Constraints Hindering ICT Integration in Ethiopian Public Secondary Schools: A Literature Review

Chala Mosisa Hunduma[1*], Yilfashewa Seyoum Mekuria[2]

1,2 College of Education and Behavioral Sciences, Haramaya University, Dire Dawa, Ethiopia.
Email: gamulemos@yahoo.com

Abstracts: The main objective of this study is to identify the constraint hindering ICT integration in Ethiopian public secondary schools. The study's results demonstrate that the Integration of ICT is still in its infant stages due to a lack of infrastructure, insufficient funds, lack of technical and administrative support, lack of time, teachers' knowledge, abilities, and use of technology are lacking. Those challenges are distinguished as teachers-related challenges, students-related challenges, resource-related challenges and administrative-related challenges. The implication is that using ICT integration to improve learning and teaching is not happening in accordance with the national ICT policy strategy, thus reaping the greatest benefit from ICT integration all concerned bodies, and actors at all levels should pay special attention to ICT integration practices in the study area from the higher-level ministry of education to the lower-level woreda education office and schools. Finally, it is suggested that in the future a countrywide study involving all other variables and private secondary schools not considered in this study should be conducted.

Keywords: ICT, Integration, Teaching and learning process, Technology.

1. INTRODUCTION

1.1. Background of the Study

The importance of ICT in the twenty-first century has altered the landscape of the teaching and learning process (Whelan, 2005), as cited in (Jo Shan2013). ICT improves education development by meeting the knowledge and information gaps that the individual and countries face across the age. Ethiopia's government, like the rest of the world, has made ICT development one of its strategic goals. Today, ICT has become a fundamental part of the teaching-learning interaction, with initiatives such as replacing chalkboards with interactive digital whiteboards and utilizing students' own smartphones or other devices for learning during class time.

Ethiopian education and training policy has been in existence since 1994. This policy becomes basis for different programs, strategies and reforms. Among those programs, GEQIP (General Education Quality Improvement Package) is one. The elements of this package are curriculum, textbooks and assessments (CTA), teacher development program (TDP), school improvement program (SIP), management and administration program (MAP), civic and ethical education, and ICT in education (Ministry of Education, 2008). In developing countries, ICT is seen as a potential to improve instructional efficiency and access. According to FDRE (2009), National information and communication and technology strategy and policy document the ICT is essential in addressing access to and quality of education, as the vast majority of Ethiopians live in distant fields and receive low quality education. Because using technology, teaching, and learning can take place even when instructors and students are physically separated from each other, the integration of ICT into education is crucial. Students will gain from ICT integration because it will allow them to engage in technology-based training that will help them learn more about a subject without being restricted to a particular curriculum or set of resources (Ghavifekr et al., 2015).

The old Ethiopian Education and Training Policy of 1994, the Education Sectors Development Program (ESDP I, II, III, IV and V) and the National Information and Communication Technology Policy and Strategy were working toward increasing the quality of education in general and ICT integration in Education in specific as a result of the government's acceptance of ICT as the primary driver and facilitator for transforming a primarily subsistence-based economy and society into a data- and knowledge-based economy and society that is effectively integrated into the global economy (Ministry of Finance and Economic Development, 2014). As a result, educational initiatives like Woreda net and school net were introduced to integrate ICT into education. Furthermore, Hare (2007) stated the

three main ICT implementation strategies in Ethiopian secondary schools Viz: Ethiopian national school net initiative, national ICT in higher education initiative, and national initiative for ICT education, training, and awareness. The foundation for implementing policy across the education sector is these three streams. Ethiopia has also collaborated with development agencies, organizations, and other stakeholders on a number of initiatives to support the integration of technology for pedagogical purposes, such as FHI 360's K-Mobile program, which was put into action in conjunction with the UN High Commissioner for Refugees (UNHCR), The World reader project, which was implemented by the Stavros Niarchos Foundation and Opera Software in Ethiopia (GIZ, 2016). However, as stated in the Ethiopian integrated education development road map (2018-2030), these activities have a negligible impact on the core processes of Ethiopian secondary schools (MoE, 2018). When it comes to using ICT in teacher preparation and development, the roadmap emphasizes the need to teach pre-service teachers not only how to use a computer, but also how to generate greater technology-enhanced lessons. Students, instructors, and teacher educators should have access to ICT infrastructure, according to the document (MoE, 2018). The document clearly suggested that future researchers conduct further studies on the integration of ICT in education.

Numerous studies also show that despite the Ethiopian governments and other stakeholders' efforts, ICT use in Ethiopian schools is still in its infant stages (Hare, 2007; MoE, 2018; Solomon, 2018; Eshetu, 2013; Abate, 2004; Mesfin, 2014). Hare (2007), for example, stated that integrating ICT into Ethiopian secondary schools is a difficult endeavor. The researcher advised future academics to use a more contextual approach when examining the integration of ICT in education and to consider the context in which ICT is used. He continued by saying that practical solutions can only be found after taking into account the structural and cultural elements of the school where ICT is being used. However, what counted for the poor performance of ICT integration in Education in the present study areas has not been well studied and documented in a comprehensive and informed way. The current study, unlike the previous local studies, attempts to see constraints hindering ICT integration in education in distinguished forms such as teacher-related challenges, student-related challenges, administrative-related challenges and resource-related challenges. Keeping this gravity of the issue in mind, the researcher develops the following research questions.

1. What is the current status of ICT integration in Ethiopian public secondary schools?
2. What are the major challenges for ICT integration in Ethiopian public secondary schools in terms of:
 i. Teacher-related challenges
 ii. Student-related challenges
 iii. Administrative-related challenges
 iv. Resource-related challenges

This literature review examined peer-reviewed articles, textbooks, academic libraries databases and other published resources relevant to ICT tools and automation of academic libraries. Statistical reviews were obtained directly from educational quality assurance agencies, Ethiopian public secondary schools, Ministry of Education; through the collaborative partnership of different stakeholders. Articles were found through search facilities of online journals, and databases; such as Research Gate, academia.edu, Ebsco Business source premier, Google Scholar, Emerald full text, and Springer Link. The methods used did not only reveal the gaps currently faced by Ethiopian public secondary schools in the automation of academic libraries automation but went a long way to serve as a guide for the way forward; based on the underlying problems that ICT tools and the automation of academic libraries automation are very important service organs to improve quality education and educational development in developing countries.

2. REVIEW OF RELATED LITERATURE

2.1. Information Communication Technology (ICT)

Within the realm of education, ICT is defined differently by different scholars and it is also common to see the acronym ICT. As Light (2009) points out, the term ICT is frequently used to describe how IT-related technologies are used in the learning and teaching process. Levina (2002) further stated that in the school setting, for

instance, ICT is employed as a descriptor for technology that includes but is not restricted to technology-mediated learning, computer-aided education, distance education, computer-based education, technology, multimedia, communications technologies, web-based learning, and computer-aided communication, etc. All the definitions mentioned above by different writers share a related concept that information should be produced and communicated. They also claim that such data includes digital or electronic. The definitions usually do not limit ICT to only computers, but also other telecommunication machinery. The above authors further claimed that the different nature of technologies does not appear to be a matter of dispute among researchers and evaluators as the word ICT is used by many to define, research and assess the multiple methods IT-related technologies incorporated into education.

2.2. ICT and Education

In recent years, a greater emphasis has been placed on using technology to address global development in recent years. The education sector has received a large part of this attention. ICT has a direct part to play in education and, if used properly, can bring many advantages to learners in the classroom as well as in education and training procedures in particular. According to Collis and Moonen (2001), technology can be used in school education through two different aspects. The first one is called a "core" technology that refers to significant operations in the teaching-learning process based on that technology. These can happen through different means, in many nations; computer technology is used by educators and pupils in computer classrooms or laboratories; or by a teacher as a presentation medium. Besides the use of IT as a core technology, the second way to use technology in the classroom is "complementary" technology. The technologies used as "complementary" can be very varied: for instance, as an instrument for a particular activity, such as communication, database search, graphic applications, and drawing support.

ICT plays an important role in the educational progress of a country. For example, the growth of ICTs in more developed and less developed nations is distinct. The nature of infrastructure, connectivity, human resource and organization has created a distinction between developed countries and developing nations. In contrast to developing nations, schools in the western world have made significant investments in ICT services over the past 20 years (Volman, 2005; cited in Condie and Munro (2007). As a result, the more developed country is more technologically advanced than the less developed country.

ICT is needed to address the challenges of globalization, to meet the countries need to aid the student learning. Especially, in this 21thc a wealth of educational resources can be accessed from anywhere with the Internet and the World Wide Web by an unlimited number of people in every subject. These are especially important for many schools in the developing country that have limited and outdated resources. There are disadvantages in Ethiopian schools, such as poor access to educational library resources (UNESCO, 2012). To overcome these challenges, the education sector development program (ESDP-III, IV and V) in Ethiopia also emphasizes the incorporation of information communication. Including technology in the classroom by deploying infrastructure, connectivity, human resources, and organization in education to help the country's education system with technology to deliver quality education. ICT can remove obstacles that cause low educational issues in any nation. According to Mohanty (2019), ICT serves as an instrument for learners in the teaching process to explore learning subjects, solve problems, and provide solutions to problems. ICT makes the acquisition of information more affordable and learning concepts are understood while engaging learners in the implementation of ICT. Information communication technology has received increasing attention for this purpose in the world system.

2.3. Ethiopian Context of ICT for Education

2.3.1. National ICT Policy and Strategies

ICT is currently growing slowly in Ethiopia, the country only accounts for 0.6 percent of internet users on the continent, and Ethiopia's web penetration rate of 1.1% is significantly lower than the continent's average of 15.6%

(Hare, 2007). In an effort to change this, the Ethiopian government has set the expansion of ICT as one of its strategic goals.

ICT policy derives from the government acceptance of ICT as the main driving force and transformative facilitator as Ethiopia's mainly subsistence-farming economy and society into an information and knowledge-based economy and society. Previously, under the former ministry of capacity building, the Ethiopian government drafted the five-year action plan for national ICT for development (ICT4D) (2006-2010) that is launched by the United Nations Development Program (FDRE, 2009).

The Ethiopian government has also created a new institutional framework under the minister of communication and information technology to give the sector a legal and regulatory framework additionally to the country's ICT policy and strategy. The Ministry of Information and Communication Technology established the first Ethiopian telecommunication agency and the Ethiopian ICT Development Agency to aid in directing and overseeing the development of ICT. The ministry also creates policy instruments, various programs, and resource mobilization. To define the current domestic policy framework for the use of ICT in a series of succeeding education sector development programs (ESDP I–V) that have gone through the Ethiopian education sector is the goal of the analysis of the context of ICT in education in Ethiopia. This is the importance that the Ethiopian authorities placed on the education sector for national development. According to FDRE (2009), ICT is particularly essential for Ethiopia because most Ethiopians reside in faraway regions and continue to be educationally disadvantaged. In recognition of the critical role that ICT plays, it is also stated that ICT facilitates the development of education and enables both individuals and countries to meet the challenges presented by the knowledge and information age.

The Major goal of national ICT policy for the education sector is to ensure that ICT is an integral part of the educational and training system at all levels, and ICT should be heavily utilized to deliver education whenever possible (FDRE 2009). The policy states that ensuring that ICT is an essential component of domestic education systems to increase quality education and make it accessible and developing standards of evaluation and guidelines for the development and exploitation of ICT in schools, colleges, and universities as part of its objective.

According to Hare, the Ethiopian National School Net Initiative, the ICTs in Higher Education Initiative, and The ICT Education in Education at the National Level, the training and awareness are the three major channels that serve as the foundation for the implementation strategies throughout the education sector. These three channels are built on the ICT in education implementation strategy and its corresponding action plan. The woreda net, the e-government communication system, is a promising and important facilitator of rapid ICT development in the nation's education sector created by the Ethiopian Telecommunications Corporation.

2.3.2. Major e-Government Initiatives in Ethiopia

2.3.2.1. Woreda Net

Woreda net is one of the public network infrastructures that connect more than 611 Woredas and was developed solely to connect administrative elements, to make government activities transparent, to make government responsible, to boost citizen involvement in government, etc. The primary objectives of Woreda net design are to provide ICT services like voice over IP, video conferencing, directory, messaging and Woreda-level internet connectivity. The initiative also offers connectivity to the school net, e-Health, and agri net. When linking these Woredas, a national data center and eleven regional information centers are created. The connection is made using a variety of terrestrial types and VSAT type (Mesfin, 2014).

The video conference service is one of the main facilities commonly used in conferences, training, etc. using point-to-point and multipoint links. Using the same network, access to the Internet is possible for connected centers. information locally and worldwide, share information and data using inner emails, and also use voice

over IP in day-to-day voice communications operations (Hare,2007).

2.3.2.2. School Net

The effect of ICTs have as a result of school networking or school net development enhances the application of ICTs in the classroom. School networks can be described as groups of schools that utilize ICTs to advance the education system or promote and improve the use of ICTs in the educational context (Bloome, 2002). The word "school" generally consists of the teachers, students, families and the broader community, all of whom can benefit from the introduction of school nets.

The national SchoolNet initiative, which began in 2004, focuses on the deployment and use of ICT to improve education in secondary schools. Its goal is to create a wide-area network that connects all secondary schools in the country by making Internet and online education available. The full implementation of the SchoolNet initiative includes teacher training, local language instruction, student performance monitoring and assessment, education system management, and eventually providing students with the skills required for the changing world of work. On the other hand, the term "net" refers to the network or platform of ICT infrastructure that allows people to communicate, collaborate, and share within either restricted or larger groupings, allowing the individual to access the entire world regardless of where he or she is in the world. In 2003, the MoE launched the school net project with UNDP support. School Net is another large network linking the different schools spread throughout the nation. More than seven hundred fifty six schools overall are linked in this network, of which 574 are high schools and 191 + are preparatory schools. Services like video education are used, digital library and the internet are given in the schools linked to this network. This scheme encourages the process of teaching and learning by providing comparable material to all classrooms regardless of geographic place or rural and urban disparities (Mesfin, 2014).

2.3.3. ICT Infrastructure in Ethiopia

During the past few decades, Ethiopia has achieved some growth and development in the ICT sector. However, Ethiopia ranked 151st in the Index of UN E-Government Development (2018) out of 193 countries, indicating that the country has been supported by minimal technological advancement. Fifty-four million individuals use of mobile devices in Ethiopia as of 2018 (Mohanty, 2019). It is still far behind several African nations. It is one of the nations with very low Internet penetration. ICT is not well utilized, mainly due to the inaccessibility of ICT facilities and poor infrastructure. The International Telecommunications Union analyzes the growth and development of ICT facilities worldwide each year. Based on this study, they rank the ICT facilities. This is quantified as the index of growth of ICTs. In terms of ICT growth, Ethiopia is ranked 170 out of a total of 176 nations, whose measure of ICT growth ranks are accessible in 2017. In IDI, even its neighboring nations, Kenya, Djibouti, and Sudan are ahead of Ethiopia. Almost all of the rural population lacks a telecommunications infrastructure. The vast majority of individuals are dependent only on the conventional and traditional information delivery system, like the radio or newspapers. According to Adam (2008), the results of a household survey on access to and use of ICT in Ethiopia and 16 other African countries. Compared to other African countries, Ethiopia has very low mobile penetration.

2.4. Integration of ICT in Teaching and Learning Process

2.4.1. Model of ICT Integration in the Teaching and Learning Process

The main point that attracts attention on the verge of integrating ICT should be the broadness of the notion of integration itself and the range of definitions linked to ICT integration. The research conducted by UNESCO (2014) recognized four stages of ICT integration within the classroom setting: Emerging, Applying, Infusing and Transforming.

Emerging phase: emerging phase is obvious when the school has few desktop computers that can only be

used by students and the administration. Teachers are learning to use desktop computers during this phase. This phase aims to familiarize educators with ICT literacy abilities. Teachers start to realize why they have to apply ICTs to their teaching (UNESCO 2014).

Application phase: Application is obvious when educators feel fairly confident about ICT apps. They can use application software and communication tool and confidently browse the Internet (ibid. Teachers decide why, when, where, and how ICT instruments will add to the goal of the lesson. Teachers should then be able to choose the appropriate ICT tool that will help the learner in understanding the new lesson. This entails having the option to decide when to use of the entire class or group of multimedia lectures.

Infusing phase is visible when educators start to use everything they have learned in every aspect of their learning. ICT is used in the preparation and management of lessons. What becomes critical is that educators explore the using ICTs and be creative.

2.4.2. ICT Integration in the School Education

2.4.2.1. Integration of ICT in the Developing Country, Ethiopia

No latest study has been performed in Ethiopia showing the status of the Integration of ICT in schools. Hare (2007) gave the recent proof of ICT use in classrooms in Ethiopia. As Hare outlined, only 40% of schools in Ethiopia have a desktop computer and even schools with a computer, most of them in Addis Abeba, creating a significant rural-urban gap. The research also showed that despite the reduced number of computers, most schools have limited or low internet access. Schools that are affiliated with the connection usually only use e-mail, and it is only accessible to the administration. Hare also noted that teachers also have restricted access to ICTs, particularly computers and the internet, which makes it hard to suppose that educators can incorporate ICT into their learning.

Despite severe internet connection problems, the woreda net, the backbone of e-government communication generated by the Ethiopian telecommunications company, is a pledge and significant enabler for fast ICT growth in the nation. This network has already started to benefit the public in the education industry. It is the same network that has given a basis for the first stage of the school net project. The school classroom is equipped with plasma screens and receives lessons via video broadcast for eight hours a day by satellite television with content from the educational media agency since September 2004.

2.4.2.2. Integration of ICT in School Systems in Developed Countries

Education is, of course, at the heart of the knowledge economy and the learning society. Correspondingly, ICT's role in classrooms is changing dramatically. The traditional function was that of a minor curricular topic, sometimes referred to as informatics, computer literacy, or keyboarding. Alternatively, it was used as educational assistance (i.e., computer-assisted instruction) to assist learners to learn other topics such as math or science.

In developed nations, ICT is now at the core of educational reform attempts that involve its use in cooperation with modifications in curriculum, teacher training, pedagogy, and evaluation. Countries from Singapore to Chile to the United States to Norway have taken the position that ICT integration into schools and curricula can enhance instructional systems and prepare learners for the learning society of the 21st century (Kozma, 2000). The European Commission and the G8 nations have recognized the importance of preparing learners for lifelong learning in the knowledge economy, and ICT plays a critical role in achieving this goal. As indicated by Korma who surveyed educational practices in 28 primarily developed countries, found that in many nations, a large number of schools were able to access the Internet. For example, in 1999, about 85 percent of schools in Canada and Denmark were able to access the Internet. About 78 percent of Norway's schools did. But only about 30% of China's schools had internet access in Hong Kong and Hungary. The significant thing was that ICT is used was often involved in creative pedagogical methods.

2.5. Benefit of Integrating ICT into Teaching and Learning Process

ICT affects all areas of human operations including education, health production, etc. These can be achieved through various aspects, such as sharing and utilization of information that enhances the quality of life and provides lifelong learning (Basargekar and Singhavi, 2015) because one of the most the primary keys to economic growth and improved human welfare, effective integration of ICTs in education improves educational quality. The major goal of using ICT in learning is to facilitate students learning.

Stoilescu (2007) defines the tasks of ICT in the classroom in two respects: first, ICT as supporting instruments. ICT serves as an instrument when performing assignments, gathering information and paperwork, communicating and conducting research. The Second task of ICT according to Voogt is ICT as a teaching and learning medium. This relates to ICT as a teaching and learning instrument itself, the medium through which educators can teach and learn. These may appear in many distinct forms in simulations and instructional networks, such as drills and practical exercises. In general, technology-based education is viewed as a means to alleviate poverty, social division, and enhance living standards as a matter of the fact that technologies can deliver educational programs at a reasonable price than traditional education systems.

There are many distinct kinds of technology that can promote and improve learning. Everything from video content and digital filmmaking to laptop computing and handheld systems has been used in schools(Basargekar and Singhavi, 2015). Likewise, fresh uses of technology such as podcasting are constantly emerging (Kozma,2000). Kozma uses those ICT instruments to facilitate the dissemination of knowledge based on the current curriculum. As a consequence, integrating ICT in learning enables both educators and learners to provide quality education (Bindu, 2016). According to Noor-ul-amin (2017), there are three conditions for educators to bring ICT into their schools: instructors should think about the efficacy of the technology, instructors should think that technological use will not cause any disturbance, and lastly educators should think that they have control over technology. Research studies, however, indicate that most teachers do not make use of ICT's ability to contribute to the quality of teaching settings, although they considerably value this opportunity (Smeets, 2005).

ICT improves the flexibility of educational delivery for students to access information at any time and location. Kozma (2000) in an attempt to describe how ICT can be applied to support education indicated that ICT assists learners in efficient and effective access to digital information. Distance education programs, which are very common these days, have attained momentum due to ICT. The requirement for all students and the teacher to be present in the same physical location is also eliminated by ICT-based instructional delivery.

ICTs also facilitate access to education for disadvantaged groups, mentors, specialists, scientists, practitioners, company leaders, and colleagues around the world. Sharma (2003) points out that utilizing ICT can enhance efficiency, teaching, and administration and create appropriate abilities in disadvantaged groups. Since learners are actively involved in teaching procedures in ICT schools, the teacher authorizes them to make choices, plans, etc. Therefore, ICT offers more instructional opportunities for both students and teachers.

2.6. Challenges Related to ICT Integration in the Teaching and Learning Process

Researchers have used different categories to identify challenges related to the use of ICT. Several studies split these challenges into two classifications: extrinsic or first-order barriers and intrinsic challenges (Flanagan and Jacobsen, 2003). External or first-order barriers include lack of equipment, Equipment unreliability, a lack of technical assistance, and other resource-related problems, whereas extrinsic obstacles are related to organizations rather than people and inherent obstacles related to educators, administrators and people (Rabah, 2015). For instance, what they meant by extrinsic and inherent varied. Jones (2005) study discovered four barriers to the incorporation of ICT in courses: lack of confidence, lack of information and skills, teachers belief, and lack of effective training. However, this review focused on the challenges related to ICT integration identified by different authors. The challenges are categorized as teacher related (Rabah, 2015), student related (Jo Shan Fu, 2013) and Administrative related, Resource related (Zhang et al., 2008).

2.6.1 Teachers' Challenges

There are many difficulties in integrating ICTs into the teaching and learning process in most developing nations, including Ethiopia. In this review, an attempt was made to see teachers related challenges in relation to attitude, knowledge, skill, and time factors. One of the major ICT integration challenges in the teaching and learning process is the attitudes of teachers towards ICT integration. Parvin (2013) states that it matters little whether or not an innovation has a huge benefit over the concept it is replacing. What matters is whether the person perceives the comparative benefit of the innovation. In his research on the development of maturity in teaching technology, reveals that among the obstacles found related to ICT integration is teachers negative attitudes. If teachers have a negative attitude toward technology adoption and prefer to stick to the old way of teaching, integration of ICT will be hampered. A range of studies conducted in Ethiopian public secondary schools also indicates the negative attitude of teachers towards Integration of ICT in education (Gebremariam, 2004; Mesfin, 2014; Solomon, 2018). Another significant barrier identified in the literature related to ICT integration is the lack of information and skill. Including technology in the classroom needs knowledge of the subject field (content knowledge), an understanding of how learners learn, and a level of technical expertise (Sedoyeka and Gafufen, 2013). If a teacher only has content knowledge and lacks the other two, he or she will be unable to adopt or integrate ICT into teaching. The research was carried out by Brehane (2012) in East African nations using a concentrated group discussion with East African teachers who stated that East African teachers are not skilled enough and lack computer knowledge to incorporate ICT into the classroom. In addition to the previously mentioned research, Abate (2004) discovered that even teachers at the secondary school level are inadequately and inappropriately trained to teach ICT. Furthermore, in relation to the use of ICT in teacher preparation and development, the Ethiopian Education Development Roadmap 2018-2030 suggested that teachers should be trained not only on how to use a computer but also on how to design high-quality, technology-enhanced lessons (MoE, 2018). Additionally, research carried out by Hennessy et.al (2010) on teacher variables affecting school ICT use of ICT in sub-Saharan African nations indicates that training opportunities remained limited, unavailable, and inconsistent in quality until recently. Consequently, the bad experience of educators when there is no knowledge to assess the use, and role of ICT in learning are prominent factors that hinder the willingness and confidence of educators to use ICT.

Many studies reveal that lack of time is another significant barrier to ICT integration into education from the teachers perspective (Mndzebele, 2012) (Kautz and Plumb, 2015). Teachers have been found to be the primary determinant of the use of new techniques in educational settings. The teachers teach multiple students topic and subject, then they have to teach ICT, which implies that they have a heavy burden. These educators have no time to design, create and integrate technology learning (Mndzebele, 2012). Also, the finding conducted by Hennessy et.al (2010) indicated that a teachers regular schedule is busy and finding time to prepare for and incorporate ICT into this daily timetable was reported as hard. An overloaded curriculum was also recorded as a reason why teachers were short on time to devote themselves to successful ICT integration (Hiwot, 2013)

2.6.2. Challenges Related to Students

Although the benefits of using ICT in the classroom have been illustrated in previous studies, there are still obstacles or difficulties connected with its use. One of these difficulties is related to the behaviour of students. According to the research done by Solomon (2018), most of the time students misuse technology by giving much time on leisure activities and having less time to learn and study. Additionally, the study identified a low interest in reading soft copy materials and lack of awareness as students related challenges of ICT integration in public and private secondary schools existed in the Dire Dawa city administration. The study conducted by Youssef and Dahmani (2014) on the impact of ICT on student performance in higher education described misuse of Facebook, YouTube and other communication channels as barriers to the integration of ICT in education that has a connection with student behavior.

2.6.3 Administrative Related Challenges

In addition to the challenges teachers and students face when using ICT, there are also other barriers in administrative terms. The principal plays a positive or negative role in shaping the culture of the school. School culture includes the vision, plans, norms and values shared by school employees (Maslowski 2001). Focusing on the significance of school roles for ICT inclusion, Pelgrum (2009) stated that efficient ICT integration depends on the attitudes and vision of school leaders rather than the ICT abilities of teachers. There is not much literature available on the ICT management capacities of school leaders and the role that school leaders play or should play as leaders in ICT inclusion. However, studies on utilizing ICT in Ethiopian schools have identified several technical and administrative barriers, such as a poor perception of ICT among school principals and educational officials, as well as a lack of appropriate ICT policies in schools, resulting in a lack of commitment on the part of school leadership (Gebremariam 2004; Kim and Gebeyehu 2014; Hussein 2018).

The lack of technical assistance in Ethiopian secondary schools has to do with technical know-how, the lack of ICT service centers, and the lack of skilled technical staff. In the study conducted by Fisseha (2011) lack of technical support and preparation time is identified as barriers to ICT integration in instructional practices. Without appropriate technical support, classroom teachers are unable to create the trust, abilities and expertise needed to effectively integrate ICT into their teaching methods, and an absence of training was a prevalent obstacle recognized by many researchers. In Frederick, Schweizer and Lowe (2006), technical issues established as a significant obstacle to incorporating ICT into schooling include: waiting for websites to open, failing to link to the internet, not printing printers, malfunctioning desktop computers, and educators having to work on ancient computers. Based on their finding, they conclude that technical obstacles prevented the smooth delivery of the lecture or the natural flow of the classroom operation.

Becta (2004,p.16) indicated in his study what the study says about geography "If there is a college's lack of available technical support, then it is probable that technical maintenance will not be carried out frequently, leading to a greater danger of technical breakdowns". However, with regard to technical support, there is an argument, Nikolopoulou and Gialamas (2013) observed that teachers with more years of computer experience and more IT confidence viewed the absence of assistance as only a minor obstacle. In contrast to these results, the other research undertaken by Liu and Pange (2014) shows that those teachers who used IT in daily life and were therefore more experienced with IT were more likely to notice a deficiency in assistance as a barrier. Based on those findings, the researcher who was reviewing this related literature concludes that teachers confronted with technical difficulties were in some cases considered to be frustrating and, in some instances, prohibitive.

In addition to the challenges faced by both students and instructors in using ICT, there are also other barriers in administrative terms. The principal plays a positive or negative role in shaping the culture of the school. School culture includes the vision, plans, norms and values shared by school employees (Maslowski 2001). Focusing on the significance of school roles for ICT inclusion, Pelgrum (2009) stated that efficient ICT integration depends on the attitudes and vision of school leaders rather than the ICT abilities of educators. The managerial capacity of educational authorities at all levels is, in some cases, compromised and restricted as a result of many leaders and managers of educational institutions being political appointees, resulting in school leadership that lacks awareness of how to digital technology in schools. Pelgrum (2001) disclosed that the majority did not have well-formulated written plans for ICT inclusion. Flanagan and Jacobsen (2003) note that leaders who are not ready for technology management are struggling to create the resources needed for ICT integration. When computers are implemented in classrooms, very few if any, school rulers have actually used desktop computers with pupils in meaningful ways and therefore lack the educational vision and experience needed to guide ICT integration. Far from generating learning possibilities, limited networks serve as barriers for educators and learners to use computers. Therefore, in schools where the principal is not ready to manage the complicated problems surrounding ICT integration, decision-making is based more on economic and technical factors than pedagogy. As important leaders of change in teaching-learning procedures, school leaders can promote the choice to incorporate ICT in teaching, learning, and school administration. To accomplish this, school officials need to recognize, promote and exercise the concept the incorporation of ICT is not about ICT, but about changing the process of teaching and learning (Afshari et.al, 2008).

2.6.4. Resource Related Challenges

In most developing countries, it is very difficult to integrate technology into education systems because it requires significant public financing (Mndzebele, 2012). Due to financial lack or insufficiency, most schools had redundant and outdated infrastructure and facilities. Most computers in developing nation schools are the effort of donations or initiatives from private businesses or international donors due to hardware/software costs, maintenance, upgrading and ICT training are bad for developing countries with bad economies. Immediately after the project comes to an end, schools also fail to integrate ICT due to a lack of finance.

The difficulties linked to ICT resources are prevalent and vary from nation to nation. an investigation carried out in the US by the National centers for education statistics in 2000 using the fast response survey system disclosed that 99 percent of regular full-time educators in public schools had access to a desktop computers (Makewa, 2013b). This is still a dream in many developing countries like Ethiopia.

In Ethiopia, most secondary schools lack basic ICT equipment and computers, even existing computers and equipment lack up-to-date hardware and software availability. Only 28% of secondary schools have access to an internet service, of which only 6% have high capacity content service (GESCI, 2017). Only 40% of Ethiopian secondary schools have desktop computers (Hare, 2007). Out of those schools that have desktop computers, most of them are in Addis Abeba, and this creates a significant rural-urban gap. Inaccessibility of ICT resources, Becta (2004) claims is occasionally brought on by a number of factors rather than just the inaccessibility of the schools' hardware and software or other ICT components, such as improper resource management, subpar hardware, inappropriate software, or a lack of private access for educators.

3. CONCLUSIONS AND RECOMMENDATIONS

Education is the backbone of every country, and ICT in education aids in reaching students from disadvantaged and remote communities, providing them with quality education, and generally providing a wider variety of instructional resources to both educators and learners. However, we must keep in mind that ICT integration into instruction and learning entails more than just using computers or having Internet access; it also involves using the technology appropriately in pedagogy and in a meaningful way. Despite efforts and policies in place, integrating ICT in education, particularly secondary education, faces numerous challenges. These challenges are distinguished as teacher-related challenges, students related challenges, administrative-related challenges, and resource related challenges. Thus, to overcome these challenges and to effectively integrate ICT into Ethiopian public secondary schools, it is strongly suggested that the following recommendations be taken into account. First, the Ethiopian Ministry of Education should provide an appropriate ICT infrastructure including the provision of appropriate and up-to-date ICT devices such as desktop computers, high-speed Internet connection, daily and controlled electricity supply, adequate power backup and there should be controlling mechanism in existing ICT infrastructure for its proper utilization or to prevent wastage. Second, teachers education institutions have to create awareness and equip teachers, students, and principals with the basic skills in the use of computers, other technologies, and technologically enhanced pedagogy. Third, Students should also be empowered as learners to allow them more liberty to explore understanding using ICT rather than getting guidance from educators most of the moment. These will require adjustments in the role of educators and learners in the teaching setting and its wider contexts. Third, school leaders in collaboration with the woreda education office should be competent and have a broad understanding of the technical, curricular, administrative, and financial dimensions of the use of ICT in education. Fourth, all concerned bodies/actors (at all levels (higher level - Ministry of education), Non-governmental organizations (NGO) to the lower level (Woreda education office, schools) should give special attention to the practices of ICT integration. Finally, to get the maximum benefit from the integration of ICT in Ethiopian secondary schools, country-wide research, involving all other variables and private secondary schools not considered in this study, should be carried out in the future.

REFERENCES

[1]   Abate Legesse 2004. An Assessment of Information Technology Implementation in Secondary School Curriculum In Bale Zone. MA Thesis, Addis Ababa University.

[2]   Adam, L. 2008. *A survey of ICT access and usage in Ethiopia: Policy implications* (Policy   Brief No. 1). Research ICT Africa.

[3]   Afshari, M., Abu Bakar. K, Luan.W, Samaha.B, and Fooi.F 2008 . *Does ICT contribute to   powerful learning environments in primary education ?.* Institute for Applied Social   Sciences, University of   Nijmegen, Netherlands

[4]   Basargekar, P. and Singhavi, C. 2015. Integrating ICT in school education: a case of pratham info tech foundation. *Journal of Information Technology Education: Discussion Cases, 4*(3), 1-22.

[5]   Becta. T., 2004. Evidence on the Progress of ICT in Education. Accessed on August 19, 2019: http://www.becta.org.uk/page documents research/becta review feb05.p:lf

[6]   Bindu, C. N. 2016. Impact of ICT on Teaching and Learning: A Literature Review. *International Journal of Management and Commerce Innovations 4(1), 24–31.*

[7]   Bloome, Anthony 2002. *School Networking Initiatives and School- Based Telecenters* :

[8]   Background Note for Ethiopian country team: received from https://www.share4dev.info/tedocuments/4264.pdf

[9]   Brehane,A. T. 2012. Understanding the Importance , Impacts and Barriers of ICT on Teaching and Learning in East African Countries. *International Journal for e- Learning Security, 2(2), 199–207.*

[10]   Collis, B., and Moonen, J. 2001. *Flexible learning in a digital world: Experiences and expectations.* London: Routledge/Farmer.

[11]   Condie, R., and Munro, B. 2007. *The impact of ICT in schools – a landscape review.* Recieved from : https:// oei.org.ar/ibertic/evaluacion/sites/default/files/ pdf

[12]   Eshetu mandefro, 2013. An assessment of the availability and utilization of ICT facility for teaching and learning purpose in selected Secondary Schools of Sidama Zone. MA Thesis in Curriculum Studies. Addis Ababa University.

[13]   Federal Democratic Republic of Ethiopia. 2009. The national   information and communication technology policy and strategy. Addis Ababa, Ethiopia

[14]   Flanagan, L. and Jacobsen, M. 2003. Technology Leadership for the twenty first century   principal. *Journal   of   Educational   Administration*, *41(2), 124-142.*

[15]   Frederick, G. R., Schweizer, H. and Lowe, R., 2006. After the in service course: Challenges of technology integration, Computers in the Schools, interdisciplinary *Journal of   practices, theories and applied research 23(2), 73-84.*

[16]   Gebremariam Mesfin. 2004. Integration of Computer Assisted Learning into the Curricula of Ethiopian Schools. MA thesis. Addis Ababa University.

[17]   GESC, 2017. *Assessment of Knowledge Society Development in Ethiopia June, 2017*

[18]   Ghavifekr, S. and Rosdy, W.A.W. 2015. Teaching and learning with technology: Effectiveness of ICT integration in schools. *International Journal of Research in Education and Science (IJRES), 1*(2), 175-191.

[19]   GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit). 2016. Education in Conflict and Crisis: How Can Technology Make a Difference? A Landscape Review

[20]   Hare, H. 2007. *ICT in Education in Ethiopia.* World bank report.

[21]   Hiwot Solomon. 2013. Practices and Challenges of Giving Information Communication Technology as a Subject of Teaching in Government Preparatory Schools of Dire Dawa Administration Council.   MA thesis. Haramaya University.

[22]   Flanagan, L. and Jacobsen, M. 2003. Technology Leadership for the twenty first century principal. *Journal of Educational Administration*, *41(2), 124-142.*

[23]   Hennessy, S., Harrison, D., and Wamakote, L. 2010. Teacher Factors Influencing Classroom Use of ICT in Sub-Saharan Africa. *Itupale Online Journal of African Studies, 2 (2010)* 39- 54

[24]   *Hussein Said Aragaw. 2018. "Practices, Challenges and Prospects of SchoolNet Implementation in Secondary Schools in Addis Ababa City Administration." MA thesis. Addis Ababa University.*

[25]   *Kim, Sung-Wan, and Gebeyehu Bogale. 2014. "Does Satellite Program Satisfy Ethiopian Secondary School Education?" In International Conference e-Learning 2014: 79–86.*

[26]   Rabah, J. 2015. Benefits and Challenges of Information and Communication Technologies (ICT) Integration in Québec English Schools. *Turkish Online Journal of Educational Technology 14(2), 24–31.*

[27]   Jones, E 2005, The use of virtual learning environments. Computer Education*, Journal of the Higher Education Academy 110(2), 16–22*

[28]   Jo Shan, F. 2013. ICT in Education : A Critical Literature Review and Its implications: *International Journal of Education and Development using Information and Communication Technology 9(1), 112–125.*

[29]   Kautz and Plumb, 2015. Barriers to the Integration of Information Technology within Early Childhood Education and Care Organisations : A Review of the Literature. Australian Conference on Information Systems.

[30]   Kozma, R 2000. Qualitative studies of innovative pedagogical practices using technology: Research design for the Second Information Technology in Education Study Module 2. Menlo Park, CA: SRI International.

[31]   Light, D. 2009. The Role of ICT in Enhancing Education in Developing Countries : Findings from an Evaluation of The Intel Teach Essentials Course in India , Turkey , and Chile. *Journal of Education for International Development 4(2), 1-15.*

[32]   Liu, X., and Pange, J. 2014. Early childhood teachers' perceived barriers to ICT integration in teaching: a survey study in Mainland China, *Journal of Computers in Education, 8(2), 1- 15.*

[33]   Levina, N. 2002. *Collaborating on Multi-party Information Systems Development Projects : A Collective Reflection-in-Action View.* Stern School of Business,New York University,USA

[34]   Makewa, C. 2013. ICT in secondary school administration in rural southern Kenya: An educator ″ s eye on its importance and use. *International Journal of Education and Development using Information and Communication Technology. 9*(2), 48–63.

[35]   Maslowski, R., 2001. School culture and School performance: An explorative study into the organizational culture of secondary schools

and their effects, Twente: University Press, Enschede

[36]   Mesfin Belachew 2014. *E-Government Initiatives in Ethiopia*. UN, The African E- Leadership .https://doi.org/10.1145/1930321.1930332

[37]   Mndzebele N. 2012. Challenges Faced by Schools when Introducing ICT in Developing Countries. *International Journal of Humanities and Social Science Invention 2(9), 1–4.*

[38]   MOE 2018. Ethiopian Education Development Roadmap (2018-   30): An integrated Executive Summary, Addis Ababa, Ethiopia.

[39]   *MoFED (Ministry of Finance and Economic Development)* 2014. *The Federal Democratic Republic of Ethiopia Growth and Transformation Plan (GTP) Draft* . Addis Ababa, Ethiopia

[40]   Mohanty, S. 2019. *The Essence of ICT Restructuring in Ethiopia. retrieved from:* https://www.researchgate.net/publication/332471290

[41]   Nikolopoulou, K., and Gialamas, V. 2013. Barriers to the integration of computers in early childhood settings: Teachers perceptions, Education and Information Technologies, Australasian Conference on Information Systems, Parette,

[42]   Noor-ul-amin, S. 2017. An effective use of ICT for education and learning by drawing on worldwide knowledge, research and experience: ICT as a change agent for education: A Literature review. *Scholarly Journal of Education, 2(4), 38-45.*

[43]   *Nguon, S. 2013. Assessment practices in a Cambodian university: Through the lens of   teachers and students. MA Thesis, Victoria University of Wellington, Wellington, New Zealand.*

[44]   Parvin, M. S. 2013. Integrations of ICT In Education Sector For The Advancement Of The Developing Country: Some Challenges and Recommendations -B Angladesh Perspective. *International Journal of Computer Science & Information Technology, 5*(4), 81–92.

[45]   Pelgrum, W.J. 2001. Obstacles to the integration of ICT in education: results from a worldwide educational assessment. *Journal Computers & Education, 37*(2), 163-178. Elsevier Ltd.

[46]   Sedoyeka, E., and Gafufen, G. 2013. Computers in Tanzania Secondary Schools - Challenges and Opportunities. *International Journal of Computing and ICT Research, 7(1), 22–32.*

[47]   Sharma, R. C. 2003. Barriers in using technology for education in developing countries. *Information Technology: Research and Education*, 2003. Proceedings. ITRE2003. International Conference on.

[48]   Smeets, E. 2005. *Does ICT contribute to powerful learning environments in primary education? 44*, 343–355. https://doi.org/10.1016/j.compedu.2004.04.003

[49]   Solomon 2018. ICT Integration in education: a comparative analysis of practices, challenges, and prospects between private and government secondary schools in Dire Dawa city   administration. MA Thesis, Haramaya University.

[50]   Stoilescu, D. 2017. *An Analysis of ICT Policies in Canada and Australia*. 13–16. Proceedings of the European Distance and E-Learning Network 2017 Annual Conference Jönköping, 13-16 June, 2017

[51]   UNESCO 2012. ICT in Education Latin America and the Caribean: A regional analysis of ICT integration and e - readiness, Paris: France

[52]   UNESCO 2014. ICT in Education in Asia: A comparative analysis of ICT integration and e - readiness in schools across Asia.

[53]   Zhang, B., Sen, P., and Seow, K. E. E. 2008. Handheld computers as cognitive tools: Technology-enhanced environmental learning. 3(3), 231–252.