

An Analysis on the Effectiveness of ICT Integration In Learning in Higher Education Institutions in Covid-19 Era

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Abstract: ICT is utilized extensively in education for several reasons, one of which is that it improves the effectiveness of teaching techniques for both teachers and pupils. ICT integration in education is most often used to describe a technologically oriented teaching and learning process that is closely related to the usage of educational resources in classrooms. Even in the face of unforeseen setbacks like the Covid-19 epidemic, teaching and learning may go on using information and communication technologies (ICT). Instead of being completed in a single phase, ICT adoption is a continuous process that fully supports teaching, learning, and information resources. The purpose of this study was to determine how ICT integration impacted classroom instruction in higher education institutions in light of the Covid-19 outbreak. For this inquiry, a mixed-methods methodology was employed. Data were gathered from both primary and supporting sources. The legitimacy and validity of this study were guaranteed by its quantitative methodology, which provided a clear picture of how ICT integration has helped higher education institutions throughout the Covid-19 pandemic. 207 out of the 225 individuals in the study's sample returned their questionnaires, giving it a 92% response rate. The findings show how ICT integration is highly advantageous for both teachers and students. Teachers who are well-prepared with ICT tools and resources are one of the critical components in the success of technology-based teaching and learning, according to study. According to the results, 50% of respondents thought ICT was very effective, giving it a grade of 75%; 34.4% gave it a rating of 50%; and 15.6% gave it a rating of 25%. Less users accessing the online learning, a lack of ICT resources (9.4%), a lack of internet connections (28.1%), and a lack of online teaching resources (12.5%) were among the challenges faced by 50% of the participants. The researcher's findings indicate that for teachers and students to get the most from ICT adoption, the first phase must be effective. The researchers recommend that the ICT infrastructure at the universities be updated. Plans for addressing any economic issues that colleges and universities may be facing should be developed by the management. ICT equipment may be exempted from taxation or subject to reduced taxation under certain policies, increasing accessibility. Government incentives could also be provided to service providers to increase the scope of their network.

Keywords: Integration, ICT, Training, Education, E-learning, Covid-19

1. INTRODUCTION

Even in the face of unforeseen setbacks like the Covid-19 epidemic, teaching and learning may go on using information and communication technologies (ICT). COVID-19 is taking precautions, including temporary school closures and the use of techniques for physical and social isolation (Fong et al., 2020). Because deadly diseases know no boundaries, the issue requires global attention. (obanolu,2020). To improve the level of care given to COVID-19 patients and lower the danger of viral transmission to other patients or medical personnel, restrictive measures are required (Wong et al., 2020). Curfews, mask wear, and company closures are just a few instances of the stringent precautions that have been put in place to prohibit pandemics from sweeping the globe. The COVID-19 virus, which is sweeping the world, has had major

impact on education institutions as well as many other industries (health, economy, etc.). According to estimates, school cancellations associated with the COVID-19 pandemic protocol have so far had an impact on 63 million instructors and more than 1.5 billion students (UNESCO, 2020; Rezki, 2020). The impacts of the epidemic could affect millions of people who are involved in the educational system, including students, instructors, and their families. In more than 124 nations, including Indonesia, educational institutions had already been closed before the inquiry was done. One of the best ways to reduce the spread of illnesses, especially among children, is to close schools (Jackson et al., 2013).

The absence of face-to-face interaction between teachers and students in the classroom is the most basic definition of

distant learning (Midgely, 2018). Since learners of all academic levels can advance their education without ever setting foot inside a classroom, distance learning differs from traditional classroom instruction. Online education provides a unique way to continue learning in trying times, like the most recent global coronavirus pandemic. Residents in that region should be able to avoid the rapidly spreading pandemic thanks to widespread social limitations that can stop the coronavirus from spreading there (Yunus & Rezki, 2020). According to this strategy, teachers educate students while the pandemic is active from their homes, maximizing ICT use so that students can continue to supervise the learning process from home. Based on information from previous epidemics and observations of student behavior that is regarded appropriate for social interaction, the decision to close schools is made (Jackson et al., 2016; Viner et al., 2020). The widespread use of technology and the global exchange of information affected every industry (Hennessy,2022). Studies have shown how important it is to use ICT in instruction and persuade people of the value of having a thorough personal understanding of ICT (Bai, et al,2021). This significance goes beyond its actual application in instructional strategies as well as its logic and justification.

ICT is widely utilized in education for several reasons, one of which is that it enhances the efficiency of teaching methods for both teachers and pupils. Churchill (2016) recommends increasing students' motivation for learning, their involvement in group projects and class debates, and the quality of education (Cinganotto,2019). These qualities make educational technology a crucial component in the advancement of learning in the present day. Schools and other educational institutions should consider incorporating information, communication, and technology (ICT) into their curricula to prepare students for life in "a knowledge society." ICT integration in education refers to the use of computer-based communication (Rachmawati, 2019). Instead of being completed in a single phase, ICT adoption is a continuous process that fully supports teaching, learning, and information resources.

The phrase "ICT integration in education" is most usually used to describe a technologically oriented teaching and learning process that is closely connected to the usage of educational technologies in classrooms (Ghavifekr & Rosdy, 2015; Sarker et al., 2019). Since children are habituated to www.ijcat.com

technology and learn better in a tech-based environment, ICT integration in schools, particularly in the classroom, is essential. This is because ICT applications, along with ICT features and components, will lead to successful learning. Technology has made significant pedagogical contributions to education. It is true that using technology-based tools and resources can help kids study a variety of disciplines more effectively, starting with math, science, languages, the arts, and other core subjects. The integration strategy aims to boost students' progress and success by implementing the proper usage of ICT in particular subject areas that need complex concepts and skills. A review of the curriculum is also required to ensure that the main goals and objectives of the curriculum are achieved by installing only applicable ICT tools and practical applications. The improvement technique entails using ICT to emphasize the introduced problem strongly. In order to present the material, for instance, in a way that will stimulate conversation and the exchange of ideas, Microsoft PowerPoint might be utilized (Ghavifekr & Rosdy, 2015).

The future of education depends on our ability to comprehend how the epidemic is influencing educational systems all across the world. In fact, studies on how pandemics affect kids, teachers, and parents will act as a guide for what to do in similar circumstances. For the purpose of incorporating technology into education, it will be helpful to understand the effects of such pandemics. Teachers in Turkey have a big responsibility to lessen the COVID-19 pandemic's effects on kids. Teachers assist students in this process by providing them with psychological and educational support. Their views will be important in establishing how the COVID-19 pandemic affects the school system. Utilizing ICT to aid and encourage students' learning is a last complementary technique (Arukaroon & Krairit, 2017). This method helps students to be more productive and organized by taking notes on a computer, delivering their work by email from home as long as the deadline is fulfilled, and researching information from a number of internet sources. The purpose of this study was to determine how ICT integration impacted classroom instruction in higher education institutions in light of the Covid-19 outbreak.

2.0 LITERATURE REVIEW

2.1 Overview of ICT Integration in Education

There is increasing demand on educational systems to use cutting-edge technology to teach students the fundamental skills required in today's society (Rana,2020). For instance, the first Nationwide Educational Technology Plan was released in the US with the goal of preparing students for the 21st century through the provision of computer training, internet access, and other essential tools. (Henderson,2019). According to Ntorukiri et al. (2021), the use of ICT in education will bridge the digital divide and make the nation competitive in terms of workforce expansion and productivity by improving accessibility, boosting productivity, and promoting high-quality education. Evidence suggests that less developed nations have researched how ICT infrastructure affects education more than more developed nations.

It appears that less developed nations have conducted more research on the effects of ICT infrastructure on education than more developed nations. It appears that less developed countries have done more research than more developed ones on the impact of ICT infrastructure on education. It appears that less developed nations have conducted more research on the effects of ICT infrastructure on education than more developed nations. It appears that less developed nations have conducted more research on the effects of ICT infrastructure on education than more developed nations. In order to close that gap, it is critical to examine how Kenya's secondary school teaching and learning are impacted by the ICT infrastructure. By improving accessibility, boosting productivity, and promoting high-quality education, it is anticipated that the integration of ICT in education will close the digital divide and make the nation competitive in terms of workforce growth and productivity. It appears that less developed countries have done more research than more developed ones on the effects of ICT infrastructure on education. In order to close that gap, it is critical to examine how Kenya's secondary school teaching and learning are impacted by the ICT infrastructure.

It is projected that the integration of ICT in education will close the digital divide and make the country competitive in terms of workforce growth and productivity by enhancing accessibility, increasing productivity, and encouraging high-quality education. ICT has gradually been included into the

educational curricula in Kenya, much like it has in other Sub-Saharan African nations (Mariga et al., 2017; Muinde & Mbataru, 2019). The Kenya National Education Sector Plan 2013-2018 placed a lot of emphasis on ICT integration despite the absence of empirical research demonstrating ICT's contribution to better learning across the nation (Piper et al., 2015). This strategy was adopted in line with the National ICT policy, which was put in place in 2006 and aimed to increase the provision of dependable, affordable, and efficient technological services throughout the economy (Republic of Kenya, 2019). In 2020, the COVID-19 epidemic presented a unique challenge for educational institutions all across the world. The vast majority of governments were compelled to close schools and restrict public gatherings in order to curb the spread of the deadly respiratory disease. According to UNICEF, COVID-19 in Kenya caused 20 million pupils to drop out of school (Brown & Otieno, 2020). In order to determine whether alternative teaching methods, such as e-learning, would be advantageous, this study concentrated on how teachers and schools were set up for technology integration before the crisis.

2.2 Impact of Covid-19 on education system

To stop the new coronavirus from spreading, state governments across the country started closing schools and other institutions. It was revealed some time in the second week of March as a temporary tactic to avoid the crowd. When the government first said that schools would be closed for a month, the timeline grew longer; currently, there is no set date for when the schools will reopen. Around this time, important occasions occur, such as competitive exams, entrance exams for different universities, university board exams, semester exams, nursery school admissions, and the university admissions process. There is currently no easy remedy to halt the COVID-19 pandemic.

Closing Kenyan schools and colleges would have a significant negative influence on the social and economic growth of the nation in addition to short-term disruptions to young students' ability to complete their education. The way learning and education are organized has changed as a result of the school closings. It started to have an effect on teaching and evaluating methods. The few private schools that offer online learning have started to implement these techniques. These institutions give their students access to online learning.

(Tarkar,2020). However, there are no e-learning options available, and all low-income private and public schools have been shut down. It hinders children's capacity to learn. Parents are currently coping with a range of issues as a result of the change in teaching methodology. The efficiency of student learning has also been affected by university closures. To ensure continuing at colleges and institutes, one action must be taken immediately away. The class moves more quickly when an online teaching method is used. Universities run their online courses using learning management systems and free and open-source digital learning tools. Higher education, which has been adversely affected by the epidemic, will have a significant impact on the future of the nation's economy.

2.3 Online learning

Some Kenyan students attend universities abroad. The demand for higher education abroad is anticipated to decline as a result of the widespread closure of institutions and universities. Everyone is currently most worried about how the outbreak would impact the employment rate. Recent graduates fear that because of the current situation, job offers from firms would be rescinded. The closure in Kenya has also altered the way that universities and other educational institutions teach. A diversified strategy would be needed to tackle the issue in Kenyan education over the long run.

Nearly everyone in the world has embraced online education since the outbreak (Goldschmidt, 2020). All educational components used in this type of online learning must be able to support learning in order for learning to continue even in the absence of face-to-face interaction. Teachers, who are the primary providers of formal education, are urged to apply learning that was previously delivered in a traditional face-to-face environment but has now gone online. Of all the current options for online learning, it could be claimed that this one has the closest links to in-person training. On the other hand, modern online courses are delivered in accordance with the predetermined course design. A different teaching strategy that can be used in emergency situations is emergency distance education.

Online instructor and student roles, online communication synchronization, online assessment roles, speed, student-teacher ratio, methodology, online instructor and student roles, and feedback sources are just a few of the factors that

must be considered for online learning to be successful. However, given the way the classroom is set up right now, this is only a short-term solution for an urgent remote learning scenario. Because emergency distance learning was performed for a period without a predetermined classroom setup, both students and teachers struggled to adapt to it. Institutions using distance learning should take into account effectiveness learning and addresses a variety of distance learning-related issues, such as interactions with students and their parents or legal guardians, the required infrastructure, the ability of staff to operate distance learning, meeting the need for learning, overcoming obstacles faced by students, school personnel, and outcomes, performance, and feedback from students and staff (Hodges et al,2020).

According to Lugonzo, H. (2020), the Kenyan government's Ministry of Education's online and distance learning programs prohibit students from forming personal relationships with and having intimate contacts with their virtual professors. Online learning is also of little value to the bulk of these students because they do not have access to devices like smartphones, internet connectivity, laptops, televisions, or radios, among other things. He asserts that this has made it more challenging for these underprivileged children to acquire a high-quality education. He suggests conducting research to identify workable mitigating strategies. They claim that problems with computer hardware, electrical power, and internet connectivity were among students' top concerns. While the access to teaching resources, carrying out online instruction, managing the online method of instruction, handling devices, and creating e-content were the main concerns of the teaching staff. In order to stay up with the rapidly evolving global education ecosystem, they contend that the epidemic has exposed faults in the current higher education system and that new legislation should be devised and executed on digital infrastructure. Ngwacho A.G (2020) asserts that COVID-19 shocks have had and will continue to have a detrimental effect on economic growth, which will have an effect on households that are poor, vulnerable, and marginalized and rely on small businesses and unpaid work to maintain their children. He claims that the pandemic has had a significant impact on their capacity to pay for school-related expenses including textbooks, meals, and supplies. According to his theory, students from low-income households will not be able to access these learning mediums as a result of the

government's adoption of remote teaching to support distance learning and online education delivered via radio, television, and the internet. This will widen the gap between access and educational quality.

According to Kamsingi (2021), as part of the Kenya School of Government's Strategic Leadership Development Program. They choose to assist the development of ICT infrastructure as a means of helping public universities deal with the COVID-19 challenges. They recommended that Kenya's government create a comprehensive strategy for funding ICT infrastructure. They argued that because universities had to close, people were forced to enroll in online courses without a reliable ICT infrastructure. They said that fewer students are enrolling in most colleges, especially public universities, and that the capitation of the exchequer has decreased. leading in financial issues for college. They suggested that since the Government of Kenya had been involved in a successful upgrade of technical institutions, a similar method should be utilized to fund ICT in universities.

3.0 METHODOLOGY

A mixed-methods methodology was used for this investigation. Data was collected from both main and auxiliary sources. This study's quantitative methodology, which painted a clear image of how ICT integration has benefited higher education institutions during the Covid-19 epidemic, ensured the study's dependability and validity. The quantitative design uses descriptive statistics to show the distribution of scores using a few indices. A wide spectrum of college students from different universities participated in the study. A survey was conducted on a sample of 225 individuals, and 207 responses were received. The researcher used intended random sampling, so everyone had an equal chance of being chosen for the sample with the intention of answering. Using SPSS version 21, all of the data collected from the respondents was examined (Statistical Package for the Social Sciences). It is also used to compute the mean, standard deviation, frequency, and percentage in order to identify the elements of ICT integration that work best for teaching in higher education institutions as well as the effectiveness of ICT integration for students' learning.

4.0 FINDINGS

The study findings presented in this part are informed by the main research questions.

4.1 Questionnaire response Rate

225 professors and students from higher education institutions were sampled for this study. Out of the total targeted respondents, 207 were able to respond. A 92% response rate was as a result. A response rate of 50% is considered adequate, whereas one of more than 70% is considered good, according to Mugenda & Mugenda (2003). Because of this, the study's response rate was very good.

4.2 Demographic information of the respondents

Table 1: Gender of the students

What is your gender?					
		Frequenc y	Percent	Valid Percent	Cumulative Percent
Valid		3	1.7	1.7	1.7
	Female	79	45.1	45.1	46.9
	Male	93	53.1	53.1	100.0
	Total	175	100.0	100.0	

According to table 2 above 53.1% of the student respondents were male while 45.1% were females.

Table 2: Gender of the teachers

What is your gender					
		Frequenc y	Percent	Valid Percent	Cumulative Percent
Valid		3	9.4	9.4	9.4
	Female	8	25.0	25.0	34.4
	Male	21	65.6	65.6	100.0
	Total	32	100.0	100.0	

According to table 1 above 65.6% of the respondents were male while 25% were females.

Table 3: Teachers level of education

	Frequency	Percent	Valid Percent	Cumulative Percent
Bachelors Degree	12	37.5	37.5	37.5
Diploma	4	12.5	12.5	50.0
Masters	16	50.0	50.0	100.0
Total	32	100.0	100.0	

According to table 2 above 50 % of the teachers had master’s degree,37.5% had Bachelor’s Degree while 12.5% had diploma.

Table 4: Students level of education

What is your highest level of education

	Frequency	Percent	Valid Percent	Cumulative Percent
Bachelor’s Degree	38	21.7	21.7	22.3
Certificate	31	17.7	17.7	40.0
Diploma	100	57.1	57.1	97.1
Masters	3	1.7	1.7	98.9
Other	2	1.1	1.1	100.0
Total	175	100.0	100.0	

According to table 4 above 57.1% of the students had diploma’s,21.7% bachelor’s degree,17.7% certificate,1.7% had masters degree while others had 1.1% .

4.3 Teachers’ perceptions on effectiveness of ICT integration in learning in higher education institutions in covid-19 era

Table 5: Challenges encountered by teachers when teaching online

Which challenges did you encounter when teaching on an eLearning platform during time of COVID-19

	Frequency	Percent	Valid Percent	Cumulative Percent
Few users accessing the platform	16	50.0	50.0	50.0
Lack of ict resources	3	9.4	9.4	59.4
Lack of internet connections	9	28.1	28.1	87.5
Lack of teaching materials	4	12.5	12.5	100.0
Total	32	100.0	100.0	

According to Table 5 above, 50% of the participants experienced difficulties, including fewer users accessing the online learning, a lack of ICT resources (9.4%), a lack of internet connections (28.1%), and a lack of online teaching resources (12.5%).

Which ICT device do you use when teaching during this time of pandemic

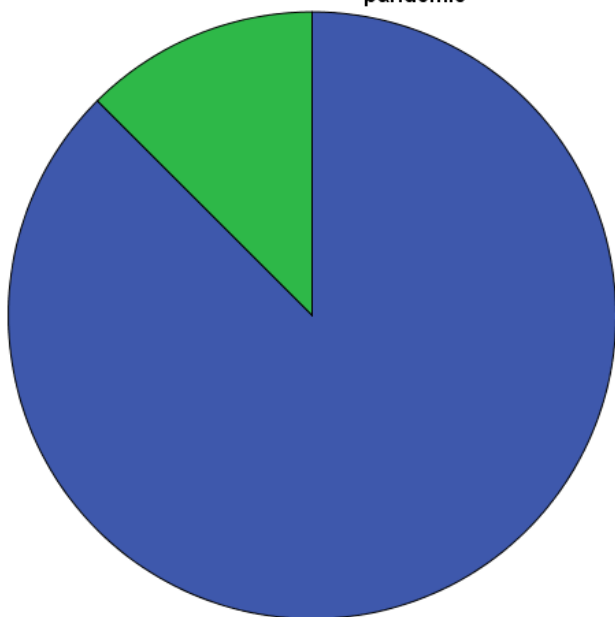


Figure 1: Devices used by teachers when teaching online

According to figure 1 above most of the teachers used laptops to teach online.

Table 6: Availability of Learning Management systems in Higher education institutions (HEI)

Does your institution have a learning management system (LMS), Virtual learning environment (VLE), e-portfolio system or equivalent

	Frequency	Percent	Valid Percent	Cumulative Percent
No	2	6.3	6.3	6.3
Yes	30	93.8	93.8	100.0
Total	32	100.0	100.0	

According to table 6 above 93.8% of the HEI's had a LMS while 6.3% had no virtual system.

Table 7: ICT delivery

Give the percentage at which use of ICT in delivery was more effective over the traditional method (Face to Face).

	Frequency	Percent	Valid Percent	Cumulative Percent
25	5	15.6	15.6	15.6
50	11	34.4	34.4	50.0
75	16	50.0	50.0	100.0
Total	32	100.0	100.0	

According to table 7 above 50% of the respondents asserted that the integration and usage of ICT in delivery was more effective with a 75% and above, 32% provided 100% effectiveness, 34.4% provided 50% while 15.6% gave a percentage of 25 on the effectiveness of ICT over the face to face learning. Technology-based teaching and learning, according to Ghavifekr and Rosdy (2015), offer a variety of engaging ways that will make the learning process more satisfying and meaningful, such as educational videos, stimulation, data storage, database use, mind-mapping, guided discovery, brainstorming, music, and the Internet (www). According to the study's findings, technology-based training and learning are more successful than traditional classroom instruction (Sumitra et al., 2021). This is because active learning environments, which are more engaging and effective for both teachers and students, are created using ICT tools and technology. Additionally, this study showed that the usage of ICT enhances student learning since lesson plans are more interesting and engaging (Hashim et al., 2020).

Does the institution provide internet access to students and staffs? .

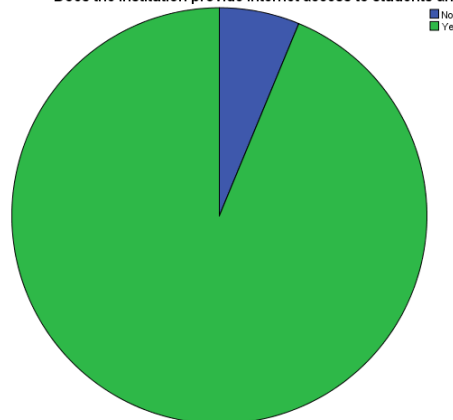


Figure 2: Devices used by teachers when teaching online
 According to figure 2 above most of the HEI's provided internet to both staff and students.

Table 8: ICT delivery

Which ICT device do you use when teaching during this time of COVID-19 pandemic

	Frequency	Percent	Valid Percent	Cumulative Percent
Laptop	28	87.5	87.5	87.5
Valid Mobile phone	4	12.5	12.5	100.0
Total	32	100.0	100.0	

Table 7 shows that 87.5% of the teachers utilized laptops while 12.5% relied on mobile phones to support instruction.

Table 9: Effectiveness of ICT in teaching

Give the percentage at which use of ICT in delivery was more effective over the traditional method (Face to Face).

	Frequency	Percent	Valid Percent	Cumulative Percent
25	5	15.6	15.6	15.6
Valid 50	11	34.4	34.4	50.0
75	16	50.0	50.0	100.0
Total	32	100.0	100.0	

According to table 8 above 50% agree that ICT was very effective with a rating of 75%, 34.4% with a rating of 50% while 15.6% with a rating of 25%.

How would you rate the quality of technological support when teaching on E-learning during Covid-19

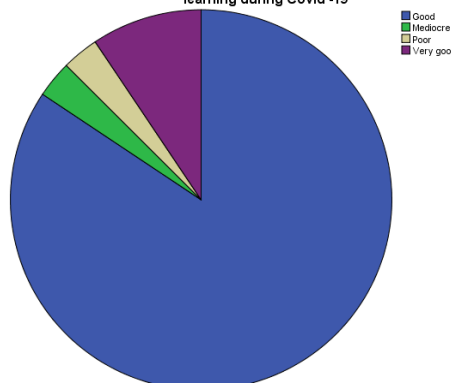


Figure 2: Quality of technological support during covid-19

According to figure 2 above most of the respondents suggested that it was good while a low percentage asserted that it was poor.

Table 10: Likert scale for Teachers' Understanding & Implementation of Distance Learning during Covid-19 Pandemic

	Strongly Disagree	Disagree	Neutral	Agree	Strongly agree
I am comfortable using a range of ICT tools and software to teach during the COVID-19 Pandemic.	0.0%	0.0%	0.0%	37.5%	62.5%
I find that using ICT resources will help me make sure that the COVID-19 Pandemic learning process is successful.	0.0%	0.0%	0.0%	56.3%	43.8%

For convenient distance learning, there is internet connectivity close to where my students live.	0.0%	3.1%	34.4%	56.3%	6.3%
During the pandemic, I frequently run into challenges when conducting distance learning.	0.0%	12.5%	6.3%	62.5%	18.8%
The COVID-19 pandemic makes distance learning a very difficult and time-consuming option.	0.0%	15.6%	43.8%	34.4%	6.3%
My pupils have sufficient ICT resources for efficient distant learning.	0.0%	3.1%	59.4%	37.5%	0.0%
I chose an ICT device that I am familiar with or frequently use.	0.0%	0.0%	3.1%	46.9%	50.0%

Table 10 reveals that 56.3% strongly agreed while 43.8% strongly agreed that using ICT tools and applications became a solution for them to ensure that the learning process during the COVID-19 Pandemic was successful, and that 62.5% strongly agreed while 37.5% agreed that they were confident using various ICT tools and applications in teaching during the COVID-19 Pandemic. Additionally, 56.3% strongly agreed while 43.8% agreed that the location of their students' residence was reachable in terms of internet access for 62.5% of respondents said they frequently had problems while doing remote learning during the epidemic; 18.8% strongly agreed; 6.3% were undecided; and 12.5% disagreed. Distance learning during the COVID-19 epidemic is very time-consuming and difficult, according to 43.8% of respondents. However, 34.4% agreed, 15.6%

disagreed, and 6.3% strongly disagreed. In terms of whether their pupils had sufficient ICT resources for seamless distance learning, 59.4% of respondents were neutral, 37.5% agreed, and 3.1% disagreed. 50% of respondents strongly agreed, 46% agreed, and 3.1% were neutral about choosing an ICT gadget that they were familiar with or frequently used.

4.4 Students' perceptions on effectiveness of ICT integration in learning in higher education institutions in covid-19 era

4.4.2 Challenges faced by learners

Table 11: Inadequate knowledge of technology

Did Inadequate knowledge of technology affect you in learning?

	Frequency	Percent	Valid Percent	Cumulative Percent
No	2	1.1	1.1	1.1
Yes	95	54.3	54.3	55.4
Total	175	100.0	100.0	100.0

According to table 11 above 44.6% suggested that their lack of knowledge in technology affected their learning while 54.3% were not affected.

Table 12: Failure of LMS

Did the learning management systems (LMS) fail ?

	Frequency	Percent	Valid Percent	Cumulative Percent
Always	3	1.7	1.7	1.7
Sometimes	12	6.9	6.9	8.6
Never	41	23.4	23.4	32.0
Often	59	33.7	33.7	65.7
Seldom	60	34.3	34.3	100.0
Total	175	100.0	100.0	100.0

According to table 11 above 34.3% of the students asserted that the LMS seldom failed,33.7% oftenly,23.4% never while 6.9% suggested that it always failed.

Table 12: Parents perceptions on remote learning

Did varying attitudes, abilities, and resources of your parents regarding remote learning affect you?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3	1.7	1.7	1.7
May be	42	24.0	24.0	25.7
Valid	68	38.9	38.9	64.6
No	62	35.4	35.4	100.0
Yes	175	100.0	100.0	
Total				

Table 12 shows that 35.4% of respondents believed that parental perception, lack of resources had an impact on distant learning, 38.9% disagreed, and 24% weren't sure. The instructor uses facilities that are more known to the pupils and are simple to use. When selecting a program to support remote learning, parents must still consider their limited financial means and attitude toward e-learning despite having good internet connectivity (Baloran, 2020; Brooks et al., 2020; Eyles & Montebruno, 2020; Favale et al., 2020; Goldschmidt, 2020; Masters et al., 2020; Shang, 2016; Viner et al., 2020). The reality that the majority of parents experience financial hardship is indicated by the study's insufficiency, the parents' opinions of their own abilities, and their ability to overcome financial challenges.

Table 13: Teachers internet connectivity during teaching

How was your instructor's internet connectivity?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3	1.7	1.7	1.7
Stable	133	76.0	76.0	77.7
Valid	39	22.3	22.3	100.0
Unstable	175	100.0	100.0	
Total				

According to table 13 above 76% of the teacher's internet connectivity was stable while 22.3% of them was unstable.

Table 14: Lack of E-learning Login credentials

Did you have Loss of login password issues

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	1.1	1.1	1.1
No	122	69.7	69.7	70.9
Valid	51	29.1	29.1	100.0
Yes	175	100.0	100.0	
Total				

Table 14 shows that whereas 69.7% of respondents were unaffected by a lack of login information, 29.1% of respondents were.

Table 15: Virtual meeting Mode

Which virtual meeting platform worked well with your internet connectivity?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3	1.7	1.7	1.7
GoogleMeet	22	12.6	12.6	14.3
Valid	38	21.7	21.7	36.0
Kenet Big Blue	13	7.4	7.4	43.4
Valid	11	6.3	6.3	49.7
Microsoft Teams	16	9.1	9.1	58.9
Valid	72	41.1	41.1	100.0
Other WebEx	175	100.0	100.0	
Total				

According to table 15 above 41% of the respondents asserted that zoom worked well with regards to internet connectivity, 21.6% preferred Kenet Big Blue Button,12.6% Google Meet,7.4% Microsoft teams,9.1% WebEx while 6.3% had others.

Table 16: Strength of the internet while accessing e-learning resources

Rate your internet connectivity while accessing the e-learning resources

	Frequency	Percent	Valid Percent	Cumulative Percent
	2	1.1	1.1	1.1
Good	111	63.4	63.4	64.6
Poor	17	9.7	9.7	74.3
Very Good	39	22.3	22.3	96.6
Very Poor	6	3.4	3.4	100.0
Total	175	100.0	100.0	

According to table 16 above 63.4% of the respondents ascertained that they had good internet connectivity, 22.3% very good, 9.7% poor, 3.4% very poor while 1.1% never provided any response.

Table 17: ICT integration in teaching and learning as perceived by students using a Likert scale in COVID-19

	Strongly Disagree	Agree	Disagree	Neutral	Strongly Agree
ICT resources are available and in good working order at my school.	0.0%	42.3%	2.3%	9.7%	44.0%
With the use of ICT, I was able to learn more efficiently throughout COVID-19.	1.1%	37.7%	2.9%	18.9%	37.1%
Utilizing ICT during the pandemic advanced my career	0.6%	40.6%	2.9%	16.6%	36.6%

The usage of ICT during the pandemic improves learning	1.7%	38.9%	4.0%	14.9%	37.7%
ICT use during the pandemic aids me in expanding my collection of educational resources.	1.1%	37.1%	2.3%	7.4%	48.6%
Use of ICT during the epidemic improves learner and my collaborative learning	1.7%	43.4%	2.3%	12.6%	37.1%
I was unable to access the virtual classrooms and resources due to unstable Internet.	2.3%	28.6%	5.1%	14.3%	46.3%
The use of ICT during the pandemic motivates students to become more engaged and active.	2.3%	36.6%	4.0%	13.7%	41.1%

Table 17 shows that 42.3% of students highly agreed, 9.7% agreed, 42.3% agreed, and 2.3% strongly disagreed that the ICT facilities in their school are functional and usable. While using ICT during COVID-19, 37.7% of participants agreed that their learning was enhanced; 37.1% strongly agreed; 18.9% were neutral; 2.9% disagreed; and 1.1% severely disagreed. When asked if using ICT during the epidemic had enhanced their professional development, 40.6% said yes, 36.6% said strongly yes, 16.6% said no, 2.9% disagreed, and

0.6% said strongly disagree. When it came to the usage of ICT during the epidemic, 38.9% agreed, 37.7% strongly agreed, 14.9% were neutral, and 4% opposed. The usage of ICT during the pandemic enabled students to be more active and engaged, according to 41% of respondents, 36.6% of respondents agreed, 13.7% were neutral, and 4% disagreed. Lack of reliable Internet access prevented me from accessing virtual classes and materials, according to 46.3% of respondents; the remaining 28.8% agreed, 14.3% were neutral, 5.1% disagreed, and 2.3% strongly disagreed. When it comes to the usage of ICT to improve collaborative learning between students and myself during the pandemic, 37.1% highly agreed, 43.4% agreed, 12.6% were indifferent, 2.3% disagreed, and 1.7% severely disagreed.

5. 0 DISCUSSIONS

According to this survey, even if the majority of teachers think that using ICT in the classroom is beneficial, the resources that are available in schools for using ICT are inadequate and in bad condition, and teachers do not receive enough professional development and training. Although some technological assistance is given, it can occasionally be improved; also, the school's computer lab is not in very good condition despite having functional equipment (Karniawati et al., 2021). Numerous institutions of higher learning have switched from the antiquated classroom model to online courses and from the antiquated offline assessment approach to an online one. They are assessing themselves utilizing internet assessment tools. These restrictions continue to apply to online evaluation tools. Using online evaluation tools, many measurement errors are reported when compared to the norm. Employers evaluate candidates based on their educational credentials, such as grade point averages and degree classifications, according to research by Piopiunik et al. (2020). The inability of recent graduates to obtain employment as a result of the shutdown. The increased candidate signal disruptions are lowering recent graduates' matching efficiency, which results in higher job-separation rates and slower salary growth. According to Fredriksson and Ihlen (2018), this is costly for both the person and society as a whole. Table 9 reveals that, with a rating of 75%, 50% of respondents thought ICT was extremely effective, followed by 34.4% with a rating of 50% and 15.6% with a rating of 25%. Technology-based teaching and learning, according to Ghavifekr and Rosdy (2015), offer a variety of engaging ways

that will make the learning process more satisfying and meaningful, such as educational videos, stimulation, data storage, database use, mind-mapping, guided discovery, brainstorming, music, and the Internet (www). According to the study's findings, technology-based training and learning are more successful than traditional classroom instruction (Sumitra et al., 2021). Since not all schools provide internet data subsidies for students and teachers, some teachers also advise pupils to use low-internet data applications and free websites, such low-cost e-learning (Tuli et al., 2020). (Jackson et al., 2020; Yuhatriati et al., 2020; Brown et al., 2020). Teachers thus urge pupils to use free online learning apps as part of the remote learning strategy.

In response to the COVID-19 outbreak and the decision to close schools, the teachers take the initiative and experiment with distance learning. Up until now, teachers have made a variety of initiatives to ensure that students continue learning and to minimize the flaws and barriers in the learning process. The likelihood of cybercrime assaults that could harm the e-learning system increases with the use of ICT in education. In order to maintain a safe and secure institutional cyberspace, faculty, students, and staff in a higher education institution should be made aware of the institution's technology policies and procedures, as well as best practices for doing so, according to Wambui, B. M (2022). The total growth of society depends on user education. It is more crucial and difficult to protect information integrity and confidentiality in complicated network systems. The bulk of users on these networks is students. Students may engage in cybercrime for a variety of motives, including curiosity or revenge. When asked if using ICT during the epidemic had enhanced their professional development, 40.6% said yes, 36.6% said strongly yes, 16.6% said no, 2.9% disagreed, and 0.6% said strongly disagree. Instructors can quickly get more confidence by undergoing various types of training and having first-hand experience with applying information. Their educational approach to the actual execution of learning will benefit from this. (Eyles, 2018; Valtonen et al., 2015). While conducting remote learning during the pandemic, 62.5% of respondents agreed that they frequently ran into difficulties; 18.8% strongly agreed; 6.3% were neutral; and 12.5% disagreed. This resulted from the shift in teaching methods following school closure. The COVID-19 pandemic triggered school closures, which compelled teachers all across the world to switch to online instruction (Moorhouse, 2020; Pace et al.,

2020). This affects any modifications the teacher makes to the teaching methodology. Teachers must be capable of regulating learning in ways that were not possible before the COVID-19 outbreak. Most of the challenges faced by the students consist of: lack of smartphones to access the eLearning, poor internet connections, too much traffic on the system while having online exams, Problems accessing zipped files and downloading large files while using a phone, Inadequate training on how to use the eLearning system and inadequate support from the instructors on challenges encouraged during the learning period. Power failure, lack of capital to buy bundles and buffering of the internet when the lecturers were teaching which caused poor audio connections.

6.0 CONCLUSION AND FUTURE WORK

The findings demonstrate that this institution's vast majority has access to the necessary ICT infrastructure. To ensure that everyone has access to high-quality, long-lasting education, it is necessary to address the infrastructure problem that exists with effective online/digital learning. Some of the issues that students had to deal with were not being able to open zipped files or download huge files using a phone, getting inadequate training on how to utilize the eLearning system, and not receiving enough support from the instructors while facing challenges while studying. Power outages, a lack of funds to pay for bundles, and internet lag while professors were delivering material all contributed to poor audio connections. The researcher's findings indicate that for teachers and students to get the most from ICT adoption, the first phase must be effective. As a result, proper implementation and support by the school's senior management constitute the first step in preparing for technology-based teaching and learning (Rochmawati & Rahmayanti, 2021). ICT integration in schools will be a tremendous success and have enormous advantages for both instructors and pupils if the deployment procedure is carried out correctly from the very beginning stage and continuous maintenance is efficiently provided (Riyanto et al., 2021). The findings show how ICT integration is highly advantageous for both teachers and students. According to research, one of the key elements in the success of technology-based teaching and learning is teachers who are well-prepared with ICT tools and resources. The researchers recommend that the ICT infrastructure at the universities be updated. Plans for addressing any economic issues that colleges and universities may be facing should be developed

by the management. ICT equipment may be subject to zero rating or reduced taxation under these measures, making them more accessible. Incentives could also be offered by the government to service providers to expand the reach of their network. The government was finally able to develop a Marshall plan to upgrade the ICT infrastructure. Future research should consider other ICT integration factors, particularly from a management perspective with regard to strategic planning and policymaking.

1 ACKNOWLEDGMENTS

Our thanks to the author and co-authors who have contributed towards the completion of this manuscript. Special thanks goes to Zetech university and JFC Medical school for granting permission to conduct the study. Special thanks to my parent Irene Wambui Mwangi for her encouragement during this research.

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