with 27.2% from Grade 11 and 27.2% from Grade 12. This strategic emphasis on older students, who have more experience with the school's resources and teaching methods, likely, provided more insightful feedback regarding ICT integration. The inclusion of students predominantly from these higher grades was designed to yield a deeper understanding of the challenges and benefits of ICT use, particularly from those who have had more extensive exposure to the school's ICT resources and teaching practices.

Table 4. 5 Descriptive Statistics of student respondents

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Grade Level	81	1	4	2.60	1.103
Age	81	1	2	1.19	.391
Gender	81	1	2	1.40	.492
Valid N (listwise)	81				

Source: Compiled by the researcher, 2024

The descriptive statistics table provides an overview of three variables: grade level, age, and gender, based on a sample size of 81 respondents. The minimum grade level is 1, and the maximum is 4, with a mean of 2.60 and a standard deviation of 1.103. This suggests that respondents are spread across different grade levels, with the average respondent being slightly above the second grade level. The standard deviation indicates that there is some variability in the grade levels of the respondents. The age variable has a minimum of 1 and a maximum of 2, with a mean of 1.19 and a standard deviation of 0.391. This likely represents a binary coding for age groups (e.g., 1 = younger, 2 = older). The mean of 1.19 indicates that most respondents fall in the younger age group, with little variation as indicated by the low standard deviation. The gender variable also has a minimum of 1 and a maximum of 2, with a mean of 1.40 and a standard deviation of 0.492. This binary coding likely represents male (1) and female (2). The mean suggests that there are slightly more male respondents than female respondents, and the standard deviation indicates moderate variation in gender distribution. Overall, the sample shows a diverse range in grade levels, a younger age group predominating, and a relatively balanced gender distribution.

Table 4.6 Number of director respondents

Statistics							
		Admin Level	Age	Gender	Marital Status	Educational level	Years of service
N	Valid	5	5	5	5	5	5
	Missing	0	0	0	0	0	0

Source: Compiled by the researcher, 2024

Table 4. 7 Demographic characteristics of directors’ respondents

Gender of Respondents					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	4	80.0	80.0	80.0
	Female	1	20.0	20.0	100.0
	Total	5	100.0	100.0	
Age of Respondents					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	26-30	1	20.0	20.0	20.0
	31-35	2	40.0	40.0	60.0
	36-40	2	40.0	40.0	100.0
	Total	5	100.0	100.0	
Experiences of Respondents					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	10-13	3	60.0	60.0	60.0
	14-16	2	40.0	40.0	100.0
	Total	5	100.0	100.0	
Admin level of Respondents					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Director	4	80.0	80.0	80.0
	V/director	1	20.0	20.0	100.0
	Total	5	100.0	100.0	
Marital Status of Respondents					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Married	4	80.0	80.0	80.0
	Single	1	20.0	20.0	100.0
	Total	5	100.0	100.0	
Educational level					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	BSC/BA	4	80.0	80.0	80.0
	MSC/MA	1	20.0	20.0	100.0
	Total	5	100.0	100.0	

Source: Compiled by the researcher, 2024

In the above table, the demographic characteristics of the school directors show that the majority, 80% (4 respondents), are male, while 20% (1 respondent) are female, indicating that most of the directors in this study are male. In terms of age, the respondents are spread across three categories: 20% are between 26–30 years old, 40% are aged 31–35, and another 40% are aged 36–40. This suggests that most directors fall within the mid-career age range of 31–40 years, indicating a balance of youth and experience in school leadership. Regarding their experience, 60% of the respondents have 10–13 years of experience; while 40% have 14–16 years of experience,

demonstrating that all the directors are highly experienced, with none having fewer than 10 years in their roles. Administratively, 80% of the interview respondents are school directors, and 20% are vice directors, showing that most of the respondents hold top management positions. Additionally, 80% of the respondents are married, while 20% are single, implying that most directors are balancing family and professional responsibilities. In terms of educational qualifications, 80% hold a Bachelor of Science or Bachelor of Arts degree, and 20% hold a Master of Arts degree, indicating that the majority have undergraduate degrees, with a small portion holding advanced degrees. Overall, the data suggests that the directors in this study are predominantly male, experienced, married, and hold at least a bachelor's degree, with most being in the mid-career stage of their professional lives.

Table 4. 8 Descriptive Statistics of director respondents

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Admin Level	5	1	2	1.20	.447
Age	5	2	3	2.80	.447
Gender	5	1	2	1.20	.447
Marital Status	5	1	2	1.20	.447
Educational level	5	1	2	1.20	.447
Years of service	5	3	5	4.00	.707
Valid N (listwise)	5				

Source: Compiled by the researcher, 2024

The descriptive statistics provide a detailed view of the directors' backgrounds in the context of ICT integration in secondary schools. The study shows a predominance of male directors, with 80% being male and only 20% female. This indicates a significant gender imbalance at the administrative level, with very few female directors, highlighting a low level of female participation in school leadership roles. The majority of directors are relatively young, with 20% aged 26-30 and 40% each in the 31-35 and 36-40 age brackets. No directors are above the age of 40. This younger demographic suggests a potentially high turnover rate, as younger directors may be less likely to remain long-term in rural areas. Most directors have substantial experience, with 60% having 10-13 years and 40% having 14-16 years of experience. This demonstrates that the directors involved in the study are well-experienced in school administration, which can provide valuable insights into the challenges of ICT integration. The majority of directors hold a first degree (80%), with 20% having a master's degree (MA). This indicates that while many directors have the necessary qualifications, a smaller proportion have advanced degrees, which could impact

their ability to address complex ICT integration issues. The majority of respondents are at the director level (80%), with the remaining 20% at the vice director level. This distribution reflects a focus on those with primary administrative responsibilities, offering a perspective on ICT integration from the top administrative echelon. A significant majority of the directors are married (80%), while 20% are unmarried or single. This marital status distribution may influence their professional stability and commitment to their roles.

Conclusion: The study highlights a significant gender imbalance in school administration, with a predominance of male directors and very few female leaders. The relatively young age of directors, combined with their considerable experience, suggests a dynamic but potentially transient leadership. The educational background predominantly consists of first-degree holders, with some advanced degrees, which may influence their approach to ICT integration. The focus on directors, rather than vice directors, ensures insights from the highest administrative level. The high proportion of married directors may contribute to their stability in their roles. Overall, the study indicates that while directors are experienced and predominantly male, there are challenges related to gender diversity, age-related turnover, and the need for advanced educational qualifications in addressing ICT integration effectively.

Table 4. 9 Accesses to ICT Tools

I have access to a computer or tablet at home or schoolwork					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	32	39.5	39.5	39.5
	Disagree	39	48.1	48.1	87.7
	Neutral	6	7.4	7.4	95.1
	Agree	2	2.5	2.5	97.5
	Strongly Agree	2	2.5	2.5	100.0
	Total	81	100.0	100.0	
The school provides enough ICT tools for all students to use					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	35	43.2	43.2	43.2
	Disagree	38	46.9	46.9	90.1
	Neutral	4	4.9	4.9	95.1
	Agree	2	2.5	2.5	97.5
	Strongly Agree	2	2.5	2.5	100.0
	Total	81	100.0	100.0	
	I have reliable access to the internet at school				
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	35	43.2	43.2	43.2
	Disagree	38	46.9	46.9	90.1
	Neutral	2	2.5	2.5	92.6
	Agree	4	4.9	4.9	97.5
	Strongly Agree	2	2.5	2.5	100.0
	Total	81	100.0	100.0	
	I often use a smartphone for school-related activities				
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	33	40.7	40.7	40.7
	Disagree	39	48.1	48.1	88.9
	Neutral	7	8.6	8.6	97.5
	Agree	1	1.2	1.2	98.8
	Strongly Agree	1	1.2	1.2	100.0
	Total	81	100.0	100.0	

Source: Compiled by the researcher, 2024

The analysis of the above table 4.1 Likert scale results reveals significant challenges regarding access to ICT tools for educational purposes. In terms of access to a computer or tablet at home or school, nearly 88% of respondents either strongly disagreed (39.5%) or disagreed (48.1%), indicating that the vast majority feel they lack access to such devices. Only 2.5% agreed or strongly agreed that they have access, while 7.4% remained neutral. This highlights the limited availability of computers or tablets for schoolwork.

When asked if the school provides enough ICT tools for all students, over 90% of respondents strongly disagreed (43.2%) or disagreed (46.9%), reflecting widespread dissatisfaction with the availability of ICT resources. Only 2.5% agreed or strongly agreed, with neutral responses making up 4.9%. This demonstrates a clear consensus that the schools do not provide adequate ICT tools for their students. Regarding reliable internet access at school, the responses were similarly negative, with 43.2% strongly disagreeing and 46.9% disagreeing. Only a small minority (4.9%) agreed and 2.5% strongly agreed that they have reliable internet access, while 2.5% were neutral. This suggests that most respondents lack reliable internet access at school.

Finally, when it comes to using smartphones for school-related activities, 40.7% strongly disagreed and 48.1% disagreed, with nearly 89% of students stating that they do not use smartphones for educational purposes. A small fraction (1.2%) agreed or strongly agreed, while 8.6% remained neutral. This indicates that smartphone use for schoolwork is uncommon.

Overall, the data suggests that access to ICT tools, including computers, tablets, internet, and smartphones, is highly limited among respondents. Both home and school environments appear to provide insufficient resources for effective ICT integration in education. This lack of access could significantly hinder the use of technology in teaching and learning, especially in rural areas where infrastructure and resources may be scarce.

Table 4. 10 Technical Challenges

I frequently encounter technical issues when using ICT tools					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	2.5	2.5	2.5
	Disagree	1	1.2	1.2	3.7
	Neutral	3	3.7	3.7	7.4
	Agree	43	53.1	53.1	60.5
	Strongly Agree	32	39.5	39.5	100.0
	Total	81	100.0	100.0	
The ICT tools provided by the school are often outdated or malfunctioning					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	3.7	3.7	3.7
	Disagree	2	2.5	2.5	6.2
	Neutral	4	4.9	4.9	11.1
	Agree	41	50.6	50.6	61.7
	Strongly Agree	31	38.3	38.3	100.0
	Total	81	100.0	100.0	
	I know how to troubleshoot basic technical problems with ICT tools				
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	35	43.2	43.2	43.2
	Disagree	38	46.9	46.9	90.1
	Neutral	2	2.5	2.5	92.6
	Agree	4	4.9	4.9	97.5
	Strongly Agree	2	2.5	2.5	100.0
	Total	81	100.0	100.0	
Slow or unstable internet connections hinder my ability to complete schoolwork					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	3.7	3.7	3.7
	Disagree	1	1.2	1.2	4.9
	Neutral	4	4.9	4.9	9.9
	Agree	42	51.9	51.9	61.7
	Strongly Agree	31	38.3	38.3	100.0
	Total	81	100.0	100.0	

Source: Compiled by the researcher, 2024

The analysis of the above table 4.2 Likert scale results shows that a majority of respondents (53.1%) agreed, and 39.5% strongly agreed, that they frequently encounter technical issues when using ICT tools, indicating that most students face regular challenges. Only a small percentage strongly disagreed (2.5%) or disagreed (1.2%), suggesting that few students do not experience these problems, while 3.7% remained neutral. This data highlights that technical difficulties are common for most students.

Regarding the ICT tools provided by the school, more than half of the respondents (50.6%) agreed, and 38.3% strongly agreed, that the tools are often outdated or malfunctioning, reflecting a widespread perception of inadequate or faulty equipment. A small minority strongly disagreed (3.7%) or disagreed (2.5%), with 4.9% neutral. This indicates that the majority of respondents feel that the school's ICT tools are outdated or do not function well.

In terms of troubleshooting basic technical problems, a large portion of respondents strongly disagreed (43.2%) or disagreed (46.9%) that they know how to address such issues, showing a lack of confidence and skills in resolving technical problems. Only 4.9% agreed, and 2.5% strongly agreed that they have troubleshooting abilities, with 2.5% neutral. This highlights a significant skills gap in technical problem-solving among the respondents.

Furthermore, over half of the students (51.9%) agreed, and 38.3% strongly agreed, that slow or unstable internet connections hinder their ability to complete schoolwork. Only a small fraction strongly disagreed (3.7%) or disagreed (1.2%), and 4.9% remained neutral. This suggests that unreliable internet access is a major barrier for most students in completing their schoolwork.

Overall, the data shows that most students face frequent technical challenges with ICT tools, with outdated or malfunctioning equipment being a notable concern. Additionally, the lack of technical troubleshooting skills among students compounds these difficulties, and slow or unstable internet connections further hinder their ability to complete schoolwork effectively. These findings point to the need for improved ICT infrastructure and training to help students develop basic technical skills to overcome these obstacles.

Table 4. 11 Digital Literacy and Skills

I feel confident in using computers and other ICT tools for my studies					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	21	25.9	25.9	25.9
	Disagree	20	24.7	24.7	50.6
	Neutral	-	-	-	-
	Agree	24	29.6	29.6	80.2
	Strongly Agree	16	19.8	19.8	100.0
	Total	81	100.0	100.0	
I have received adequate training on how to use ICT tools for learning					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	35	43.2	43.2	43.2
	Disagree	38	46.9	46.9	90.1
	Neutral	4	4.9	4.9	95.1
	Agree	2	2.5	2.5	97.5
	Strongly Agree	2	2.5	2.5	100.0
	Total	81	100.0	100.0	
	I can easily learn how to use new software or applications in school				
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	39	48.1	48.1	87.7
	Disagree	6	7.4	7.4	95.1
	Neutral	2	2.5	2.5	97.5
	Agree	2	2.5	2.5	100.0
	Strongly Agree	81	100.0	100.0	
	Total	81	100.0	100.0	
	I can easily learn how to use new software or applications in school				
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	35	43.2	43.2	43.2
	Disagree	38	46.9	46.9	90.1
	Neutral	4	4.9	4.9	95.1
	Agree	2	2.5	2.5	97.5
	Strongly Agree	2	2.5	2.5	100.0
	Total	81	100.0	100.0	
	I can develop my confidence in using ICT technology				
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	5	6.2	6.2	6.2
	Disagree	7	8.6	8.6	14.8
	Neutral	-	-	-	-
	Agree	57	70.4	70.4	85.2
	Strongly Agree	12	14.8	14.8	100.0
	Total	81	100.0	100.0	

Source: Compiled by the researcher, 2024

Analysis of the above table 4.3 results shows that a significant portion of respondents agree (29.6%) and strongly agree (19.8%) that they feel confident using ICT tools, indicating a positive self-assessment by nearly half of the respondents. However, a combined 50.6% strongly disagree (25.9%) and disagree (24.7%), showing that many students still lack confidence. Summary: Confidence in using ICT tools is fairly balanced, with a substantial number of students feeling confident, but a similarly large portion not confident in their ICT abilities. A vast majority of respondents strongly disagree (43.2%) and disagree (46.9%) that they have received adequate training, indicating a severe lack of training opportunities. Only 2.5% agree and strongly agree, while 4.9% are neutral. Summary: Most students report inadequate training on how to use ICT tools for learning, suggesting a significant gap in educational resources. A large percentage of respondents strongly disagree (48.1%) and disagree (7.4%), showing that many students struggle with learning new software. A very small proportion agree (2.5%) or strongly agree (2.5%) with this statement, while 2.5% remain neutral. Summary: The majority of students find it difficult to learn new software or applications, with few expressing ease in adapting to new technologies. Strong majorities agree (70.4%) and strongly agree (14.8%) that they can develop confidence in using ICT tools, reflecting optimism among students about their potential to improve. Only a small number strongly disagree (6.2%) and disagree (8.6%) with this statement. Summary: Most students are confident in their ability to develop their skills and confidence with ICT tools over time, indicating a positive outlook despite current challenges.

The results indicate that while many students feel confident in using ICT tools (49.4% agree or strongly agree), a significant number (50.6%) lack confidence, revealing a mixed experience with ICT usage. Moreover, the data highlights a clear gap in training, as the vast majority of respondents report insufficient preparation for using ICT tools in their studies.

Students also seem to struggle with learning new software, with nearly half strongly disagreeing that they can easily learn new applications. This points to a lack of both training and adaptability in ICT skills. However, on a positive note, most students believe they can develop confidence in using ICT tools, suggesting a strong potential for growth if given proper support and training.

In summary, the data reflects a need for improved ICT training and support in schools, as well as initiatives to build students' skills and confidence in using new technologies. While there are challenges in adapting to ICT tools, students' willingness to improve is a promising sign for future development.

Table 4. 12 Educational Content and Resources

I find it difficult to find educational materials online that align with my curriculum					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	3.7	3.7	3.7
	Disagree	2	2.5	2.5	6.2
	Neutral	1	1.2	1.2	7.4
	Agree	42	51.9	51.9	59.3
	Strongly Agree	33	40.7	40.7	100.0
	Total	81	100.0	100.0	
The digital content we use is interesting and engaging					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	4	4.9	4.9	4.9
	Disagree	8	9.9	9.9	14.8
	Neutral	11	13.6	13.6	28.4
	Agree	48	59.3	59.3	87.7
	Strongly Agree	10	12.3	12.3	100.0
	Total	81	100.0	100.0	
	I can't access educational content online due to lack of connectivity				
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	3.7	3.7	3.7
	Disagree	2	2.5	2.5	6.2
	Neutral	1	1.2	1.2	7.4
	Agree	42	51.9	51.9	59.3
	Strongly Agree	33	40.7	40.7	100.0
	Total	81	100.0	100.0	
	The offline resources provided by the school are helpful for my studies				
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	35	43.2	43.2	43.2
	Disagree	38	46.9	46.9	90.1
	Neutral	4	4.9	4.9	95.1
	Agree	2	2.5	2.5	97.5
	Strongly Agree	2	2.5	2.5	100.0
	Total	81	100.0	100.0	

Source: Compiled by the researcher, 2024

In the above table, table 4.4, significant portion of respondents agree (51.9%) and strongly agree (40.7%) that they struggle to find online educational materials aligned with their curriculum. This suggests that a large majority of students face difficulties accessing appropriate resources. Only a small percentage strongly disagree (3.7%) and disagree (2.5%), while 1.2% remain neutral. The results shows that most students struggle to find online educational materials that align with their curriculum, reflecting a common challenge in accessing relevant resources. A majority of

respondents agree (59.3%) that the digital content used in their studies is interesting and engaging, with 12.3% strongly agreeing. However, a smaller percentage strongly disagree (4.9%) and disagree (9.9%), while 13.6% remain neutral. The results shows that the majority of students find digital content engaging, although there is a notable minority who either disagree or feel neutral about its quality. Large proportions of respondents agree (51.9%) and strongly agree (40.7%) that they struggle to access online educational content due to connectivity issues. This highlights a significant barrier to digital learning. Only a small fraction strongly disagree (3.7%) and disagree (2.5%), with 1.2% remaining neutral. The results shows that most students face challenges accessing educational content online because of connectivity issues, presenting a key obstacle in using ICT tools for learning. A vast majority of respondents strongly disagree (43.2%) and disagree (46.9%) that the offline resources provided by the school are helpful, showing widespread dissatisfaction with offline materials. Only 2.5% agree or strongly agree, and 4.9% are neutral. The results shows that the offline resources provided by schools are generally perceived as unhelpful by most students, indicating a gap in the quality of available non-digital educational materials.

Overall, the results indicate that a majority of students face difficulties in finding online educational materials aligned with their curriculum, exacerbating the challenges of using ICT tools for learning. Moreover, issues with internet connectivity are a significant barrier, as most respondents report difficulties accessing online resources due to lack of reliable connectivity.

Interestingly, students generally find digital content engaging, which is a positive sign that, once accessed, digital resources can hold their attention and enhance learning. However, there is clear dissatisfaction with offline resources, which are not viewed as adequate or helpful for most students. In summary, these findings suggest that while students are open to and interested in digital content, issues like connectivity and the alignment of online materials with the curriculum are major challenges. The poor quality of offline resources further compounds these difficulties, pointing to a need for better offline and online support to ensure equitable access to quality educational materials.

Table 4. 13 Motivation and Engagement

Using ICT tools makes learning more enjoyable for me					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	5	6.2	6.2	6.2
	Disagree	5	6.2	6.2	12.3
	Neutral	-	-	-	-
	Agree	41	50.6	50.6	63.0
	Strongly Agree	30	37.0	37.0	100.0
	Total	81	100.0	100.0	
I am motivated to use ICT tools for my schoolwork					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	7	8.6	8.6	8.6
	Disagree	8	9.9	9.9	18.5
	Neutral	-	-	-	-
	Agree	39	48.1	48.1	66.7
	Strongly Agree	27	33.3	33.3	100.0
	Total	81	100.0	100.0	
	I prefer using ICT tools over traditional learning methods				
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	6	7.4	7.4	7.4
	Disagree	7	8.6	8.6	16.0
	Neutral	-	-	-	-
	Agree	40	49.4	49.4	65.4
	Strongly Agree	28	34.6	34.6	100.0
	Total	81	100.0	100.0	
I get distracted easily when using ICT tools for learning					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	19	23.5	23.5	23.5
	Disagree	55	67.9	67.9	91.4
	Neutral	4	4.9	4.9	96.3
	Agree	3	3.7	3.7	100.0
	Strongly Agree	-	-	-	-
	Total	81	100.0	100.0	

Source: Compiled by the researcher, 2024

In the above table, significant majority of respondents agree (50.6%) and strongly agree (37.0%) that using ICT tools enhances the enjoyment of their learning experience. This indicates a positive reception towards the integration of technology in education. Only a small fraction strongly disagree (6.2%) and disagree (6.2%), with no respondents remaining neutral. As a result data shows that most students find ICT tools to be enjoyable for learning, with minimal dissent. The majorities of students are either motivated (48.1%) or strongly motivated (33.3%) to use ICT tools for their schoolwork. However, a smaller group either strongly disagrees (8.6%) or disagrees

(9.9%), which points to a minority who are less enthusiastic or motivated about using these tools. Therefore, most students are motivated to use ICT tools for their schoolwork, although a small number show less enthusiasm. A notable portion of students prefers ICT tools (49.4%) or strongly prefers those (34.6%) over traditional learning methods. Conversely, a smaller percentage strongly disagree (7.4%) and disagree (8.6%), indicating that while the majority favor ICT, some students still favor traditional approaches. As a result, the majority of students prefer ICT tools to traditional methods, though a minority still favors conventional learning. Most respondents strongly disagree (23.5%) or disagree (67.9%) that they get easily distracted when using ICT tools, showing that the majority can maintain focus during digital learning. Only a small number agree (3.7%), and 4.9% are neutral. This shows that the majority of students do not find ICT tools distracting, with only a few reporting focus issues.

Overall, the results indicate a strong positive attitude towards ICT tools, with most students finding them enjoyable and motivating for their studies. A significant portion of students prefers ICT tools over traditional learning methods and generally does not experience distraction from digital tools. Despite these positive findings, a small percentage of students remain unmotivated or prefer traditional methods. This suggests that while ICT tools are broadly welcomed and beneficial, it is important to address the preferences and needs of all students to ensure equitable and effective integration of technology in education. Overall, the data highlights a promising opportunity for schools to further leverage ICT tools to enhance learning outcomes while considering diverse learning preferences.

Table 4. 14 Environmental and Infrastructural Challenges

Power outages in our area often disrupt my ability to use ICT tools					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	5	6.2	6.2	6.2
	Disagree	5	6.2	6.2	12.3
	Neutral	3	3.7	3.7	16.0
	Agree	43	53.1	53.1	69.1
	Strongly Agree	25	30.9	30.9	100.0
	Total	81	100.0	100.0	
The school infrastructure supports the effective use of ICT tools					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	8	9.9	9.9	9.9
	Disagree	9	11.1	11.1	21.0
	Neutral	2	2.5	2.5	23.5
	Agree	37	45.7	45.7	69.1
	Strongly Agree	25	30.9	30.9	100.0
	Total	81	100.0	100.0	
The rural environment limits my access to ICT tools compared to urban students					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	6	7.4	7.4	7.4
	Disagree	8	9.9	9.9	17.3
	Neutral	2	2.5	2.5	19.8
	Agree	39	48.1	48.1	67.9
	Strongly Agree	26	32.1	32.1	100.0
	Total	81	100.0	100.0	
I have a quiet and conducive environment at home for using ICT tools for study					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	17	21.0	21.0	21.0
	Disagree	50	61.7	61.7	82.7
	Neutral	6	7.4	7.4	90.1
	Agree	6	7.4	7.4	97.5
	Strongly Agree	2	2.5	2.5	100.0
	Total	81	100.0	100.0	

Source: Compiled by the researcher, 2024

A large number of respondents agree (53.1%) or strongly agree (30.9%) that power outages frequently disrupt their ability to use ICT tools. This highlights a significant issue affecting their use of technology. Only a small percentage strongly disagree (6.2%) or disagree (6.2%), with a minimal number remaining neutral (3.7%). This shows that Power outages are a common and notable disruption for many students, impacting their ability to use ICT tools effectively. A majority of respondents agree (45.7%) or strongly agree (30.9%) that the school's infrastructure supports the effective use of ICT tools. However, a smaller portion strongly disagree (9.9%) or

disagree (11.1%), with only a small number remaining neutral (2.5%). Therefore, most students feel that their school infrastructure supports ICT use; there is a noticeable minority who feel that it does not, indicating potential areas for improvement. Nearly half of the respondents agree (48.1%) or strongly agree (32.1%) that living in a rural environment limits their access to ICT tools compared to urban students. A smaller portion strongly disagree (7.4%) or disagree (9.9%), with only 2.5% remaining neutral. As a result Students in rural areas perceive significant limitations in their access to ICT tools compared to their urban counterparts, reflecting a disparity in resources. A majority of respondents disagree (61.7%) or strongly disagree (21.0%) that they have a quiet and conducive environment at home for using ICT tools. A smaller number are neutral (7.4%) or agree (7.4%), with only 2.5% strongly agreeing. Therefore, many students do not have a quiet and conducive home environment for using ICT tools, which could hinder their study effectiveness.

Overall, the data reveals several challenges faced by students in their use of ICT tools. Frequent power outages significantly disrupt access to technology, highlighting a critical infrastructure issue. While the school infrastructure is generally perceived to support ICT use, there are still concerns among a minority of students, suggesting that improvements may be needed. The rural-urban divide in access to ICT tools is evident, with rural students feeling disadvantaged compared to their urban peers. Additionally, a significant number of students report lacking a quiet and conducive home environment for study, which could further impact their ability to use ICT tools effectively. The findings point to major obstacles such as power outages, insufficient infrastructure support, and rural-urban disparities in access to ICT tools. Addressing these issues, along with creating a more supportive home environment for studying, could significantly enhance the effectiveness of ICT integration in education.

Table 4. 15 Improving Access to ICT Tools

Providing more computers and tablets in schools will improve student access to ICT tools					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	3.7	3.7	3.7
	Disagree	4	4.9	4.9	8.6
	Neutral	3	3.7	3.7	12.3
	Agree	47	58.0	58.0	70.4
	Strongly Agree	24	29.6	29.6	100.0
	Total	81	100.0	100.0	
Offering affordable or subsidized internet plans for students would enhance their ability to use ICT tools at home					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	3.7	3.7	3.7
	Disagree	7	8.6	8.6	12.3
	Neutral	2	2.5	2.5	14.8
	Agree	42	51.9	51.9	66.7
	Strongly Agree	27	33.3	33.3	100.0
	Total	81	100.0	100.0	
Establishing community ICT centers would provide students with better access to digital resources					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	5	6.2	6.2	6.2
	Disagree	6	7.4	7.4	13.6
	Neutral	1	1.2	1.2	14.8
	Agree	43	53.1	53.1	67.9
	Strongly Agree	26	32.1	32.1	100.0
	Total	81	100.0	100.0	
Implementing a loan program for ICT devices would help students who cannot afford their own					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	2.5	2.5	2.5
	Disagree	4	4.9	4.9	7.4
	Neutral	3	3.7	3.7	11.1
	Agree	46	56.8	56.8	67.9
	Strongly Agree	26	32.1	32.1	100.0
	Total	81	100.0	100.0	

Source: Compiled by the researcher, 2024

In the above table, a significant portion of respondents agree (58.0%) or strongly agree (29.6%) that increasing the number of computers and tablets in schools would enhance student access to ICT tools. Only a small percentage strongly disagree (3.7%) or disagree (4.9%), with 3.7% remaining neutral. Therefore, the majority of students believe that more computers and tablets in schools would improve their access to ICT tools, indicating strong support for increasing the availability of these resources. A considerable number of respondents agree (51.9%) or strongly agree (33.3%)

that affordable or subsidized internet plans would improve their ability to use ICT tools at home. A small percentage strongly disagree (3.7%) or disagree (8.6%), with 2.5% remaining neutral. As a result, there is strong support for the idea that affordable or subsidized internet plans would help students access ICT tools more effectively at home, reflecting recognition of the financial barriers to internet access. A majority of respondents agree (53.1%) or strongly agree (32.1%) that establishing community ICT centers would enhance their access to digital resources. A smaller proportion strongly disagree (6.2%) or disagree (7.4%), with 1.2% remaining neutral. The idea of community for ICT centers is well-supported, with most students believing that such centers would improve their access to digital resources, suggesting a need for more community-based solutions. A large number of respondents agree (56.8%) or strongly agree (32.1%) that a loan program for ICT devices would benefit students who cannot afford their own. Only a small percentage strongly disagree (2.5%) or disagree (4.9%), with 3.7% remaining neutral. The result shows there is substantial support for a loan program for ICT devices, indicating that such an initiative could help address financial barriers and improve access to necessary technology for students.

Overall, the results highlight several key areas where increased support could significantly enhance students' access to ICT tools. There is a strong consensus that providing more computers and tablets in schools, offering affordable or subsidized internet plans, and establishing community ICT centers would greatly improve students' access to technology. Additionally, implementing a loan program for ICT devices is seen as a valuable way to support students who face financial constraints. These findings underscore the importance of addressing both the availability of physical devices and the affordability of internet access. While most students see clear benefits from these proposed solutions, there are only minor concerns or disagreements, suggesting broad agreement on the need for expanded access to ICT resources. In summary, the data supports the need for comprehensive strategies to improve access to ICT tools, including increasing device availability in schools, offering financial assistance for internet access, and establishing community resources and support programs. These measures are likely to address existing barriers and enhance students' ability to effectively utilize ICT tools for their education.

Table 4. 16 Enhancing Technical Support and Infrastructure

Investing in solar-powered or alternative energy solutions in our area would ensure reliable ICT use with frequent power outages					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	3.7	3.7	3.7
	Disagree	4	4.9	4.9	8.6
	Neutral	3	3.7	3.7	12.3
	Agree	47	58.0	58.0	70.4
	Strongly Agree	24	29.6	29.6	100.0
	Total	81	100.0	100.0	
Training students and teachers in basic troubleshooting skills would minimize disruptions due to technical problems					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	3.7	3.7	3.7
	Disagree	7	8.6	8.6	12.3
	Neutral	2	2.5	2.5	14.8
	Agree	42	51.9	51.9	66.7
	Strongly Agree	27	33.3	33.3	100.0
	Total	81	100.0	100.0	
	Improving the reliability of the internet and power supply in rural areas would significantly enhance ICT usage				
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	5	6.2	6.2	6.2
	Disagree	6	7.4	7.4	13.6
	Neutral	1	1.2	1.2	14.8
	Agree	43	53.1	53.1	67.9
	Strongly Agree	26	32.1	32.1	100.0
	Total	81	100.0	100.0	
	Offering regular ICT training sessions for students would improve their ability to use digital tools effectively				
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	2.5	2.5	2.5
	Disagree	4	4.9	4.9	7.4
	Neutral	3	3.7	3.7	11.1
	Agree	46	56.8	56.8	67.9
	Strongly Agree	26	32.1	32.1	100.0
	Total	81	100.0	100.0	

Source: Compiled by the researcher, 2024

In the above table, a significant majority of respondents agree (58.0%) or strongly agree (29.6%) that investing in solar-powered or alternative energy solutions would ensure reliable ICT use in the face of frequent power outages. Only a small proportion strongly disagree (3.7%) or disagree (4.9%), with 3.7% remaining neutral. As a result, most students believe that solar-powered or

alternative energy solutions are crucial for maintaining reliable ICT use, reflecting a strong endorsement of such measures to address power outage issues. A large number of respondents agree (51.9%) or strongly agree (33.3%) that training students and teachers in basic troubleshooting skills would help minimize disruptions caused by technical problems. A small percentage strongly disagree (3.7%) or disagree (8.6%), with 2.5% remaining neutral. Therefore, There is strong support for providing troubleshooting training as a means to reduce technical disruptions, indicating that such training is seen as an effective way to handle ICT-related issues. A majority of respondents agree (53.1%) or strongly agree (32.1%) that improving the reliability of internet and power supply in rural areas would significantly enhance ICT usage. A smaller percentage strongly disagree (6.2%) or disagree (7.4%), with 1.2% remaining neutral. As a result, enhancing the reliability of internet and power supply is widely supported as a means to improve ICT usage, highlighting the need for better infrastructure to facilitate effective technology use in rural areas. Most respondents agree (56.8%) or strongly agree (32.1%) those regular ICT training sessions would improve students' ability to use digital tools effectively. Only a few strongly disagree (2.5%) or disagree (4.9%), with 3.7% remaining neutral. Therefore, regular ICT training sessions are viewed as beneficial for enhancing students' digital skills, suggesting that ongoing training is important for maximizing the effectiveness of ICT tools.

Overall, the results indicate a strong consensus on several key strategies for improving ICT use in rural areas. Investing in alternative energy solutions is seen as essential for overcoming power outages and ensuring consistent access to ICT tools. Similarly, improving the reliability of internet and power supply is recognized as crucial for enhancing ICT usage. Training students and teachers in troubleshooting and providing regular ICT training sessions are both supported as effective ways to minimize technical disruptions and improve digital tool usage. These findings reflect a broad agreement on the need for infrastructure improvements and educational support to better facilitate ICT use. The findings shows, the data highlights several important areas for intervention, including the adoption of alternative energy solutions, enhancement of internet and power infrastructure, and the implementation of regular training programs. These measures are likely to address current challenges and significantly improve the effectiveness of ICT tools in rural educational settings.

Table 4. 17 Challenges of access to ICT Tools

Limited access to ICT infrastructure is a significant challenge in our school					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	-	-	-	-
	Disagree	1	10.0	10.0	10.0
	Neutral	1	10.0	10.0	20.0
	Agree	5	50.0	50.0	70.0
	Strongly Agree	3	30.0	30.0	100.0
	Total	10	100.0	100.0	
Poor internet connectivity or lack of internet access affects our ability to use ICT tools effectively					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	-	-	-	-
	Disagree	1	10.0	10.0	10.0
	Neutral	1	10.0	10.0	20.0
	Agree	5	50.0	50.0	70.0
	Strongly Agree	3	30.0	30.0	100.0
	Total	10	100.0	100.0	
	Inadequate power supply is a major issue for using ICT tools in our school				
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	20.0	20.0	20.0
	Disagree	-	-	-	-
	Neutral	-	-	-	-
	Agree	5	50.0	50.0	70.0
	Strongly Agree	3	30.0	30.0	100.0
	Total	10	100.0	100.0	
	The amount of time allocated for practical use of computer use is insufficient				
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	-	-	-	-
	Disagree	-	-	-	-
	Neutral	1	10.0	10.0	10.0
	Agree	8	80.0	80.0	90.0
	Strongly Agree	1	10.0	10.0	100.0
	Total	10	100.0	100.0	

Source: Compiled by the researcher, 2024

In the above table, a majority of respondents agree (50.0%) or strongly agree (30.0%) that limited access to ICT infrastructure is a significant challenge at their school. Only 10% disagree, and another 10% remain neutral. There are no responses indicating strong disagreement. Therefore, the majority of respondents perceive limited access to ICT infrastructure as a significant challenge, highlighting the need for improved resources to support ICT use in the school. Similar to the previous statement, a significant portion of respondents agree (50.0%) or strongly agree (30.0%) that poor internet connectivity or lack of access affects their ability to use ICT tools effectively.

Only 10% disagree, and another 10% remain neutral. There are no responses of strong disagreement. This shows that, Poor internet connectivity is also seen as a major issue affecting ICT tool usage, reinforcing the need for better internet access to enhance effectiveness. Half of the respondents agree (50.0%) or strongly agree (30.0%) that inadequate power supply is a major issue. In contrast, 20% strongly disagree, and there are no other disagreement responses. As a result, inadequate power supply is a recognized problem for using ICT tools, but the presence of disagreement indicates that this issue may not be uniformly experienced. A substantial majority of respondents agree (80.0%) or strongly agree (10.0%) that the time allocated for practical use of computers is insufficient. Only 10% remain neutral, with no responses of disagreement or strong disagreement. There is a strong consensus that the allocated time for practical computer use is insufficient, pointing to a need for increased opportunities for hands-on practice.

Overall, the results indicate several significant challenges related to ICT use in the school environment. Limited access to ICT infrastructure, poor internet connectivity, and inadequate power supply are identified as major issues affecting the effectiveness of ICT tools. These challenges are compounded by insufficient time allocated for practical computer use, which further limits students' opportunities to engage with technology. The findings highlight a critical need for improvements in both infrastructure and resources to support effective ICT use. Addressing these issues through better infrastructure, reliable internet and power supply, and increased practical time could significantly enhance the educational value of ICT tools.

In summary, the data underscores the importance of addressing infrastructure limitations and resource allocation to improve ICT integration and effectiveness in schools. Enhancing these areas will be crucial in ensuring that students can fully benefit from the educational opportunities provided by technology.

Table 4. 18 Technical Challenges

The absence of an ICT technician in the computer lab affects practical training					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	-	-	-	-
	Disagree	-	-	-	-
	Neutral	2	20.0	20.0	20.0
	Agree	4	40.0	40.0	60.0
	Strongly Agree	4	40.0	40.0	100.0
	Total	10	100.0	100.0	
There is a shortage of functional computers in the computer laboratory					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	-	-	-	-
	Disagree	-	-	-	-
	Neutral	2	20.0	20.0	20.0
	Agree	3	30.0	30.0	50.0
	Strongly Agree	5	50.0	50.0	100.0
	Total	81	100.0	100.0	
	There is no dedicated ICT lab available for teachers to use				
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	-	-	-	-
	Disagree	-	-	-	-
	Neutral	-	-	-	-
	Agree	6	60.0	60.0	60.0
	Strongly Agree	4	40.0	40.0	100.0
	Total	10	100.0	100.0	

Source: Compiled by the researcher, 2024

The data shows that 40.0% of respondents agree, and another 40.0% strongly agree that the absence of an ICT technician affects practical training in the computer lab. Only 20.0% of respondents are neutral on this issue, with no responses indicating disagreement. Therefore, a significant majority of respondents believe that not having an ICT technician impacts the effectiveness of practical training, indicating a strong need for technical support in computer labs. Half of the respondents strongly agree, and 30.0% agree that there is a shortage of functional computers in the computer laboratory. Only 20.0% are neutral on this matter, with no responses of disagreement. As a result, the data suggests that a substantial number of respondents perceive a shortage of functional computers as a problem, highlighting the need for better resources in the computer lab. A majority of respondents agree (60.0%) or strongly agree (40.0%) that there is no dedicated ICT lab available for teachers. There are no neutral, disagree, or strongly disagree responses. This shows that, the lack of a dedicated ICT lab for teachers is widely recognized as an issue, suggesting a need for facilities that support teachers' use of technology.

Overall, the results highlight several critical issues affecting the use of ICT tools in the educational setting. The absence of an ICT technician is seen as a significant barrier to effective practical training, pointing to the need for technical support in maintaining and managing computer resources. Similarly, the shortage of functional computers is a major concern, affecting the ability of students and teachers to use technology effectively.

Moreover, the lack of a dedicated ICT lab for teachers further compounds these issues, indicating a gap in resources that could support instructional technology use.

In summary, the findings highlight the importance of addressing technical support, improving the availability of functional computers, and creating dedicated ICT spaces for teachers. These improvements are essential for enhancing the overall effectiveness and accessibility of ICT tools in education.

Table 4. 19 Improving Access to ICT Tools

Providing each teacher with a personal laptop or tablet would enhance ICT integration in teaching					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	-	-	-	-
	Disagree	1	10.0	10.0	10.0
	Neutral	1	10.0	10.0	20.0
	Agree	6	60.0	60.0	80.0
	Strongly Agree	2	20.0	20.0	100.0
	Total	10	100.0	100.0	
Ensuring reliable and high-speed internet access in schools would support better use of ICT tools					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	-	-	-	-
	Disagree	1	10.0	10.0	10.0
	Neutral	2	20.0	20.0	30.0
	Agree	4	40.0	40.0	70.0
	Strongly Agree	3	30.0	30.0	100.0
	Total	10	100.0	100.0	
	Establishing ICT resource centers in rural areas would provide teachers with access to necessary technology				
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	20.0	20.0	20.0
	Disagree	-	-	-	-
	Neutral	-	-	-	-
	Agree	4	40.0	40.0	60.0
	Strongly Agree	4	40.0	40.0	100.0
	Total	10	100.0	100.0	
Implementing school-wide policies to ensure equitable access to ICT tools for all teachers would be beneficial					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid					

	Strongly Disagree	-	-	-	-
	Disagree	1	10.0	10.0	10.0
	Neutral	1	10.0	10.0	20.0
	Agree	7	70.0	70.0	90.0
	Strongly Agree	1	10.0	10.0	100.0
	Total	10	100.0	100.0	
Improving the reliability of electricity and internet in rural areas would enhance the use of ICT tools in teaching					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	10.0	10.0	10.0
	Disagree	-	-	-	-
	Neutral	1	10.0	10.0	20.0
	Agree	5	50.0	50.0	70.0
	Strongly Agree	3	30.0	30.0	100.0
	Total	10	100.0	100.0	
Providing backup power solutions, like generators or solar panels, would ensure continuous use of ICT tools					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	-	-	-	-
	Disagree	-	-	-	-
	Neutral	1	10.0	10.0	10.0
	Agree	5	50.0	50.0	60.0
	Strongly Agree	4	40.0	40.0	100.0
	Total	10	100.0	100.0	

Source: Compiled by the researcher, 2024

A significant majority of respondents agree (60%) or strongly agree (20%) that providing each teacher with a personal laptop or tablet would enhance ICT integration in teaching. Only 10% of respondents disagree and another 10% are neutral. Therefore, there is strong support for the idea that personal laptops or tablets for teachers would improve ICT integration, with minimal disagreement or neutral responses. Most respondents agree (40%) or strongly agree (30%) that reliable and high-speed internet access is crucial for better use of ICT tools. A small number disagree (10%) or are neutral (20%). This shows that, ensuring high-speed internet is seen as important for effective ICT use, with a general consensus on its necessity despite a few neutral or negative responses. Half of the respondents agree (40%) or strongly agree (40%) that establishing ICT resource centers in rural areas would provide essential technology access. The remaining 20% strongly disagree, with no respondents indicating neutral positions. As a result, there is strong support for the creation of ICT resource centers in rural areas, although there is some disagreement, reflecting a mixed view on this approach. A majority of respondents agree (70%) or strongly agree (10%) that implementing equitable access policies for ICT tools would be beneficial. Only 10%

disagree and another 10% are neutral. Therefore, there is broad agreement on the need for school-wide policies to ensure equitable ICT access for teachers, with few dissenting opinions. Half of the respondents agree (50%) and 30% strongly agree that improving electricity and internet reliability in rural areas would enhance ICT use in teaching. Minorities of 10% strongly disagree and another 10% are neutral. As a result, improving infrastructure reliability is considered important for enhancing ICT use in teaching, with strong support despite some disagreement and neutral responses. A majority of respondents agree (50%) or strongly agree (40%) that backup power solutions would ensure continuous ICT tool usage. Only 10% are neutral, and there are no responses indicating disagreement. Therefore, there is strong support for backup power solutions to ensure uninterrupted use of ICT tools, with no significant opposition.

Overall, the data shows strong support for several measures to enhance ICT integration in teaching. Providing personal laptops or tablets for teachers, ensuring reliable internet access, and establishing ICT resource centers are widely endorsed as effective strategies. Similarly, improving infrastructure reliability and providing backup power solutions are seen as essential for maintaining ICT tool usage in challenging environments. The findings indicate an agreement on the importance of investing in both infrastructure and resources to support effective ICT integration in education. Addressing these areas could significantly improve the use of technology in teaching and learning environments.

4.3 Researcher’s Observation

Table 4. 20 The number of school’s ICT technology materials and Readiness

Model	Total	Ready for use		Not Ready for use	
		#	%	#	%
Desktop computer	252	100	39.7	152	60.3
Laptop computer	10	10	100%	0	0
Printer	7	5	71.4	2	28.6
Photocopy machine	3	3	100%	0	0
Plasma	51	0	0	51	100
Generator	5	2	40	3	60
Solar system	2	2	100	0	0
Television for staff class	2	1	50	1	50
Projector	0	0	0	0	0
Wi-Fi	0	0	0	0	0
White board for computer lab	0	0	0	0	0
Flash Disk used for plasma and other temporary data	59	9	15.2	50	84.8
Scanner	0	0	0	0	0

Source: Compiled by the researcher, 2024

Analysis and Summary of Equipment Readiness

The equipment readiness analysis reveals significant disparities in the operational status of various technology resources. Out of 252 desktop computers, only 39.7% are ready for use, with a concerning 60.3% not operational, highlighting a major issue with desktop computer readiness. In contrast, all 10 laptop computers are fully operational, suggesting this equipment is in good condition. Printers show a mixed performance with 71.4% operational and 28.6% not functioning, indicating a generally good state but with some need for improvement. All three photocopier machines are operational, indicating no issues in this area. However, all 51 plasma screens are non-functional, presenting a critical issue. Generators show that only 40% are ready for use, with 60% non-operational, which could affect power backup reliability. On a positive note, both solar systems are fully operational, indicating effectiveness in this energy solution. The situation is mixed for televisions used in staff classes, with 50% operational and 50% not functioning. There are no projectors, Wi-Fi access points, or whiteboards available for the computer lab, highlighting significant gaps. Flash disks show a stark contrast with only 15.2% operational and a vast 84.8% non-functional. Additionally, no scanners are available, further underscoring the technology gap.

In summary, the data reveals critical issues with desktop computers, plasma screens, and generators, requiring urgent attention and repairs. Although some equipment like laptops, photocopier machines, solar systems, and televisions for staff classes are functioning well, significant gaps in connectivity and essential classroom resources, such as projectors, Wi-Fi, whiteboards, and scanners, need to be addressed to enhance teaching and learning effectiveness.

Under this circumstance, teachers felt pressure because they might be disadvantaged when they did not use ICT (Jang, 2020). As mentioned in above table, among the five-selected rural area secondary schools covered in this study, only two Secondary Schools have solar system. However, those two (100%) was ready for use. However, the solar systems have no enough power to activate/enable lab computers and plasma TVs. They use them for photocopier machine, printer and light. The other device in selected rural area secondary school was television in teachers' staff class for entertaining teachers after classroom teaching. There was only two schools have television in their staff class. From those one is ready for use and the other one is not ready for use by cause of dish installation problem. The other ICT devices such as wireless internet, projector, and whiteboard for computer lab and scanner are not found in selected rural secondary schools of Enor woreda. The other and the last one is flash disk used for plasma and other temporary data. In all schools the total numbers of flash disks were 59. From those only five (15.2%) are ready for use and 50 (84.8%) were not ready for use and those flashes were purchased only for plasma

televisions. They cannot use flashes, because plasma televisions are not ready for use. It is clear that there are diverse factors that affect the implementation of ICT for education policy in particular the plasma mode of education (Ababa, 2017).

4.4 Discussion of interview obtained from school directors

As the schools director respondents mentioned, rural secondary school encounters several major obstacles in integrating ICT into teaching and learning. These include limited internet access, insufficient ICT equipment, unreliable energy supply, and high costs of ICT materials, lack of dedicated ICT labs, and insufficient skills and training among teachers. These issues significantly obstruct the effective use of technology and reduce the benefits for students. Addressing these challenges requires concerted efforts and support from government agencies, educational organizations, and community partners. By collaborating to overcome these barriers, we can foster a more supportive environment for ICT integration and enhance educational outcomes for our students.

The school's ICT integration efforts are hindered by unstable internet connectivity limited and outdated ICT tools, and insufficient technical support. Unreliable internet affects access to online resources and communication. The shortage of modern equipment restricts students' access to necessary technology and innovative teaching methods. Inadequate technical support leads to continual equipment interruption, further disrupting the learning process. To successfully integrate ICT into our educational practices, we need to improve infrastructure, enhance resource availability, and ensure reliable technical support. Collaboration from governmental and non-governmental organizations, as well as community involvement, is essential to overcoming these challenges and creating a more effective ICT environment in our school.

The school directors also responded that, teachers at rural secondary school face significant obstacles in effectively using ICT tools. These include limited training and professional development, inadequate access to equipment, technical issues with insufficient support, unreliable internet connectivity, challenges in curriculum integration, and varying student readiness and skills. These factors collectively hinder teachers' ability to incorporate technology into their lessons and deliver meaningful digital learning experiences. To address these challenges, a comprehensive approach is needed. This includes providing continuous training for teachers, improving access to technology, enhancing technical support, and ensuring reliable internet connectivity. By undertaking these issues, they can better support their teachers in using ICT tools effectively, ultimately improving the educational experience for their students.

Besides, the school receives support from the district and government for ICT integration in various forms, such as funding, infrastructure development, professional development, technical support, educational programs, and community engagement. However, these efforts are often insufficient, with gaps in funding, slow infrastructure improvements, infrequent and non-targeted professional development, limited technical support, and poorly coordinated community initiatives. These shortcomings hinder their ability to effectively integrate ICT into teaching and learning. To successfully integrate ICT into rural school, they require more comprehensive and consistent support from the district and government. This includes increased funding, faster infrastructure improvements, more frequent and targeted professional development, enhanced technical support, and stronger community collaboration. Addressing these areas will help them overcome existing challenges and better leverage for ICT to enhance educational outcomes for rural students.

Successful ICT integration in rural secondary school depends on several key resources: financial, technical, human, educational, and community engagement. Adequate funding is crucial for purchasing and maintaining ICT equipment and software. Reliable technical infrastructure, including stable internet, power supply, and technical support, is essential for effective ICT use. Skilled teachers and dedicated technical support staff are vital for integrating technology into teaching. High-quality digital educational resources enhance learning, and support from the community and stakeholders provides additional resources and creates a supportive environment. To effectively integrate ICT into rural school, they need a strong combination of financial, technical, human, and educational resources, as well as active engagement from the community and stakeholders. Securing these resources will enable them to successfully incorporate ICT into teaching and learning processes, ultimately improving the educational experience for students.

To overcome the challenges of ICT integration in rural secondary school, the directors employ a many-sided strategy. This includes improving infrastructure through technology upgrades and enhanced connectivity, offering ongoing professional development and supportive resources for teachers, ensuring both in-house and external technical support, fostering student engagement with digital literacy programs and interactive learning, securing additional resources through grants and community involvement, and conducting regular assessments to monitor and evaluate teachers' progress. By addressing these challenges with a comprehensive approach encompassing infrastructure improvements, professional development, technical support, student engagement, resource acquisition, and continuous evaluation, their aim is to create a more effective and sustainable ICT integration environment. This strategy will enhance teaching, learning and better prepare of students for the future.

To enhance ICT integration at rural school, key changes are needed: upgrading infrastructure with modern equipment and better internet connectivity, increasing professional development for teachers, expanding technical support, and integrating ICT more effectively into the curriculum. Additionally, focusing on student digital literacy, providing engaging learning tools, and fostering community and stakeholder engagement are crucial. These changes will help create a more effective and supportive environment for using ICT in education. By implementing these improvements, upgrading technology, enhancing teacher training, expanding technical support, and better integrating ICT into the curriculum, along with strengthening community involvement—they can develop a strong ICT integration strategy. This approach will enhance teaching and learning and better prepare our students for success in the digital world.

To maximize the benefits of ICT tools for students, they focus on several key strategies: aligning technology with educational goals, effectively monitoring and using ICT tools, providing ongoing professional development for teachers, tailoring technology to individual student needs, ensuring equitable access, promoting digital literacy, and involving parents. These strategies help ensure that ICT tools enhance learning outcomes, support personalized and differentiated instruction, and provide equal opportunities for all students. By aligning ICT tools with educational objectives, offering continuous teacher training, customizing technology to meet student needs, and engaging parents, they can ensure that technology effectively contributes to student learning and overall educational development. These comprehensive strategies are essential for optimizing the impact of ICT tools in rural secondary school.

To address ICT integration and challenges, school directors should: conduct a needs assessment and create a strategic plan aligned with educational goals; secure and manage resources efficiently, prioritizing key investments; invest in ongoing professional development for teachers; focus on personalized learning and digital literacy; address technical issues with reliable support and maintenance plans; and engage the community and parents through partnerships and communication. Monitoring and evaluating progress will ensure that strategies are effective and adaptable. By employing a strategic approach to planning, resource management, teacher training, and community engagement, school directors can successfully integrate ICT into their schools. This will enhance educational practices and better equip students for the digital era.

Using ICT tools in the school presents additional challenges including cultural and attitudinal barriers, student access and equity issues, sustainability and permanence concerns, security and privacy risks, the need for contextual adaptation, and limitations in exploring innovative approaches. Addressing these difficulties involves overcoming resistance to technology, ensuring

equitable access for all students, maintaining long-term viability of ICT initiatives, protecting student data, adapting technology to the local context, and managing resource constraints. To effectively integrate ICT tools, a comprehensive and adaptive approach is needed. This includes engaging with the community, strategically planning, addressing cultural resistance, and focusing on sustainability, security, and contextual relevance. By attacking these challenges, the school can enhance support for students and staff, ensuring that ICT integration is both effective and permanent.

4.5 General Finding

Limited Practical Skills: Students in rural area secondary schools often exhibit limited practical skills in using ICT tools. While they may have some theoretical understanding, their ability to apply this knowledge in practical scenarios is often underdeveloped. This can be attributed to insufficient hands-on learning opportunities, lack of access to functioning ICT facilities, and inadequate exposure to real-world ICT applications.

Low Confidence Levels: Many students lack confidence in their ability to use ICT tools effectively. This is often due to sporadic access to technology, outdated or malfunctioning equipment, and a lack of consistent guidance from teachers who themselves may not be fully trained in ICT.

Digital Literacy Gaps: There is a significant gap in digital literacy among students, particularly in areas such as using software applications, conducting online research, and understanding digital safety and ethics. This gap is often wider in rural areas due to less exposure to ICT both at school and in their personal lives.

Limited Access to ICT Infrastructure: One of the biggest challenges is the limited availability of ICT infrastructure, including computers, internet access, and related technologies. Rural schools often have fewer resources and outdated equipment, which hinders students' ability to learn and practice ICT skills.

Poor Internet Connectivity: Even when computers are available, poor internet connectivity is a significant barrier. Slow or unreliable internet connections can make it difficult for students to access online resources, complete assignments, and participate in digital learning activities.

Inadequate Power Supply: Frequent power outages or lack of reliable electricity in rural areas can severely disrupt the use of ICT tools. This affects both the availability of technology for learning and the ability of schools to maintain and repair equipment.

Lack of Teacher Training: Teachers in rural schools often lack adequate training in ICT, making it challenging for them to effectively integrate technology into their teaching. This leads to a reliance on traditional teaching methods and a missed opportunity to enhance learning through ICT.

Financial Constraints: Financial limitations are a pervasive challenge in rural schools. The high cost of purchasing, maintaining, and upgrading ICT equipment, combined with limited budgets, restricts the ability of schools to provide adequate technology resources.

Cultural and Language Barriers: In some rural areas, cultural attitudes and language differences can pose barriers to ICT adoption. For example, there may be a resistance to using technology or a lack of content in the local language that makes it difficult for students to engage with ICT tools.

Low Motivation and Engagement: Due to the aforementioned challenges, students often lack motivation to engage with ICT tools. Without consistent exposure and encouragement, they may not see the value of ICT in their education, leading to lower engagement and poorer outcomes.

CHAPTER FIVE

5. CONCLUSION, RECOMMENDATION AND FUTURE WORKS

5.1. Conclusion

In rural area secondary schools, students often face significant challenges in performing well with ICT tools. Limited practical skills hinder their ability to apply theoretical knowledge due to a lack of hands-on learning opportunities, access to functioning ICT facilities, and exposure to real-world applications. Confidence in using technology is low, driven by inconsistent access to equipment and insufficient teacher support. Additionally, digital literacy gaps remain pronounced, with many students struggling to use software applications, conduct online research, or understand digital safety.

The obstacles to ICT integration in these schools are multifaceted. Limited access to infrastructure, poor internet connectivity, and inadequate power supply disrupt learning. Teachers often lack ICT training, limiting their ability to incorporate technology into their lessons. Financial constraints also play a key role, as rural schools struggle to afford and maintain the necessary equipment. Cultural and language barriers, as well as low student motivation and engagement, further complicate ICT adoption.

To address these issues, various solutions can be implemented. Increased government and NGO support can improve infrastructure, while regular teacher training can build ICT competency. Affordable and sustainable technology options, such as low-cost laptops or offline digital content, can help overcome financial challenges. Raising community awareness about the value of ICT, providing consistent technical support, and offering incentives for ICT usage can boost engagement. Aligning the curriculum to better integrate technology across subjects will also make learning more relevant for students.

In conclusion, overcoming the challenges of ICT integration in rural secondary schools requires a strategic approach that involves community participation, support from NGOs and government, sustainable planning, and continuous monitoring. This will create a collaborative learning environment, promote digital literacy, and ultimately drive socio-economic development in rural communities.

5.2. Recommendations

To address the challenges in ICT integration in rural schools, several key actions are recommended. First, increasing hands-on learning opportunities by providing more functional ICT equipment and incorporating practical projects into the curriculum will help students develop essential skills.

Improving access to reliable ICT tools and ensuring consistent support from trained teachers can foster student confidence in technology use. Digital literacy programs that focus on software usage, online research, and digital safety should also be offered to close literacy gaps. Additionally, investing in upgraded ICT infrastructure, including computers and related tools, is critical to support student learning, while improving internet connectivity in rural areas through government and private partnerships will ensure consistent access to online resources. Developing alternative power solutions, such as solar energy, is essential for providing uninterrupted access to ICT in schools that suffer from frequent power outages.

Regular ICT training for teachers is another important step, equipping them with both technical and instructional skills to integrate technology effectively. Financial constraints can be addressed by encouraging government and NGO funding for affordable ICT tools, with an emphasis on cost-effective and sustainable solutions. Cultural and language barriers can be overcome by raising community awareness of ICT benefits and developing local-language content to engage students better. To combat low motivation, incentive programs for students and teachers should be introduced, rewarding achievements in digital literacy and projects.

Advocacy for increased funding and involvement from NGOs to provide up-to-date equipment and reliable internet is essential for improving rural ICT infrastructure. Fostering partnerships with community leaders, parents, and students will help create a supportive and collaborative environment for technology adoption. Regular technical support and maintenance, possibly in collaboration with local businesses or technical institutions, should be established to ensure that ICT equipment remains functional. Lastly, the curriculum should be revised to incorporate ICT tasks across subjects, linking technology use with real-world applications and collaborative projects to make learning more relevant and engaging for students.

5.3. Future Works

Future research should focus on addressing the key challenges of rural secondary schools face in integrating ICT tools effectively. Studies could explore innovative learning models, such as mobile ICT labs and virtual simulations, to enhance students' practical skills. Additionally, research could assess how structured support systems like peer mentoring and ICT clubs improve student confidence and motivation in using technology.

Further research is also needed to bridge digital literacy gaps through tailored curricula, explore alternative technologies like solar-powered systems to address infrastructure challenges, and develop sustainable financial models for ICT development. Investigating teacher training programs

and culturally adapted ICT tools can help rural schools enhance student engagement and overcome barriers, ultimately improving educational outcomes in these underserved areas.

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APENDIX I

**Hawassa University
Institute of Technology
College of Informatics**

Department of Information Technology

Title: The challenges of ICT integration in teaching and learning in rural secondary schools

Interview Guide for School Directors

The aim of this interview is to collect basic information on the integration process of ICT on education. It also looks in to how ICT education and practice improves education quality and its challenges in selected rural secondary schools of woreda. Therefore, it is to gather your opinion and experience on the issues and challenges.

Qualitative Interview Guide:

Challenges of ICT integration in Teaching and Learning

Background Information

1. Can you describe your role and how long you have been serving as a school director?
2. What is the current level of ICT integration in your school?

Strategic Vision and ICT Integration

3. What is your vision for the integration of ICT in teaching and learning at your school?
4. What are the key priorities for your school when it comes to ICT integration?
5. How do you align ICT initiatives with the overall educational goals of the school?

Challenges in ICT Integration

6. What are the most significant challenges your school faces in integrating ICT into teaching and learning?
7. How do issues like internet connectivity, availability of ICT tools, and technical support impact your school's ICT integration efforts?
8. What challenges do teachers face in effectively using ICT tools in the classroom?
9. What challenges do students encounter when using ICT tools for learning?

Support and Resources

10. What kind of support does your school receive from the district or government for ICT integration?
11. What resources (financial, technical, or human) do you think are most critical for successful ICT integration?
12. How do you address the challenges of ICT integration at your school?

Teacher and Student Engagement

13. How do you engage teachers in the process of ICT integration?
14. How do you ensure that students are benefiting from the ICT tools available?

Future Directions and Recommendations

15. What changes or improvements would you like to see in the way ICT is integrated into teaching and learning at your school?
16. What advice would you give to other school directors facing similar challenges with ICT integration?
17. Looking forward, what are your goals for ICT use in your school in the next few years?

Closing Thoughts

18. Is there anything else you would like to share about the challenges of using ICT tools in your school?

This interview guide is designed to produce rich and qualitative data on the challenges and strategies related to ICT integration from the perspective of school directors, providing valuable insights into the leadership challenges and opportunities in this area.

Thank you indeed.

APENDIX II

TEACHER'S QUESTIONNAIRE

This research with academic purpose is supposed to find out the challenges affecting teachers' ICT usage in rural area secondary schools of Enor woreda in Gurage Zone. Your answers to the questions below will be managed confidentially and will be only used for this study. I politely ask you to complete with your choice by ticking (√) the answer in the corresponding space for closed questions or write the response for the open ended question in the space provided.

Part A: Demographic data

Age

25-35 35-45 45-55 55 and above

Sex

Male female

Educational background

Diploma First degree Master's degree

Years of service as a teacher

1-5 years b) 5-10 year 10-15 year d) 15 and above

Title

Teacher

Name of your school _____

Part B: Specific objective related questions

1. Teachers' challenges of using ICT in teaching their subject:

Indicate the extent to which you agree on points related to perception of ICT in education towards education quality by putting (√) against each item

NOTE: SD-Strongly Disagree, D-Disagree, UD- Undecided, A- Agree, SA-Strongly Agree

No	Lists of Items					
		SD	D	N	A	SA
1.	Limited access to ICT infrastructure is a significant challenge in our school					
2.	Poor internet connectivity or lack of internet access affects our ability to use ICT tools effectively					
3.	Inadequate power supply is a major issue for using ICT tools in our school					
4.	The amount of time allocated for practical use of computer use is insufficient					

II. Technical Challenges		SD	D	N	A	SA
5.	The absence of an ICT technician in the computer lab affects practical training					
6.	There is a shortage of functional computers in the computer laboratory					
7.	There is no dedicated ICT lab available for teachers to use					
Possible Solutions to Challenges in Using ICT Tools						
III. Improving Access to ICT Tools		SD	D	N	A	SA
8.	Providing each teacher with a personal laptop or tablet would enhance ICT integration in teaching					
9.	Ensuring reliable and high-speed internet access in schools would support better use of ICT tools					
10.	Establishing ICT resource centers in rural areas would provide teachers with access to necessary technology					
11.	Implementing school-wide policies to ensure equitable access to ICT tools for all teachers would be beneficial					
12.	Improving the reliability of electricity and internet in rural areas would enhance the use of ICT tools in teaching					
13.	Providing backup power solutions, like generators or solar panels, would ensure continuous use of ICT tools					

APENDIX III

Questionnaire for Students

Part A: Demographic data

Age

13-15 16-20 21-25 25 and above

Sex

Male female

Grade Level

9th 10th 11th 12th

Name of your school _____

Students' academic performance on using ICT tools in learning:

Indicate the extent to which you agree on points related to using of ICT in education towards education quality by putting (√) against each item

NOTE: SD-Strongly Disagree, D-Disagree, N- Neutral, A- Agree, SA-Strongly Agree

No	Lists of Items					
		SD	D	N	A	SA
	IV. Access to ICT Tools					
14.	I have access to a computer or smart phone at home for schoolwork					
15.	The school provides enough ICT tools for all students to use					
16.	I have reliable access to the internet at school					
17.	I often use a smartphone for school-related activities					
	V. Technical Challenges	SD	D	N	A	SA
18.	I frequently encounter technical issues when using ICT tools					
19.	The ICT tools provided by the school are often outdated or malfunctioning					
20.	I know how to troubleshoot basic technical problems with ICT tools					
21.	Slow or unstable internet connections hinder my ability to complete schoolwork					
	VI. Digital Literacy and Skills	SD	D	N	A	SA
22.	I feel confident using computers and other ICT tools for my studies					
23.	I have received adequate training on how to use ICT tools for learning					
24.	I can easily learn how to use new software or applications in school					
25.	I can easily use Microsoft office applications					

26.	I develop confidence in using ICT technology					
	VII. Educational Content and Resources	SD	D	N	A	SA
27.	I find it difficult to find educational materials online that align with my curriculum					
28.	The digital content we use is interesting and engaging					
29.	I can't access educational content online due to lack of connectivity					
30.	The offline resources provided by the school are helpful for my studies					
	VIII. Motivation and Engagement	SD	D	N	A	SA
31.	Using ICT tools makes learning more enjoyable for me					
32.	I am motivated to use ICT tools for my schoolwork					
33.	I prefer using ICT tools over traditional learning methods					
34.	I get distracted easily when using ICT tools for learning					
	IX. Environmental and Infrastructural Challenges	SD	D	N	A	SA
35.	Power outages in our area often disrupt my ability to use ICT tools					
36.	The school infrastructure supports the effective use of ICT tools					
37.	The rural environment limits my access to ICT tools compared to urban students					
38.	I have a quiet and conducive environment at home for using ICT tools for study					
Possible Solutions to Challenges in Using ICT Tools						
	X. Improving Access to ICT Tools	SD	D	N	A	SA
39.	Providing more computers and tablets in schools will improve student access to ICT tools					
40.	Offering affordable or subsidized internet plans for students would enhance their ability to use ICT tools at home					
41.	Establishing community ICT centers would provide students with better access to digital resources					
42.	Implementing a loan program for ICT devices would help students who cannot afford their own					
	XI. Enhancing Technical Support and Infrastructure	SD	D	N	A	SA

43.	Investing in solar-powered or alternative energy solutions in our area would ensure reliable ICT use with frequent power outages					
44.	Training students and teachers in basic troubleshooting skills would minimize disruptions due to technical problems					
45.	Improving the reliability of the internet and power supply in rural areas would significantly enhance ICT usage					
46.	Offering regular ICT training sessions for students would improve their ability to use digital tools effectively					
47.	Encouraging peer-to-peer learning initiatives would help students share their ICT knowledge with one another					
48.	Providing incentives for students to use ICT tools in their studies would increase their motivation					

Thank you indeed.

APENDIX IV

RESEARCHER'S OBSERVATION SCHEDULE

This research with academic purpose is supposed to study the issues and challenges facing the integration of ICT tools in teaching and learning in rural area secondary schools of Enor woreda in Gurage Zone. Responses of questions on the infrastructure and school equipment's will be managed confidentially and will be used only for this study.

Model	Total	Ready for use		Not Ready for use	
		#	%	#	%
Desktop computer					
Laptop computer					
Printer					
Photocopy machine					
Plasma					
Generator					
Solar system					
Television for staff class					
Projector					
Wi-Fi					
White board for computer lab					
Flash Disk used for plasma and other temporary data					
Scanner					

Thanks all!

The END