



Influence of Technology Assisted Pedagogy in Enhancing Teachers' Competence in Catholic Secondary Schools in Addis Ababa, Ethiopia

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Abstract: *The purpose of the study was to investigate the influence of technology assisted pedagogy enhancing teachers' competence in teaching in Catholic secondary schools in Addis Abeba. Explanatory sequential mixed-method research design guided the study. The target population included teachers, school heads, students, and supervisors in the Catholic Secondary Schools of Addis Abeba. Proportionate stratified sampling and finite sampling technique has been used to select a sample size of 240 teachers, 263 students, 11 school heads and 4 supervisors respectively. Data collection instruments were questionnaires and interview guide which were subjected to both content and face validity. Cronbach Alpha determined the reliability of quantitative items, with a reliability coefficient of .78 and .79; whereas those of qualitative items were determined in terms of their credibility and dependability. The study found that the better the teachers' expertise and skills, the larger their influence on the usage of technology for instruction. Teachers with more experience were also found to be less inclined to integrate ICT into their classroom activities, preferring to stick to traditional pedagogical strategies.*

Keywords: *Technology assisted pedagogy, ICT skills, Online Learning, Catholic Schools, Explanatory*

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1. Introduction

Technology in the twenty-first century is undergoing a massive transformation which, according to some (Dexter & Richardson, 2020), hasn't yet begun. Even today, technologies exist that have the potential to drastically transform our way of life, socializing, and, most crucially, the educational process. According to Meilleur (2018), our era is on the cusp of technologies such as artificial intelligence (AI), big data algorithms, 3D printing, and the internet of things, which will entwine the virtual with the actual world. Technology experts (Bina, Ramadhani, Andhany, & Wardani, 2021) warn that the future is not something we can imagine, and that we must prepare for it with a special skill that is learning to learn so that education remains valid in a different way.

The digital revolution demands educators to shift from teaching mere literacy and numeracy to building

knowledge and distinguishing the true from the false and way of navigating on google (Meyer & Zahedi, 2014). Younger students learn more through their senses and technology needs to work introducing digital multisensory learning tools that will increase motivation and make learning fun (Ponticorvo, Fuccio, Ferrara, & Rega, 2019). The advancement of Information Communication Technology (ICT) has shown us the real possibility of effective education outside the traditional classroom setting.

Education has a global appeal due to its incorporation with technology (Dhwan, 2020; Mukhedkar, 2020). Teachers and students in the developed world took advantage of accessible ICT, and schools attempted to integrate education with other development areas. Since the 1980s in the United States was a time for the first personal computers that became the birthplace of digital learning. The concept spread gradually to all Europe and Asia and later to Africa though the wide use was far

bigger in North America especially for post-secondary education (Thompson, 2021). The first two decades of the 21st century showed rapid development of ICT use in education around the world, more applications of online platforms have been used to supplement regular school education. The growth in educational technology reached an investment of \$18.66 Billion by 2019 and the online market projected to reach \$350 Billion by 2025. This included language applications, video conferencing tools, virtual tutors, and software for online learning (Amery, 2021).

Digital learning has been in progress in several countries of Africa like Ghana (Bariham, 2021), South Africa (Mathevela & Uwizeyimana, 2014), and Nigeria (Oyinloya, 2020) with all its limitations. According to the Ghanaian research by Bariham (2021) schools lacked infrastructure that are basic to integrate technology and on the other hand teachers needed improved competence to handle the upcoming demand of technology.

The new relevant education should be critical thinking and compliance which will be skills needed in the future (Harari, 2018). As in the past, today, and tomorrow the objective of the school will remain the same. However, the content, curriculum, and the process will need adaptation, and society needs to embrace technology. It is agreed (Meilleur, 2018) that education needs to prepare for the widely unknown future and probably the digital revolution will be the greatest in human history.

Secondary education in Ethiopia have already been suffering the crisis of poor performance failing to ensure quality which according to researchers (Ahmed, Miller, Gebremeskel & Ebessa, 2019, 5) “unacceptably low”. The challenge is further accentuated by the inequalities between the student population as most rural students and teachers lack familiarity with the tools and infrastructure that drive the whole process (Belay, 2020). The findings of Alemu (2017) on practices of education in Ethiopia studying the existing reality of ICT seeks attention and the capacity building of teachers is neglected.

Despite the policy and belief in the urgent need for implementation of ICT usage in secondary schools, there is a comprehensive lack of readiness (Bati, & Workneh, 2021). ICT in catholic secondary schools of Addis Abeba is taught as a subject and the credit hour allocated to it is only minimal as allocated by the education bureau which compared to the objectives of the national ICT plan is seriously insignificant. This will seek the gap in knowledge that hinders the implementation of ICT policy in the catholic secondary schools of Addis Abeba where there is a relatively better infrastructure and performance as the outcome of the matriculations show. The skill and attitude of teachers and the potential challenges to technology use will be studied. Governments and stakeholders can close the gap by improving teachers' competence and encouraging them to use technology-assisted teaching. The purpose of this study is to see if teachers in Addis Abeba's Catholic secondary schools are equipped to teach per the demands of the 21st century in terms of

spreading knowledge through computer technology. Are Addis Abeba's Catholic secondary schools ready to implement a technology-assisted pedagogy in the post-COVID-19 era?

2. Literature Review

Students of today belong to the technology generation, but they are not expected to produce or develop what is sufficient for their consumption in their education (Cruz & Díaz, 2016). The pedagogical skills of teachers are needed therefore to fill the gap and bridge the transition from traditional ways to ICT enhanced lessons. The study carried out by Gil-Flores, Rodríguez-Santero & Torres-Gordillo (2017) on teachers' ICT skills that called itself “Generation Z” collected data from 80 schools and 1433 teachers in Madrid of Spain. The quantitative study carried out showed that the MoE of Spain gives digital training to its teacher for development. The study findings showed that teachers had low ICT skills significantly different from the expected competencies. The study points out the deficit in teachers' training on ICT which has a long way to go for teachers to embrace fully the digital pedagogy. The study did not see the perspective of students and how they perceive the effectiveness of the pedagogy they receive. The current study will consider collecting data from students as well because students are in a better position to evaluate teachers' competence in ICT use during their teaching.

According to Barrera (2018) a study done in Colombia on teachers need the support that enables them to enhance their ICT skills in their career as educators of the digital age. Quality of education needs to take into consideration the whole process of education from teachers to students. ICT competency is a key skill that leaves teachers desperate and the whole education system crippled if not handled with priority (Rodríguez, Nussbaum, & Dombrowskaia, 2012). Barbara's (2018) cross-sectional quantitative study done in Colombia proposed out that the content knowledge of teachers if not supported with technological skills for pedagogy will be endangered. Stakeholders need to facilitate training and capacity building of teachers to enable them and equip them with technological tools and the dynamics of pedagogy.

Teaching as a profession needs continuous professional development to meet the rapid changes in technology (Wabule, 2016). The continuous professional development (CPD) programs of Uganda, subject to failure unable to meet the intended goals. This was calling for the restructuring of teachers' training programs of higher institutions. The gap in this research was failing to question CPD itself. Tukundane & Zeelen (2015) questioned the content of CPD recommending that it should work on integrating technology and invest in the technological skills of teachers. There can be weak CPD if it is not about ICT integration, and the kind of professional development for the 21st century demands. Tusiime, Johannesen & Gudmundsdottir (2019) teachers' digital competence is enhanced either formally with continuous professional development and pre-service training or informally with collaborative and

self-learning. The current study will question the development programs and their content.

Desta, Chalchisa, & Lemma (2013) examined the continuous professional development of teachers in Addis Abeba which collected data from 300 randomly selected teachers. This research examined challenges, practices, opportunities, and prospects of teachers' personal development. In its findings emerged the attitude of teachers as an influencing factor to the practice of updates. Evaluating information technology integration (Bati & Workneh, 2021) of secondary schools in Ethiopia, the study used Design-reality Gap Analysis. In this mixed-method survey research data was collected from stakeholders and findings revealed poor success and a lot of drawbacks across. The problems reported included infrastructure, coordination, teachers' capacity, and school leaders. Data from students revealed they had better access to cloud-based ICT outside of schools. On the other hand, teachers and school leaders informed the benefits and risks of integrating mobile technology into education. The advantage of mobile technologies is students have access to information that would ease teaching and learning which ultimately improves communication. The main risks identified are the possible challenge of time management, excessive dependence on technology, circulation of harmful content, and destructive aspects of social media. The recommendations of these studies did not adequately address technophobia with a more positive recommendation. The current study will approach ICT integration as a positive reality that would enhance education and recommend possible strategies to curb unnecessary fear.

According to Alemu (2017) transforming the practices of education in Ethiopia needs to focus on three objectives: the existing reality of ICT, how ICT can assist instructors, and challenges of ICT integration. Technology integration in education has a bigger gap in education than in any other sector. Many countries have developed strategies and ICT has noticeably become a strategic priority and policy area. Despite all the limitations that characterize poor ICT development, it remains the contemporary learning paradigm (Buabeng-Andoh, 2012). However, the capacity building of teachers has been neglected and needed more attention. The teacher and the student are the main stakeholders of education and call for more technology updates. The current research will seek data from administrators that will address capacity building issues.

Research findings (Almerich, Orellana, Suárez-Rodríguez, & Díaz-García, 2016; Scherer & Siddiq, 2015; Krumsvik et al. 2016; Dong et al. 2020; Cruz et al., 2016; UNESCO, 2011) agree on the importance of teachers related variables to be key to technology integration in the pedagogic process. There is a discrepancy or at least a lack of common understanding about the definition of what technological competency for a teacher is. In some cases (Agyei, 2021; Scherer & Siddiq, 2015; Dong et al., 2020) the training and capacity building workshops that intend to boost ICT use for instruction do not happen on the ground because

of multiple factors like lack of infrastructure, bad leadership, and negative attitude of teachers towards technology.

3. Methodology

3.1 Research Design

This study employed a mixed method approach, which combines quantitative and qualitative research methods. Explanatory sequential mixed method design was used. Explanatory sequential mixed method is a research approach that gathers quantitative and qualitative data separately (Creswell, 2018). The explanatory sequential mixed method approach is a method in which a large amount of quantitative data is collected and analysed, and then qualitative data is used to fill in the gaps found in the quantitative data to answer the research questions. As a result, qualitative data filled in any gaps or discrepancies that weren't adequately covered to answer the research questions, and the tools were communicated at the data analysis level.

3.2 Sampling Procedures and Sample Size

Sampling technique is the systematic selection of a subset from a defined population for a study (Sharma, 2017). This study involved non-probability sampling for qualitative and multi-stage sampling technique for quantitative designs. These sampling techniques were employed to ensure that everyone in the study's population had an equal opportunity and to avoid any potential bias.

3.3 Description of Research Instruments

Research instruments are tools designed to collect data that will inform the research objectives (Newby, 2014). This section describes the instruments the study used to collect data. The study used questionnaires to collect data from students and teachers. To collect data from school heads and supervisors interview guide was used. Through interview the school heads and supervisors were possible sources of data that may not have been in the mind of the researcher.

A questionnaire is a set of questions meant to elicit detailed responses and yield quantitative data (Kumar, 2014). Closed-ended and open-ended questions were included in this study's questionnaires. The study used semi-structured interview. This involved asking organized questions according to the research questions with a spontaneous probing to facilitate the flow of ideas (Creswell, 2018).

3.4 Validity

Validity of research instruments to the ability that a scale will measure what it is intended to measure (Berkowitz, Caner, & Fang, 2012). Content validity was used to examine the content of the data collection instruments whether they yielded the desired outcome. The validity of the questionnaires was improved seeking the

instructions of experts on ICT and research who advised improving the items of the questionnaires. Pilot testing has been done on the questionnaires to guarantee their validity. The improved instruments were subjected to the judgement of experts before the actual data collection.

3.5 Reliability

Reliability is the degree to which a test provides the same result when repeated at different times (Flanagan,

2016). The purpose of the pre-testing served to check the reliability of the instruments. To adapt the instruments for our study, the items Cronbach's Alpha generated from SPSS version 25.00 was used to compute the internal-consistency reliability of the data collection to be relevant to the study population.

Table 1: Reliability of Scales used in the Study

Variable	Teachers	
	No. of items	Cronbach's alpha
ICT knowledge and Skills	13	.78

Source: Field Data 2021

Cronbach's Alpha is the measure of the internal consistency of scores across items measuring the same variable. The Cronbach alpha score of 0.6-0.7 is acceptable; 0.8 and above is excellent; and a score of more than 0.95 is not desirable because it reflects redundancy rather than precision (Ursachi, Horodnic, & Zait, 2015). Our reliability threshold was between Cronbach alpha=0.7 and 0.95. Following the results Cronbach's alpha yielded the weaker items were revised seeking the help of experts in research. Because all of the items had a 0.78 or higher yield, they were considered as reliable and used.

3.6 Reliability of Qualitative Instruments

Credibility and reliability of qualitative instruments is about elements transferability, credibility, dependability, and conformability (Kumar, 2014). Credibility also has something to do with having the required permissions from the institutions and consent from the person to give the interview. Participants for the interview were given ample opportunity to refuse to participate in the data collection so that the participants were involved genuinely and willing to take part in the research. As the project developed, and interviews gone from one to the other the previous information helped to

build up and cross-check information in the form of probing questions. The dependability of the interview guide improved seeking instructions of experts after the testing of the instruments. The information gathered during the interview was transcribed and shared with the respondents for clarification and to confirmed the data's trustworthiness. The respondents had the opportunity to review the transcribed interview and checked that it accurately reflected what they meant or provided corrections. This established the data to be representative of the experience of teachers in the administrative role.

4. Results and Discussion

The study investigated the ICT knowledge and skills of teachers and its extent in the pedagogic process. The responses of teachers, students, principals, and supervisors are presented and discussed. Thirteen items for teachers and ten items for students were generated to answer the research question.

The Likert rating scale was used to collect data on ICT usage patterns and teacher skills. The scale's ratings reflect the frequency with which teachers utilize technology, with 1 indicating never and 5 indicating always. Table 2 presents the summary of how teachers feel about their ICT consumption.

Table 2: Teachers' Response to ICT Skills and Knowledge

	N f(%)	R f(%)	S f(%)	O f(%)	A f(%)	M	SD
Microsoft Office package	13(6.3)	27(13.0)	60(28.8)	53(25.5)	55(26.4)	3.52	1.19
ICT to do presentations you have prepared	46(22.1)	39(18.8)	53(25.5)	37(17.8)	33(15.9)	2.86	1.36
Install software	34(16.3)	35(16.8)	64(30.8)	31(14.9)	44(21.2)	3.07	1.34
Basic ICTs in classroom for instruction, developing lessons relevant for subject area	41(19.7)	58(27.9)	43(20.7)	47(22.6)	19(9.1)	2.73	1.26
Design pictures, diagram, videos, symbols useful for instruction	27(13.0)	47(22.6)	71(34.1)	40(19.2)	23(11.1)	2.92	1.17
Communicate to students with messaging using Telegram	28(13.5)	35(16.8)	84(40.4)	40(19.2)	21(10.1)	2.95	1.14
Internet for academic content	11(5.3)	22(10.6)	61(29.3)	68(32.7)	46(32.7)	3.55	1.10
Search relevant material from the internet	6(2.9)	10(4.8)	56(26.9)	68(32.7)	68(22.1)	3.87	1.01
Give assignments to your students that involve computer use at home?	12(5.8)	58(27.9)	75(36.1)	54(26.0)	9(4.3)	2.95	0.97
Special applications and software to simplify teaching and learning	35(16.8)	79(38.0)	38(18.3)	42(20.2)	14(6.7)	2.62	1.17
Provide tutorial and make-up	28(13.5)	62(29.8)	62(29.8)	45(21.6)	11(5.3)	2.75	1.10
Online platforms that allow interactions during sessions	117(56.3)	54(26.0)	24(11.5)	10(4.8)	3(1.4)	1.69	0.95
Video conferencing applications, virtual tutors, software	129(62.0)	41(19.7)	24(11.5)	9(4.3)	5(2.4)	1.65	1.00

N=208

Scale: N=Never, R=Rarely, S=Sometimes, O=Often, A=Always

On a Likert rating scale, teachers' ICT knowledge and skills for lesson preparation, classroom instruction, assessments, communication, and administrative records is tested in the survey. The descriptive statistics shown in frequencies and percentages demonstrates that there are teachers with the least knowledge of ICT for educational purposes as well as teachers with up-to-date knowledge of ICT for educational purposes. The first section of the items inquired about teachers' perceptions of fundamental computer use, which progressed from basic to advanced.

Teachers with good numbers use the basic computers like Microsoft word and spreadsheets (55(26.4%) always and 53(25.5%) often. The most complex ones that required an updated usage of computers that were largely implemented as the demand emerged due to

COVID-19 which are online platforms and video conferencing applications were hardly used by teachers 117(56.3%) responding never to online platforms for teaching and 129(62%) of teachers responding never to using video conferencing for any kind of pedagogy. However, there is still a small percentage of teachers who used video conferencing 3(1.4%) and internet and online teaching 5(2.5%) which is insignificant.

The current findings concur with Krumsvik et al. (2016), whose findings reported teachers' lacking competencies in utilizing digital resources. Though there was better use of ICT at a personal level, the items that reflected communal use and more sophisticated ones were left untouched for instruction by many.

Instructional media and technology is a significant part of teachers' training and their profession. Traditionally, teachers collected whatever their environment availed to expound concepts in tangible terms for their students as a way of making learning easier and more practical. Computers are tools that enable one to produce everything possible in a very simple manner. Teachers who utilize computers to produce design pictures, diagram, videos, symbols useful for instruction replacing the traditional medium and easing their effort to get instruments. Our study findings concur with the findings of Rudolph (2017), who studied the advancement of multimedia use for instructional purposes in the last decade. Effective learning happens best with the use of images, symbols that involve the eye than words spoken and written. Findings of this study show that teachers who use computer products such as designs, diagram, pictures, and videos are more than the average yielding $M=2.92$ ($SD=1.17$). The difficulties where the use of such instructional medium is attributed to the lack of technical support, ability to self-produce videos and time constraints of teachers.

The Ethiopian Ministry of Education used media like radio and Television for years as a means of communication which was to address the question of reaching all students from various backgrounds. COVID-19 outbreak, and the subsequent lockdowns provoked schools to communicate to students using any possible means to make learning possible in difficult situations. Addis Abeba widely used messaging applications and mostly the Telegram encouraged by the education bureau. The findings of the current study reveal that most teachers used this means to reach their students. Government and school administrations made this possibility of using the Telegram to disburse educational material and receive assignments of students so that learning was possible (Kufi, Negassa, Melaku, & Mergo, 2020). There are still teachers who never used this means of communication 28(13.5%) and some more who rarely used it 35(16.8%). Though there is a much bigger number that uses the medium when it comes as the only means of doing education, the little number that never or rarely uses to digitally communicate is a resistance to technology.

The results of this study agree with McEneaney (2015), who found that teachers use the internet for academic content in large amounts. Schools teach knowledge; and teaching students to use internet for academic purposes there is a need for what to know as well. McEneaney (2015) on his study on finding knowledge on the internet found the success of internet for educational content depends on the well-motivated nature of students and the pedagogical skills of teachers.

According to the findings of this study, teachers perceived themselves to have a good extent of basic ICT use which is the Microsoft Office package. This differs from the findings of Ahmed (2015) whose findings on the practice of ICT infrastructure and technology integration in secondary schools revealed that Sudan severely lacked ICT infrastructure for secondary

education and lagged many countries of the world compared to the discussion referred to the literature where figures are presented. schools used ICT for basic administrative purposes. The software used commonly is word processing, PowerPoint, and databases. Software specific to other subjects and contents is not considered to be a priority. Another research done in Khartoum state, on teachers' skills and ICT integration examined how much technology was integrated for pedagogy. Another similar finding (Ramadan, Chen & Hudson, 2018) in Sudan indicated the limited skills of teachers who would not go further to use the computer for other enhanced purposes. The use of the internet, most teachers used the internet using data on their phones and mainly for social media purposes. Few teachers used the internet through computers. The internet navigation again did not go through enough to a pedagogical use that enhanced instructional use. Teachers needed more training on file management and spreadsheet use.

Video conferencing applications and virtual tutors are new technological realities. Technology has made them more available as the demand grew with the COVID-19 pandemic and huge use of them was a reality. However, 129 (62%) of the teachers in the current study never used video conferencing applications in any form. This concurs with Paschal, Pacho & Adewoyin (2022) whose findings revealed the application of new methods in higher learning institutions. The resistance of teachers towards possible technologies only accentuated the gap and frustrated the expectations of recipients who demanded more for their satisfaction than the traditional availability of teachers. The findings of Chang & Aytenew (2021) on the other hand differ and positive experiences are also a possibility. In the comparative study from the perspectives of China and Ethiopia in their way of responding to the pandemic situation, the findings presented positive experiences in distance learning. However, challenges like accessibility, instructional difficulties, student-teacher resistance, and cultural challenges are commonplace.

The results indicate there was very little or no development of special applications for teaching have been Enhanced use of ICT inventiveness in the secondary schools. This concurs with Mesfin, Ghinea, Grønli & Hwang (2018) investigated digital media in its use as a teaching aid in secondary schools. The findings revealed that the adaptation of ICT and innovation needs gradual progression as opposed to an immediate one. This shows that the perception of teachers on the possibility of simplifying concepts and transmission of knowledge is not yet mature enough for execution. the fact that every aspect of life in the city reminds the society of the new culture of ICT integration in every service, education has not pushed itself through its key stakeholders to harness this opportunity at its service.

Students responded to questions about their knowledge and skills on basic ICT usage for academic purposes. Table 3 presents students' familiarity with using ICT for learning.

Table 3: Students' Response to ICT Knowledge and Skills

	N f(%)	R f(%)	S f(%)	O f(%)	A f(%)	Mea n	SD
Microsoft Office package	9(3.5)	46(18.0)	114(44.5)	55(21.5)	32(12.5)	3.21	0.99
Install software	79(30.9)	62(24.2)	66(25.8)	35(13.7)	14(5.5)	2.38	1.20
Design pictures, diagram, videos	78(30.5)	62(24.2)	75(29.3)	26(10.2)	15(5.9)	2.36	1.18
ICT to do presentations prepared	32(12.5)	82(32.0)	72(28.5)	47(18.4)	22(8.6)	2.91	2.31
Text messaging like Telegram, Messenger	31(12.1)	13(5.1)	18(7.0)	40(15.6)	154(60.2)	4.06	1.40
Search relevant material from the internet	28(10.9)	10(3.9)	26(10.2)	49(19.1)	143(55.9)	4.05	1.34
Given assignments that involve computer use at home	9(3.5)	45(17.6)	65(25.4)	81(31.6)	56(21.9)	3.50	1.12
Identify software/hardware troubleshooting	58(22.7)	82(32.0)	71(28.1)	38(14.8)	6(2.3)	2.41	1.06
Teachers engage students to explore new realities and solve real problems of life using digital sources	87(34.0)	82(32.0)	58(22.7)	21(8.2)	8(3.1)	2.14	1.07
ICT to deepen your knowledge	21(8.2)	33(12.9)	55(21.5)	64(25.0)	83(32.4)	3.60	1.28

N=256;

Scale: N=Never, R=Rarely, S=Sometimes, O=Often, A=Always

Findings from students demonstrate that some have a higher level of ICT knowledge and skill, while others have little or no experience with ICT in their education. On using ICT in real-life circumstances, the students perceived themselves to be average users 114(44.5%) indicating sometimes. Students who used text messaging applications like Telegram and Messenger to gather material for studies, questions, and notes number 154(60.2%) of the respondents. Students, 143(55.5%) of the respondents perceive the use of internet to seek for relevant material indicating a high frequency. As a result, the most common uses of technology for academic purposes are Google searches and texting. Students look for relevant academic content on the internet and text more on social media platforms than teachers .

The finding of this study concurs with Szmuda, et al. (2020) on internet as an important invention that made the life of students much easier in availing an ocean of resources. The teacher of this age is to guide their students on how to search relevant material out of immense possible distractions. According to our teachers it is another form of library where knowledge

is easily found. The finding show a great use of internet search.

Text messaging and social media platforms made learning easier. The findings show that 154(60.2%) of students perceive mobile networks to be utilized in their learning. 143(55.9%) students perceive themselves as using internet for searching relevant material for their education. This means there is a wide usage of social media by students. However, findings differ when it comes to the content of the media use (Oyelere, Suhonen & Sutilen, 2016) whose findings revealed that students used mobile applications several times during the day for entertainment while using very little to do what is required of the teacher-given materials. The findings of Kimo & Gemechu (2021) showed students spent significantly long hours every day and log in several times. The study observed that the use of the media is mostly for non-academic purposes.

On whether ICT deeps the knowledge processing, the current findings showed students believe in ICT as a progressive tool. Similarly, the findings of Agyei (2020) found that the knowledge, skills, and attitudes of students changed depending on the success of the ICT implementation. The ICT use of schools with not

enough preparation lacked feasibility. The highest ICT tool being used widely is the smartphones that originally would be personal equipment used for communication. Mobile phones are proving to be of further use than limited texting and voice calls. The findings of Ojo & Adu (2018) concur with this the fact that ICT tools used for academic purposes are the mobile phones of students that are widely used to navigate the internet searching for relevant material related to the subjects they are studying. Students downloaded, shared, and navigated material whenever there lacked satisfaction from what the teacher had to give.

The perception of students about ICT whether it deepens knowledge is very high with 64 (25%) students responding often and 83(32.4%) students responding very often. This concurs with the findings of Gültekin, Erkaplan, Uzun & Güney (2020) where without difference in demographic characteristics there was great enthusiasm about using ICT for education. However, it is important to note that there are some 21(8.2%) who believe ICT never helps knowledge.

Findings from interview revealed that it is mostly the ICT departments that have the knowledge capital to delve into the depth of sophisticated use that involves programming and creating. This disagrees with the findings of Blau & Shamir-Inbal (2017) where teachers in every stage are involved in coding and programming computers for purposes of instructions.

From the headteachers interview, one respondent says: “many of our teachers work on their own computers or in the computer lab. Senior teachers, on the other hand, rarely use computers or other technologies, preferring conventional methods over new ones”. Another respondent has a similar view and said: “senior teachers are reluctant about using technology because they lack the necessary knowledge. Young people are considerably more at ease with technology”.

Most of the school heads (five of the eight) interviewed agree on the fact that teachers in their schools have a limited understanding of computer basics and as a result, they are less likely to use it. The supervisory role for technology integration is explained by an internal supervisor of the Catholic schools in Addis Abeba: “internal supervision for teachers is on how much individual teachers use ICT in their lessons and how much they integrate technology creatively”. The ICT knowledge and skill gap is yet a concern of the government, the training of trainees is given by the government and the training of the staff and induction is left up to the schools. An external supervisor, states: “according to our assessments, the trainings and inductions planned are not satisfactory. The trainings that are practically done are not very much related to technology that could not satisfy the demands of the time. The extent of technology integration in schools is very poor”.

With the closure of schools, COVID-19 offered a huge push to the use of ICT in education, ensuring that technology was the only alternative remaining. One respondent notes what is shared by other directors: “it has been possible to reach students through internet

when the schools were closed. Teachers sent materials to their students through Telegram. Parents were very much interested and happy to receive messages through this means”.

The current findings differ from the findings of Ersoy (2016) who was satisfied with the areas of ICT competencies in Turkey that revealed candidates considering themselves significantly competent for a pedagogy that is supported by ICT. This was the result of the training that increased the usage of ICT. This was a case where progressive society could do the necessary updates having the necessary conditions around beginning from the physical structure down to human resource. The mind set therefore plays a significant role in utilizing the possible resource at hand as well as working for those that are yet to be found provided sincere effort is made despite all possible drawbacks.

How much pragmatic the school administrator determines how the process of education in utilizing updated tools by the school community. The findings of this study concur with the findings of Obiakor & Nwakpa (2021) on the principals’ provisions of LMS where there were enough computers, internet connections, phones, and television sets for learning. The management style and its emphasis on teaching aid and utilizing what is available in the ambiance matters a lot. This shows how the resistance of teachers in the use of available resources could come from laziness or other related excuses. However, it is important to note that there are schools with equipped resources and yet poor utilization. A school principal in an interview noted “there are limited resources in our school, however, even what we have is not at the service of what it is intended to serve”. This very much conveys a message that the leadership style of school heads and their monitoring and evaluations is a factor that affects technology integration into education.

The findings of the current study showed a great need for a combined effort of stakeholders in enhancing educational logistics beyond maintaining the status quo. This concurs with the findings of Goshu & Woldeamanual (2019) whose evaluation of secondary schools revealed a great need for the achievement of goals and objectives in a new way. The efforts of stakeholders, their struggle with economic challenges, and raising their children offering the minimum will not guarantee success in the future. This means there is a great need to create the awareness of stakeholders so that there is ample investment in the section of education that improves the technology and skills of teachers so that there is a valid effort put on the ground.

These findings agree with Bati & Workneh (2021) evaluating information technology integration of secondary schools in Ethiopia, the problems reported included infrastructure, coordination, teachers’ capacity, and school leaders which agrees with the finding of the current study. On one hand, various factors influence teachers’ knowledge and skills, and on the other, several factors stifle teachers’ desire to use ICT. Traditional pedagogic practices have created a culture that needs to be broken with a comprehensive

approach and investment that will take pedagogy to the next level.

5. Conclusion and Recommendations

5.1 Conclusion

Basing on what the study findings revealed the influence of technology-assisted pedagogy determines the competence of teachers' communication in classrooms. The teachers who had better knowledge and skills of ICT tend to be better equipped with enhanced pedagogy.

Teachers with advanced experience in the teaching seem to be more comfortable with the conventional pedagogic strategies. positively, this shows the confidence they have in what they always practiced. However, the need to engage in the new technologies has been clearly seen especially with the coming of the COVID-19 pandemic which pushed everybody to using technology assisted teaching and learning. The lesson here was that the future of education should be enhanced by technology and content-rich teachers only need the integration of medium.

In conclusion, the results of the study show promising desire for a progress in technology integration for pedagogy in schools. There is a need for establishing solid mentality for the use of several ways of measures to enhance pedagogical utilization of ICT. Developing a human resource pool that speaks the same language of the contemporary need is a challenge to secondary schools. The enthusiasm of young generation needs to be bridged with the wisdom of the senior teachers so that there is no rush to break nor remain behind helplessly.

5.2 Recommendations

This section of our study makes recommendations based on the findings. The following recommendations were made based on the research findings, with a focus on the influence of technology-assisted pedagogy in enhancing teachers' competence:

ICT implementation should be a criterion for being a good teacher. Pedagogy should base itself on the fact that technology enables teachers to develop creative and

dynamic classrooms and provides them with access to innovative resources. Effective teachers see the value of incorporating technology into the classroom and coming up with new ways making teaching more engaging. Teachers should be trained to be innovative when creating teaching aids rather than relying on the possible poor state of schools. Anything in the environment could be turned into a teaching tool. Teachers must now open their eyes to a new level of passion thanks to the internet of things and an ocean of available resources.

Students should regard teachers with the utmost respect when interacting with them. They should be aware that any technology that makes life easier, including learning, has to go through a more rigorous procedure. Teachers have learned the hard way, which causes them to view knowledge in a different light. Wisdom is more about meaning than it is about having access to information. As a result, students will do well in seeking a better understanding of technology and the quick information available to them, as well as a greater appreciation for their teachers.

Catholic schools need to work harder on the area of ICT integration into education because there is a danger of getting satisfied with the little use of Telegram messaging to send notes, homework and study material. Schools should go to a direction with an ideal that is progressive creating a digital library, using PowerPoint presentations, holding online classes, and using movies and audios in class. Assisting students in the use of the internet and other ICT resources for invention and creativity.

ICT should not be luxurious for education. It should be available with low and affordable price. The government and related organizations should support it because education is more universal than local when technology integrated. Rightly, the supervisors' main concern is whether the curriculum is being followed, whether the laboratories are properly equipped, and whether the staff is properly qualified. This, however, poses danger as a result, because they pay little attention to the degree to which technology is integrated, as long as the material is supplied in whatever format, traditional or progressive.

References

- Agyei, D. D. (2020). The Impact of Educational Technology Initiatives on Student Learning Outcomes: Perspectives of Sub-Saharan Africa. *International Journal of Education, Learning and Development* 8(7), 43-62.
- Ahmed, A. (2015). A preliminary study of ICT's infrastructure and pedagogical practices for technology integration in Sudanese Secondary schools. *International Journal of Instructional Technology and Distance Learning*, 12(7), 37-54.
- Ahmed, A. Y., Miller, V. W., Gebremeskel, H. H., & Ebessa, A. D. (2019). Mapping inequality in access to meaningful learning in secondary education in Ethiopia: implications for sustainable development. *Educational Studies*, 45(5), 554-581.
- Aklog, Y. (2019). *Technical factors affecting schoolnet project implementation in Addis Ababa: Case of selected secondary schools in Kolfe-Keranyo Sub-City, Addis Ababa*. Addis Ababa University.
- Alemu, B. M. (2017). Transforming Educational Practices of Ethiopia into Development and the Knowledge Society through Information and Communication Technology. *African Educational Research Journal*, 5(1), 1-17.
- Almerich, G., Orellana, N., Suárez-Rodríguez, J., & Díaz-García, I. (2016). Teachers' information and communication technology competences: A

- structural approach. *Computers & Education*, 100, 110-125.
- Arkorful, V., Barfi, K. A., & Aboagye, I. K. (2021). Integration of information and communication technology in teaching: Initial perspectives of senior high school teachers in Ghana. *Education and Information Technologies*, 26(4), 3771-3787.
- Assefa, T. (2017). Educational technology implementation in Ethiopian high schools: Benefits and challenges of the instructional plasma TV. In *Handbook on digital learning for K-12 schools* (pp. 413-427).
- Bass, J. M. (2011). An early-stage ICT maturity model derived from Ethiopian education institutions. *International Journal of Education and Development Using Information and Communication Technology*, 7(1), 5-25.
- Bati, T. B., & Workneh, A. W. (2021). Evaluating integrated use of information technologies in secondary schools of Ethiopia using design-reality gap analysis: A school-level study. *The Electronic Journal of Information Systems in Developing Countries* 87(1), 1-23.
- Belay, D. G. (2020). COVID-19, Distance learning and educational inequality in rural Ethiopia. *Pedagogical Research*, 5(4), 1-11.
- Berkowitz, D., Caner, M., & Fang, Y. (2012). The validity of instruments revisited. *Journal of Econometrics*, 166(2), 255-266.
- Bina, N. S., Ramadhani, R., Andhany, E., & Wardani, H. (2021). Statistical Skills Analysis of Students Using Online-Learning Platforms such as Whatsapp, Youtube, and Zoom Meetings during Covid-19 Pandemic. *Jurnal Teori dan Aplikasi Matematika*, 5(2), 405-417.
- Blau, I., & Shamir-Inbal, T. (2017). Digital competences and long-term ICT integration in school culture: The perspective of elementary school leaders. *Education and Information Technologies*, 22(3), 769-787.
- Boone, S., & Van Houtte, M. (2013). In search of the mechanisms conducive to class differentials in educational choice: A mixed method research. *The Sociological Review*, 61(3), 549-572.
- Buabeng-Andoh, C. (2012). Factors influencing teachers' adoption and integration of information and communication technology into teaching: A review of the literature. *International Journal of Education and Development using Information and Communication Technology*, 8(1): 136-155.
- Bukaliya, R., & Mubika, A. K. (2011). Teacher competence in ICT: implications for computer education in Zimbabwean secondary schools. *International Journal of Social Sciences & Education*, 1(4), 414-425.
- Chang, C., & Aytenev, G. (2021). Facing Challenges of Covid-19: The perspective of China and Ethiopia educational institutions. *Journal of Education, Teaching and Learning*, 6(1), 61-68.
- Check, J., & Schutt, R. K. (2011). *Research methods in education*. Sage Publications.
- Connelly, L. M. (2016). Cross-sectional survey research. *Medsurg nursing*, 25(5), 369.
- Creswell, J. W. (2018). *Research design: qualitative, quantitative and mixed methods approaches*. Sage Publications. USA.
- Cruz, F. J. F., & Díaz, M. J. F. (2016). Generation z's teachers and their digital skills. *Comunicar. Media Education Research Journal*, 24(1), 97-105.
- Desta, D., Chalchisa, D., & Lemma, G. (2013). School-based continuous teacher professional development in Addis Ababa: An investigation of practices, opportunities and challenges. *Journal of international Cooperation in education*, 15(3), 77-94.
- Dexter, S., & Richardson, J. W. (2020). What does technology integration research tell us about the leadership of technology?. *Journal of Research on Technology in Education*, 52(1), 17-36.
- Dhawan, S. (2020). Online learning: A panacea in the time of COVID-19 crisis. *Journal of Educational Technology Systems*, 49(1), 5-22.
- Dlamini, R., & Mbatha, K. (2018). The discourse on ICT teacher professional development needs: The case of a South African teachers' union. *International Journal of Education and Development using ICT*, 14(2), 17-37.
- Dong, Y., Xu, C., Chai, C. S., & Zhai, X. (2020). Exploring the structural relationship among teachers' technostress, technological pedagogical content knowledge (TPACK), computer self-efficacy and school support. *The Asia-Pacific Education Researcher*, 29(2), 147-157.
- Ersoy, M., Yurdakul, I. K., & Ceylan, B. (2016). Investigating Preservice Teachers' TPACK Competencies Through the Lenses of ICT Skills: An Experimental Study. *Education & Science/Egitim ve Bilim*, 41(186). DOI: 10.15390/EB.2016.6345
- Flanagan, C. (2016). *Research methods companion for a level psychology*. Oxford: Oxford University Press.
- Getenet, S. T., Beswick, K., & Callingham, R. (2016). Professionalizing in-service teachers' focus on technological pedagogical and content knowledge. *Education and Information Technologies*, 21(1), 19-34.
- Gil-Flores, J., Rodríguez-Santero, J., & Torres-Gordillo, J. J. (2017). Factors that explain the use of ICT in secondary-education classrooms: The role of

- teacher characteristics and school infrastructure. *Computers in Human Behavior*, 68, 441-449.
- Goshu, B. S., & Woldeamanuel, M. M. (2019). Education quality challenges in Ethiopian secondary schools. *Journal of Education, Society and Behavioural Science*, 31(2), 1-15.
- Gültekin, O., Erkaplan, S., Uzun, H., & Güney, E. (2020). Investigation of academic staff's self-efficacy using the educational internet. *Higher Education Studies*, 10(3), 26-33
- Harari, Y. N. (2018). *21 Lessons for the 21st Century*. Jonattian Cape, London.
- Ibrahem, U. M., & Alamro, A. R. (2021). Effects of infographics on developing computer knowledge, skills and achievement motivation among Hail University students. *International Journal of Instruction*, 14(1), 907-926.
- Kallio, H., Pietilä, A. M., Johnson, M., & Kangasniemi, M. (2016). Systematic methodological review: developing a framework for a qualitative semi-structured interview guide. *Journal of advanced nursing*, 72(12), 2954-2965.
- Kimo, K., & Gemechu, S. (2021). Association between students social media use and their academic performance: The case of preparatory schools in Adama. *The Ethiopian Journal of Education*, 41(2), 207-238.
- Kufi, E. F., Negassa, T., Melaku, R., & Mergo, R. (2020). Impact of corona pandemic on educational undertakings and possible breakthrough mechanisms. *BizEcons Quarterly*, 11(1), 3-14.
- Kumar, R. (2014). *Research methodology: A step-by-step guide for beginners*. California: SAGE Publication Ltd.
- McEaney, E. H. (2015). Finding knowledge on the internet: Implications for the knowledge-driven curriculum. *Journal of Curriculum Studies*, 47(6), 802-819.
- Meilleur, C. (2018). 4 challenges for education in the digital revolution era. Retrieved from <https://knowledgeone.ca/4-challenges-for-education-in-the-digital-revolution-era/>
- Mesfin, G., Ghinea, G., Grønli, T. M., & Hwang, W. Y. (2018). Enhanced agility of e-learning adoption in high schools. *Journal of Educational Technology & Society*, 21(4), 157-170.
- Ministry of ICT, (2006). *National Information, Communications and Technology (ICT) Policy*. Kenya.
- Ministry of ICT, (2019). *National Information, Communications and Technology (ICT) Policy*. Kenya.
- Mukhedkar, A. R. (2020). *Online education one of the way to handle challenges posed by COVID-19 in higher education*. COVID-19: crisis, effects, challenges and innovations.
- Newby, P. (2014). *Research methods for education*. Routledge.
- Obiakor, M. I., & Nwakpa, P. (2021). Principals provision of learning management systems in secondary schools in enugu education zone during COVID-19 lockdown. *African Journal of Educational Management, Teaching and Entrepreneurship Studies*, 3(1), 169-180.
- Ojo, O. A., & Adu, E. O. (2018). The effectiveness of Information and Communication Technologies (ICTs) in teaching and learning in high schools in Eastern Cape Province. *South African Journal of Education*, 38(1), 1-11.
- Oyelere, S. S., Suhonen, J., & Sutinen, E. (2016). M-learning: A new paradigm of learning ICT in Nigeria. *International Journal of Interactive Mobile Technologies*, 10(1), 35-44.
- Paschal, M. J., Pacho, T. O., & Adewoyin, O. (2022). Teaching methods applied in higher education during COVID-19 pandemic in Africa. *International Journal of Educational Policy Research and Review*, 9(1), 27-40.
- Piper, B., Jepkemei, E., Kwayumba, D., & Kibukho, K. (2015). Kenya's ICT Policy in Practice: The Effectiveness of Tablets and E-Readers in Improving Student Outcomes. In *FIRE: Forum for International Research in Education*, 2 (1), 3-18.
- Ramadan, A., Chen, X., & Hudson, L. L. (2018). Teachers' Skills and ICT Integration in Technical and Vocational Education and Training TVET: A Case of Khartoum State-Sudan. *World Journal of Education*, 8(3), 31-43.
- Rodríguez, P., Nussbaum, M., & Dombrowskaia, L. (2012). ICT for education: a conceptual framework for the sustainable adoption of technology-enhanced learning environments in schools. *Technology, Pedagogy and Education*, 21(3), 291-315.
- Rudolph, M. (2017). Cognitive theory of multimedia learning. *Journal of Online Higher Education*, 1(2), 1-15.
- Saleh, M., & Battisha, M. (2020). A proposed paradigm for the requirements for designing and using digital games-based learning by educable intellectual disabled children. *Technium Social Sciences Journal*, 2(1), 37-66.
- Scherer, R., & Siddiq, F. (2015). Revisiting teachers' computer self-efficacy: A differentiated view on gender differences. *Computers in Human Behavior*, 53, 48-57.
- Sharma, G. (2017). Pros and cons of different sampling techniques. *International journal of applied research*, 3(7), 749-752.

- Sohn, B. K., Thomas, S. P., Greenberg, K. H., & Pollio, H. R. (2017). Hearing the voices of students and teachers: A phenomenological approach to educational research. *Qualitative Research in Education, 6*(2), 121-148.
- Szmuda, T., Özdemir, C., Ali, S., Singh, A., Syed, M. T., & Słoniewski, P. (2020). Readability of online patient education material for the novel coronavirus disease (COVID-19): a cross-sectional health literacy study. *Public Health, 185*(14), 21-25.
- Taherdoost, H. (2016). Sampling methods in research methodology; how to choose a sampling technique for research. *How to Choose a Sampling Technique for Research, 5*(2), 18-27.
- Thompson, E. (2021). *History of online education*. <https://thebestschools.org/magazine/online-education-history/>
- Tukundane, C. & J. Zeelen. (2015). Using participatory action research to improve vocational skills training for marginalised youths in Uganda: Experiences from early school-leavers' project. *International Journal of Training Research, 13*(3), 246–261.
- Tusiime, W., Johannesen, M., & Gudmundsdottir, G. (2019). Developing teachers' digital competence: Approaches for art and design teacher educators in Uganda. *International Journal of Education and Development using ICT, 15*(1), 133-149.
- Ursachi, G., Horodnic, I. A., & Zait, A. (2015). How reliable are measurement scales? External factors with indirect influence on reliability estimators. *Procedia Economics and Finance, 20*(11), 679-686.
- Wabule, A. (2016). Continuous professional development: What role and who benefits? Reflections on teacher development in Uganda. *Africa Education Review, 13*(3-4), 141-156.
- Wondemetegn, S. A. (2016). The historic move, contemporary challenges and opportunities in Ethiopian education. *International journal of African and Asian studies, 1*(26), 56-66.
- Zainul Rashid, M. R., Lim, J. F., Nawawi, N. H. M., Luqman, M., Zolkeplai, M. F., Rangkuty, H. S., & Schindler, A. E. (2014). A pilot study to determine whether progestogen supplementation using dydrogesterone during the first trimester will reduce the incidence of gestational hypertension in primigravidae. *Gynecological Endocrinology, 30*(3), 217-220.