International Journal of Education and Development using Information and Communication Technology (IJEDICT), 2024, Vol. 20, Issue 1, pp. 107-118

Change and Challenges of ICT use in Secondary Schools

K. Ravishankar & Demelash Misgana Wase
Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology, India

ABSTRACT

This study discusses the change and challenges of ICT use in secondary schools in Bole Sub City, Addis Ababa. The use of ICT in today's teaching and learning process is essential. Six secondary schools, eighty-seven teachers, six principals, and six department heads served as respondents for the investigation of the study, and information was obtained through questionnaires and interviews. The opinions and stands of department heads, principals, and instructors about the application and difficulties of ICT education in the teaching and learning process were ascertained using the descriptive survey method. The respondents' perceptions and attitudes were examined using the mean score and standard deviation to examine quantitative data. The results demonstrate that, even in cases where ICT is used in schools, significant obstacles exist to overcome. These obstacles include a lack of resources, poor Internet access, power outages, a shortage of time or restricted time for ICT use, a lack of technical support, a lack of funding from the government, and a lack of training.

Keywords**:** *ICT; Secondary schools; Change; Challenge; sub city*

INTRODUCTION

Due to advancements in educational technology, teaching and learning are now significantly impacted (Pozo, J., et al., 2021). Teachers used several audio and visual tools, including movies, radio, slides, records, and overhead projectors, to facilitate classroom instruction before the invention of computers (Technology, C. 2013). After World War II, improvements in computer technology opened up fresh possibilities for enhancing classroom instruction (Arkorful, 2014). Computers offer new types of learning, such as collaborative learning, blended learning, and online learning, in conjunction with telecommunications networks and web technologies. Web technologies increase the flexibility of learning. Students get access to educational materials from their own institutions and content creators worldwide. The Internet enables in-depth research and likely application. ICT helps with creating engaging learning environments and can transform how students learn and teachers teach, so that they may engage with information in active, self-directed, and valuable ways. ICT is currently recognized as a crucial instrument for advancing new pedagogical paradigms. Students' cooperation, communication, problem-solving, and lifelong learning abilities are all improved with its aid (Sawyer, J., & Obeid 13, R. 2017). For the development of a new paradigm of learner-centered education systems that better meet the requirements of learners, ICT becomes a critical instrument (a change catalyst). ICT may enhance national and international networking and collaboration in education, supporting teacher professional development. To address the challenges that instructors confront today, several ICT options exist for videoconferencing via multimedia delivery to websites. In actuality, ICT can give today's instructors and students more adaptable and efficient methods for lifelong learning. Consequently, educators and students will experience significant advantages for their empowerment and growth. Effective ICT use has the potential to benefit both ICT teachers and students in the classroom greatly.

ICT significantly impacts a nation's political and economic activities, notably affecting instructors and students because there are many opportunities for instructors and students to use ICT in schools (Das, Koushik 2019). Thanks to technology, ICT is increasingly being used as a source of information for political and social development. However, a country's position and attempts to use and benefit from ICT strongly depend on its level of development. All forms of technology used to collect, process, protect, store, and transmit data are collectively called information technology (IT). The essential idea in using technology is not obtaining and storing information but instead talking with people about it, exchanging ideas, and ultimately coming to a consensus on the fundamental concerns of the information to use it for the purpose it was developed. According to UNESCO, ICT is a scientific, technological, engineering, and managerial discipline and method utilized in handling information, its application, and its association with social, economic, and cultural matters (Ratheeswari, 2018).

Learning about computers leads to learning with computers (Mikre, 2011). ICT is the management of information (images, phrases, instructions, and graphs) for use with electrical and specialist equipment like PCs, cameras, and phones; and according to Ajayi et al. (2009), ICT is also known as electrical or mechanical equipment assisted by human and intelligent materials which may be utilized for a range of teaching and learning activities, in addition to personal use. It is impossible to overstate the value of ICTs in today's society and the education system.

Data and communication technology can reinforce teaching, add to radical educational changes, accelerate expertise, and expand knowledge. It also has the potential to persuade and attract students to learn how to connect classroom experiences to work rehearsals and to help create financial readiness for future workers (Ajayi et al., 2009). Use of ICT tools in increasing quality education has several benefits, such as allowing students to choose when to learn without worrying about their geographic location (Alemu et al., 2015). ICT also enables students to locate and research cutting-edge studies from experts throughout the globe. Thirdly, integrating ICT into the education system will facilitate the delivery of instruction to students, the monitoring of student achievement, and the timing of evaluations. Ndum & Okey (2013) assert that ICT has made it possible to serve educational goals by altering necessary training and work approaches.

Oduma & Ile (2014) asserted that ICT fostered the development of necessary abilities, fostered e-learning, fostered teacher re-preparation, upheld and updated the minimal scholarly quality, and established virtual library services. It also boosted student motivation and commitment. According to Ghavifekr et al., (2006), additional advantages of ICT included instantaneous knowledge sharing, self-directed learning opportunities, encouragement for experiential learning, doors opening for novel ways of thinking, and a developmentally supportive environment.

ICT use in the teaching-learning process is essential, given the benefits of education in population building and the current change in secondary schools (Ajayi et al., 2009). Teaching and learning no longer include the teacher lecturing to a group of students while seated in a classroom and not cooperating sufficiently. Moreover, Ajayi et al., (2009) provided examples of how teachers should utilize ICT to help students pass traditional cutoff points, ensure adequate participation in the teaching and learning process, and create the conditions needed for testing and research. One of the creative abilities that teachers should have is the ability to employ technology in the classroom. Another is a fundamental comprehension of computer concepts and operations. Moreover, the personal and professional use of technology for professional purposes has been identified by Luhamya et al., (2017). ICT significantly facilitates information acquisition, according to Nwosu et al., (2011), giving the nation extraordinary potential to improve educational frameworks, improve strategy formulation and execution, and widen the range of opportunities for business people.

ICT provides an excellent promise to improve teaching and learning when used effectively, Oduma et al., (2014), therefore, if Ethiopia aspires to increase the quality of education, the fundamentals

of ICT technologies in its educational framework need to be carefully considered. Improvement of the nature of instruction and learning is a significant issue in preparation, particularly during an extended period of instruction. ICT may improve education in several ways, such as by fostering the development of core skills, modernizing classrooms, and improving instructor preparation. (Luhamya, et al., 2017). Although many factors may contribute to poor educational quality, improper use of ICT, educators' ICT proficiency, students' ICT proficiency, the tendency and inspiration to use ICT, the point at which ICT and instructional framework integration occurs, ICT foundations, and electricity concerns were examined.

Benefits of implementation of ICT in Education

Using technology in education aims to make it better than without it. According to Reeves (1998), technology in education has a variety of beneficial effects on the teaching-learning processes. Some purported advantages include making course materials easily accessible, enhancing students' writing motivation, encouraging widespread engagement, and making subjects easier to understand. In addition, having the proper framework can make it easier to monitor and oversee student work and quickly determine whether training modifications are necessary to enhance student learning. When utilized appropriately, information and communication technology (ICT) can improve learning both within and outside of the classroom.

ICT is directly related to education and its use can create more opportunities for teaching and learning, such as more student-centered instruction, the ability to reach more students, more chances for collaboration and communication between teachers and students, more opportunities for teachers to use multiple technologies, more opportunities for students to be enthusiastic learners and provide access to a wide range of courses. Since ICTs enable everyone to do so almost instantaneously, access to knowledge and information should benefit all individuals, organizations, and communities.

Status of ICT in education system

More appropriate environments and learning opportunities are necessary to foster inquiring minds, independence, teamwork, and ownership of knowledge. Accordingly, the effectiveness of teaching and learning is significantly impacted by the availability of ICT and its successful use in the classroom (Bariu, 2020).

In developed nations like Germany, Japan, France, Britain, and the USA, ICT has transformed education to better prepare students for life in the modern world and to study, work, and live there (Ratheeswari, 2018). The use of ICT in high schools is one of the main initiatives being carried out by developing countries to implement education reform programs (Barakabitze et al., 2019).

To deliver basic knowledge and educate the people, developing countries must utilize contemporary communication and information technology and methodologies (Tam et al., 2020). Several studies indicate that most developing countries should use the Internet for education to leverage ICT fully, because one of education's fundamental tenets is social equality (Tam et al., 2020). High schools served as the research site. Equity, accessibility, efficiency, quality, relevance, and learning outcomes in education and training have all been monitored by the Ministry of Education (ESDPVI, 2021). The Education Management Information System (EMIS) now collects and processes data on educational performance, which can be utilized to improve service delivery across the country. Studies on ICT indicate that ICT will significantly progress the type of improvements realized in education.

As a result, teachers are beginning to understand how important it is to integrate ICT into the modern classroom. One of the components of the policy that will make the General Education

Quality Improvement Programme easier to implement is the communications technology component. Rapid technological advancement means continuously picking up new abilities and information. Secondary school ICT courses should support forming professional teams with these cutting-edge skills (Shrestha et al., 2019). However, the existing infrastructure hinders the suggested approach. Merely 40% of Ethiopian schools are equipped with computers. Access to ICT, particularly laptops and the Internet is also restricted for teachers.

Change through ICT in Education

ICT applications have rapidly multiplied, resulting in a profound shift in technology, society, and the economy. These changes have made it necessary for educational institutions, administrators, and teachers to reevaluate their roles, teaching strategies, and long-term objectives. In the knowledge era, a nation's economic vitality depends on its educational system.

It is viewed as a comparison study of inputs and outputs. ICTs have changed how individuals operate today and are currently reshaping educational systems, according to Alemu et al., (2015). The inputs into the educational system include teachers, students, classroom materials, teaching aids, and teaching methodologies. Both the quantity and quality of student learning are outputs. The likelihood of acquiring education increases with the appropriate integration of ICT into the teaching and learning environment, combined with enhanced productivity. ICT expands the possibilities available to pupils and informs teachers about their new duties within the educational system.

The rising usage of ICT will alter many teaching and learning techniques teachers and students utilize. ICT administration serves a recurring and necessary purpose in the sphere of education.

ICT and the Ethiopian Education system

Expanding access to education and maintaining the caliber of education provided are priorities for the Federal Government of Ethiopia since they are both necessary for achieving rapid and long-term economic growth. Secondary school education in the nation has advanced dramatically since the new Education and Training Policies (ETP) were implemented in 1994. Every aspect of social and economic life is touched by ICT use. ICT is a field that is rapidly changing. Technology ages quickly, necessitating the continuous acquisition of new skills and information. The Ethiopian Ministry of Education claims that ICTs can increase access to education for a more significant portion of the populace (Hare, 2007).

The Ethiopian government acknowledged the critical role that ICTs can play in changing the educational system and ensuring that a higher proportion of citizens have access to education, as shown in Table1 - availability, functionality and computer used for teaching and computers access the Internet at the city administration level.

Table 1: *Availability of Computers and Internet Accessibility in the Secondary Schools of the Study Area, Addis Ababa*

Available Number of Schools		Functional Number of Computers		Availability Number of Schools		Computer Accessible Internet	
2020/21	2020/22	2020/21	2021/22	2020/21	2021/22	2020/21	2021/22
206	201	10,848	8611	169	162	15,489	13081

Source: - Education statistics from the annual abstract of the Federal Democratic Republic of Ethiopia's Ministry of Education.

Research Questions

Accordingly, the study was designed to answer the following basic questions:

- To what extent are human and material resources allocated to facilitate utilization of ICT?
- To what extent ICT supports the teaching learning process in the school?
- What are the major challenges in the implementation of ICT in the schools?

Objectives of the study

- To investigate change and challenges of the implementation of ICT in the secondary schools.

Specific objectives of the study

- To examine the extent of resource allocation to facilitate the implementation of ICT in secondary schools
- To identify whether the teaching and learning process in the study area is well supported by ICT
- To determine what challenges hinder the efficient use of ICT in secondary schools.

Research Design and Methodology

The study's primary objective was to study the problems and changes brought about by ICT in secondary schools in Addis Ababa's Bole sub-city. A descriptive survey design that integrated qualitative and quantitative research methodologies was employed. Both qualitative and quantitative data were gathered for the study using interview techniques and a questionnaire. For this investigation, we also used primary and secondary data.

All six government secondary schools in the Bole sub-city were to be considered in the study. Principals and department heads of teachers were taken into account. Purposive sampling was used to choose department heads and principals, whereas simple random sampling was used to select the teachers.

Teachers, department heads, and principals were the main sources of primary data. Different documents like Annual abstracts, ESDP materials and other documents were used as the secondary data sources. SPSS Version 20 software was used to analyze the data. Both quantitative and qualitative methods were used to assess the acquired data. Descriptive statistics like mean and standard deviation were used for the discussion of quantitative data that was collected from teachers. In contrast, qualitative data was collected from principals and department heads through structured interviews.

Table 2: *Target Population and Sample Size*

No	Type Of Respondents	Population Size	Sample Size	%	Sampling Technique
1	Teachers	580	87	15	Simple random
2	Principals	24	6	15	Simple random
3	Department Heads	36	6	16.7	Simple random

As seen in Table 2, the population size of teachers in Bole sub-city secondary schools was 580, the number of principals in the sub-city was 24, and the number of department heads was 36. The researcher selected 15% of respondents from the total population of teachers by simple random sampling and 15% of principals and 16.7% of department heads using random sampling for the interview.

Table 3: *Background Information about Respondents*

Item	Variables	Principals		Dep. Heads		Teachers	
		F	%	F	%	F	%
Gender	Male	4	66.7	5	83.3	66	75.9
	Female	2	33.3	1	16.7	21	24.13
	Total	6	100	6	100	87	100
Age	21-30	1	16.7	1	16.7	14	16.09
	31-40	4	66.7	3	50	44	50.57
	41-50	1	16.7	2	33.3	21	24.13
	51 & above	-	-	-	-	8	9.19
	Total	6	100	6	100	87	100
Qualification	BA/BSC	-	-	2	33.3	53	60.91
	MA/MSC &above	6	100	4	66.7	34	39.08
	Total	6	100	6	100	87	100
Experience	Below 10	6	25.0		27.8	9	10.34
	10-20	2	33.3	3	50	62	71.26
	Above 20	4	66.7	3	50	16	18.39
	Total	6	100	6	100	87	100

The data in Table 3 above, indicates that there were 66.7% more male principals than female principals overall, 83.3% more male department heads than female department heads, and 75.9% more male teaching staff than female teachers. The responses from male principals, department heads, and teachers outnumbered that of female principals, department heads, and teachers. This could imply that most secondary school principals, department heads, and teachers were men. According to the data, the majority of principals (66.7%), department heads (50%), and teachers (50.57%) were between the ages of 31 and 40. On the same table, all respondent principals (100%) and department heads (66.7%) had a second educational degree qualification. However, most teachers (60.91%) have a bachelor's degree. 66.7% of principals had more than 20 years of experience, but 50% of department heads and 62% of teachers had 10 to 20 years of teaching experience.

Overall, the data on work experience above indicates that most school principals, department heads, and teachers have sufficient work experience to fulfil their jobs and provide relevant information about what is happening in their institutions. Indeed, having more and sufficient job experience attracts and contributes significantly to providing high-quality education.

For the purpose of analysis mean values indicated in Table 4 below were interpreted as follows: 1.00 to 1.5 - highly disagreed, 1.6 to 2.5 - strongly disagreed, 2.6 to 3.5 - undecided, 3.6 to 4.5 - agreed, and 4.6 to 5.00 - strongly agreed.

Table 4: *The Practice of ICT in the Secondary Schools*

No	Indicator	M	SD
1	Computers are available for students in schools.	3.62	.73
2	There are enough computers in the schools.	2.16	.95
3	The technical support and infrastructure are available at the schools.	2.22	.98
4	The internet connection's speed sufficient for ICT.	2.33	.85
5	Electricity is available in the schools.	3.77	.71
6	There is a skill gap in teaching and learning in ICT.	2.35	1.12
7	ICT improves students learning skills.	3.94	.66
8	ICT is crucial to supporting educational activities.	3.90	.64
9	Schools pay attention to ICT education.	3.61	.93
10	ICT is currently being used in teaching and learning in a satisfactory manner.	2.41	1.02

As seen from Table 4, item 1, the mean value was 3.62, which implies that computers are available for students in these schools, while for item 2, the mean value of 2.16 indicates that even if computers were in the schools for students, there would need to be more computers. Further, item 3 - whether technical support and infrastructure are available at schools returned a mean score of 2.22, suggesting a problem with ICT infrastructure in schools.

Moreover, the speed of the Internet connection could be more satisfactory and relying on the respondents' responses, electricity is available in the schools. However, for item 6, with a mean value of 2.35, this suggests that there is a skill gap in ICT teaching and learning in schools. There are also some general questions, such as whether ICT improves students' learning skills, whether ICT is necessary to support learning or not, and whether schools pay attention to ICT education, which returned mean scores of 3.94, 3.90, and 3.61, respectively. This shows that most respondents agree that ICT improves students learning, it is essential to support learning activities, and schools should pay attention to ICT education. However, when asked whether the current use of ICT in the teaching and learning process is good, respondents to item 10 returned a mean score of 2.41. This indicates that how ICT is currently being used for teaching and learning needs to be more satisfactory. In this regard one of the school principals noted the following:

> *"A lack of computers and internet connection infrastructure is typical in our school these days due to a lack of funds and the expensive cost of ICT equipment. Furthermore, as the number of students grows, we are attempting to address such issues by using shift, and he also added that even if the above problems are there in schools' information communication technology in school have great opportunities. For instance, some of students have gotten good opportunities being employed in some electronic shops.* (School Principal)

Table 5: *Challenges of ICT Implementation in the Secondary Schools*

No	Indicator	M	SD
1	Insufficient number of computers	3.68	.94
2	Inadequate internet connectivity	3.70	.75
3	Power supply fluctuation (interruption)	3.70	.81
4	The high cost of hardware and software	2.97	1.15
5	The computer is quite old and slow.	3.89	.73
6	There is a shortage of trained ICT teachers	3.80	.63
7	There is a lack of government incentives for teachers.	3.72	.99
8	There is also a lack of technical support.	3.62	1.01
9	Inadequate ICT usage training	3.76	1.01
10	Lack of interest on the student side in using ICT	2.71	1.02
11	Lack of computer skill among teachers and students	3.79	.91
12	Lack of enough time to use ICT in the schools	3.53	.99

Regarding the challenges of ICT implementations in secondary schools, as shown in Table 5 above, the mean score was 3.68 on item 1. This suggests the need for more computers in the schools. Items 2 and 3 with a mean score of 3.70 respectively, suggest the need for more Internet connectivity and less power supply fluctuations in the schools. The mean score for item 4 was 2.97 suggesting that even if this issue is a problem in the schools, it is not a big deal like other problems,

while the mean score of 3.89 and 3.80 on items 5 and 6 respectively implies that the computers in the schools are old and slow, and there is also a shortage of trained ICT teachers.

The other main issues raised in the secondary schools include, lack of government incentives, lack of technical assistance from concerned bodies, inadequate ICT usage training, lack of computer skills among teachers and students, and inadequate time to use ICT in the schools. In regard to whether students are interested in using ICT, the mean score was 2.71. This reveals that even if the schools have insufficient infrastructure, the students are interested in using ICT technology.

One of the department heads raised his concerns as follows:

> *"In our school, there is a lack of functional computers in our ICT lab. Furthermore, the ICT class room to student ratio deviates from the standard. As a result, we teach and show to students in shifts. Even if there are many problems concerning information communication technology there is access to Wi-Fi using our smart phones and laptops to send different notes and assignments to our students and also to share important information to parents, in addition to these, our knowledge regarding ICT had increased."* (Department Head)

In addition to the above-mentioned issues one of the principals also said that:

> *"Teachers should motivate their students to use the available information technology resources to enhance their academic performance. With my experience, I want to stress that, in my suggestion as a principal; every teacher must act with greater responsibility and play a crucial part in the ICT-based teaching learning."* (School Principal)

DISCUSSION

ICT undoubtedly can improve learning outcomes by developing students' critical thinking skills and giving them access to the latest knowledge without creating accessibility or distance constraints. Students can engage in interactive assignments with a broader range of information and knowledge during their studies because of the integration of ICT in the classroom. The opinions and worldviews of the teachers will also influence how they integrate ICT into their lesson plans (Arnseth & Hatlevik, 2012; Rampersad, 2011). Educators can enhance their ICT integration strategies in the classroom by utilizing current and comprehensive resources, all supported by the Ministry of Education. When ICT is used for education and learning, emphasizing Internet accessibility will make learning and instruction global and provide a virtual learning environment for teachers and students.

The findings of the analysis investigating the change and challenges of ICT in Government Secondary Schools of Bole sub-city, and from the practice of ICT in Secondary Schools illustrates that computers are available for students in schools that have electricity, ICT improves students' learning skills, and it is crucial to supporting educational activities. Also, these schools have paid attention to ICT activities.

On the other hand, some of the challenges within the schools include a problem regarding the number of computers in the schools, technical support and infrastructure in the schools, Internet connection speed, a skill gap in teaching and learning in ICT, and computers are quite old and slow, there is a shortage of trained ICT teachers, lack of government incentives for teachers, inadequate ICT usage training and inadequate time to use ICT in the schools.

Generally, the result of the study revealed that even if there are achievements or changes regarding the accessibility of ICT in all Government schools in the sub-city, many problems remain unresolved and impact the ability to implement quality ICT education in the schools.

CONCLUSION

ICT in secondary school teaching necessitates the use of computers, the Internet, television, laptops, and projectors, all of which help with the delivery of teaching and the learning process itself. ICTs in education improve teaching and learning at all levels. Specific ICT tools for teaching and learning, however, were available. Examples include computers, televisions, videos, projectors, whiteboards, laptops, and mobile phones. In terms of number or quantity, the existing ICT tools, particularly computers, needed to be improved. On the other hand, there are significant challenges to ICT implementation in secondary schools, including insufficient numbers, interruptions in the power supply, poor internet access, a lack of time or limited time to use ICTs, a lack of technical assistance, a lack of government incentives, and a lack of training are all factors.

RECOMMENDATIONS

- Schools should pay attention to information communication technology education.
- There should be technical support from the concerned bodies.
- Increase the availability of ICT tools in schools for the benefit of students as well as teachers.
- Improve school computer supplies and make them available to teachers and students.
- It is recommended that schools have an uninterrupted power supply and an internet connection in order to use ICT.

REFERENCES

Ajayi, I., & Ekundayo, H. (2009). The application of information and communication technology in Nigerian secondary schools. *International NGO Journal*, 4(5), 281–286. http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:The+application+of+information+and+communication+technology+in+Nigerian+secondary+schools#0

Alemu, B. M. (2015). Integrating ICT into Teaching-learning Practices: Promise, Challenges and Future Directions of Higher Educational Institutes. *Universal Journal of Educational Research*, vol. 3, no. 3, pp. 170–189. https://doi.org/10.13189/ujer.2015.030303

Arkorful, V. (2014). The role of e-learning, advantages and disadvantages of its adoption in higher education. *International Journal of Education and Research*, vol. 2, no. 12, December

Arnseth, H. C., & Hatlevik, O. E. (2010). Challenges in aligning pedagogical practices and pupils' competencies with the Information Society's demands: The case of Norway. In S. Mukerji & P. Triphati (Eds.), Cases on technological adaptability and transnational learning: Issues and challenges. Hershey: IGI global.

Barakabitze, A.A., William-Andey Lazaro, A., Ainea, N., Mkwizu, M.H., Maziku, H., Matofali, A.X., Iddi, A., and Sanga, C. (2019) "Transforming African education systems in science, technology, engineering, and mathematics (STEM) using ICTs: challenges and opportunities," *Education Research International*, vol. 2019, Article ID 6946809, 29 pages, 2019.

Bariu, T. N. (2020). "Status of ICT infrastructure used in teaching and learning in secondary schools in MeruCounty, Kenya," *European Journal of Interactive Multimedia and Education*, vol. 1, no. 1, Article ID e02002, 2020.

Das, Koushik. (2019). The Role and Impact of ICT in Improving the Quality of Education: https://ijissh.org/storage/Volume4/Issue6/IJISSH-040611.pdf

Ghavifekr, S., Kunjappan, T., Ramasamy, L., Anthony, A., & My, E. (2006). Teaching and Learning with ICT Tools: Issues and Challenges from Teachers' Perceptions. Vol. 4, no. 2, pp. 38–57. www.mojet.net

Hare, H. (2007). ICT in Education in Ethiopia. World Bank / Infodev, June, 1–9. www.infodev.org/en/Publication

Kozma, R. B. (2005). National Policies that Connect ICT-Based Education Reform to Economic and Social Development. Human Technology: *An Interdisciplinary Journal on Humans in ICT Environments*, vol. 1, no. 2, pp. 117–156. https://doi.org/10.17011/ht/urn.2005355

Luhamya, A., Bakkabulindi, F. E. K., & Muyinda, P. B. (2017). Integration of ICT in teaching and learning: a review of theories. *Makerere Journal of Higher Education*, vol. 9, no. 1, pp. 21. https://doi.org/10.4314/majohe.v9i1.2

Mikre, F. (2011). The Roles of Information Communication Technologies in Education Review Article with Emphasis to the Computer and Internet. *African Journals Online*, vol. 6, no. 2, pp. 109–126. http://www.ajol.info/index.php/ejesc/article/view/73521

MoE, Education Sector Development Programme VI (ESDP VI). (2021). The Federal Ministry of Education, Addis Ababa, 2021.

Ndum, V. E., & Okey, S. (2013). Information and Communication Technology and the Enhancement of Quality and Accessible Secondary Education in Nigeria. *Journal of Qualitative Education,* vol. 9, no. 3, pp. 1–7.

Nwosu, O., & Ogbomo, E. F. (2011). ICT in Education: A Catalyst for Effective Use of Information. PNLA Quarterly, vol. 75, no. 4, pp. 38–49. http://search.proquest.com/docview/1266143752?accountid=161002

Oduma, C., & Ile, C. (2014). ICT Education for Teachers and ICT Supported Instruction: Problems and Prospects in the Nigerian Education System. *African Research Review*, vol. 8, no. 2, pp. 199. https://doi.org/10.4314/afrrev.v8i2.12

Pozo, J., Echeverría, M. P., & Cabellos, B. (2021). Teaching and Learning in Times of COVID-19 : Uses of Digital Technologies During School Lockdowns. 12(April), pp. 1–13. https://doi.org/10.3389/fpsyg.2021.656776

Ratheeswari, K. (2018). Information Communication Technology in Education, *Journal of Applied and Advanced Research*, 2018: 3(Suppl. 1) S45-S47 https://dx.doi.org/10.21839/jaar.2018.v3S1.169 ISSN 2519-9412 / © 2018 Phoenix Research Publishers

Reeves, J, C. (1998). The Impact of Media and Technology in School. *A Research Report for the Bertelsmann Foundation*: University of Georgia.

Sawyer, J., & Obeid13, R. (2017). Cooperative and collaborative learning: getting the best of both words. Copyright and Other Legal Notices, April, 163. https://www.researchgate.net/publication/315747276_Cooperative_and_collaborative_learning_Getting_the_best_of_both_methods

Seife, T.K. (2020). “Rethinking, Ethiopian education system: restoration and rectification,” in The Education Systems of Africa. Global Education Systems, K. S. Adeyemo, Ed., pp. 1–22, Springer, Cham, 2020.

Shrestha, Ra, S., U., Khatiwada, S., Yoon, S. W., & Kwon, K. (2019). The rise of technology and impact on skills. *International Journal of Training Research*, vol. 17, sup1, pp. 26-40

Tam, H. L., Chan, A. Y. F & Lai, O. L. H. (2020). Gender stereotyping and STEM education: Girls' empowerment through effective ICT training in Hong Kong. *Children and Youth Services Review*, vol. 119, 105624.

Technology, C. (2013). ICT in Education: A Critical Literature Review and Its Implications Jo Shan Fu, vol. 9, no. 1, pp.112–125.

Zhang, S., and Usaho, K. (2019). “Factors affecting school administration effectiveness in public upper secondary schools of Heze City, Shandong Province, the People’s Republic of China,” *EAU Heritage Journal Social Science and Humanities*, vol. 9, no. 3, pp. 108–121, 2019.