SCHOOL OF TEACHER EDUCATION

ASSESSING THE UTILIZATION OF INSTRUCTIONAL MATERIALS AND TECHNOLOGY IN SECONDARY SCHOOLS OF HAWASSA CITY ADMINISTRATION

BY

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HAWASSA, ETHIOPIA

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HAWASSA UNIVERSITY SCHOOL OF GRADUATE

This is to certify that the thesis entitled "Assessing the utilization of instructional materials and technology in secondary schools of Hawassa city administration" submitted in partial fulfillment of the requirements for the Degree of Master of Art in Curriculum and Instruction, the Graduate program of the school of education, and has been carried out by Mahlet Kassa, under my supervision. Therefore, I recommend that the student has fulfilled the requirements and hence hereby can submit the thesis to the department of education.

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I hereby declare that this MA thesis, entitled "Assessing the utilization of instructional materials and technology in secondary schools of Hawassa city administration", is my original work and has not been presented for a degree in any other university and sources of materials used for the thesis have been dully acknowledged.

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TABLE OF CONTENTS

ACKNOWLEDGEMENT v
LIST OF TABLES viii
ACRONYMS viii
Abstract x
CHAPTER ONE 1
1.INTRODUCTION 1
1.1 Background of the study 1
1.2 Statement of the problem 3
1.3. Research Questions 5
1.4 Objectives of the study 5
1.5 Significance of the study 6
1.6 .Scope of the study 6
1.7. Limitation of the Study 6
1.8. Definition of Key Terms 7
1.9 Organization of the Study 8
CHAPTER TWO 9
2.LITERATURE REVIEW 9
2.1. Introduction 9
2.2. Concepts of Instructional Materials and Technology 9
2.3. Historical overview of instructional materials and technology 10
2.4 Availability of Instructional Materials and Technologies in Secondary Schools 12
2.5. Use of Instructional materials and Technologies in the Teaching-Learning Process 14
2.6. Categories of contemporary instructional materials and technologies 16
2.7. Factors affecting the application of Instructional materials and Technology 19
2.8. Strategies to minimize the challenges of using Instructional material and Technologies 22
2.9. Conceptual Framework 23
CHAPTER THREE 24
3. RESEARCH METHODOLOGY 24
3.1. Introduction 24
3.2 Description of Study Area 24
3.3 Map of Study Area 24

3.4. Research Design 25
3.5. Research method 25
3.6. Source of data 26
3.7. Population, Sample and Sampling Techniques 26
3.8. Data collection tools 28
3.9. Data Collection Procedures 29
3.10. Reliability and Validity of the Instrument 30
3.11. Tools of data analysis 30
3.12. Ethical practices 31
CHAPTER FOUR 32
4.RESULT AND DISCUSSION 32
4.1. General Characteristics of the Respondents 32
4.2. Data Presentation, Analysis and Interpretation 35
4.3 Discussion 52
CHAPTER FIVE 55
5.Summary, Conclusion and Recommendations 55
5.1. Summary 55
5.2 Conclusion 57
5.3 Recommendations 58
Suggestion for future work 60
REFERENCES 61
APPENDIX – A 68
APPENDIX - B 75

LIST OF TABLES

Tables: Pages

1. Total population and sample size.....31
2. Characteristics of teacher's 36
3. Characteristics of student's.....37
4. Responses of teachers on availability of instructional materials and technologies.....39
5. Responses of students on availability of instructional materials and technologies.....41
6. Responses of teachers on using of instructional materials and technologies..... ….45
7. Student responses to the use of instructional materials and technologies by teachers 47
8. The response of the frequency of utilization 49
9. Teachers' responses on factors affecting the use of IMT..... ….52

ACRONYMS

CL	Confidence Level
DVD	Digital Versatile Disc
ETP	Education and Training Policy
ICT	Information and Communication Technology
IMT	Instructional Materials and Technology
MoE	Ministry of education
SPSS	Statistical Package for the Social Sciences
WWII	World War II

Abstract

The primary objective of this research was to assess the utilization of instructional materials and technology in secondary schools of Hawassa city Administration. To this end, Descriptive survey design was use. The researcher developed two types of questionnaires as the main data collecting instruments for addressing teachers and students. In addition to the main data collecting tools, interview, observation and document analysis were also used to help supplement the data gained through the questionnaires. The responses to close ended questions were analyses using SPSS statistics version 26 computer software. The data obtained through interview and document analysis were analyzed by condensing the information into key themes and topics. The findings of the study revealed that in the sampled schools availability of traditional materials like textbooks and teacher's guides was generally good, but significant gaps existed in resources such as manipulatives, visual aids, and technology-based tools. Utilization of instructional materials leaned towards traditional methods, with limited use of technology-based tools, particularly in public schools. Factors affecting application included inadequate supply and access, ineffective utilization, insufficient training opportunities, lack of support from school administration, technical infrastructure issues, and limited internet connectivity. Finally, the researcher recommends that the school administration, teachers and the concerned government bodies should work collaboratively to ensure the adequate availability and use of instructional materials and technologies for effective learning and teaching activity. Future research is suggested to assess the impact on students' academic performance.

Keywords: Instructional materials, technology, secondary schools, utilization, factors.

CHAPTER ONE

1.INTRODUCTION

This chapter states the background of the study, statement of the problem, the research questions, objectives of the study, limitations of the study, significance's of the study, scope of the study and organization of the study.

1.1 Background of the study

In today's world, functional education serves as a fundamental tool for securing employment, personal growth, economic well-being, and fostering positive social connections. Conversely, the absence of functional education leads to ignorance, underdevelopment, maladjustment, criminal behavior, poverty, and frustration. Without useful instructional resources to support creative production in contemporary domains like science and technology, among others, effective teaching could not be possible (Idris, 2008).

According to Kadzera (2006), application and use of instructional materials motivate learning by stimulating students to learn. The use of instructional materials in the classroom has the potential to help the teacher explain new concepts briefly, clearly, result a better understanding to the students whom the concepts being taught.

Furthermore, some of the instructional materials necessary for effective teaching and learning materials may include the chalkboard, models, graphs, charts, maps, pictures, diagrams, cartoons, slides, filmstrips, radio, and television. However, the application of instructional materials and technology in teaching learning process are not ends by themselves but they are means to an end. They could not achieve the expected value on their own; their usefulness depends on what the teacher makes out of them. For effective utilization, teachers must understand how to use and control the technologies. Also, instructional technologies can add strong value to the modern educational environment.(Christine, 2023).

ICT has been applied for 100 years in education, ever since the popularization of radio in the 1920s (Benjamin, 2023). But it is the use of digital technology over the past 40 years that has the most significant potential to transform education. An education technology industry has emerged and focused, in turn, on the development and distribution of education content, learning management systems, language applications, augmented and virtual reality, personalized tutoring, and testing. (Benamin,2023).

In recent years, the use of technology in education has become increasingly common worldwide. This includes the use of devices such as laptops, tablets, and smart phones, as well as educational software, online learning platforms, and multimedia resources. In Africa, the use of technology in education is also on the rise. Many African countries are investing in technology infrastructure and providing devices to students and teachers. For example, in Rwanda, every student from primary school to university has access to a laptop or tablet through the one laptop per child program. In Kenya, the government has launched the Digital Literacy Program, which aims to provide every primary school student with a tablet loaded with educational content. In fact, this doesn't mean that it is accessible to all students in everywhere. It is still challenging to the widespread adoption of instructional technologies in developing countries like Ethiopia. These include limited access to reliable internet connectivity, a lack of funding for technology infrastructure and devices, and limited training for teachers on how to effectively integrate technology into their teaching (Benjamin, 2023).

Ethiopia is also trying the best in adopting instructional materials and technologies in the teaching learning process. It is accepted that instruction in Ethiopia has experienced a worldview move since the presentation of the Instruction and preparing approach (Kassahun, 2012). The change was requested by the emergency into which the past instruction framework was peacemaker. To improve the quality of instruction at the secondary level, a procedure has been laid by the government to supply ICT foundation to assist schools get limited instruction transmission (MoE, 2010). For instance, ICT has gradually been introduced in the country, starting with plasma TV, followed by computer-based instruction, and ultimately, multi-modal or all ICTs that contribute to the achievement of educational goals and targets in schools (Demissew, 2006).

Ethiopia is known to have an involvement crossing around four decades of utilizing radio and TV to strengthen secondary school instruction. The Instructive media organization of the service of Instruction follows its beginnings to the Audio-Visual Center built up in 1952. This center was creating, and disseminating audio-visual instructing helps, and it indeed had a portable group that was voyaging to towns and schools to appear movies and slides (Demissew, 2000).

Gaining its opportunity to bring about fast growth and development to the country, Ethiopian government gave bold emphasis to science and technology progressively changing the system connected by the core approach of student-centered learning. All programs have only been delivered to governmental secondary schools in the country through a closed-circuit system using satellite dishes (Berhanu A., 2013). The Ethiopian government is being locked in to grow ICT entrance in schools through distinctive measures. It presented an unused mode of educating within the tall schools through live broadcast TV and introduced one or two computer labs with web associations in all tall schools within the nation (Temtim A. 2017).

Even though, various measures had been taken to come up with a solution to the education problem in the country, still a wide spread quality problem is prevailing in the country. In this regard, the researcher of this study believes that the use of instructional materials and technologies in selected schools of Hawassa City administration can partly help to identify and alleviate the quality problems currently prevailing in education. Hence, it is with this background in mind that the researcher intended to undertake the research on assess the utilization of instructional materials and technologies in teaching and learning process in secondary schools of Hawassa city administration.

1.2 Statement of the problem

The utilization of instructional materials and technologies is recognized to enhance the teaching-learning process, because students are more motivated when technology-based education is used in the classroom. Teaching and learning activities are made easier by instructional materials, which ultimately leads to the achievement of lesson objectives (Kunfea, 2018). Instructional technologies are known to strengthen learning because when technology-based instruction is actualized within the classroom, learners are propelled. Instructional materials encourage teaching and learning exercises and, subsequently, the fulfillment of the lesson destinations. Instructional materials that

are utilized within the classroom are known to empower learning and, in this manner, make it less demanding and more curiously. The nearness of Instructional materials assets does not ensure that instructors will utilize them to guarantee the arrangement of quality instruction (Muddasir, 2011).

The Ethiopian Government acknowledges education and training as the cornerstone of social progress and economic development. Thus, now days, the government of Ethiopia is committed and insisting to use technology and application of digital technology for educational development, particularly in the training and development of teachers, and is working to ensure that ICT is equally available across all levels of the school system (MoE, 2016).

The era of 21^{st} century is often regarded as era of technology. Technology, today, plays a very important role in our life. The impact of technology can be felt in every possible field one such field in Education. We are utilizing scientific techniques for solving problems and improving our lives. For learners to acquire better knowledge and develop the necessary skills and to make the teaching and learning process easier, simpler, and more comprehensive, implementing a technology-based education system is crucial. It is necessary to introduce instructional technologies into secondary schools for teaching and learning purposes. But their availability should be at the required level, and utilizing the available technologies is crucial.

There are various problems in utilization instructional materials and technology in different secondary schools in the country. The study conducted by Muddasir (2011) on instructional technologies in various areas of Ethiopia also found that the extent of utilizing instructional technology is quite inadequate in many secondary schools.

Other researchers such as Assefa (2017) and Solomon (2019) conducted studies on related issue to the knowledge of the researcher, there was no research conducted on the specific studies with utilization of instructional materials and technology in Mathematics and ICT in Hawassa city administration of secondary schools. Thus, the researcher here felt that, there is a gap which needs in-depth investigation in the study area about the current status on this particular issue.

To get to the core of this inquiry, there are central questions that will serve as guides in determining the direction and focus of the study. With this in view, the study is aimed at addressing the

following research questions: the availability of instructional materials and technologies in mathematics and ICT subjects in the selected secondary schools, the use or utilizations of instructional materials and technology by Mathematics and ICT subject teachers in the selected secondary schools, and the factors affecting the use of instructional materials and technologies in the selected secondary schools. This study focuses on the utilization of instructional materials and technology on the teaching and learning process of Mathematics and ICT subject in selected secondary schools in Hawassa City administration.

1.3. Research Questions

1. What is the status of instructional materials and technology availability in Mathematics and ICT subjects in secondary schools of Hawassa city administration?
2. To what extent are teachers utilize instructional materials and technology in teaching Mathematics and ICT subjects in secondary schools of Hawassa city administration?
3. What are the factors that affect the utilization of instructional materials and technology in the teaching learning process of Mathematics and ICT subjects in secondary schools of Hawassa city administration?

1.4 Objectives of the study

1.4.1 General objective

- To assess the utilization of instructional materials and technology in Mathematics and ICT subjects in selected secondary schools of Hawassa city administration.

1.4.2 Specific objectives

- To assess the adequacy of instructional materials and technologies in Mathematics and ICT subjects in selected secondary schools of Hawassa city administration.
- To assess the extent to which the available instructional materials and technologies are utilized in Mathematics and ICT subjects in selected secondary schools of Hawassa city administration.

- To identify the factors that affect the utilization of instructional materials and technology in Mathematics and ICT subjects in selected secondary schools of Hawassa city administration.

1.5 Significance of the study

The findings of this study will help other researchers who wish to conduct similar research in education, and it will serve as a valuable document for teachers, principals, and writers in academic areas in secondary schools. The findings and recommendations of this study could be used by the Hawassa city education office as a framework to organize training sessions for secondary school teachers, principals, and supervisors on how to effectively utilize instructional materials and technology. Also, it provides valuable feedback to selected schools regarding the way of ensuring the effectiveness of the use of instructional resources and the benefits of proper utilization of instructional materials.

1.6 .Scope of the study

This study focuses on the assessing the utilization of instructional materials and technology in two subjects, Mathematics and ICT, specifically in four secondary schools in Hawassa city administrations, targeting grade 9 up to 12. The aim is to investigate how instructional materials and technology is currently employed as a tool to improve the teaching and learning experience in the chosen subjects.

1.7. Limitation of the Study

It is evident that research work is not completely devoid of limitations. To this goal, various limitations were exposed when doing this study. One evident restriction was a shortage of contemporary and relevant literature on the subject, particularly in the Ethiopian context. Most of the recent literature available in Western countries was not always applicable to the local circumstances in Ethiopia. Because the study's conclusions were based on Likert-type questions, participants were unable to create their own responses, nor could the researcher probe for additional information.

1.8. Definition of Key Terms

Educational technology: Any tool, equipment, or device, whether electronic or mechanical, that can help students accomplish specified learning goals. It includes both instructional and learning technologies.

Information and Communication Technology: ICT refers to the use of technology for communication, information processing, and data management. It encompasses a wide range of digital technologies, such as computers, software applications, internet resources, telecommunications devices, and multimedia tools used for accessing, processing, and sharing information.

ICT integration: Refers to the use of computer-based communication that is incorporated into the daily classroom instructional process.

Implementation of instructional technology: Preparing materials for classroom instruction using the available materials: any collection of materials, including animate and inanimate objects, and human and non-human resources that a teacher may use in teaching and learning situations to achieve desired learning objectives.

Instructional Materials: refer to any resources, tools, or aids used by teachers to facilitate learning and instruction in the classroom. These may include textbooks, workbooks, worksheets, visual aids, manipulatives, multimedia presentations, and other educational resources that support teaching and learning.

Technology: in the context of education refers to the use of digital tools, devices, software applications, and online resources to enhance teaching and learning processes. This may include computers, tablets, interactive whiteboards, educational software, internet resources, and other technological tools used in the classroom.

Mathematics: is a discipline that involves the study of numbers, quantities, shapes, patterns, structures, and relationships. In the context of this research, mathematics refers to the specific subject area taught in schools that covers topics such as arithmetic, algebra, geometry, calculus, statistics, and other mathematical concepts.

Utilization of technology: Refers to the integration of technological tools and resources in teaching and learning processes to enhance the quality of education and improve students' academic achievement.

1.9 Organization of the Study

This study paper was organized in five chapters. The first section is an introduction under which the background of the study, statement of the problem, research questions, objective of the study, and significance of the study and scope of the study are presented. chapter two was provide literature review (both theoretical and empirical literature's) are summarized, the third chapter was contain the research design, research method, type of data and method of data collection. Chapter four was focus on data analysis and discussions and finally chapter five contain summary, conclusions and recommendations.

CHAPTER TWO

2.LITERATURE REVIEW

2.1. Introduction

Teaching and learning experiences are greatly influenced by instructional materials in the dynamic field of education. A vast array of resources is included in these materials, such as manipulatives, digital content, multimedia tools, and textbooks. It is crucial to assess these resources' effects on student outcomes closely as educators work to establish productive learning environments.

The education technology that is used is more complex than just a substitution of resources. Technology may be one-to-many, one-to-one or peer-to-peer technology. It may require students to learn alone or with others, online or offline, independently or networked. It delivers content, creates learner communities and connects teachers with students. This results from practice or other forms of experience (Schunk, 2012). There is an assertion that learning can be reinforced with instructional technologies of different varieties because they stimulate, motivate, and attract learners' attention for a while during the teaching and learning process. Technology is perhaps the strongest factor shaping the educational setting (Johnson, 2016).

2.2. Concepts of Instructional Materials and Technology

Instructional materials are those materials that are used in the classroom for instruction or demonstration purposes by teachers and students. Instructional materials have been identified as very important factors in teaching and that effective teaching cannot take place without availability of basic relevant instructional materials (Esquillo, 2021).

According to Wambui (2013), instructional materials are tools locally made or imported that can make remarkable improvements and can take a lesson if intelligently used. Instructional materials are very essential elements in the teaching and learning process of any subject like mathematics. One important dimension in teaching education that is getting a lot of attention is related to the use of instructional materials. Instructional materials are those materials used by a teacher to simplify their teaching. Such instructional materials are printed instructional media, non-print instructional media and concrete materials (Mueni, 2019). They include both visual and audiovisual aids and could either be concrete or abstract. It is held that good teaching resources can never replace the

teacher, but the teacher uses them to achieve their teaching and learning objectives. Some of the instructional materials necessary for effective teaching and learning of mathematics include the chalkboard, models, graphs, charts, pictures, diagrams, cartoons, slides, filmstrips, radio, and television (Kochhar, 1991).

In otherwise, instructional technologies can be considered as devices that assist an instructor to clarify, establish, and correlate concepts, to transmit to learner's facts, skills, attitudes, knowledge, and appreciation, and to enable them to make learning more concrete, clear, and effective. They view instructional technologies as being part of the teaching-learning process and making learning more realistic. Therefore, from the above definition point of view, the term instructional technologies generally refers to the various devices used for providing classroom instruction to make the teaching and learning process more bright and interesting (Mudasir, 2023).

Instructional technology can also be defined in two ways. In its more familiar sense, it means the media born of the communications revolution, which can be used for instructional purposes alongside the teacher, text book, and blackboard. The second one is a less familiar definition of instructional technology that goes beyond any particular medium or device. In this sense, instructional technology is more than the sum of its parts. It is a systematic way of designing, carrying out, and evaluating the total process of learning and teaching in terms of specific objectives, based on studies in human learning and communication, and employing a combination of human and nonhuman resources to bring about more effective instruction (Chyung, 2008).

2.3. Historical overview of instructional materials and technology

In the teaching-learning process, technology has been used for a long time in various forms: black and white boards, pens, and recently, overhead projectors, radio, TV, and film (Matilda, 2007). With the development of learning technologies in the late 20th century, the education system has changed rapidly. This is due to the capability of technology to provide a proactive, easy-to-access, and comprehensive teaching and learning environment. In the early part of the twentieth century, when school museums, the equivalent of district-wide media centers, came into existence, most of

the media housed in school museums were visual media such as photographs, slides and films (Furkan, 2023).

In 1913, Thomas Edison envisioned that school systems would be completely changed with visual media in the next ten years, proclaiming:" Books will soon be obsolete in by schools. Although the revolutionary changes in school systems envisioned by Edison did not happen, the visual instruction movement did grow, resulting in five national professional organizations for visual instruction and a number of courses and textbooks on visual instruction. As the media began incorporating sound in the 1920s, the visual instruction movement was expanded to the audiovisual instruction movement. Before World War II, learners were only expected to understand and learn rudimentary skills, such as reading, writing, and arithmetic. During this time period, behaviorism dominated the psychology of learning, and behaviorist theories were used as the basis for designing many of the early audiovisual materials. The growth of the audiovisual instruction movement slowed in schools during World War II (WWII), but a wide variety of audiovisual materials and equipment, such as training films, film projectors, and overhead projectors, were extensively used to train U.S. military personnel and to prepare U.S. civilians to work in industry (Reiser, 2018) (Saettler, 1990).

Many of the programmed instructional materials developed during the late 1950s through the 1960s were tested and evaluated while they were being developed. The issues seem to result in a sweeping effect on the advancement of direction materials (Olsen, 1982). The calling of direction innovation developed amid World War II, and the direction of direction technologists have changed over time. According to Stabler (1969), the application of direction innovation, which was based on pre-war logical inquiry about, is demonstrated to be exceptionally beneficial in a controlled environment and direction materials give a run of learning encounters to learners, from coordinated to circuitous. Learning encounters are a continuum of directness to back handedness, which includes a relationship with the continuum of concreteness to deliberation (Dale, 1969).

Currently, the Ministry of Education (MoE) all over the world has provided a lot of facilities and training in order to enhance the use of advanced technologies in the countries' teaching-learning processes (Ghavifekr, 2015). The generation of a wide assortment of guidelines and a wide use of

innovations were energized by the rise of an official military approach and, at long last, the parcel of colossal money related assets accessible for the improvement of the program (Chyung, 2008).

In connection to Africa, the concept of utilizing direction assets can be followed back to inborn African instruction. The center of inborn African instruction was learning by doing as well as being interpretive in nature. As both print and non-print media were non-existent or rare, depending upon words from a school instructor was one major challenge confronted by early schools in the utilization and procurement of assets (Bogonko, 1992).

In recent years, the integration of technologies and computers in the educational process has increasingly become an integral part of the education system. Technology can enhance the education process in many ways. Research, presentation, communication, collaboration, problem-solving, and creativity are all now under the influence of today's computers and other technologies that have become an important part of our daily lives. Therefore, it is equally important to integrate the same technologies in the education process (Blerim, 2012). Since integrated technologies incorporate diverse forms of media under the control of a computer to produce and deliver materials in a variety of ways for teaching and learning, they are essential for multimedia learning (Rita, 2013).

According to Birhanu (2016), in the past, mathematics instruction in Ethiopia was primarily based on traditional methods such as rote memorization and teacher - centered instructional materials were limited to textbooks and chalkboards. In addition, of modern technologies in recent years, there has been a growing emphasis on the integration of modern instructional technologies in mathematics education in Ethiopia. This includes the use of computers, interactive whiteboards, educational software, and online resources to enhance teaching and learning.

2.4 Availability of Instructional Materials and Technologies in Secondary Schools

Both teachers and students need instructional materials for the successful teaching and learning of any subject (Janovsky, 2015). In this vein, another study argues that instructional materials help teachers to easily achieve instructional objectives and students to understand the content in practical

ways (Msafiri, 2017). A teacher that uses teaching aids to deliver his or her lesson will cover more facts in less time than one who relies on oral lesson delivery (Ogbu, 2015).

The availability of instructional materials and ability of mathematics teachers to use them are vital determinants in the selection of the teaching methods to be used by mathematics teachers and consequently, mathematics achievements (Afolabi, 2008). For technology to be used in the learning and teaching process, it must first be available (Majed 1996). The unavailability of the required instructional resources is known to contribute to the minimal use of instructional materials and technologies by teachers in the classroom. The availability of instructional technology materials is an important factor that determines the frequency with which teachers use instructional materials (Fuller 2000). The frequency of instructional technology use is related to the availability of technological hardware in the classroom (Holloway, 1996).

Africa in using ICT to improve the quality of teaching and learning through activities such as intensive ICT skills training to teachers, increase in ICT equipment's and applications in schools, and emergence of living labs (LLs) and innovation spaces/centers (InnoSpace). We first provide some of the challenges of integrating ICTs in education followed by a description of key past and current ICT initiatives supporting the adoption of ICTs in schools using a number of case studies in sub-Saharan Africa (Asongu, 2017).

One survey on the use of instructional technologies in five teacher training colleges in Malawi found that classroom facilities like power sockets were vandalized or were not there at all for use with instructional media. Further reports indicate that a lack of instructional media resources is one of the reasons contributing to the minimal use of instructional technology in teacher training in Malawi (Kadzera, 2006).

A similar study in Ethiopia noted that the lack of required instructional resources is one of the reasons for teachers' limited use of instructional technology (Amare, 1998). When instructional technologies are available and the school is committed to using them. This would exhibit the administration's commitment and hence facilitate the change process, making it easily acceptable to subordinates. In spite of the fact that instructional materials have been found to be indispensable in

the teaching of most of the subjects in schools, some materials are in short supply while others are non-existent at all. From all indications, instructional materials and equipment necessary for teaching and learning were inadequate and fell short of the expected standards.

2.5. Use of Instructional materials and Technologies in the Teaching-Learning Process

These instructional materials bring life to learning by stimulating students to learn, and they must serve as a vehicle for improving the quality of learning for every student (Pattaya, 2014). The use of instructional materials in the classroom has the potential to help the teacher explain new concepts clearly, resulting in better student understanding of the concepts being taught. However, they are not ends in themselves, but they are means to an end (Kadzera, 2006).

According to Mueni, (2019), the use of instructional materials promoted the students' willingness to engage in classroom activities. The researchers also noted that the use of instructional materials helped learners display a positive attitude towards classroom activities, create favorable learning conditions and engage learners in the activities. It also enabled them to have an interest in this area and develop curiosity about wanting to learn more.

Technology and Education for Life plays an important role in achieving the goals of the new extended Curriculum. In addition to instructional materials, instructional technology plays a significant role in the reinforcement of the teaching-learning process. This is because instructional technologies can stimulate, motivate, and attract learners' attention during the instruction process. In order to empower teaching and learning activities, both teachers and students must have access to instructional technologies in schools (Linns, 1997). Learning involves the interplay of students' motivation, physical facilities, teaching resources, the skills of teachers, and curriculum demands. The use of instructional technologies in educational systems brings about fruitful learning outcomes, since such resources stimulate students' learning as well as motivate them (Lyons, 2002). It can be used to make the learning experience more dynamic, concrete, and realistic (Ogaga et al., 2016).

In association with expanding the human consideration span, one ponder expressed that 85% of the brain is really not required for your audience to get a handle on what you are cruel. You must construct unused gadgets to keep 100% of the audience members' brains possessed (Sonya, 1988).
Several studies conducted with regard to the use of instructional materials and technologies show that classroom instruction, when supported by materials and technology, greatly benefits learners. The materials and technologies that the teacher uses in the classroom determine students' enthusiasm, involvement, and willingness to participate in the learning process (Marder, 2023).

When students are actively engaged, they are able to retain knowledge as well as participate in class. Instructional materials have the potential to enhance students' learning. Their role in teaching and learning is one of the most important and widely discussed issues in contemporary education policy (Aramide, 2010).
In case audiovisual materials are appropriately utilized, they will empower the instructors to attain the taking after: decrease verbalization, invigorate self-activity, make modern points curiously, supply concrete conceptual considering, increment maintenance capacity, create sharp perception, and cultivate inventive creative energy (Okpala, 1999).

The use of ICT in the mathematics classroom is primarily of particular concern to mathematics educators. The two-dimensional and three-dimensional images will give an obvious idea to the students. With the help of the Internet, new information and data, portable, graphic calculators, computerized graphing, specialized software, spreadsheets, and databases, etc. are always available to the students. With different theories of trigonometry, it is possible to make ICT dependent on practical applications.

Thus, various kinds of ICT products available and having relevance to education, such as teleconferencing, email, audio conferencing, television lessons, radio broadcasts, interactive radio counseling, interactive voice response systems, audio-cassettes, CD ROMs, etc., have been used in education for different purposes (Sanyal, 2001) (Sharma, 2003). While the aim of ICT integration is to improve and increase the quality, accessibility, and cost efficiency of the delivery of instruction

to students, it also refers to the benefits of networking with the learning communities to face the challenges of current globalization (Albirini, 2006).

2.6. Categories of contemporary instructional materials and technologies

This study focuses on 21st century common instructional materials and technologies used in the classroom. Mainly, they are classified into four. These are traditional resources, graphic and interactive materials, presentation items, tests and assessments and technology devices are included., Namely, they include textbooks, reference books, lesson plans, workbooks, flashcards, supplemental reading materials, chalkboard displays, marker boards (whiteboards), magnetic board displays, flip-charts, posters, and models graphics, slides, filmstrips, overhead head projector, LCD projector, computers, silent films, models, mock-ups, white board, peg board, bulletin board, tape recorder, video, plasma TV, internet, Physical objects, photographs, illustrations, charts, graphs, maps, multimedia, games and school net. These are expected to be available in all secondary schools (Usmonov, 2022).

There are two types of displays. Non-projected display materials include all visual display materials that can be shown to a class, small group, or individual student without the use of an optical or electronic projector of any sort. The projected display materials include all visual display materials that do not incorporate movement and which require an optical projector of some sort in order to show them to a class or group or enable them to be studied by an individual learner, the most important of which are listed below: Overhead projector transparencies and similar materials: textual or graphical images on large acetate sheets that can either be displayed to a class or group using an overhead projector (Usmonov, 2022).

Audio equipment includes all the various systems whereby straight-forward audio signals can be played to a class or listened to by an individual. Radio broadcasts and audiotapes are some of the most important audio materials. Video materials include all media that enable audio signals to be combined with moving visual sequences. Television broadcasts and videotape recordings are among the main systems that are currently available. Computer-mediated materials include all the various materials that require a computer of some sort to enable them to be displayed, studied, or used. This technology constitutes the most important single resource, which brought about the

massive shift from conventional expository teaching to mediated individualized learning (Usmonov, 2022).

The variety of instructional materials listed above describes the range of resources that individual teachers could adapt to complement the various teaching and learning activities to enhance a teacher's output and improve the learner's performance. Obviously, some of these materials vary from conventional instructional materials that are imported and therefore mostly out of reach of many schools in Ethiopia. However, it has been noticed that ICT is currently contributing to enhancing education, mainly in teaching and learning of Science, Technology, Engineering, and Mathematics (STEM) subjects (Ndihokubwayo et al., 2020). Although Temtim (2017) stated that the Ethiopian government is being engaged to expand ICT penetration in high schools through different measures.

2.6.1. Instructional Materials and Technology in Mathematics Education

Mathematics is an important element in human life. Human beings use it daily as a tool to facilitate their life. As a result of its significant value, teaching and learning of mathematics should be approached in ways that help learners develop a positive attitude towards it (Mueni, 2019). Many students report finding mathematics difficult and researchers recommend using concrete teaching aids (Matagalpa, 2019). Students are likely to quickly forget what they hear, but remember what they have seen, touched, and interacted with (Olayinka, 2016). Despite the effectiveness of the use of instructional materials, it was observed that some schools lack basic instructional facilities and materials for the teaching and learning processes (Amadi, 2019). In most cases, many learners have difficulties understanding certain mathematical concepts as a result of their beginner level of cognitive operation. However, where standard instructional materials are scarce or unavailable in a school, those improvised from locally available materials can enhance lessons (Ndihokubwayo et al., 2020).

According to Alshatri (2019), mathematics is an essential subject among the curriculum subjects taught in schools. However, because of the abstract nature of mathematics, students have difficulties understanding this subject (Mabagala, 2019). Major problems in the development of a positive attitude towards mathematics in the early years of preschool may come when learners start

dropping out of school and others are forced to repeat classes (Mueni, 2019). Despite the significance of mathematics in society, students have performed poorly in national exams in this subject. Several factors have been attributed to poor performance in mathematics, including poor teaching methods, poor interest in mathematics, and the absence of appropriate teaching resources across all educational programs. Mathematics lessons should be introduced as early as possible because mathematics is one of the subjects that are useful for human life (Rusyani et al., 2022).

Therefore, the use of instructional materials in mathematics enhances students' academic achievement in mathematics (Agwagah, 200) (Bala& Musa, 2006). Also, the relevance of mathematics in national development, human activities, scientific and technological careers as well as in numerous careers is attested in the literature (Bala& Musa, 2006) (Eraikhuemen, 2003) (Kalyan, 2020). Therefore, it is important to identify ways of making mathematics more concrete for learners so they can understand it more easily.

2.6.2. Instructional Materials and Technology in ICT Education

Information and Communication Technology is the combination of two terms, that is Information Technology and Communication Technology. In the new policy, emphasis is given to the development of problem-solving capacity and culture in the content of education, curriculum structure and approach, focusing on the acquisition of scientific knowledge and practicum (MoE, 1994). This can be partly ensured by allowing the integration of ICT into the education system.

The world is changing quickly, and the field of instruction is encountering these changes in particular because they apply to guidelines and advances. As a classroom instrument, computers have captured the attention of the instruction community. Integration of ICT in education refers to the use of computer-based communication that's integrated into the day-to-day classroom directions prepared (Ghavifekr, 2015).

The 1994 Education Strategy Policy clearly outlines a progressive educational philosophy that is inclusive of technological needs. It is an excellent basis to begin preparing students with 21st century skills (Jenifer F., 2014). To enhance the quality of education at secondary level, a strategy has been made by the government to provide ICT infrastructures to help schools receive satellite education transmission (Ministry of Education: 2010). It is also characterized as those advances that

are utilized for getting to, gathering, controlling, and showing or communicating data. The innovations may incorporate equipment, computer program applications, and networks (Anderson, 2003). According to Tinio (2002), ICT makes dynamic changes in society and influences all aspects of life.

Today, ICT in education encompasses a vast range of rapidly evolving technologies, such as Desktop, Notebook, and Handheld Computers, Digital Cameras, the Internet, Cloud Computing, the World Wide Web, Spread Sheets, Tutorials, Simulations, email, Local Area Networking, Bluetooth, Streaming, and DVDs; and applications such as word processors, Virtual Environment, Simulator, Digital libraries, Computer-Mediated Conferencing, videoconferencing, Emulator etc. ICT allows for the production of digital resources such as digital libraries, where students, teachers, and professionals can access study material and course material from anywhere at any time. The influences are felt more and more at schools. ICT provides both students and teachers with more opportunities to adapt learning and teaching to individual needs, forcing schools to aptly respond to this technical innovation, and it also increases access and improves the quality of education in developing countries.

2.7. Factors affecting the application of Instructional materials and Technology

There are some factors that considerably affect the implementation of instructional material and technology. Some of these are the curriculum, syllabus, and learning competencies, Learners' learning styles, aptitudes, proficiency, and Pedagogical principles held by the teachers, societal demands, non-availability of materials, laziness of the teachers, lack of skill and strategies, financial constraint, lack of appropriate materials in textbook, time constraint, lack of support from authority, lack of geography resource room, teacher’s past experiences; contextual factors; the teacher’s interpretation of the texts and etc. The effectiveness of instructional material and technologies depends upon the manner and degree to which they meet the needs of teachers and students. Any evaluation must examine usage, scope of print and non-print collections, frequency of removal of biased and outdated materials, and procedures that promote ease of use and accessibility (Bebell et al., 2004).

Different studies have been undertaken and attempted to cover the factors contributing to the limited use of instructional materials and technology in teaching-learning process (Moore, 2004), (Krisa, 1998), and (Yaghi, 1996). Their investigation could disclose other factors, which are listed below:

Lack of Resources: One significant factor that can hinder the effective use of instructional materials in schools is a lack of resources, often due to insufficient funding or budget constraints. This challenge can have a cascading impact on the overall quality of education provided.

Impact on Quality and Variety: Insufficient funding can limit the variety and quality of instructional materials available. High-quality materials, especially those that are technologically advanced or designed for specific learning needs, can be expensive to develop or procure. Without access to a diverse range of materials, educators might struggle to cater to different learning styles and individual student needs.

Limited Accessibility: Students from low-income communities or underfunded schools are disproportionately affected by the lack of resources. They may not have access to the same level of instructional materials as their counterparts in wealthier schools. This inequality in resource availability can contribute to educational disparities and hinder the goal of providing an equitable education to all students.

Mismatch with Curriculum: The mismatch between instructional materials and the curriculum is a factor that can hinder their effective use in education settings. Effective instructional materials are those that align closely with the curriculum's learning objectives and goals. If the materials deviate from the curriculum's scope and sequence, they might not support the intended learning outcomes. Misalignment can lead to confusion among students and educators regarding what is being taught and assessed. If the materials do not address or align with the learning objectives of the curriculum, they may not contribute to the desired educational out comes. When there's a mismatch between the materials and the curriculum, students may perceive the content as irrelevant or disconnected from their experiences, leading to decreased engagement.

Time:- The implementation of technology in the teaching field requires time to learn the skill. Teachers must have time to learn necessary computer and other technology related skills in order to apply these skills into their class curriculum.

Teacher Attitude*:*-The use of instructional technologies by teachers has an impact on students' content acquisition and adds to class performance. One of the obstacles to the successful use of instructional technologies in classroom teaching and learning activities appears to be the resistance of teachers (Beggs, 2000). According to Becker, (1999) teachers who have been provided by their schools with a computer and all the necessary instructional technology within the classroom will be more likely to have a positive attitude.

Lack of Training:- Teachers need to be provided with training's that help them clearly see the benefits of teaching with technology. Well-trained teachers tend to be more comfortable with and more efficient for learners, while poorly-trained teachers may model bad experience that could cause negative attitudes towards classroom technology and among the students (Yaghi 1996).

Attitudes of Administrators*:*-The lack of support from administrators impedes the use of instructional technology in the classroom. According to Yaghi, (1996), administrators think that the use of computers should be restricted to those who can make the best use of it.

Level of Education*:*- The teacher's academic and professional qualification contributes to proper preparation and use of instructional resources during teaching and learning process. Teacher's academic qualification level is a key characteristic to effective use of any given instructional method. Low academic level hinders teachers from understanding and utilizing the instructional resources effectively in teaching (Inda, 2013).

Human or Psychological Factor*:*-Teachers who are not very familiar with technology naturally have little commitment to implementing technology in the classroom. They might be embarrassed to commit errors in front of students or their colleagues. Johnson A. et al., (2016) stated that there are two common challenges faced by educators when attempting to integrate technology in the classroom.

Further studies conducted by Krysa (1998) have shown that factors such as teacher attitude and teacher training contribute to the use of technology in the classroom.

2.8. Strategies to minimize the challenges of using Instructional material and Technologies

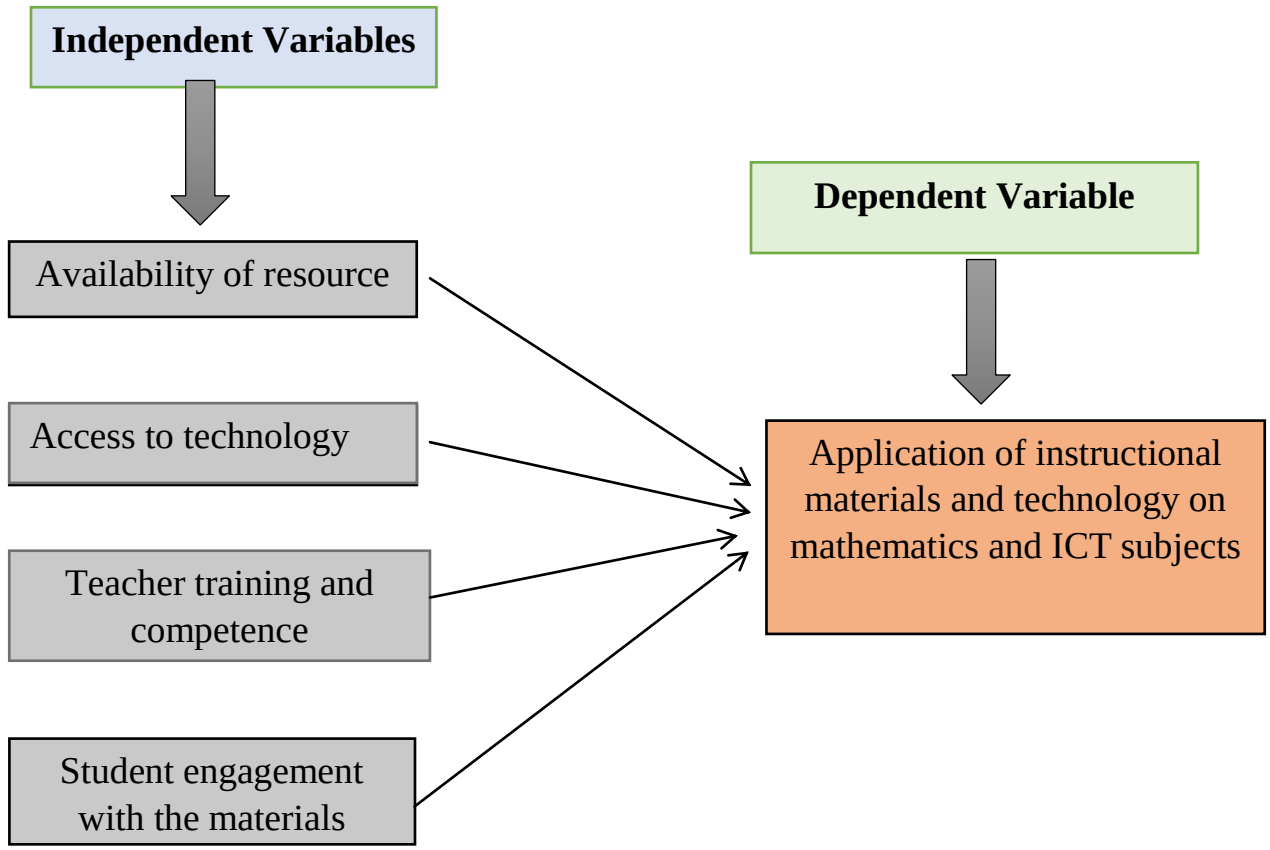
According to Johnson, (2016), the following strategies were used to overcome the challenges of using instructional materials and technologies: It is necessary that teachers have a say in what instruction and technologies they will use in the class room. Teaching is a deeply personal experience, and when teachers feel as though they have lost the ability to teach in a manner that best suits them, it can be frustrating and discouraging. No single educational materials and technology will be perfect for every teacher, and teachers should have the ability to select a materials and technology that they feel most comfortable with.

To minimize the challenges of using instructional materials the concern body have to learn four domain strategies. The first one is to organize the material in to small, easily retrievable chunks, secondly link new information to knowledge the learner already possesses, thirdly use mnemonics and other memory devices for new information and lastly use meaningful contexts and relevant cues. Many methods have been utilized to provide professional development to teachers on technology integration issues. The three methods on which the research evidence seems strongest are: developing technological skills, increasing support through collaborative environments, and providing increased mentoring. The most common objective has been to change teachers' attitudes towards technology integration in an effort to get them to use technology more often (Richard, 2018).

The studies conducted in different parts of the world, including Africa, the improvisation of instructional technologies is also considered one of the strategies. Improvisation involves the sourcing, selection, and deployment of relevant instructional materials into the teaching-learning focus in the absence or shortage of standard materials for a meaningful realization of specified educational goals and objectives (Eshiet, 1996).

2.9. Conceptual Framework

Figure 2.1: Conceptual Framework showing the relationships between the independent and dependent variables related to the assessment of instructional materials and technology in teaching and learning process.



Source: Compiled by the researcher, (2024)

The conceptual framework for the study as presented in Figure 2.1 considered how various factors influence the availability, utilization, benefits, and challenges associated with instructional materials and technology within the educational context. In this study, the independent variable would typically refer to the factors that are manipulated or assessed to determine their effect on the application and use of instructional materials and technology.

CHAPTER THREE

3. RESEARCH METHODOLOGY

3.1. Introduction

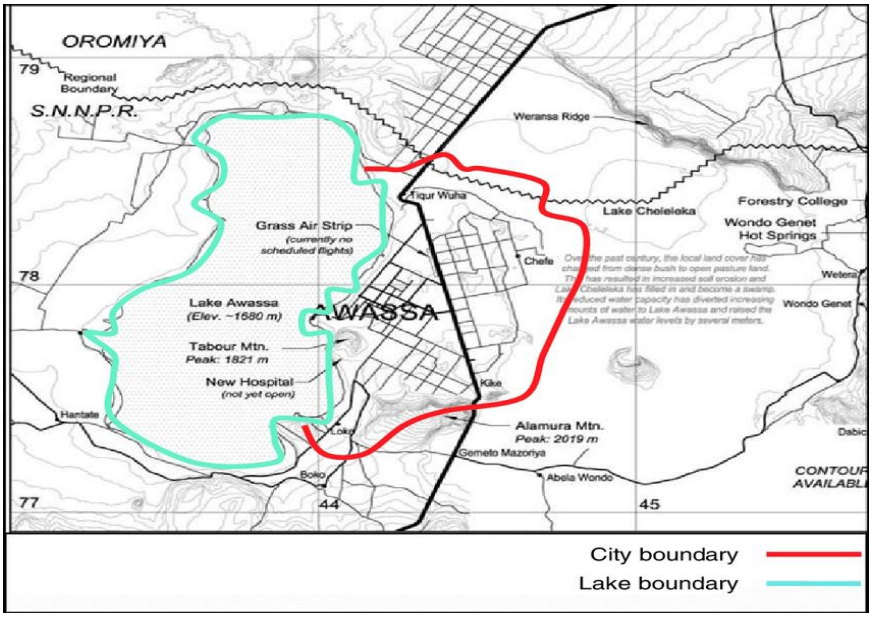
This chapter deals with research methodology consisting of description of study area, research design, research method, sources of data, sample size, sampling technique, data collection instruments, procedures of data collection, and methods of data analysis, as well as ethical considerations.

3.2 Description of Study Area

The study was conducted in Hawassa City administration, which is the capital of the Sidama National Regional State and located 273km South of Addis Ababa, the capital of Ethiopia. It lies on the Trans-African Highway 4 Cairo-Cape Town and has a latitude and longitude of 7°3´N 38°28´E and an elevation of 1,708 meters (5,604 feet) above sea level. The city has 8 sub-cities, 32 kebeles and a population of 133,097 according to 2023 estimate. It covers 50 km2 and is located 1,708m above sea level. In the city, there are 21 secondary schools (6 public and 15 private).

3.3 Map of Study Area

Map of Hawassa City



Source: SNNPRS Finance and Economic Development Bureau.

3.4. Research Design

The objective of this study was to assess the utilization of instructional materials and technology in the teaching-learning process in mathematics and ICT subjects in secondary schools of Hawassa City administration. In order to achieve this objective, a descriptive survey design was used, since this descriptive design is a method of collecting information by interviewing and administering a self-administered questionnaire to a sample of individuals. If the primary aim is to understand the current landscape of instructional materials and technology use in mathematics and ICT subjects at secondary schools, a descriptive survey design could be advantageous. It allows for the collection of comprehensive data on how instructional materials and technology is currently availability, utilized, the factors affecting the use of instructional materials and technology, and the overall environment surrounding its implementation.

3.5. Research method

A research method is a systematic approach to conducting research and gathering data in order to answer a specific research question or hypothesis. There are various research methods, including qualitative, quantitative, and mixed methods. Qualitative research is often used to explore complex phenomena and generate hypotheses for further investigation. On the other hand Quantitative research methods involve the collection and analysis of numerical data to answer specific research questions. This method includes surveys and statistical analysis, and is used to measure and quantify relationships between variables. Finally, mixed methods approach is intentionally combines quantitative and qualitative approaches as components of the study. The researchers emphasize the research problem and use all approaches available to understand the problem. The choice of research method depends on the nature of the research question, the type of data needed, and the overall research design.(Creswell, 2009).

Hence, based on the above discussions of the three research method and by considering the research problem and objective, this study was used mixed method approach.

3.6. Source of data

3.6.1 Primary Data Sources

The primary data was gathered from different respondents in the selected secondary schools who have adequate information about the application of instructional materials and technology in the teaching-learning process in Hawassa city administration. Accordingly, the primary data was obtained from secondary school teachers, students and principals.

3.6.2. Secondary Data Sources

Through an analytical review of various documentary sources, the researcher gathered relevant secondary data related to the study's topic in order to strengthen the study. Books, articles, theses, journals, the internet, reports, and any other related academic or scholarly writings were the most popular types of these sources. Secondary data was collected from such observation classroom, documents from schools such as lesson plans and school annual plans.

3.7. Population, Sample and Sampling Techniques

The populations of this study were teachers, students, and principals. Among 21 secondary schools (16 private and 5 public secondary schools) of Hawassa city administration 2 private and 2 public secondary schools was selected as sample study areas by simple random sampling method. These are Tabor secondary school and Alamura secondary school from public secondary schools and SOS secondary school and Sankofa International School from private schools.

Since the population is large, taking samples is needed. Among four secondary schools 71 mathematics and ICT subject teachers were selected, 371 students, and 4 principals were selected to be respondents in the study. Therefore, the total number of participants in the study was 446. Different scholars use different formulas to determine the necessary sample size. The sample size was determined using a simplified formula provided by Yemane's (1967) formula. The formula considers the level of 95% confidence level (CI) and the margin of error of 5%. To determine the sample size of teachers, the researcher used the following formula provided by Yemane: Based on

this, the researcher decides to take the upper population size as the limit to get a more valid sample size. If the population size (N) of the study is known and the sampling error (e) is fixed by the researcher, then the total sampling size can be calculated using the following formula: Where n is the sample size, N is the population size, 95% confidence level, and margin of error = 0.05 are assumed for the purpose of determining the sample size for this study.

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

$$\mathbf{n = 88/1 + 88(0.05)^2}$$

$$\mathbf{\approx 71}$$

Once the sample size of the teacher respondents is calculated using the above formula, proportional representation was used to determine the number of teachers sampled in each selected secondary school. In the case of students, used adjusting large population size (Finite Population Correction)

Since, the student population (N = 11009) finite, we can apply the finite population correction formula to calculate the sample size.

Finite Population Correction Formula: n' = n/(1 + (n - 1)/N)

Where: n' = adjusted sample size, n = initial sample size (384), N = population size (11,009)

n' = 384/(1 + 34/1008)

n' = 384/(1 + 384/1000)

n' = 384/(1 + 0.0348)

n' = 384/1.0348

n' ≈371

So, the adjusted sample size for students is approximately 371. The same process was applied to proportional representation was used to determine the number of students sampled in each selected secondary school, while using random sampling for the data collection. Purposive sampling was used to select participants from principals.

Table 1: Total population and sample size

	Respondents		**Name of schools**				
			Tabor	Alamura	SOS	Sankofa	Total
Population size	Teachers	Mathematics	34	21	4	5	64
		ICT	12	8	2	2	24
		Total	46	29	6	7	88
	Student		5644	4381	564	420	11,009
	Principal		4	4	4	4	16
	Total population size		**5648**	**4385**	**568**	**424**	**11,025**
Sample size	Teachers		37	23	5	6	71
	Student		192	146	19	14	371
	Principal		1	1	1	1	4
	Total sample size		**230**	**170**	**25**	**21**	**446**

The reason for using random sampling techniques in determining the sample are to give equal chance for every teachers and students to be included in the study from each school they are selected proportional to their total number of teachers and students. Data collected by means of a questionnaire, which is the principal data collection instrument.

On the other hand, the Principals were selected to gather proper and relevant information. For this case, purposive sampling technique was used on their responsibility.

3.8. Data collection tools

In order to gather information, the researcher was used four main instruments for data collection, namely questionnaire, interview, observation and document analysis.

3.8.1 Questionnaire

The main data collection instruments were questionnaires. From teachers and students respondent's data were collected by using close ended questionnaires.

3.8.2 Interview

In qualitative research, the interviewee is a major source of data needed for understanding the phenomena under study. For the purpose of this study, a semi-structured interview was used. The interview for this study was used principals to get their understanding and perspectives about the issue. To create a suitable atmosphere and relationship, the selection of participants was based on the willingness of the individuals to participate in the study.

3.8.3 Observation

The observation serves as an additional technique that complements the information obtained through the interview and questionnaires. The researcher for this study was the information obtained from the observation to triangulate the data collected, particularly from teachers and students, using closed ended questionnaires. Using an observation checklist, information was collected from classrooms, pedagogical centers, and libraries for the availability and utilization of instructional materials and technologies.

3.8.4 Document analysis

Document analysis was particularly used to triangulate the information obtained using questionnaires.

3.9. Data Collection Procedures

In the beginning, the researcher was contact the concerned officials in the Hawassa City administration Education Office. The contact helps to get sufficient prior information about the number of secondary schools in Hawassa City, the number of teachers, students, and principals in the schools. The general information obtained was crucial for the researcher to make a decision concerning the best way to go about the data collection process. In order to accomplish the data collection process successfully in the selected secondary schools, the researcher had a plan to follow the following procedures: handing in a cooperation letter, collecting data from departments, making contact, and establishing rapport with all principals in the selected secondary schools. Before approaching respondents for data collection, the researcher was given a brief explanation about the purpose and nature of the study. The questionnaires that are completed by respondents

and all the qualitative (interview and observation) data collection procedures were conducted by the researcher.

3.10. Reliability and Validity of the Instrument

In this study, a pilot test was conducted to assess the reliability of the questionnaires. According to Anderson (1998), a pilot study precedes the main research and serves to test the procedures and techniques to ensure their effectiveness. Its purpose is to ascertain the feasibility of obtaining worthwhile results and to prevent trivial or insignificant research. Similarly, Santos (1999) described a pilot study as a common method to gauge the reliability of survey instruments, particularly in evaluating the internal consistency of survey items. It aids researchers in identifying and refining problematic items related to content and format. To this aim, the researcher administered the survey to a convenience sample of 15(10 Mathematics and 5 ICT) teachers from Adis ketema Secondary School in Hawassa city, chosen based on their availability and willingness to participate. Participants were invited to provide feedback on any items they found confusing, difficult to grasp, or irrelevant. The survey utilized rating scales, and reliability was assessed using Cronbach's alpha, yielding coefficients of 0.89 for Mathematics and 0.90 for ICT. Additionally, the draft questionnaire underwent scrutiny by advisors and two postgraduate students in the field to identify any vague or unclear items. Their feedback was instrumental in enhancing the clarity of statements, correcting grammatical and typographical errors, and refining instructions. Revised questionnaires were then administered to the sample for further validation.

3.11. Tools of data analysis

Data analysis is the application of reasoning to understand the data that was gathered from respondents, and the appropriate analytical technique of the analysis is mainly determined by the characteristics of the research design and the nature of the data collected (Eldridge, S. (2023). Data collected through primary sources from respondents and secondary sources from documents was analyzed through quantitative and qualitative data analysis methods. A quantitative approach was used for the purpose of using numeric explanations to describe respondents' responses. It was collected through the questionnaire, reported by using simple descriptive statistical tools like, frequency analysis, table, percentage, mean, and standard deviation.

The data collected from respondents was analyzed by sequential data analysis method, systematically organized, summarized, and interpreted based on the facts of the data. For this study, both quantitative and qualitative methods of data analysis were applied.

The raw quantitative data obtained through a closed-ended questionnaire was carefully coded and entered into the computer for processing by using SPSS-26, and the qualitative data, which have been gathered through interviews, and observation, and document analysis, were analyzed and summarized. Most of the data was collected from teachers and students with the help of closed questionnaires.

3.12. Ethical practices

In order to get the research process done professionally, ethical issues was seriously taken into consideration. An official letter was written from the Hawassa University ethical board to the Hawassa city administration education office. Before data collection is undertaken, all the participants in this study were duly informed about the purpose of the study, and their willingness and agreement were secured. A cooperation letter collected from the school of education at Hawassa University was given to the sample secondary school principals. The participants were informed by the researcher that participation in the study was done only voluntarily, and they were assured that the responses they give were kept confidential.

In addition, the researcher took great care not to personalize respondents in any part of the data presentation, analysis, or interpretation. Furthermore, all the materials used for the purpose of this research were properly acknowledged. Each informant was given a pseudonym name for ethical reasons, to protect confidentiality, and also to help the researcher differentiate one respondent from the other during analysis.

CHAPTER FOUR

4.RESULT AND DISCUSSION

This chapter deals with the presentation, analysis and interpretation of data collected from teachers, students, and principals through questionnaire and interview, and additionally data collected by means of document analysis and observation. It includes two major parts. The first part presents the general characteristics of teacher respondents in terms of sex, age, educational qualifications, work experience and departments and sex, age and grade level of the students. The second part is concerned with the presentation, analysis and interpretation of data. The chapter primarily covers the results obtained about the extent of availability of instructional materials and technologies in the selected schools, the extent of utilizing the instructional materials and technologies by teachers, factors affecting the utilization of instructional materials and technologies, and strategies to minimize the challenges in the selected schools.

4.1. General Characteristics of the Respondents

Demographic factors were not the primary focus of the study; however, the demographic characteristics provide valuable context for interpreting the results.

Description of the respondents' characteristics provides some basic demographic information about the distribution of their general characteristics considered in the study. The following table 4.1 depicts the frequency and percentage of respondents' characteristics by sex, age, educational backgrounds and work experience.

Table 4.1. Characteristics of teacher respondents by sex, age, education, years of work experience and departments.

Characteristics		**Respondents**	
Variables	Values	Frequency	Percent (%)
Sex	Male	49	68.06
	Female	23	31.94
	Total	**72**	**100.0**
Age	21-30	17	23.61
	31-40	30	41.66
	41-50	19	26.40
	above 50	6	8.33
	Total	**72**	**100.0**
Years of Experience	<5	5	6.9
	6-10	14	19.50
	11-15	23	31.94
	16-20	17	23.61
	>20	13	18.05
	Total	**72**	**100.0**
Educational Level	BSc/BA	48	66.6
	MSc/MA	24	33.4
	Total	**72**	**100.0**

Source: Own survey result and SPSS output (2024)

About 62 teacher respondents, as indicated in the above table, 49(68.06%) were men and 23(31.94%) were women. In terms of age distribution, 17 teachers (23.61%) belonged to the 21–30 age group, 30 teachers 41.66%) to the 31–40 age group, 19 teachers (26.4%) to the 41–50 age group, and 6 teachers (8.33%) to the 51 and above age group. Based on the available data, 91.67% of the teachers who responded were between the ages of 21 and 50. Regarding the number of years that teachers had served, it was discovered that 5(6.9%) had <5 of work experience, 14(19.5%) had between 6-10 , 23(31.94%) had between11-15, 17(23.61%) had between16-20, and the remaining 13(18.05%) teachers had extensive work experience spanning 21years and beyond. In terms of educational attainment, there were 24(33.3%) more holders of BSc/BA degrees than MA/MSc degrees.

Table 4.2. Characteristics of student's respondents by sex, age, grade level and name of school.

Characteristics		**Respondents**	
Variables	Values	Frequency	Percent (%)
Sex	Male	181	48.8
	Female	190	51.2
	Total	**371**	**100**
Age	16-20	371	100
	Total	**100**	**100**
Grade Level	9	115	31.0
	10	60	16.2
	11	84	22.6
	12	112	30.2
	Total	**371**	**100**
Name of school	Tabor	195	52.6
	Alamura	143	38.5
	Sankofa	14	3.8
	SOS	19	5.1
	Total	371	100

Source: Own survey result and SPSS output (2024)

Table 4.2 presents data on various characteristics of respondents, including their sex, age, grade level, and the name of their school. The data shows that out of 371 respondents, 48.8% are male and 51.2% are female. All respondents fall within the age range of 16-20, which accounts for 100% of the sample. The respondents are distributed across different grade levels, with the majority being in grades 9, 11, and 12, accounting for 31.0%, 22.6%, and 30.2% respectively. Grade 10 has the smallest representation at 16.2%.Tabor has the highest representation at 52.6%, followed by Alamura at 38.5%. Sankofa and SOS have relatively lower representation at 3.8% and 5.1% respectively.

4.2. Data Presentation, Analysis and Interpretation

This section includes the quantitative analysis of data obtained from teachers and students through questionnaires; the qualitative analysis of principal interview responses; and the analysis of information gathered through observation and checklists for document analysis.

4.2.1. Availability of instructional materials and technologies

As indicated in chapter three to obtain the required relevant data from respondents, the data collecting instrument was a questionnaire which consisted of 84 closed ended questions for teacher respondents, and also 61 closed ended questions for student's respondents. Looking at the average mean score may tell only part of the story of what respondents' rated on a 5 point Likert scale. So, in addition to mean, it is standard deviation (SD) which provides a valuable descriptive measure of the distribution of responses. SD generally does not indicate "right or wrong" or better or worse"- a lower SD is not necessarily more desirable. It is used to describe distribution in relation to mean. In respect to this research SD will be used for the description of variability of responses where needed.

Table4.4. Responses of teachers to the extent of availability of instructional materials and technologies in both mathematics and ICT subjects.

Subjects	**Item No.**			N	Mean	Std. Deviation
Mathematics	Materials	**1**	Textbook	48	4.82	.389
		2	Teachers Guide	48	4.36	.486
	Manipulatives	**3**	Blocks	48	2.51	1.073
		4	Counters	48	2.59	.715
		5	Geometric shapes	48	3.21	.864
		6	Measuring tools	48	2.67	1.084
	Visual aids	**7**	Charts	48	2.85	1.159
		8	Graphs	48	2.92	1.010
		9	Diagrams	48	3.08	1.109
		10	Illustrations	48	2.95	.944
		11	Math software	48	1.89	.833

	Technology based tools	**12**	Online tutorials	48	1.79	.978
		13	Educational app	48	2.05	1.169
		14	Interactive simulation	48	1.95	1.146
ICT	**ICT based**	**15**	Computers	24	3.39	1.644
		16	Software application	24	2.09	1.240
		17	Internet resources	24	2.00	1.314
		18	Multimedia presentation	24	2.12	1.043
		19	Coding kits	24	1.96	1.107
		20	Virtual labs	24	1.52	.511
		21	Tape recorder	24	1.26	1.214
		22	Video	24	2.57	1.619
		23	Plasma TV	24	3.91	.668
		24	Internet	24	1.48	1.039
		25	School net	24	1.39	.783

Source: Own survey result and SPSS output (2024)

Note:

- 0-2.5 low mean difference of agreement due to positive statement
- 2.6-3.5 medium mean difference
- 3.6-5.00 – high mean difference

Results presented in table 4.4 regarding to availability of instructional materials and technologies in both mathematics and ICT subjects. In terms of mathematics materials, items such as textbooks and teacher guides are highly regarded, evidenced by their high mean ratings of 4.82 and 4.36 respectively, with minimal standard deviations suggesting a strong agreement among respondents. Conversely, manipulatives like blocks and geometric shapes display a wider range of opinions, as reflected in their mean scores ranging from 2.51 to 3.21, coupled with standard deviations spanning from 0.715 to 1.084. Visual aids, encompassing charts, graphs, diagrams, and illustrations, fall within a similar range, demonstrating varied perceptions with means ranging from 2.85 to 3.08 and standard deviations from 1.010 to 1.159. Meanwhile, technology-based tools such as math software

and educational apps yield mean ratings between 1.79 and 2.05, indicating moderate favorability with somewhat higher standard deviations ranging from 0.833 to 1.169, suggesting a broader diversity of opinions.

Transitioning to the realm of ICT, plasma TVs and computers emerge as the most highly regarded ICT resources, garnering mean ratings of 3.91 and 3.39 respectively. The relatively low standard deviations of .668 and 1.644 suggest a stronger consensus among respondents regarding their effectiveness in educational settings, software applications, and internet resources exhibit mean ratings around 2, suggesting moderate favor, accompanied by standard deviations ranging from 1.240 to 1.314, indicating considerable variability in perceptions. Multimedia presentations and coding kits display similar trends. Conversely, virtual labs, tape recorders, and school networks are perceived less favorably, with mean ratings between 1.26 and 1.52 and standard deviations ranging from 0.783 to 1.214, suggesting a lack of consensus among respondents regarding their efficacy. Notably, plasma TVs emerge as the most highly regarded ICT resource, show a mean rating of 3.91 alongside a relatively low standard deviation of 0.668, investigative of a strong consensus regarding their perceived effectiveness in educational contexts.

Table 4.5. Responses of students to the extent of availability of instructional materials and technologies in both mathematics and ICT subjects.

Subjects	**Item No.**			N	Mean	Std. Deviation
Mathematics	Materials	**1**	Textbook	371	1.8125	.39154
		2	Teachers Guide	371	1.7375	.44137
	Manipulatives	**3**	Blocks	371	1.2688	.44470
		4	Counters	371	1.2500	.43437
		5	Geometric shapes	371	1.3625	.48223
		6	Measuring tools	371	1.2125	.48223

	Visual aids	**7**	Charts	371	1.3437	.49011
		8	Graphs	371	1.3563	.48039
		9	Diagrams	371	1.3187	.49490
		10	Illustrations	371	1.3750	.48564
	Technology based tools	**11**	Math software	371	1.2187	.41470
		12	Online tutorials	371	1.1188	.32451
		13	Educational app	371	1.2625	.44137
		14	Interactive simulation	371	1.1500	.35819
ICT	**ICT based**	**15**	Computers	371	1.5250	.44792
		16	Software application	371	1.1187	.49490
		17	Internet resources	371	1.1572	.36517
		18	Multimedia presentation	371	1.3750	.48564
		19	Coding kits	371	1.1625	.37007
		20	Virtual labs	371	1.3125	.46497
		21	Tape recorder	371	1.1188	.32451
		22	Video	371	1.4000	.49144
		23	Plasma TV	371	1.4625	.50016
		24	Internet	371	1.2750	.44792
		25	School net	371	1.3750	.48564

Source: Own survey result and SPSS output (2024)

Note:

- 0-1 low mean difference of agreement due to positive statement
- 1.1-1.5 medium mean difference
- 1.6-2.00 – high mean difference

The data presented reflects the responses of students were asked to rate the availability of various items on a scale of 1 for "There are none" to 2 for "Are there." The mean scores and standard deviations provide insight into the perceived availability of these resources.

Results presented in Table 4.5 mean score textbooks is 1.8125 with a standard deviation of 0.39154. This indicates that students perceive textbooks to be highly available with relatively low variability in their responses. The mean score teachers guide is 1.7375 with a standard deviation of 0.44137. Similar to textbooks, students perceive teacher's guides to be readily available with slightly higher variability compared to textbooks. The mean scores for manipulatives range from 1.2125 to 1.3625, indicating a medium agreement level of availability. The standard deviations range from 0.43437 to 0.49490, suggesting consistent perceptions among students regarding the availability of these manipulatives. Mean scores for visual aids range from 1.2187 to 1.3750, indicating medium agreement level of availability. The standard deviations range from 0.48039 to 0.49011, suggesting relatively low variability in students' perceptions. Mean scores for technology-based tools range from 1.1187 to 1.2625, indicating a medium agreement level of availability. The standard deviations range from 0.32451 to 0.44137, indicating relatively consistent perceptions among students regarding the availability of these tools.

Transitioning to the realm of ICT, The mean score of computers is 1.5250 with a standard deviation of 0.44792, indicating a relatively high availability of computers with moderate variability in students' perceptions. The mean score is 1.1187 with a standard deviation of 0.49490, suggesting that while software applications are perceived to be available, there is some variability in students' perceptions. Mean scores for internet resources range from 1.1572 to 1.3750, indicating a moderate to medium agreement level of availability. The standard deviations range from 0.36517 to 0.48564, suggesting relatively consistent perceptions among students regarding the availability of these resources. The mean score of multimedia presentation is 1.3750 with a standard deviation of 0.48564, indicating a medium level of multimedia presentations with moderate variability in

students' perceptions. Mean scores for these other technologies range from 1.1188 to 1.4625, indicating varying levels of availability. The standard deviations range from 0.32451 to 0.50016, suggesting variability in students' perceptions regarding the medium level availability of these technologies.

To the question “How well is the school equipped with instructional materials and technology? If no which major types do you think you are missing for your school?”

One of the principals, **private school principal A, responded:**

My school have enough number of a computer for ICT, but not sufficient for mathematics subject. But it fulfilled in the classroom like TV used to teach Audio and video as instruction materials.

To the same question public school principal B, responded:

It is not well equipped specially technological instruments, network infrastructures and like

Private school principal C, responded:

our school is relatively good enough from others school, however it needs further effort.

Public school principal D, responded:

The instructional materials and technology in our school is not complete enough, but there is something that has been started in a certain way, and there is a math lab room with computers brought to us by the Camara Education Ethiopian Secondary Education Aid Organization to support math and science lessons.

The responses from the principals offer a nuanced view of the availability of instructional materials and technology in their respective schools. Private School Principal A acknowledges a sufficient number of computers for ICT but notes a lack of adequacy for mathematics subjects. They highlight the presence of instructional materials such as TVs for audio and video instruction within classrooms. Public School Principal B, on the other hand, expresses dissatisfaction with the school's technological instruments and network infrastructures, indicating a deficiency in essential resources to support teaching and learning. Private School Principal C portrays their school as relatively well-equipped compared to others but recognizes the ongoing need for improvement, suggesting ongoing efforts to enhance resources. Finally, Public School Principal D describes a situation where instructional materials and technology are incomplete but notes some progress, particularly

mentioning the support received for math and science lessons through the provision of a math lab room with computers from an external organization

Information collected by means of observation checklist the result that not all instructional materials and technologies were available in equal proportion. . It was noted and observed that from instructional materials revealed that textbook and teachers guide are present in all schools. Manipulatives and visual aids were present in small quantity. For technology-based tools in mathematics, items like math software, online tutorials, educational apps, and interactive simulations had very lower level of availability and almost none. Computers which were kept in the ICT rooms were observed to be insufficient compared to the number of students in the sample schools. But the rest technology items were found to be either rare or absent. The above responses indicate that from all instructional materials only textbook and teacher guide is high availability and from technologies only plasma TV or TV and computer were present in small quantity.

4.2.2. The extent of using by teachers

The mean and standard deviation of the responses of teacher respondents to the extent of using the instructional materials and technology devices are tabulated and presented in table **4.6.**

Table 4.6. Responses of teachers to the extent of using of instructional materials and technologies in both mathematics and ICT subjects.

Subjects	**Item No.**			N	Mean	Std. Deviation
Mathematics	Materials	**1**	Textbook	48	4.50	1.155
		2	Teachers Guide	48	4.47	1.154
	Manipulatives	**3**	Blocks	48	2.22	1.368
		4	Counters	48	2.43	1.238
		5	Geometric shapes	48	2.68	1.421
		6	Measuring tools	48	2.55	1.377
	Visual aids	**7**	Charts	48	2.85	1.369
		8	Graphs	48	3.25	1.104

		9	Diagrams	48	3.03	1.097
		10	Illustrations	48	2.88	1.042
	Technology based tools	**11**	Math software	48	2.23	.832
		12	Online tutorials	48	2.15	.736
		13	Educational app	48	2.23	.832
		14	Interactive simulation	48	2.10	.744
ICT	**ICT based**	**15**	Computers	24	3.70	1.428
		16	Software application	24	2.65	1.071
		17	Internet resources	24	2.61	.891
		18	Multimedia presentation	24	2.48	.790
		19	Coding kits	24	2.30	1.363
		20	Virtual labs	24	2.04	1.461
		21	Tape recorder	24	1.65	1.152
		22	Video	24	2.70	1.428
		23	Plasma TV	24	1.91	.949
		24	Internet	24	2.74	.864
		25	School net	24	2.17	.937

Source: filed survey (2024)

Table 4.6 presents the responses of teachers regarding the extent of utilization of instructional materials and technology in both mathematics and ICT subjects. Teachers were asked to rate the utilization of various items on a scale from 1 for "Strongly Disagree" to 5 for "Strongly Agree." The mean scores and standard deviations provide insights into how teachers perceive the utilization of these resources.

In the mathematics section textbooks received the highest mean rating of 4.50, indicating that they are widely utilized in mathematics instruction. Teacher's guides also had a high mean rating of 4.47, suggesting good utilization. Manipulatives and visual aids had varying mean ratings ranging from 2.88 to 3.78, indicating moderate levels of utilization across these resources.

When it came to technology-based tools in mathematics, items like math software, online tutorials, educational apps, and interactive simulations had lower mean ratings between 2.10 and 2.23, suggesting limited utilization or not compared to traditional materials.

In the ICT section, teachers rated the utilization of ICT-based tools. Computers received a high mean rating of 3.70 rating that they are medium utilized in ICT instruction. Other tools had varying mean ratings between 1.65 and 3.13, suggesting differing levels of utilization across ICT resources.

Table 4.7. Student responses to the use of instructional materials and technologies by teachers in mathematics and ICT subjects.

Subjects	**Item No.**			N	Mean	Std. Deviation
Mathematics	Materials	**1**	Textbook	371	2.7358	.48800
		2	Teachers Guide	371	1.5795	.70597
	Manipulatives	**3**	Blocks	371	1.3827	.66505
		4	Counters	371	1.2183	.45117
		5	Geometric shapes	371	1.4232	.62506
		6	Measuring tools	371	1.4555	.54529
	Visual aids	**7**	Charts	371	1.5175	.63381
		8	Graphs	371	1.8922	.61444
		9	Diagrams	371	1.7709	.62715
		10	Illustrations	371	1.2911	.56607
	Technology based tools	**11**	Math software	371	1.4367	.68431
		12	Online tutorials	371	1.2507	.56398
		13	Educational app	371	1.4771	.76150

		14	Interactive simulation	371	1.1887	.48988
ICT	**ICT based**	**15**	Computers	371	1.9892	.77800
		16	Software application	371	1.5903	.68915
		17	Internet resources	371	1.4151	.69375
		18	Multimedia presentation	371	1.1779	.47151
		19	Coding kits	371	1.1536	.41669
		20	Virtual labs	371	1.3908	.73948
		21	Tape recorder	371	1.0970	.29641
		22	Video	371	1.2453	.53696
		23	Plasma TV	371	1.2318	.61964
		24	Internet	371	1.4394	.74867
		25	School net	371	1.3720	.67917

Source: filed survey (2024)

Note:

- 0-1 low mean difference of agreement due to positive statement
- 1.1-2 medium mean difference
- 2.1-2.00 – high mean difference

Table 4.7 provides insights into the utilization of instructional materials and technologies by teachers in both mathematics and ICT subjects, as perceived by students. In the realm of mathematics, textbooks emerge as highly utilized instructional materials, with a mean score of 2.7358 and a relatively low standard deviation of 0.48800, indicating widespread agreement among students regarding their usage. Conversely, teachers' guides, manipulatives like blocks and counters, and visual aids such as charts and illustrations exhibit lower mean scores, suggesting lesser utilization compared to textbooks. Notably, while technology-based tools like math software and educational apps show moderate utilization, interactive simulations score comparatively lower. In the domain of ICT, software applications stand out as frequently employed resources, with mean

scores of 1.5903. However, items such as coding kits and tape recorders demonstrate lower mean scores, indicating potentially underutilized resources in the classroom. Interestingly, computers receive a notably high mean score of 1.9892, suggesting robust utilization in ICT instruction. Despite variations in utilization across different instructional materials and technologies, the data underscore the importance of leveraging a diverse range of resources to enhance teaching and learning experiences in both mathematics and ICT subjects. Further analysis of utilization patterns could inform strategies to optimize resource allocation and pedagogical approaches in these domains.

Table 4.8 The response of the frequency of utilization of different instructional materials and technologies.

Subjects	**Item No.**	**Description of items**	N	Mean	Std. Deviation
Mathematics	1	How often do you use textbook for teaching in classroom?	48	3.00	.000
	2	How often do you use teachers guide?	48	2.85	.432
	3	How often do you use blocks for math problems?	48	1.64	.707
	4	How often do you use counters for algebraic tasks?	48	1.64	.743
	5	How often do you use geometric shapes aid for geometry concepts?	48	2.00	.562
	6	How often do you use charts or graph?	48	1.69	.694
	7	How often do you use math software?	48	1.28	.510
	8	How often do you utilize online tutorials?	48	1.18	.389
	9	How frequently do you engage with interactive simulations?	48	1.28	.510
	10	How often do you incorporate educational apps?	48	1.36	.584

ICT	1	How often do you use computers?	24	2.65	.487
	2	How often do you utilize educational software programs for coding, graphical design, multimedia production, data analysis?	24	2.13	.815
	3	How frequently do you access online platforms, websites, and databases for learning ICT concepts and skills?	24	2.13	.815
	4	How often do you engage with audiovisual materials like videos, animations, podcasts, and slid shows?	24	1.83	.984
	5	How frequently do you use physical or virtual coding kits to learn programming language?	24	1.43	.662
	6	How often do you interact with interact with interactive simulations and virtual labs?	24	1.43	.662

Source: Own survey result and SPSS output (2024)

Note:

- 0-1 low mean difference of agreement due to positive statement
- 1.1-2 medium mean difference
- 2.1-3.00 – high mean difference

The table 4.8 provides the teachers' responses regarding the frequency of utilizing instructional materials and technology in both mathematics and ICT subjects. The responses are based on a scale ranging from 1 for "Never use", 2 for "Sometime" and 3 for "Frequently".

In the mathematics section, Textbooks had a mean score of 2.95, indicating that they are used always s in classroom instruction. Teacher's guides followed closely with a mean score of 2.77, also suggesting occasional use. However, items like blocks, counters, geometric shapes, and visual aids had lower mean scores ranging from 1.59 to 2.15, indicating some time utilization. Technology-based tools in mathematics such as math software, online tutorials, interactive simulations, and educational apps had the lowest mean scores between 1.18 and 1.38, indicating rare use.

In the ICT section, Computers had a mean score of 2.65, suggesting they are used in frequently in ICT instruction. Other items like educational software programs and online platforms had mean

scores of 2.13, indicating sometime used. Audiovisual materials had a mean score of 1.83, while coding kits and interactive simulations/virtual labs had the lowest mean scores of 1.43, indicating limited utilization.

Interview response from principals

To the question "To what extent are your teachers skilled to use some of the instructional materials and technologies. What extent are your teachers use the instructional materials and technology?''

One of the principals, **private school principal A, responded:**

In my school, the teachers skills towards using computer. They use textbooks and reference books for math lessons. From technology, they use TV to show different videos. But there is not enough technology availability to support mathematics education and as a result, teachers are forced to teach without the help of technology. They also have a computer lab for ICT education. But fluctuation of the electricity and internet is a hindering the application of widespread use.

One of the principals**, public school principal B, responded:**

They have basic sill. But the major problem is the commitment shortage. They may need short on job training on modern technology applications. But there is not availability of technology materials for math's subject especially. And also not enough for ICT.

One of the principals, **private school principal C, responded:**

In fact majority of our teachers are well skilled but there is shortage of technology materials for math's subject especially.

The responses from the principals reflect a common theme of recognizing the importance of instructional materials and technology in education, particularly in the section of mathematics. Principal A highlights the limited availability of technology resources, such as computers and stable internet connection, which hampers the integration of technology into teaching practices. Similarly, Principal B acknowledges the need for training on modern technology applications and laments the lack of technology materials, especially in mathematics and ICT. Principal C echoes these sentiments, noting a shortage of technology materials specifically tailored for mathematics instruction. Finally the principals acknowledge the skills of their teachers; there is a clear consensus

on the challenges posed by inadequate technology resources and the need for greater support in this area to enhance teaching and learning experiences.

4.2. 3. Factors affecting the use of instructional materials and technologies

Interpreting the factors that influence the availability and utilization of instructional materials and technology in educational settings is crucial for understanding the complex dynamics shaping teaching practices. Several key factors can impact the accessibility, application, and effectiveness of instructional resources in secondary schools.

Table 4.9. : Teachers' responses on factors affecting the use of instructional materials and technologies.

Item No.	**Description of items**	N	Mean	S.D
1	Teachers feel that there is an adequate supply of materials and technology.	**72**	2.36	1.254
2	Teachers have access to the required instructional materials and technology.	**72**	2.17	.987
3	Teachers use the instructional materials and technology effectively to address the learning objectives of the curriculum.	**72**	2.08	.775
4	There is sufficient time and opportunities to learn necessary computer and technology-related skills.	**72**	2.42	.915
5	I believe that training and support in utilizing instructional materials and technologies.	**72**	4.58	.588
6	Teachers are given trainings whenever new technologies are introduced.	**72**	1.68	.901
7	Teachers get enough support from the school administration to motivate them in using instructional materials and technologies.	**72**	2.21	.704
8	The teachers have no lack of knowledge in the use of instructional materials and technologies.	**72**	3.50	.901

9	Teachers obtain technical assistance from the school.	**72**	2.31	.715
10	There is reliable electric power supply to enable teachers to use instructional technologies.	**72**	2.65	1.118
11	There are enough computers in the school to help teachers support the classroom teaching with technology.	**72**	2.39	1.014
12	The computers in our school are regularly maintained to ensure optimal performance for teaching.	**72**	2.56	1.410
13	There is internet connection in the school for teachers to use it for teaching purpose.	**72**	1.98	1.152
14	The school has a continual monitoring and evaluation system for ensuring the use of instructional materials and technologies by teachers.	**72**	1.90	.863
15	Teachers have interest in using instructional materials and technologies.	**72**	3.37	1.149
16	The more the number of teachers teaching experience, the better their extent of using instructional materials and technology for instruction purpose.	**72**	3.84	1.308
17	The school is known to go with the rapid technological changes.	**72**	2.55	1.626
18	The school teachers improvise instructional materials and technologies in the school pedagogical center.	**72**	2.77	.948

Source: Own survey result and SPSS output (2024)

Table 4.9. Indicate the results. Items 1(Mean = 2.36) and 2 (Mean = 2.17) suggest that teachers do not feel that there is an adequate supply of materials and technology, and they may not have easy access to the required instructional materials. This indicates a potential lack of resources and support in providing teachers with the necessary tools for effective teaching. Item 3(Mean = 2.08) reveals that teachers do not believe they are using instructional materials and technology effectively to address the learning objectives of the curriculum. This may indicate a need for further training and support in integrating these resources into their teaching practices. Item 4(Mean = 2.42) suggests that there may be insufficient time and opportunities for teachers to learn necessary

computer and technology-related skills. This highlights the importance of providing dedicated time and resources for professional development in this area. Item 5(Mean = 4.58) shows that teachers highly value training and support in utilizing instructional materials and technologies. This indicates a desire for ongoing professional development opportunities to enhance their skills in this area. Item 6(Mean = 1.68) suggests that teachers may not receive adequate training when new technologies are introduced. This highlights a potential gap in providing timely and relevant training to keep teachers updated with new technologies. Item 7(Mean = 2.21) indicates that teachers feel they do not receive enough support from the school administration to motivate them in using instructional materials and technologies. This suggests a need for stronger leadership and support from school administrators to encourage the effective use of these resources. Item 8(Mean = 3.50) reveals that teachers may feel they lack sufficient knowledge in the use of instructional materials and technologies. This highlights the importance of providing comprehensive training and support to ensure teachers are confident and competent in utilizing these resources. Items 9(Mean = 2.31), 10(Mean = 2.65), 11(Mean = 2.39), and 12(Mean = 2.56), suggest that there may be challenges related to technical infrastructure, such as reliable electric power supply, sufficient computers, and regular maintenance. These issues can hinder the effective use of instructional materials and technology in classrooms. Item 13(Mean = 1.98) shows that there may be limitations in internet connectivity, which can impact teachers' ability to utilize online resources for teaching purposes. Item 14 (Mean = 1.90) indicates that there may be a lack of a monitoring and evaluation system in place to ensure the consistent use of instructional materials and technologies by teachers. Implementing such a system can help track progress and identify areas for improvement. Item 15(Mean = 3.37) suggests that teachers have a moderate level of interest in using instructional materials and technologies. This indicates a potential willingness to engage with these resources but also highlights the need for further motivation and support. Item 16(Mean = 3.84) reveals that teachers with more teaching experience are more likely to use instructional materials and technology. This highlights the importance of experience in building confidence and proficiency in utilizing these resources. Item 17(Mean = 2.55) suggests that the school may face challenges in keeping up with rapid technological changes. This indicates a potential need for better resources, training, and support to stay updated with the latest technologies. Item 18(Mean = 2.77) indicates that teachers somewhat engage in improvising instructional materials and technologies

Interview response from principals

To the question "What are the administrative challenges you are experiencing in your school with regard to the application of instructional materials and technologies in mathematics and ICT subjects?''

One of the principals, **private school principal A, responded:**

I think the challenges, In mathematics subjects from the syllabus content they do not have sufficient instructional material. The curriculum by itself challenge for these subjects ICT and mathematics the reason behind, especially in ICT. They examined in theory / written but the subject matter more of it need engagement of technology and instructional materials. Lack of instruction materials in the school for mathematics subjects, specifically only for 3D contents. Fluctuation of electricity as not used always TV.

One of the principals, **public school principal B, responded:**

There is no adequate supply of instructional materials and technology inputs. Even if there are the technology materials like computers the robbers / thief is the common challenge in our school. There is also teachers who are not interested in using the few materials that are available.

One of the principals**, private school principal C, responded:**

All the stakeholders are not providing appropriate attention for the instructional materials and technology. There are lack of instructional materials and technology especially for mathematics subject in the school. There is no math lab or digital library in the school.

One of the principals**, public school principal D, responded**:

There is not enough material and technology in our school. There is a problem of supply. It has a digital library for students from 9th to 12th for maths and science subjects. The number of students is high but the material is few. As a result, students are not getting education supported by materials and technology.

From the insightful responses provided by the principals across various school settings, it's evident that the challenge of insufficient instructional materials and technology persists, particularly in mathematics and ICT subjects. Private school principal A highlights the need for engagement with

technology in these subjects, emphasizing the scarcity of instructional materials, especially in areas like 3D content. Public school principal B sheds light on additional obstacles such as security concerns and teacher reluctance to utilize available resources. Private school principal C emphasizes the collective responsibility of stakeholders in addressing this issue, emphasizing the absence of essential resources like math labs and digital libraries. Finally, governmental school principal D underscores the disparity between student numbers and available materials, despite the presence of a digital library. In conclusion, it's vital for educational institutions and stakeholders to collaboratively address the shortage of instructional materials and technology, ensuring equitable access and support for students across all subjects.

4.3 Discussion

This research clearly studies the application of instructional materials and technology in mathematics and ICT subjects in the secondary schools of Hawassa City Administration.

Instructional materials are those materials that are used in the classroom for instruction or demonstration purposes by teachers and students. Instructional technologies can be considered as devices that assist an instructor to clarify, establish, and correlate concepts, to transmit to learner's facts, skills, attitudes, knowledge, and appreciation, and to enable them to make learning more concrete, clear, and effective. As observed from the result obtained in this study, instructional materials such as textbooks, teachers guide and some visual aids seem to be the most available and utilized in the schools. Therefore, its effect to a great extent on student's academic performance is nevertheless expected. Msafiri (2017) argues that instructional materials help teachers to easily achieve instructional objectives and students to understand the content in practical ways. Ogbu (2015) observed that a teacher that uses teaching aids to deliver his or her lesson will cover more facts in less time than one who rely on only oral lesson delivery. The data suggested that exposed the inadequacy in availability of some relevant and important instructional materials and technologies. Specifically, the instructional materials in mathematics teaching (geometric shapes, charts, graphs, diagrams and illustrations) almost none, and technologies in teaching (math software, online tutorials, educational app, and interactive simulation) are none except Alamura secondary school. Adebule and Ayoola (2016) provided empirical confirmation that the use of instructional materials improved students' performance in mathematics. The performance of students taught with instructional resources and the performance of students taught without them

were found to differ significantly, they confirmed. According to a study by Aburime et al. (2016), there was a statistically significant difference between the mean scores of history students who received enough material resources and those who did not.

The data suggested that in the ICT subjects also inadequacy in availability of some relevant and important ICT based materials like software application, multimedia presentation, coding kits, virtual lab, and internet resources are not available in the schools. The only ICT based material is computer but it also not enough in terms of number of students. Ajayi (2008) states that there are several ways to use ICT facilities, such as systematized feedback systems, computer-based networks and operations, audio and video conferencing, internet/global websites, and computer-assisted training. However, it must be emphasized that the availability of these resources and the proficiency of teachers in using them are prerequisites for the efficient use of the various ICT methods in teaching learning.

The data suggested that the principals' observations reverberate with research indicating a lack of sufficient materials and technology inputs in schools (Table 4.9, Items 1 and 2). This shortage not only impedes effective teaching but also limits students' access to diverse learning resources, hindering their educational development (Mtebe & Raisamo, 2014). Furthermore, security concerns, as highlighted by public school principal B, are an additional barrier to the effective utilization of available resources (Table 4.9, Item 2). Studies have shown that factors like theft and vandalism can significantly impact the accessibility and sustainability of technology in educational environments (Kimmons & Hall, 2017).

The principals' responses also underline the importance of teacher training and support in utilizing instructional materials and technologies (Table 4.9, Items 5 and 6). Research suggests that effective professional development programs play a crucial role in enhancing teachers' confidence and skills in integrating technology into their pedagogy (Ertmer et al., 2012). However, as indicated by private school principal A, there may be gaps in providing timely and relevant training when new technologies are introduced (Table 4.9, Item 6). Addressing this gap requires ongoing and tailored support to ensure teachers are equipped to influence technology effectively in their classrooms. Moreover, the principals' responses highlight infrastructure-related challenges, such as unreliable electricity supply and limited internet connectivity (Table 4.9, Items 10-13). These issues align with

research findings indicating that inadequate infrastructure can hinder the seamless integration of technology into teaching and learning processes (Mtebe & Raisamo, 2018). Without reliable access to power and the internet, teachers may struggle to implement technology-enhanced instructional strategies, thereby compromising the quality of education provided to students.

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CHAPTER FIVE

5.Summary, Conclusion and Recommendations

5.1. Summary

Investigating the use of educational resources and technology in mathematics and ICT subjects in four chosen secondary schools under Hawassa City Administration was the primary goal of this study. The researcher developed the following three study questions in order to accomplish this goal:

1. Are there enough technological resources and educational materials available in the schools?
2. Are the available instructional materials and technologies sufficiently used in the schools?
3. What are the major factors affecting the use of instructional materials and technologies in the selected schools?

A mixed study design was utilized to answer these fundamental questions. Four secondary schools were used to perform the study. In addition to the 62 teachers and 160 students who served as the primary sources of data, the data was also gathered from four school principals, observation, and document analysis. Teachers, school principals, and student participants were chosen by the random sampling approach for teachers and students; however, purposive sampling was utilized for principals, Tools that were both quantitative and qualitative were used to collect the required data.

5.1.1 Summary of findings related to availability of instructional materials and technology in the schools.

- The majority of the respondents through questionnaires and interview indicated that extent to which the availability of instructional materials and technology in the schools, the finding also indicates that, the extent to which the availability of text book and teachers guide were found at good level. But limited availability is particularly in the areas of manipulatives, visual aids, and technology-based tools for mathematics. Out of four schools the only school that have digital library for mathematics and science subjects is, Alamura secondary school.
- The majority of respondents indicated that, the extent to which the availability of ICT based materials, they rated moderate not enough availability of computers, while the availability of

other ICT resources, such as software applications, internet resources, and coding kits, was as found at very low level or totally absent in the schools undergoing in the study.

5.1.2 Summary of findings related to utilization or use of instructional materials and technology in the schools.

- The majority of the teachers confirmed that, traditional materials like textbooks and teacher's guides are used more frequently in mathematics subjects compared to technology-based tools. But limited utilization is particularly in the areas of manipulatives, and visual aids because of their availability. Technology -based tools are not used in all public schools because they do not exist but only Alamura secondary school that have digital library for mathematics and science subjects but it is not sufficient in terms of number of students in the school. But in private schools there are TV in all class room and all are functional. There is a clear disparity in the utilization of computers and technology resources.
- Frequency of utilization of ICT based materials such as, computer is found at medium level. But the study result indicates that, other ICT resources, such as software applications, internet resources, and coding kits, was as found at very low level or totally absent in the schools undergoing in the study.

5.1.3 Summary of findings related to factors affecting the application of instructional materials and technology in the schools.

Based on the analysis of the respondents related to factors affecting the application of instructional materials and technology were stated common points as follow:

- Lack of adequate supply and access. There is insufficient supply of materials and technology, indicating a potential lack of resources and support for effective teaching.
- Ineffective use of instructional materials. The teachers are not effectively using instructional materials and technology to address the learning objectives of the curriculum.
- Insufficient time and opportunities to learn necessary computer and technology-related skills for teachers
- There is no training and support in utilizing instructional materials and technologies, indicating a desire for ongoing professional development opportunities.

- Teachers feel they do not receive enough support from school administration to motivate them in using instructional materials and technologies, indicating a need for stronger leadership and support.
- Issues related to technical infrastructure, such as reliable power supply, sufficient computers, and maintenance.
- Limited internet connectivity may impact teachers' ability to utilize online resources for teaching purposes.
- Lack or the absence of a monitoring and evaluation system may hinder consistent use of instructional materials and technologies by teachers.
- Lack of interest in using instructional materials and technology. Teachers show a moderate level of interest in using instructional materials and technologies, indicating a willingness to engage.

5.2 Conclusion

The essence of this study was to investigate the application of instructional materials and technologies in selected secondary schools in Hawassa city administration. From the study it is concluded that instructional materials and technologies which greatly contribute to the betterment of teaching and learning activity are generally insufficiently available except textbook and teachers guide, which is revealed to be the most abundant one in the schools. The extent of availability varies from one school to another.

- Regarding to the findings the availability of technological resources and educational materials, it was evident that while traditional materials like textbooks and teacher's guides were generally adequate, there were significant gaps in other essential resources, such as manipulatives, visual aids, and technology-based tools for mathematics. markedly, only one out of the four schools possessed a digital library for mathematics and science subjects. Additionally, the availability of ICT resources like computers, software applications, and internet access was rated as moderate to very low, with some resources even being entirely absent in the schools surveyed.
- The findings concerning the utilization of instructional materials and technology revealed a preference for traditional materials over technology-based tools in mathematics subjects. Limited utilization of manipulatives and visual aids was attributed to their insufficient availability. Furthermore, while private schools demonstrated better access to technology, such as functional TVs in all classrooms, public schools faced disparities, with some lacking basic

technology resources. Similarly, the utilization of ICT-based materials like computers was moderate, but other resources like software applications and coding kits were severely underutilized or absent.

- The study identified several factors affecting the application of instructional materials and technology. These included inadequate supply and access to resources, ineffective utilization of available materials, insufficient training opportunities for teachers to acquire necessary technology-related skills, and a lack of support and motivation from school administration. Technical infrastructure issues, such as unreliable power supply and limited internet connectivity, further hindered the effective use of technology in teaching. Additionally, the absence of a monitoring and evaluation system and a moderate level of interest among teachers in using instructional materials and technology highlighted the need for comprehensive support and ongoing professional development.

- In conclusion, while there are pockets of availability and utilization of instructional materials and technology in secondary schools, significant disparities exist, particularly in public schools, regarding access and utilization. Addressing these disparities requires a multifaceted approach involving increased resource allocation, targeted training programs for teachers, enhanced technical infrastructure, and stronger leadership support to foster a conducive environment for effective teaching and learning through the integration of technology.

5.3 Recommendations

Based on the above major view of findings and conclusions drawn, the following recommendation forwarded to improve the application of instructional materials and technology in secondary schools of Hawassa city.

5.3.1. For Schools

- Schools should prioritize the allocation of resources towards acquiring and maintaining a diverse range of instructional materials and technology tools, particularly those essential for mathematics and ICT subjects. This may involve conducting regular needs assessments to identify gaps and areas for improvement, and subsequently investing in the procurement of manipulatives, visual aids, and technology-based resources.

- Schools should explore partnerships with local businesses, NGOs, or government agencies to secure funding or donations for educational resources. Establishing a system for inventory management and regular maintenance of existing resources can also help ensure their permanence and effectiveness in supporting teaching and learning activities.

5.3.2 For Teachers

- Teachers should actively seek professional development opportunities to enhance their proficiency in utilizing instructional materials and technology effectively in their teaching practices. This may involve attending workshops, seminars, or online courses focused on integrating technology into classroom instruction, as well as learning how to adapt traditional teaching materials to meet the diverse needs of students.
- Collaborating with colleagues to share best practices and innovative teaching strategies can also foster a culture of continuous improvement and resourcefulness among educators. Furthermore, teachers should advocate for greater support and recognition from school administration in their efforts to incorporate instructional materials and technology into their lesson plans, as well as advocate for increased access to training and resources.

5.3.3 For Hawassa City Administration Education Office

- The education office should prioritize addressing the systemic issues identified in the study, such as inadequate resource allocation, technical infrastructure deficiencies, and limited professional development opportunities for teachers. This may involve conducting a comprehensive review of existing policies and practices related to the procurement, distribution, and utilization of instructional materials and technology across all secondary schools under its field.
- The office should also collaborate with relevant stakeholders, including school administrators, teachers, parents, and community members, to develop and implement targeted interventions aimed at improving access to resources, enhancing technical support services, and fostering a culture of innovation and continuous improvement in teaching and learning practices. Additionally, the education office should consider establishing a monitoring and evaluation system to track progress towards addressing the identified challenges and ensure accountability and transparency in resource management and utilization.

Suggestion for future work

- Finally, it can be suggested that further studies needs to be conducted, on the application of instructional materials and technology its effect on students' academic performance in the Secondary Schools of Hawassa city Administration, to ensure the quality of education and to improve students' academic achievement.

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APPENDIX – A

HAWASSA UNIVERSITY

School of Graduate studies College of Education

Department of Curriculum and Instruction

Questionnaire to be completed by Teachers

Dear respondent, the researcher of this study is working on a partial fulfillment of a Master of art in Curriculum and Instruction. The purpose of this questionnaire is to gather information used to assess of the application of instructional materials and technology in mathematics and information and communication technology subjects in selected secondary schools of Hawassa City administration and then to suggest solutions for the identified problems. The response for each in the questionnaire could be of great help to the intended. Hence, you are kindly requested to respond honestly and thoughtfully. The success of the study depends on your genuine information. All the responses will be treated with the utmost confidentiality. You do not need to write your name, and you will not be able to be identified or traced.

Thank for response in advance

Directions

1. Please try to answer all the questions

2. Please indicate your answer by putting "√" in the table or box provided.

3. Open ended questions are expected to be given in writing on the space provided. If the space is not sufficient, please use the backside of the paper. Thanks.

Part 1. General information

1. Name of School: _____
2. Sex: Male ☐ Female ☐
3. Age_____years
4. Educational Level:
   A. Diploma ☐
   B. BSc/BA ☐
   C. MSc/MA ☐
5. Years of experience in teaching: _____years

Part two: Availability of instructional materials and technologies

Instructional materials and technologies are available for secondary school teachers to use for classroom instruction purposes whenever they need them. The following instructional materials and technologies are adequately available in the school. Rate the following questions by putting a tick (√) on the appropriate box using the scale given below. 5=strongly agree (SA); 4=agree (A); 3=undecided (U); 2=disagree (D); 1=strongly disagree (SD).

Subjects	**Item No.**			**Rating scales**				
				SD (1)	**D (2)**	**U (3)**	**A (4)**	**SA (5)**
Mathematics	Materials	**1**	Textbook					
		2	Teachers Guide					
	Manipulatives	**3**	Blocks					
		4	Counters					
		5	Geometric shapes					
		6	Measuring tools					
	Visual aids	**7**	Charts					
		8	Graphs					
		9	Diagrams					
		10	Illustrations					

	Technology based tools	**11**	Math software					
		12	Online tutorials					
		13	Educational app					
		14	Interactive simulation					
ICT	**ICT based**	**15**	Computer					
		16	Software application					
		17	Internet resources					
		18	Multimedia presentation					
		19	Coding kits					
		20	Virtual labs					
		21	Tape recorder					
		22	Video					
		23	Plasma TV					
		24	Internet					
		25	School net					

Part three: The extent to which instructional materials and technologies are utilized by teachers

Section:-1 Rate the types of instructional materials and technologies do you typically use in your lessons by putting a tick (√) on the appropriate box using the scale given below. 1= strongly disagree (SD); 2= disagree (D); 3= undecided (U); 4 = agree (A); 5= strongly agree (SA) = 5.

				Rating scales				
Subjects	**Item No.**			**SD (1)**	**D (2)**	**U (3)**	**A** (4)	**SA (5)**
	Materials	**1**	Textbook					
		2	Teachers Guide					
		3	Blocks					

Mathematics	Manipulatives	**4**	Counters					
		5	Geometric shapes					
		6	Measuring tools					
	Visual aids	**7**	Charts					
		8	Graphs					
		9	Diagrams					
		10	Illustrations					
	Technology based tools	**11**	Math software					
		12	Online tutorials					
		13	Educational app					
		14	Interactive simulation					
ICT	**ICT based materials**	**15**	Computer					
		16	Software application					
		17	Internet resources					
		18	Multimedia presentation					
		19	Coding kits					
		20	Virtual labs					
		21	Tape recorder					
		22	Video					
		23	Plasma TV					
		24	Internet					
		25	School net					

Section:-2 Indicate your response for each utilization of instructional materials and technology in your school related statement. Please by putting a tick (√) on the appropriate box that most closely describes your opinion about the frequency of utilization of different instructional materials and technology by using the scale given below 1=Never use (N) ;2= Sometimes(S) 3=Frequently(F).

	Item No.	**Description of items**	**Rating scales**		
			N (1)	S (2)	F (3)

Subjects					
Mathematics	1	How often do you use textbook for teaching in classroom?			
	2	How often do you use teachers guide?			
	3	How often do you use blocks for math problems?			
	4	How often do you use counters for algebraic tasks?			
	5	How often do you use geometric shapes aid for geometry concepts?			
	6	How often do you use charts or graph?			
	7	How often do you use math software?			
	8	How often do you utilize online tutorials?			
	9	How frequently do you engage with interactive simulations?			
	10	How often do you incorporate educational apps?			
ICT	1	How often do you use computers?			
	2	How often do you utilize educational software programs for coding, graphical design, multimedia production, data analysis?			
	3	How frequently do you access online platforms, websites, and databases for learning ICT concepts and skills?			
	4	How often do you engage with audiovisual materials like videos, animations, podcasts, and slid shows?			
	5	How frequently do you use physical or virtual coding kits to learn programming language?			
	6	How often do you interact with interact with interactive simulations and virtual labs?			

Part four: Factors affecting the application of instructional materials and technology

The descriptions of the possible factors associated with the use of instructional materials and technologies in the classroom are listed in the table below. Rate by putting a tick (√) on the

appropriate box using the scale given below 1= strongly disagree (SD); 2= disagree (D); 3= undecided (U); 4 = agree (A); 5= strongly agree (SA).

Item No.	**Description of items**	**Rating scales**				
		SD	D	U	A	SA
1	Teachers feel that there is an adequate supply of materials and technology.					
2	Teachers may have access to the required instructional materials and technology.					
3	Teachers use the instructional materials and technology effectively to address the learning objectives of the curriculum.					
4	There is sufficient time and opportunities to learn necessary computer and technology-related skills.					
5	I believe that training and support in utilizing instructional materials and technologies.					
6	Teachers are given trainings whenever new technologies are introduced.					
7	Teachers get enough support from the school administration to motivate them in using instructional materials and technologies.					
8	The teachers have no lack of knowledge in the use of instructional materials and technologies.					
9	Teachers obtain technical assistance from the school.					
10	There is reliable electric power supply to enable teachers to use instructional technologies.					
11	There are enough computers in the school to help teachers support the classroom teaching with technology.					
12	The computers in our school are regularly maintained to ensure optimal performance for teaching.					
13	There is internet connection in the school for teachers to use it for teaching purpose.					
14	The school has a continual monitoring and evaluation system for					

	ensuring the use of instructional materials and technologies by teachers.					
15	Teachers have interest in using instructional materials and technologies.					
16	The more the number of teachers teaching experience, the better their extent of using instructional materials and technology for instruction purpose.					
17	The school is known to go with the rapid technological changes.					
18	The school teachers improvise instructional materials and technologies in the school pedagogical center.					

APPENDIX - B

HAWASSA UNIVERSITY

School of Graduate studies College of Education

Department of Curriculum and Instruction

Questionnaire to be completed by students

Part 1. General information

1. Name of School: _____

2. Sex: Male ☐ Female ☐

3. Age; _____years

4. Grade Level:

9^{th} ☐

10^{th} ☐

11^{th} ☐

12^{th} ☐

Topic: Assessing the Application of Instructional Materials and Technology in Mathematics and Information Communication Technology in Secondary Schools

Dear student,

Thank you for taking the time to provide your feedback on the use of teaching materials and technology in mathematics and information communication technology lessons in our school. Please answer the following questions honestly and to the best of your ability.

Part One: To determine the availability of instructional materials and technology in mathematics and information communication technology subjects in our school; Use this symbol (√) to indicate no.1=There are none and 2=Are there.

Subjects				There are none	Are there
Mathematics	Materials	**1**	Textbook		
		2	Teachers guide		
	Manipulatives	**3**	Blocks		
		4	Counters		
		5	Geometric shapes		
		6	Measuring tools		
	Visual aids	**7**	Charts		
		8	Graphs		
		9	Diagrams		
		10	Illustrations		
	Technology based tools	**11**	Math software		
		12	Online tutorials		
		13	Educational app		
		14	Interactive simulation		
ICT	**ICT based materials**	**15**	Computer and laptops		
		16	Software application		
		17	Internet resources		
		18	Multimedia presentation		
		19	Coding kits		
		20	Virtual labs		
		21	Tape recorder		
		22	Video		
		23	Plasma TV		
		24	Internet		
		25	School net		

Part Two: How often are teaching materials used in classrooms? Use this symbol (√) to indicate 1=Never(N), 2=Frequently(F), and 3=Always.(A)

Subjects				1	2	3
Mathematics	Materials	1	Textbook			
		2	Teachers guide			
	Manipulatives	3	Blocks			
		4	Counters			
		5	Geometric shapes			
		6	Measuring tools			
	Visual aids	7	Charts			
		8	Graphs			
		9	Diagrams			
		10	Illustrations			
	Technology based tools	11	Math software			
		12	Online tutorials			
		13	Educational app			
		14	Interactive simulation			
ICT	**ICT based materials**	15	Computer			
		16	Software application			
		17	Internet resources			
		18	Multimedia presentation			
		19	Coding kits			
		20	Virtual labs			
		21	Tape recorder			
		22	Video			
		23	Plasma TV			
		24	Internet			
		25	School net			