

Factors Affecting the Use of ICT in Secondary Schools

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Abstract: The main purpose of this study is to identify the problems that affect the use of ICT in selected secondary schools in Kolfe Keranio Sub-City, Addis Ababa, Ethiopia and recommend solutions in the process of teaching and learning in secondary schools. In order to review literature on usage issues and gain better experience from countries similar to Ethiopia, as well as identify factors that affect ICT use in secondary schools. The use of ICT is a major driving force in the education system around the world and the use of ICT is currently on the rise in Ethiopia. Thus, schools can use ICT to help make the learning process more successful.

Index Terms: ICTs, challenges of the use of ICT in secondary schools.

I. INTRODUCTION

Information and Communication Technology (ICT) is an effective educational technology tool which promotes dramatic changes in teaching and learning process. The use of ICT offers powerful learning environments and can transform the learning and teaching process so that students can deal with knowledge in an active, self-directed and constructive way. Present ICT is considered as an important means to promote new methods of instruction. It uses to develop students' skills cooperation, communication problem solving and lifelong learning [1]. As cited by Hailye, (2018), education is one of the fundamental factors of development. No country can achieve sustainable economic development without substantial investment in human capital. Education enriches people's understanding of themselves and the world. It improves the quality of their lives and leads to broad social benefits to individuals and society in general. Education raises people's productivity, creativity and promotes technological advancement; it is also an important contributor to technological capability and technical change in organizations. In addition to it plays a crucial role in securing economic, social and political progress and improving fair income distribution among people (Ilhan, 2001). Information and Communication Technology (ICT) is an essential educational technology tool that can enhance impressive changes in the teaching and learning process. The use of ICT offers powerful learning environments and can transform the learning and teaching process so that students can deal with knowledge in an active, self-directed and constructive way. Present ICT is considered as an important means to promote new methods of instruction. It uses to develop students' skills in cooperation, communication, problem solving and lifelong learning [1]. ICTs are making dynamic changes in society. They are influencing all aspects of life. The influences are felt more and more at schools. Because ICTs provide both students and teachers with more opportunities in adapting learning and teaching to individual needs, society is, forcing schools aptly respond to this technical innovation (Mikre, 2011). The use of ICT in education has introduced other modes of education other than the traditional mode [13].

II. LITERATURE REVIEW

This section contains information on problem solving and research questions. ICT begins by explaining the definition of ICT and selecting the most relevant research topics in Ethiopia topics and building an understanding of these concepts. Various previous studies and theories on the factors affecting the use ICT, as well as the steps taken to overcome the processes that affect the use of ICT are described.

Information and Communication Technology (ICT): Information and communication technologies (ICT) have tremendous potential to enhance the lives of people in general and, particularly, those in developing countries. Use of ICT can boost business, support education and healthcare systems and also enhance all levels of government in their development processes worldwide. The term "technology" can be used to mean a very wide variety of things, from computers to pencils [2]. ICT plays a crucial role in education if properly used, it can provide significant to teachers and students in the classroom. Generally in training and teaching-learning process. ICT also gives opportunities in advancing skills, knowledge and sustaining lifelong learning (Abrham, 2016). ICT is creating active modifications in socioeconomic and political activities of a country and influences all parts of society life, where the effect is high in the case of teachers and students. Since the technology provides both teachers and students with excessive chances in using ICT [9].

Information and Communication Technology for Education /ICT4E/: Information Communication Technology has played an educational role in formal settings in programs provided by governmental agencies, public and private educational institutions, for-profit corporations and non-profit groups and secular and religious communities (Blurton, 1999).The above paragraph described that the application of ICT goes beyond education in both profit and non-profit driven organization to facilitate the quality and quantity of the product or service they provide to their customers. Information and Communication Technology (ICT) has a direct role to play in education and if appropriately used, it can bring many benefits to students in the classroom as well as in education

and training processes in general (Madzima et al, 2010). ICT also offers possibilities in facilitating skill formation, sustaining lifelong learning, and advancing community linkages. Planning for effective use of ICTs in education necessitates understanding of the potential of the technologies to meet different educational objectives and, consequently to decide which of these objectives is pursued [2]. The Benefits of ICT in Education: The uses of ICT is making major differences in the learning of students and teaching approaches. Schools in the Western World invested a lot for ICT infrastructures over the last 20 years, and students use computers more often and for a much larger range of applications (Volman, 2005). Several studies reveal that students using ICT facilities mostly show higher learning gains than those who do not use [4]. Use of ICTs enhances all forms of information exchange, observation, learning and decision-making. Business transactions are expanded and speeded up with ICTs and 15 business opportunities easily identified and markets operate more efficiently (Labelle 2005). ICTs promote access to information for private and professional decision making which expand the range of choices and opportunities by facilitating greater access to economic, educational and development-related information [5]. Benefits of ICT for education:

- ICT can increase access to education: ICT such as distance education system, e-learning and access to personal computers (e.g. OLPC) provides education to people in remote areas where teacher recruitment is often difficult. Moreover, the internet enables them to access any information in the world without actual transportation.
- ICT can improve the quality of education: The quality of education is improved by ICT through use of digital teaching and learning materials, broadcasting qualified lecturers and providing distance learning for teachers.
- ICT can motivate students: ICT motivates not only students to study but also their parents to send their children to schools, because computers are something new which seem attractive and nowadays people recognizes that ICT skill is necessary for the information age [6].

Challenges of ICTs: As cited by Said, there are many kinds of constraints or pitfalls for Information Communication Technology for Education (ICT4E) projects, such as, poor infrastructure (Duncombe 2006; Ndou 2004), organization or community acceptance (Whyte 1999 cited in Harris et al. 2003), relevance of information (Etta and Parvyn, 2003), financial sustainability (Oestmann and Dymond 2001), lack of training and skilled personnel (Ndou 2004), literacy (Roman and Colle 2002; Warschauer 2003), gender (Farrell and Isaacs 2007; Törenli 2006 [2]. As cited by Legesse, a number of factors hinder the application of information technologies in the Ethiopian schools. The major factors include lack of information, securing adequate funding and securing professional development (Yiftusira, 2003) [7]. Educational ICT Equipment and Infrastructure: The physical and technological infrastructure of ICT is a fundamental condition for implementing changes to use ICT in education. Setting up the infrastructure requires consideration of availability of physical infrastructure (e.g. rooms for servers, computer rooms, placing of cables and network points, electricity supply points), ICT hardware and software, human resources to set up and maintain the infrastructure and support everyday running (Lim, Chai and Churchill, 2010 cited in UNESCO, 2012). Some key components of schools' ICT infrastructure and hardware including networks, Internet access, computer rooms, open access rooms, staff computers, computers for students, and digital media production facilities. Given sufficient ICT infrastructure for both teachers and students, schools need to have technical assistants and coordinators to maintain systems and ensure that the infrastructure remains compatible with developments in software (Divaharan and Lim, 2010). While technical assistants help to maintain ICT equipment and ensure everything works, ICT coordinators help to keep up-to-date with new innovations in the ICT field, decide the direction of ICT use for their schools, and organize in-school training for teachers (Lai, Trewern and Pratt, 2002 as cited in UNESCO, 2012). Through planning, allocating resources and budget, and giving technical and curriculum support, such coordinators lead the community of teachers in the integration of ICT-based teaching (Lai and Pratt, 2004 as cited in UNESCO, 2012). Teachers ICT Professional Development: When teaching and learning takes place using information and communication technology especially educational satellite plasma television in school setting, one important component is teachers confidence, skill and interest to teach subjects incorporating information and communication technology. This is possible giving continuous training and practice to improving students' interest to learn and work more (Birhanu, 2012) [2].

Roles of ICT in Education: The Roles of ICT in education, Information communication technologies (ICT) at present are influencing every aspect of human life. They are playing salient roles in work places, business, education, and entertainment. Moreover, many people recognize ICTs as catalysts for change; change in working conditions, handling and exchanging information, teaching methods, learning approaches, scientific research, and in accessing information [4]. ICT roles in education, ICT is currently playing a significant role in all aspects of human life. ICT is a powerful tool for expanding educational opportunities. Numerous studies indicate that students who use ICT have higher learning opportunities than those who do not. ICT provides quick and easy access to extensive and up-to-date information and is a tool for solving challenges in the teaching and learning process. Proper use of ICT technology plays an important role in the teaching and learning process, which helps to successfully implement ICT technology in the education sector.

ICT for Education in Ethiopia: Information and Communication Technology (ICT) has a direct role to play in education and if appropriately used, it can bring many benefits to students in the classroom as well as in education and training processes in general (Madzima et al, 2010). ICT also offers possibilities in facilitating skill formation, sustaining lifelong learning, and advancing community linkages. Planning for effective use of ICTs in education necessitates understanding of the potential of the technologies to meet different educational objectives and, consequently to decide which of these objectives is pursued [2]. The Ethiopian Government acknowledges education as the cornerstone of social progress and economic development. ICT can enhance the educational system in areas such as access to a wealth of information and online courseware. Equally important is the digital skills imparting function of schools teaching students how to use ICT, as well as to develop higher level skills for future employment in computer related occupations. As the vast majority of the Ethiopian population lives in remote areas with shortages of teachers, ICT is crucial in addressing access and quality of education. This pillar also ties into the foundational area of Human Capital

Development [11]. There are many areas of ICT application in Education. ICT facilitates the teaching– learning process: improving access to broader sources of learning materials, facilitating collaborative and group work through networking and realizing individualized student centered learning. According to Leach (2005), ICTs have enhanced teacher’s professional knowledge, skills, and capabilities by extending their subject knowledge, and enabling more efficient planning and preparation for teaching. Yusuf (2005) asserted that ICT can enhance teaching and learning through its dynamic, interactive, and engaging content; and it can provide real opportunities for individualized instruction [12].

ICT Benefits for Education Quality: As ICTs are influencing all aspects of life, they are making dynamic changes in society. The influences are felt more and more at schools. Because ICTs provide both students and teachers with more opportunities in adapting learning and teaching from individual to a community need Tinio (2002). The potentials of ICTs in increasing access and improving relevance and quality of education in developing countries further stated by Tinio (2002). ICTs greatly facilitate the acquisition and absorption of knowledge, offering developing countries unprecedented opportunities to enhance education, improve policy formulation and execution, and widen the range of opportunities for business and the poor [8]. ICT technology is it increases motivation for teachers and students, increases participation, and enhances the quality of education by using ICT to acquire basic skills in the teaching and learning process. Using educational technologies to improve the quality of education and updating teachers and students with ICT skills is an important tool to ensure quality education and it helps to make the teaching and learning process more successful.

Factors hindering ICT implementation: There are various obstacles to the success of ICT in education. The following are some of the major barriers to effective ICT implementation in schools.

- Lack of ICT resource - Lack of adequate supportive resources is one of the main factors that hinder ICT implementation in education (Alhawiti, 2013). According to Bingimlas (2009), inaccessibility of resources remains a major obstacle to the incorporation of technology in education in both developed and developing countries. Bingimlas’s analysis shows that computers may not always be accessible to educators. One reason for this is that such resources are mostly shared in most learning institutions. This is further aggravated by inadequate copies of software, lack of simultaneous internet access, slowness of ICT systems, and limited availability of educational software. Essentially, it is difficult to successfully implement ICT in education without sufficient hardware and software (Bingimlas, 2009) [3]. There is a shortage of ICT resources in schools. Inadequate computer supply, inadequate plasma TV, spare parts, etc. are obstacles to ICT implementation. Therefore, teachers and students should have adequate access to ICT resources.
- Lack of ICT policy - Another major factor that hinders the effective implementation of educational technology into schools is the lack of educational policy and strategy relating to ICT adoption (Oyaid, 2009). In this concept, Wozney et al. (2006), argue that a clear policy framework helps in the creation of a school culture that supports ICT adoption. Balanskat et al. (2006), stressed that it is important for policy makers in the education sector to focus on policies that encourage educators to incorporate educational technologies in their instructional practices. This, for instance, includes rewarding teachers who use educational technology [3].
- Lack of management and technical support - ICT implementation in schools is also hindered by lack of management and technical support (Kozma, 2008). Research done by Ismail (2010) argued that one of the key obligations for the school administration comprises being conscious of areas that necessitate attentions for the fruitful application of ICT within institutions. Wong et al. (2008) established that if the school administration offers support and motivation for the teachers, a suitable working atmosphere would be formed to encourage teachers to test the use of ICT within their lessons. Technical issues such as poor internet connectivity, for instance, discourage teachers from using educational technology. This is particularly true for school teachers (Bingimlas, 2009) [3]. Technical failures can occur when teachers use technology resources. Therefore, the presence of management and IT support in educational institutions in the event of technical problems encourages teachers to use ICT tools.
- Time limitations - Teachers are also hampered by over-loaded curriculums, which leave them little time to integrate technology into their instructional practices (Bingimlas, 2009). Time limitations and difficulties of scheduling adequate time for technology-oriented classes is actually a significant barrier to the use of technological resources in teaching (Jones, 2004; Tearle, 2003) [3].
- Lack of teachers training and confidence - It is also important for learning institutions to provide teachers with more training on educational technology (Hennessy, 2005). Lack of training is actually the most commonly cited barrier in the successful implementation of ICT in teaching and learning (Bingimlas, 2009; Balanskat et al., 2006; Hakami, et al., 2013; Buabeng Andoh, 2012). Teachers have limited knowledge on the use technological resources in the classroom. Therefore, training equips teachers with the skills and knowledge necessary for utilizing ICT in the classroom (Hew & Brush, 2007). This also equips teachers with greater confidence in as far as using educational technology is concerned [3].

ICT Infrastructure: The term infrastructure covers both devices and cabling. Devices supporting technology in schools include specialized equipment (such as switches, routers, modems, or codecs) that link computers or video hardware to networks. Infrastructure also refers to cabling, whether wire, fiber optic, or coaxial. In newer systems, links between computers are wireless, in which case infrastructure refers to receivers and transmitters. For schools to use technology, they must first have it and make it available for students, teachers, and administrative staff. Acquiring that technology, from computers to modems to two-way conferencing equipment, is only one step in facilitating student learning [2].

Information Technology (IT) Security: As cited by Aklog, security is treated as the most important concern in the online world (Nikkhahan et al., 2009). IT security is considered to be one of the most significant divisions of information security

(Euting&Weimert, 2009). The main purposes of the information security are protecting the information and guarantee to obtain ability, privacy and honesty of information (Aljifri&Navarro, 2003; Elmarie&Elme, 2000 [14].

ICT Security Objectives [10].

- To secure and safeguard the national electric communications system (national, institutional and individual security).
- To enhance user confidence and trust within the public, as well as to protect both data and network integrity.
- To prevent, detect and respond to cyber crime and misuse of ICT so as to contribute to the fight against national, regional and international crimes such as prostitution, fraud, organized crime and terrorism.
- To address national security implications arising from the widespread application of ICT within the economy and society.
- To build overall implementation, crime’s prevention and controlling capacity of government bodies in charge of ICT policy implementation and monitoring.

III. METHODOLOGY

The research methods focuses on factors affecting the use of ICT in Kolfe Keranio sub-city secondary schools and uses descriptive research methods. Data was collected from teachers and students and used a descriptive data collection method to identify the challenges faced by the secondary schools in the use of ICT by reading and reviewing various research papers and preparing questionnaires on Google Forms and completing the questionnaire and data is analyzed from respondents is provided as a percentage of the pie chart and in tabular form.

IV. DATA PRESENTATION AND ANALYSIS

Presents the background characteristics of the questionnaire, answers each research question, and presents the findings of the study on factors affecting the use of ICT in Kolfe Keranio sub-city selected secondary schools. Level of importance of the factors among in schools; the possible solution of the managing of the challenges in the use of ICT process. Respondents' characteristics description provides information on the following sections: Addis Ababa City Administration, kolfe keranio sub-city, secondary schools sample taken from teachers and students. The main characteristics of sample teachers include gender, age, educational qualification and years of teaching experience.

Table 1: Characteristics of Respondents Teachers

No.	Level	Alternatives	Percent
1	Gender	Male	63.6%
		Female	36.4%
2	Age	20-30 years	27.3%
		31-40 years	50%
		41-50 years	18.2%
		Above 51 years	4.5%
3	Educational Qualification	Diploma	4.5%
		Degree	86.4%
		MSC/MA	9.1%
4	Years of teaching experience	1-5 years	27.3%
		6-10 years	36.4%
		11-15 years	22.7%
		16-20 years	4.5%
		Above 21 years	9.1%

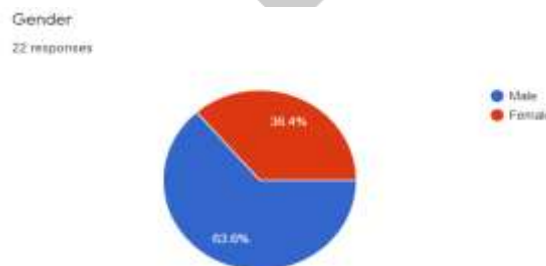


Figure 1: Teachers’ by Sex

Table 2: Factors affecting the use of ICT implementation, teachers

No.	Item	Agree	Neutral	Disagree
1	The speed of Internet connection is satisfactory to use ICT	95.5%	-	4.5%
2	Availability of electric supply	95.5%	-	4.5%
3	Using ICT can be improve students' learning skill	100%	-	-
4	Teachers' skill gap in teaching and learning with ICT	4.5%	-	95.4%
5	Teacher's experience working with Computer competency	100%	-	-
6	Number of computers supplies are accessible in the schools	-	9.1%	90.9%
7	Teachers get appropriate ICT training	4.5%	4.5%	90.9%
8	ICT is very important to support learning activities	100%	-	-
9	Challenges faced by teachers' in the process of teaching and learning using ICT	100%	-	-
10	Existence of factors that influence teachers' use of ICT in the teaching and learning process	95.4%	4.5	-
11	Schools pay attention to ICT education	-	18.2%	81.8%
12	The current usage of ICT in the teaching and learning process is satisfactory	13.6%	18.2%	68.2%
13	Existence of factors that hinder the use of ICT in the teaching and learning process	100%	-	-
14	Teachers use ICT tools in the teaching and learning process	100%	-	-
15	Training given to teachers in the preparation and use of ICT in the teaching and learning process	4.5%	9.1%	86.4%
16	The technical support and infrastructure in schools is adequate	-	9.1%	90.9%
17	Computer is a valuable tool for teachers	95.4%	-	4.5%

Table 3: Characteristics of Respondents, Students

No.	Level	Alternatives	Percent
1	Gender	Male	58.5%
		Female	41.5%
2	Age	15-16 years	4.6%
		17-18 years	26.2%
		19-20 years	52.3%
		21 years and above	16.9%

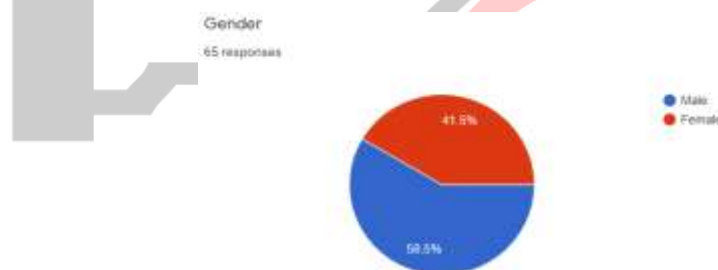
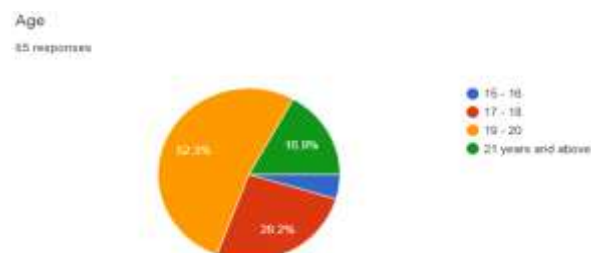
**Figure 2: Students' by Sex****Figure 3: Students Age Group**

Table 4: Factors affecting the use of ICT implementation, students

No.	Item	Agree	Neutral	Disagree
1	The speed of Internet connection is satisfactory to use ICT	69.2%	18.5%	12.3%
2	Availability of electric supply	73.8%	13.8%	12.3%
3	Using ICT can be improve students' learning skill	93.8%	4.6%	1.5%
4	Teachers skill gap in teaching and learning with ICT	59.4%	21.9%	18.8%
5	Teacher's experience working with Computer competency	38.5%	16.9%	44.6%
6	Number of computers supplies are accessible in the schools	4.6%	13.8%	81.6%
7	Students get appropriate ICT training	4.6%	9.2%	86.2%
8	ICT is very important to support learning activities	93.9%	3.1%	3%
9	Challenges faced by students' in the process of teaching and learning using ICT	87.7%	7.7%	4.6%
10	Existence of factors that influence students' use of ICT in the teaching and learning process	84.6%	9.2%	6.1%
11	Schools pay attention to ICT education	9.2%	29.2%	61.5%
12	The current usage of ICT in the teaching and learning process is satisfactory	7.7%	12.3%	80%
13	Existence of factors that hinder the use of ICT in the teaching and learning process	84.6%	9.2%	6.2%
14	Students use ICT tools in the teaching and learning process	64.6%	15.4%	20%
15	Training given to students in the preparation and use of ICT in the teaching and learning process	6.2%	17.2%	76.6%
16	The technical support and infrastructure in schools is adequate	7.9%	19%	73.1%
17	Computer is a valuable tool for students	87.6%	3.1%	9.4%

V. CONCLUSION, RECOMMENDATIONS AND FUTURE WORK

Findings

The purpose of the study is to examine and address the challenges affecting the use of ICT in Addis Ababa City Administration's Kolfe Keranio Sub-City. The overall objective of this study is to identify the challenges that affect the use of ICT in Addis Ababa city administration; kolfe keranio sub-city selected secondary schools. The findings of this study indicate that infrastructure-related factors, lack of technical support, and inadequate computer supplies are major obstacles to ICT use in Kolfe Keranio sub-city selected secondary schools. There is a challenges that affect the use of ICT in schools are inadequate infrastructure, power outages, internet outages, inadequate computer supplies for teachers and students in schools, inadequate ICT training and use of ICT for teachers and students, there is a gap in ICT skills to teach technology to their students, and teachers lack the skills and experience working with computer competency, inadequate technical support and infrastructure in schools, and schools do not pay attention to ICT education. The use of ICT in schools helps to improve students' learning skills, and is essential to support learning and teaching processes in the teaching and learning process. The use of ICT increases student motivation, connects students to multiple sources of information, supports active and in-class learning environments and contributes more to teacher facilitation, and contributes to a quality teaching and learning process. Teachers and students use ICT tools to support learning and teaching activities.

Conclusion

In this study, there are a variety of challenges related to the use of ICT in schools. Inadequate infrastructure, power outages, Internet outages, inadequate computer supplies, lack of technical support, lack of ICT skills training, teachers lack of experience working with computer competency, teachers and students' lack of ICT preparation and use of ICT training, and schools they are not paying attention to ICT education. By identifying these challenges, it advises teachers and students to use ICT for better teaching and learning. The use of ICT in secondary schools is beneficial for teachers and students and simplifies the teaching and learning process. Using ICT improves the teaching and learning process at all levels, making it easier for students to understand. However, there are many problems with the use of ICT for education in Ethiopia. Therefore, to identify the problems and suggest solutions.

Recommendations

Based on the research findings and conclusions, successful solutions for the use of ICT are recommended.

- To use ICT, it recommends that schools have uninterrupted power supply and internet connection.
- There should be provide appropriate ICT skills training for teachers.
- Provide training to teachers on ICT preparation and use.
- Improve computer supplies in schools and make them accessible to teachers and students.
- Improving the provision of ICT tools in schools for the benefit of teachers and students.
- There should be ICT technical support in schools.
- Benefiting teachers and students by using ITC in schools.
- Schools should pay attention to ICT education.

➤ In order to successfully operate the use of ICT in schools, access to electricity must be the basic requirements of schools. Infrastructure, such as regular electricity and generators, must exist in schools to provide ICT services.

Future Work

This study is believed to help fill some gaps, but it is still not fully explored and important work needs to be done in the future. The study explores the use of ICT in schools and should explore the benefits of additional ICT technologies. Investigate the factors that influence the use of ICT in schools, such as ICT professionals, school principals, school administration staff and stakeholders, about the challenges of using ICT. This study was conducted only in one sub-city, and similar studies may be conducted in other sub-cities, as well as comparative studies on the use of ICT in secondary schools.

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