

# Impact of Technology on Teaching Learning Process in “O” Level Secondary Schools: A Case Study of Selected O’level Secondary Schools in Wakiso, Wakiso District

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## ABSTRACT

This study investigates the impact of technology on the teaching learning process in O’level secondary schools in Wakiso, Wakiso district. Through a mixed-methods approach, the research examines the ways how schools utilize ICT tools/ equipment, the influence of technology integration on the teaching leaning process, and the way of improving student’s performance in ICT. Data was collected from 222 respondents, including ICT teachers, administrators, lab technicians, and students, with a 90% response rate. The findings reveal that most of the schools in wakiso greatly utilize ICT tools through accessing information via internet. Additionally, technology integration greatly influences the teaching learning process to a large extent. Furthermore, the students’ performance in ICT can be improved by providing more or enough ICT tools /equipment in schools of Wakiso. Intervening factors such as teaching methods, parental involvement, student motivation, peer influence, school management, availability of extracurricular programs, community and environmental factors, access to educational technology, student health and well-being, and government policies also affect the teaching leaning process and student performance. Based on these findings, the study recommends improving school facilities, enhancing teacher qualifications through professional development, and implementing strategies to positively change students' attitudes towards ICT, Providing enough ICT tools and continuous motivation. Addressing these issues is essential to improve ICT performance and overall educational outcomes in the region. Further research is suggested to explore additional factors and the long-term effects of the proposed interventions.

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## INTRODUCTION

The integration of technology in education has a rich history spanning several decades. In 1960s, the first computers were introduced in schools, primarily for administrative tasks [1, 2]. The 1980s saw the emergence of educational software, focusing on basic skills like math and reading [3–5]. In Uganda, the government launched the National ICT policy in 2003, aiming to promote technology adoption in all sectors, including education [6, 7]. The policy led to the establishment of the Uganda National Education Information System(UNEIS) in 2005, which aimed to improve data management and decision making in education [8].

Studies have shown that technology integration in education has evolved over the years. For example, a study by Ottenwidth [9] found that technology adoption in schools increased significantly between 1995 and 2005. Another study by UNESCO [10, 11] highlighted the growing trend of technology use in African Schools including Uganda.

In O’level secondary schools in Wakiso, technology adoption has been gradual. A study by Lukenge [12]

found that most Schools in Wakiso had basic computer infrastructure, but limited internet connectivity and digital resources. Another study by Kagambe [13] highlighted the challenges faced by teachers in integrating technology into their teaching practices.

There are number of theories that are put forward to explain the impact of technology on the teaching learning process and they include the following;

**Social Constructivist Theory:** Vygotsky posits that learning is a social process, and technology can facilitate collaboration and knowledge construction [14, 15]. Social constructivism is the view that learning occurs through social interaction and the help of others, often in a group. Typically, Children learn individually, this is referred to as individual constructivism. Individual constructivism is the theoretical perspective that focuses on how people, as individuals, construct meaning from the events around them for example ICT equipment[16].

**Technology acceptance model (TAM):** Davis (1989) has been one of the most influential models of

technology acceptance, with two primary factors influencing an individual's intention to use new technology: perceived ease of use and perceived usefulness. An older adult who perceives digital games as too difficult to play or a waste of time will be unlikely to want to adopt this technology, while an older adult who perceives digital games as providing needed mental stimulation and as easy to learn will be more likely to want to learn how to use digital games. While TAM has been criticized on a number of grounds, it serves as a useful general framework and is consistent with a number of investigations into the factors that influence older adults' intention to use new technology [17, 18]. It also explains how teachers' attitudes and intentions influence technology adoption.

**Diffusion of innovations Theory:** Rogers (2003) describes how technology spreads through a social, influencing teaching learning processes. Pedagogical Content Knowledge (PCK) Frame work: Dickerson [19] highlights the importance of teachers' subject matter knowledge and pedagogical skills in the effectively integrating technology. Self-

#### **Research Design**

A descriptive technique was used as the research design in this study. The approach was selected because it helps researchers describe, examine, record, and analyze study variables as they are, making it both appropriate and the most applicable. It's also because, in relation to the research question variable as it exists, the factors influencing O'level

determination theory: Deci and Leijen [20] explain how technology can influence students' motivation, engagement, and learning out comes. Activity Theory: Karasavvidis [21] Examine how technology influences teaching learning processes by analyzing the interactions between teachers, students and technology.

The integration of technology in O'level Secondary schools in Uganda has been hindered by inadequate infrastructures, insufficient teacher training and limited access to digital resources, resulting in a significant gap between the potential benefits of technology enhanced learning and the current reality[22]. This has caused continuous poor academic performance and inadequate preparation for digital age among others [22]. It's upon this back ground that this study will address the impact of technology on teaching leaning process in O'level secondary schools in Wakiso [22]. The purpose of the study is to investigate about the impact of technology on teaching learning process in O'level secondary schools in Wakiso district.

#### **METHODOLOGY**

secondary school pupils' performance are more qualitative than quantitative.

#### **Area of Study**

The research is conducted in Wakiso, Wakiso District, Uganda. This area is selected due to its diverse range of "O" level schools, which provides a representative sample for examining the impact of technology on the teaching learning process especially at the ordinary level.



### Study Population

This study focused on a carefully selected sample of individuals from the broader population within secondary schools in Wakiso. Specifically, the research involved a subset of students, ICT teachers, Computer laboratory technicians, and administrative staff. By concentrating on this selected group, the study aims to gain insights that are representative of the experiences and perspectives of these key stakeholders, while recognizing that the findings may not fully encompass the entire population of the Wakiso secondary school community. The target population of the study is 500 respondents of which the sample size was selected through the Slovene's formula as shown in Equation (1).

$$n = \frac{N}{1 + N(e)^2} \quad (1)$$

Where n = sample size

N= population of the study

1= constant

e = level of significance

$$n = \frac{500}{1 + 500(0.05)^2}$$

$$n = \frac{500}{1 + 500(0.0025)}$$

$$n = \frac{500}{1 + 1.25}$$

$$n = \frac{500}{2.25}$$

$$n = 222.222 \approx 222$$

Sample size = 222 Respondents.

### Sample Size

A sample is a subset of respondents selected from the population of interest (Bennet. 2015). In many circumstances, sampling is a more practical approach than examining the entire population. The goal of a sample is to achieve a result that is typical of the entire population being sampled without having to go to the trouble of questioning everyone, even though no sample can be guaranteed to be truly representative drawn. For this study a sample size of 222 respondents is targeted, comprising 172 students, 10 lab technicians, 20 ICT teachers, and 20 school administrators. This sample size is considered sufficient to provide a diverse and representative dataset for the study. The Participant schools were drawn from five schools; Queen of Martyrs secondary school, Devine College wakiso, Kingdom High school, Wakiso Christian High School, St. John's Wakiso Secondary school. The population included the ordinary level students to whom ICT is a compulsory subject and advanced level students take ICT as one of their subsidiary subject.

**Table 1: The target population**

S/N	Population group	Population	Sample size
1	Administrators (head teachers, director of studies, etc.)	20	20
2	ICT teachers	70	20
3	lab attendants/ technicians	10	10
4	ICT students	400	172
<b>Total</b>		<b>500</b>	<b>222</b>

**Source:** Present study (2024)

### SAMPLING TECHNIQUES

#### Purposive sampling

In this study, purposive sampling was used. With purposeful sampling, study participants who are thought to have a reliable grasp of the study variables are specifically chosen because of their close connection to and involvement with the subject being studied [23]. Head teachers and other administrators at the schools were be purposefully chosen with the aid of a purposive sample technique. Because they are directly connected to and affiliated with the academic procedures used at their institutions, it is expected that the sampled number of persons had knowledge of the variables of the research issue.

#### Simple random sampling

Simple random sampling is a probability sampling technique where each member of the population has an equal chance of being selected to participate in the study [24].

#### Data Collection instruments

##### Questionnaire Method

One major research method for the study involved use of questionnaires. This study used both open-ended and closed-ended questionnaires to collect data. In order to support the achievement of the research objectives, the questionnaire tried to elicit particular responses from study participants. In order to allow respondents to provide thorough answers for a thorough analysis, the surveys included both closed- and open-ended questions. The organization of these was determined by the research objectives, which are outlined in the first chapter of this study. Questionnaires, mostly aimed at ICT teachers and students.

##### Interview Method

In-person interviews between the researcher and study participants was also be used in this investigation where by this technique was used to

$$CVI = \frac{\text{Total number of items rated by all respondents}}{\text{Total number of items in the questionnaire}}$$

collect data through face to face, phone, or online conversations with participants. It involved asking open ended questions to gather in depth information about their experience attitudes and Opinions.

#### Survey research

Here designed questionnaires were used to collect data from students, teachers and administrators about their experiences with technology in teaching and learning

#### Observation method

Observation method involved watching and recording behaviors, actions, and events. It was used to collect data on how teachers use technology to engage students, types of technology used, frequency and duration of use.

#### Data processing and Analysis

Microsoft Excel, word was utilized to analyze the data and provide the results in the form of frequency distribution tables. The most popular format for presenting data that was examined were tables. It is well recognized that tables are a helpful tool for presenting a lot of comprehensive information in a condensed space. In this instance, answer data was summarized using frequency distribution tables

#### Validity of instruments

As described by Amin 2005, validity was the degree to which a test measures what it was supposed to measure. To insure validity of research instruments; pilot testing of copies of questionnaire was carried out in two schools of Wakiso district. Supervisors were requested to rate the instruments in order to discover their validity. In order to establish content validity, results from the ratings was computed using the following formula.

Where CVI = Content Validity Index

In case the calculated content validity index was equal or greater than 0.70, then instrument was valid, Amin 2005. If it was less that, are adjustment were to bed one. I calculated the validity of instruments and I got the validity index of 0.75 so the instrument was valid. Qualitative validity of instruments was ensured by processing data into manageable proportions through editing, coding and tabulation methods. Data collected was checked while still in the field to ensure that all questions are answered. Contradictory information was removed if found useless. By coding, answers to each item on the questionnaire was classified into meaningful categories. Tabulation was used to obtain frequencies and percentages of each item.

#### Reliability of instruments

##### Quantitative reliability

The reliability of the instruments was established using cronbach alpha because according to Amin 2005, the researcher used the cronbach alpha coefficient in order to establish reliability. The formulae for cronbach alpha coefficient test of reliability in the following

$$R = K \left[ \frac{ESDi2}{k-SDt2} \right]$$

Where R= reliability

**ESDi2**= sum of the variance of individual items in the questionnaire

**SDt2**= variance of entire questionnaire

**K**= number of items in the questionnaire

#### Background information about the respondents

Relevant background information about the respondents that participated in the study relates to their gender, jurisdiction; level of educational attainment; and duration of teaching services experience, since they could influence the extent to which the respondents are knowledgeable about the

In case alpha is equal to 0.7 and above the questionnaire was considered reliable and ready for use in the field

#### Data management and analysis

Data analysis was both quantitative and qualitative because both quantitative and qualitative (descriptive) data was necessitated and subsequently, collected for the study. Once completed, questionnaires were received from the respondents and checked for completeness and clarity. If there were unclear data in the respondent's responses, the respondent was asked to clarify the response.

##### Quantitative data analysis

The responses to the close-ended items in the data collection instrument were assigned codes and labels and thereafter, entered into a SPSS file. Frequency counts of the responses were then obtained to generate descriptive information about the respondents that participated in the study and to illustrate the general trend of findings on the various variables that were under investigation. This involved the use of percentages, tables and charts, since they help to summarize large quantities of data whilst making the report reader friendly.

##### Qualitative data analysis

The data from the interviews, on the other hand, was carefully read. Thereafter, it was slightly edited for grammatical correctness, coherence, chronology and precision and presented as quotations so as to triangulate the data obtained through the administration of the close ended instruments, which was quantitative in nature.

## RESULTS

variables that were involved in the study and the extent to which the data that they provide can be generalized to the population. Subsequently, information pertaining to these variables was elicited and the findings are summarized in Table 2.

**Table 2: Distribution of respondents that participated in the study by gender and position**

Variable	Categories	Frequency	Percentage (%)
<b>gender</b>			
	Male	100	45
	Female	122	55
	<b>Total</b>	<b>222</b>	<b>100</b>
<b>Position</b>			
	Administrators	20	9
	ICT Teachers	20	9
	ICT Students	172	77
	Lab attendant/technicians	10	5
	<b>Total</b>	<b>222</b>	<b>100</b>

**Table 2: Shows the Distribution of respondents that participated in the study by gender and position.**

**Table 3: Age of Respondents.**

Age group	Frequency
15-20	55
20-25	75
25-30	40
30-35	25
35-40	17
40-45	10
<b>Total</b>	<b>222</b>

Source; Present study 2024

The table .2 shows the distribution of 222 individuals across various age groups. Most of the respondents are aged between 20-25 and they are 75 and the least 10 are aged between 40-45, 55 in the 15-20 range, 40

in the 25-30 range ,25 in the 30-35 range ,17 in the 35-40 range. Generally, the number decreases as the age of respondents increases.

**Table 1: Distribution of teachers that participated in the study by level of education and duration of teaching experience**

Variable	Categories	Frequency	Percentage (%)
<b>Level of educational attainment</b>	Masters	1	5
	Diploma	2	10
	Degree	17	85
	<b>Total</b>	<b>20</b>	<b>100</b>
<b>Duration of education service experience</b>	Less than one year	2	10
	One to two years	3	15
	Two to three years	10	50
	Over three years	5	25
	<b>Total</b>	<b>20</b>	<b>100</b>

In Table 3 it is well seen that all the teachers that were involved in the study were qualified teachers, since they were either grade five or graduate teachers. It also indicated that 75% of the Teachers had an

experience of two and above years in Teaching and this indicates the Most of the Teachers were experienced.

### QUANTITATIVE ANALYSIS

#### How technology is utilized in Schools

Under this subsection, an investigation was made to find out how well do different schools in Wakiso utilize ICT during the teaching learning process. It should be noted that the way how ICT is utilized in

schools differ from one school to another, therefore respondents from different schools were required to choose from the options provided on how they utilize ICT in their schools.

**Table 2: How schools utilize technology**

S/N	Category of respondents	Frequency	Response			
			A	B	C	D
1	administrators	20	2	4	0	14
2	ICT Teachers	20	5	5	0	10
3	ICT students	172	30	20	10	112
4	Lab attendants/technicians	10	3	2	0	5
<b>TOTAL</b>		<b>222</b>	<b>40(18%)</b>	<b>31(14%)</b>	<b>10(5%)</b>	<b>141(63%)</b>

**Source; Present study 2024**

From the above Data, most of the respondent (63%) used technology for both Accessing information via internet and Online learning platform such as You tube and Google, followed by 40% Of the respondents who used technology to only access information via internet, then 31% used technology to access to online learning platform such as you tube and Google, and lastly 10% who used technology for playing Educational Games.

**The influence of technology**

In this subsection, an investigation on how technology influence the teaching learning process was carried out and respondents were required to give their opinion on the list of options provided. Everyone was free to choose any option depending on him /herself.

**Table 3: Extent to which technology as influenced the teaching learning process**

S/N	Category of respondents	Frequency	Response		
			A	B	C
1	Administrators	20	10	7	3
2	ICT Teachers	20	2	15	3
3	ICT Students	172	100	50	22
4	Lab attendants / technicians	10	6	4	0
<b>TOTAL</b>		<b>222</b>	<b>118(53%)</b>	<b>76(34%)</b>	<b>28(13%)</b>

**Source; Present study 2024**

From the above data, majority of the respondents (53%) stated that technology influences the teaching learning process to a large extent, 34% suggested that Technology do influence the teaching learning

process but to a less extent while only 13% believe that Technology has no effect on the teaching learning process.

**How to improve student's performance in ICT**

Here, an investigation was made to find out how can Teachers, administrators, Students and Lab

What can be done in order to improve student's performance in ICT?

**Table 4: What can be done to improve students' performance in ICT?**

S/N	Category of respondents	Frequency	Response			
			A	B	C	D
1	Administrators	20	5	10	0	5
2	ICT Teachers	20	3	15	0	2
3	ICT Students	172	40	120	5	7
4	Lab attendants / technicians	10	1	9	0	0
<b>TOTAL</b>		<b>222</b>	<b>49(22%)</b>	<b>154(69%)</b>	<b>5(3%)</b>	<b>14(6%)</b>

Source; Present study 2024

From the above data, majority of the respondents (69%) stated that Providing enough ICT Tools /devices is the best way students' performance in ICT can improved in Schools, 22% respondents in their views suggested that continuous motivation is the best way of improving students' performance in ICT , 14% believe that continuous motivation, providing enough ICT tools, counseling and guidance are the

The return rate of 100% for all categories of respondents (ICT teachers, administrators, lab technicians, and ICT students) is highly commendable. This exceptional response rate provides confidence that the data collected accurately represents the target population, ensuring that the study's findings are reliable and valid. The full participation of all sampled respondents reflects a strong engagement with the study and suggests that the issues explored are relevant and of Technology has significantly impacted the teaching leaning process in various ways, including the following. Enhances student engagement; technology makes learning more interactive and fun thus increasing student's participation and motivation which in turn increases their love for ICT[25, 26]. Personalized learning, technology allows for tailed instruction catering to individual learning style and needs .Increased accessibility, technology provides access to quality education for remote disabled, or underprivileged students, therefore students in every area of the country either rural or urban, can access to information via internet which makes study very easy and more convenient .Improved assessment and feedback ,technology facilitates instant assessment and feedback which helps students to rack progress and identify areas for improvement .Develop digital literacy, technology integration helps students develop essential digital skills ,preparing them for future careers.

Student's attitudes towards ICT can significantly impact their performance in various ways. A student

ways how performance in ICT can be improved, then 3% suggested that Counseling and guidance is the best way to improve students' performance in ICT. Therefore, according to the results in the table 4.3.3 above, providing enough ICT tools/device was stated as the best way to improve students' performance in ICT, followed by continuous motivation and finally counseling and guidance.

#### DISCUSSION

can either have positive or negative towards ICT. Positive attitudes affects student's performance in ICT in the following ways; Positive attitude towards ICT can enhance student's motivation to learn and engage with technology[27]. Also positive attitude towards ICT improves student's engagement, students with positive attitudes towards ICT are more likely to participate and engage with ICT based learning activities. Better understanding, positive attitudes can lead to a deeper understanding of ICT concepts and skills. Increased confidence, students with positive attitude tend to be more confident in using ICT leading to improve performance. Negative attitude towards ICT also has its own comes as seen below; decreased motivation, negative attitude can lead to decreased motivation and interest in learning ICT. Resistance to learning, students with negative attitude may resist learning ICT, leading to poor performance. Limited understanding of ICT concepts[28]. Technology integration in education can bring several challenges, and these include; Technical issues, Hardware and software problems, connectivity issues and compatibility concerns. Teacher training and support, inadequate training, lack of technical expertise, and insufficient support. Digital divide, unequal access to technology, internet connectivity and digital literacy among students. Curriculum integration, aligning technology with curriculum goals, standards and assessments. Class management, managing student use of technology, minimizing distractions, and maintaining focus.



## CONCLUSION

From the discussion, it can be included that; technology is of much significant on the teaching learning process in various ways such as enhancing student's engagement, improved assessment, and increased accessibility among others. Technology has transformed the teaching learning process, making it more engaging, interactive, and effective. Technology integration can enhance student learning outcome, improve academic performance, and increase student motivation. Technology provides access to vast educational resources enabling personalized learning and catering to diverse learning needs.

Based on the effects of student's attitudes towards ICT on their performance, the following conclusions can be drawn, Positive attitudes towards ICT are crucial for effective technology integration in education. Student's attitudes significantly influence their motivation engagement, and performance in ICT based learning. Negative attitudes can hinder student's ability to fully benefit from technology enhanced learning.

Based on the challenges that come with technology integration, the following conclusions can be drawn; Technology integration is a complex process that requires careful planning, implementation and ongoing support .Technical issues ,teacher training and digital divide are significant challenges that need to be addressed .Effective technology integration requires a holistic approach ,considering technical, pedagogical, and social aspects .Teacher professional development is crucial to overcome challenges and ensure successful technology integration. Educational institutions need to allocate sufficient resources and funding to support technology integration

### Recommendations

Students should use technology to access information via internet, this is because source like Google, YouTube among others provides a student with amount of information and resources, if a student

visits those sites he/she can get a lot of information, this will help to boost their understanding on particular topic in ICT which in turn will result into better grades. Students should also use technology to access online learning platforms such as you tube, google among others. On sites such as you tube, zoom, students can be taught new information online via internet and here they are allowed to ask questions where they have not understood and they can receive the responses right away. This format of online studying helps to save time it can be accesses anywhere. By embracing technology, students can develop essential skills such as critical thinking, problem solving skills. Technology encourage critical thinking and problem solving. Technology provides logical questions and games that help to boost their thinking.

Implement motivational programs and activities that highlight the relevance and excitement of ICT and this will help to boost student's productivity in ICT and enhance focus, efforts, and persistence, hence resulting into increased productivity. Motivation will help students to overcome obstacles, setbacks, and failures. Proving enough ICT equipment to students, there should enough ICT tool for practical purposes. ICT tools for example monitors, projectors among others, help to make the teaching leaning process easier and more practical. Teaching using ICT tools make the information clearer to understand.

### Future Research

Further research should be conducted to explore the role of Artificial intelligence in personalized leaning; A study on Adaptive Assessment and Feedback Further research can also Investigated on whether gender plays a role in ICT performance, identifying potential socio-cultural factors or biases that might contribute to differences in achievement between male and female students. Further research can also investigate the effectiveness of Parents involvement in the teaching leaning process.

## ABBREVIATIONS

ICT	Information technology
"O" level	Ordinary level
UNEB	Uganda National Examinations Board
STEM	Science, Technology, Engineering, and Mathematics
REB	Rwanda Education Board
PISA	Program for International Student Assessment
PCK	pedagogical content knowledge
NECT	National Examinations Council of Tanzania
KCSE	Kenya Certificate of Secondary Education
A level	Advanced level

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