

## Integration of ICT in Teaching and Learning in Secondary Schools in Kigezi Region, Uganda

Dr. Businge Phelix Mbabazi<sup>1\*</sup>, Tamale Micheal<sup>2</sup>, Dr. Nafiu Lukman Abiodun<sup>3</sup>

<sup>1</sup>Department of Information Technology and Computer Science, Kabale University, Uganda

<sup>2</sup>Department of Information Technology and Computer Science, Kabale University, Uganda

<sup>3</sup>Department of Economics and Statistics, Kabale University, Uganda

DOI - <http://doi.org/10.37502/IJSMR.2022.5711>

### Abstract

Embracing of Information and Communication Technology (ICT) by most secondary schools in Uganda, especially in Kigezi region is faced by a number of challenges which had not yet been clearly documented. The purpose of this study was to establish whether ICT is being integrated in the teaching and learning process among selected secondary schools in Kigezi region. The study was guided by MICTIVO model (2009) of ICT integration. The quantitative research approach was the main approach while the qualitative approach was complementary. A sample of 332 students and 24 teachers from six (6) schools were required to participate in the study. Data was collected by means of a questionnaire and analysed using SPSS. The findings from the study indicated that ICT is not being used in the teaching and learning process, most of ICT Infrastructures were not available in schools and most respondents lacked the basic ICT skills and competencies. The model developed revealed that location of the schools and the year of existence were found to be significant while class and gender were found to be insignificant to ICT adoption in secondary schools. Based on the findings of the study, it is recommended that government and stakeholders should ensure that; schools are provided with the necessary ICT infrastructure, recruitment of qualified computer teachers, recruitment of computer laboratory technicians, continuous retooling of both students and staff and schools should encourage ICT usage at home.

**Keywords:** ICT, Integration, Teaching, Learning.

### 1. Introduction

Recent trends in educational systems worldwide include the integration of Information and Communication Technology (ICT) in the teaching and learning process (Omwenga, 2007). This is to help students acquire the relevant knowledge and skills needed in the 21st century (Omwenga, 2007; Uzunbolyu and Tuncay, 2010). Uganda developed her initial National ICT Policy in 2003 with the objective of integrating ICT into the educational curricula at all levels. Other literacy programmes were also included to provide equitable access to quality education for all students in Uganda regardless of their academic level (Farrell, 2007).

When the Ministry of ICT was established in Uganda in 2006, a number of policies were developed by the Ministry of Education and Sports to enable teachers acquire the necessary

ICT skills (Magambo, 2007; MoES, 2005). One of such policies was the ICT policy on Education for primary and secondary schools which specifically aimed at training teachers in ICT skills (MoES, 2005). The ministry of Education and Sports and ICT in partnership with other government agencies, like the Uganda Communications Commission (UCC), directed a number of efforts and resources towards improving teachers' ICT skills so that they effectively integrate ICT in their teaching and learning process (Magambo, 2007).

Information Communication Technologies (ICTs) could, if adopted and implemented appropriately, support learning and teaching but this is most of the times hindered by the prevailing digital divide between the urban and rural schools in Uganda (Ndaula, Kahuma , Mwebembezi & Masagazi, 2013). This is evident in terms of both physical resources and the capabilities of teachers to effectively utilize the limited available ICT resources especially in the rural schools where a great percentage of the schools in Kigezi region fall.

The digital divide within education systems of developing countries is evidenced in the lack of ICT infrastructure in schools and the insufficient capabilities of teachers to effectively utilize the available limited ICT resources they may have at hand (Uzunbolyu and Tuncay, 2010). Most of the times schools lack basic educational resources and justifying expenses on costly, fragile and often short-lived ICT can be problematic (Hite et al. 2010; Keniston, 2002; Ndaula, Kahuma , Mwebembezi & Masagazi, 2013). A successful combination of ICT resource acquisition and the capabilities of teachers to effectively use these resources can, provide schools with the required competency that can greatly benefit both the teachers and learners during the teaching and learning process. As head teachers become more aware of the advantages and strategies of ICT resources, they stand to increase the educational benefits for their students.

The research found out the major challenges hindering secondary school teachers from integrating ICT in the teaching and learning process.

To achieve this, the research was guided by the following key questions;

- a) How do teachers and students use ICTs in the teaching and learning process?
- b) What ICT infrastructure is available in the schools to support ICT integration in Education?
- c) What challenges do teachers and students face that hinder them from embracing ICT in Education?
- d) Which model can facilitate ICT adoption in Teaching and learning process?

### **1.1 Statement of the Problem**

Whereas the investment in ICT continues to increase in the education sector in Uganda (Ministry of Education and Sports, 2018), anecdotal evidence suggests that basic information communication technologies like computers and projectors are still not being effectively used in education institutions at all levels in the districts of Kigezi region. Most teachers in these institutions do not use these ICTs in the process of curriculum delivery as frequently as policy makers and researchers expect. Research conducted by (Farrell, 2007) showed that some institutions of higher learning especially universities like Makerere, Kyambogo, Mbarara,

Uganda Martyrs and Nkozi University have tried to integrate ICT into the teaching and learning process, but they have always faced the problem of high costs of purchasing and maintaining the ICT equipment as their main hindrance. At Kabale University it has been observed that most of the students admitted at the university from Kigezi region have limited computer skills and knowledge, yet ICT is one of the subjects they learn in secondary school. What is not clear is why they have limited computer knowledge and skills. In order to prepare student with the skills and knowledge necessary for the information society, ICT should be integrated at all level and all subject matter curriculum with appropriate way (Suat, 2014). Failure to effectively access and adopt ICTs and knowledge has greatly hindered sustainable progress for individuals and communities as we enter the 21st century (Katundu, 2000). Therefore, the study investigated integration of ICTs in Teaching and Learning in Selected secondary schools in Kigezi Region Districts, Uganda.

## **1.2 Objective of the study**

The main objective of the study was to establish ICT adoption in teaching and learning process in the selected secondary schools in Kigezi region.

### **1.2.1 Specific Objectives**

The specific objectives of the study include the following:

- i. To assess the usage of ICTs in the teaching and learning process.
- ii. To establish the ICT infrastructures currently available in the selected schools and how they are being used.
- iii. To ascertain the challenges secondary school teachers, face in integrating ICT in the teaching and learning process.
- iv. To develop a model for ICT adoption in teaching and learning process.

## **1.3 Rationale**

One of the goals of East African Community Vision 2050 is well-educated and healthy human resources where Science, Technology and innovation is the key enabler which is in line with Uganda Vision 2040 to have access to affordable quality health and education services. Ugandans aspire for a healthy, literate and well-informed society where education curriculum, examination and instruction methods will be revised to suit the proposed changes in the education system as well as being responsive to the market demand. Therefore, this study was intended to help the University achieve its 3rd core mandate of community outreach by encouraging the integration of ICTs in teaching and learning. This will help to create a Technology driven education system. Findings can be used to enable Kabale University take lead in solving the problems hindering integration of ICT in the teaching and learning process in secondary schools in Kigezi region. Hence, facilitate the integration of ICT in the teaching and learning process by both teachers and students in these schools. Findings of this study will also be important to school administrators, and other stakeholders in the education sector in Kigezi region to ascertain how prepared their secondary schools are in terms of enabling environment to support adoption and integration of ICT in teaching and learning process. The findings may further be used to highlight the capacity building gaps that are important in

formulating the suitable framework to empower teachers and students to effectively integrate ICT in the secondary school curriculum and how these gaps can be filled.

## **2. Literature Review**

In the past years, different researchers have investigated on various ICT implementations across a number of sectors among which include the education sector both in Uganda and internationally. For instance, Salih (2004) researched about the factors affecting the application of ICT in distance education in Turkey whereas Bagchi and Godwin (2007) carried out research on the factors that drive adoption of ICT in Africa and in the Organization of Economic and Cooperative Development (OECD) set of nations. Katushabe and Kisambira (2002) focused on ICT based educational content at Kyambogo University and its affiliated National Teachers Colleges; whereas Odongo (2007) took a study on ICT integration and its influence on teaching process in selected secondary schools in central Uganda. Justus Ariho and Twinomujuni (2011) undertook a study to ascertain problems in ICT implementation in selected institutions of higher learning in Kigezi Region Districts. None of the above studies has tackled the challenges faced by teachers in secondary schools in integrating ICT in education, yet secondary level is a critical level in the education process where this should be emphasized and thoroughly integrated in the teaching process. A study conducted by Mugisha (2007) put emphasis on the problems hindering ICT implementation in the curriculum of Primary Teachers' College in Kabale District. The study considered mainly tutors' attitude towards usage of ICTs in teaching and the availability of ICT infrastructure. Whereas the research looked at problems related to ICT implementation in education, the intended population consisted of only tutors in the said college hence leaving a gap which this study intends to close by considering secondary. In another research, (Munyantware, 2006) conducted a study on the problems hindering teachers' adoption of ICT in secondary schools in the western district of Kisoro. In this study, the researcher found out that teachers' technological skills were very essential to enable successful ICT implementation in the teaching and learning process. However, there was still a gap in the study since it targeted only science and mathematics teachers in secondary schools leaving out teachers for other subjects. The study also did not assess the extent to which other factors like availability of ICT infrastructure in the school can also impact ICT integration in education. This study intends to explore in depth the impact all the other underlying challenges can impact the process of ICT integration in education.

## **3. Methodology**

### **3.1 Study Design**

The study adopted across sectional descriptive survey design to collect data at one point in time from all the selected secondary schools. The quantitative approach was the main approach while the qualitative was the complementary approach. This research design was used to identify the challenges hindering ICT integration in the teaching and learning process in secondary schools in Kigezi sub region.

### **3.2 Population and Sample size**

The target population included students (1943), Teachers (24), Administrators (12) and Inspector of Schools (3) selected from Kigezi Region Districts of Kabale, Rukinga and Rukungiri. The six (6) schools were based on the top schools from which Kabale University get the highest number of students admitted for the different courses in different academic years. The schools represented both urban and rural setting by selecting one from Town and another from rural setting in each district and a total population of 1943 was considered as shown in table 1 below.

The sample size was determined using Yamane's formulae (1967).

$$n = N/(1+N(e^2))$$

Where; N is the population of study; n is the sample size and e is precision level.

To ensure proper representation of the samples, randomization and stratification approaches was used. Stratification uses knowledge of the population to increase the representatives of a sample of a given population size or to get an equivalent amount of information for a small sample (Margaret, 1995). From the six (6) schools, a sample of 332 students were required to participate in the study.

#### **4. Results & Discussions**

Data was collected from the three districts and a total of 332 questionnaires were distributed. A total of 233 questionnaires were returned and relevant to be used for analysis. This represented a return rate of 70.2% which was good enough for analysis.

##### **4.1 Objective 1: Usage of ICT in the Teaching and Learning Process**

As shown in Table 1 below, the most appearing response was Never (Mode of 1), with majority of the respondents reporting they have never used ICT in teaching and learning process except where sometime (36.8%) students use ICT to work on exercises and other tasks as indicated; Download homework uploaded by teacher on the school website (94.3%), Download/download/browse material from the school's website (85.9%), Create your own digital learning materials (81.6%), Use ICT to provide feedback and/or assess teachers' teaching (77.1%), To answer an online work or assignment (75.1%), Download/download/browse material from a learning platform (71.6%), Evaluate digital learning resources in the subject(s) you learn(70.9%), To make presentation slides (69.4%), Use applications to aid your learning process (64.1%), To monitor and evaluate your progress or performance (61.1%), Look for online professional development opportunities (58.9%), Browse/search the internet to collect information which you can use to understand concepts better (58.4%), To learn in class (47.6%) and Communicate online with your colleagues (47.4%).

**Table 1: Usage of ICT In the Teaching and Learning Process**

	<b>How have you used ICT during your learning?</b>	<b>Never</b>	<b>Rarely</b>	<b>Sometimes</b>	<b>Often</b>	<b>Mode</b>
1	Download homework uploaded by teacher on the school website	94.3	4.4	0.9	0.4	1
2	Download/download/browse material from the school's website	85.9	5.3	6.2	2.6	1
3	Create your own digital learning materials	81.6	8.8	8.8	9.0	1
4	Use ICT to provide feedback and/or assess teachers' teaching	77.1	15.6	4.8	2.6	1
5	To answer an online work or assignment	75.1	14.0	6.1	4.8	1
6	Download/download/browse material from a learning platform	71.6	9.1	15.9	3.4	1
7	Evaluate digital learning resources in the subject(s) you learn	70.9	18.9	7.9	2.2	1
8	To make presentation slides	69.4	12.1	9.9	8.6	1
9	Use applications to aid your learning process	64.1	14.7	15.2	6.1	1
10	To monitor and evaluate your progress or performance	61.1	11.8	17.0	10.0	1
11	Look for online professional development opportunities	58.9	18.6	16.5	6.1	1
12	Browse/search the internet to collect information which you can use to understand concepts better	58.4	13.9	23.8	3.9	1
13	To learn in class	47.6	12.1	10.0	30.3	1
14	Communicate online with your colleagues	47.4	23.7	17.5	11.4	1
15	Work on exercises and other tasks	36.0	15.4	36.8	11.8	3

In summary most of the respondents had never used ICT during the teaching and learning process for; Downloading homework uploaded by teacher on the school website ,Downloading material from the school's website ,Creating their own digital learning materials, Using ICT to provide feedback and/or assess teachers' teaching, Answering online work or assignment, Evaluating digital learning resources in the subject(s) you learn, Making presentation slides, Using applications to aid their learning/Teaching process, Monitoring and evaluating progress or performance, Looking for online professional development opportunities ,Communicating online with colleagues, and Working on other tasks as reflected in the table 2 above by the average mode of 1[Never]. These are in line with findings showed that most teachers in schools do not undergo professional ICT training and therefore do not exhibit necessary ICT skills (Ndawula, Kahuma and Mwebembezi, 2013).

This finding was supported by qualitative finding from one of the staff during interviews.

*"I have personally never used ICT to prepare for my class, give exercises to my students, provides feedback to my students, and to make a presentation in class. On rare scenarios; I have used ICT to search the internet for teaching materials and to keep students marks"*

#### 4.2 Objective 2: ICT Infrastructures Currently Available

Table 2 below shows that the majority of the respondents reported that most of the ICT infrastructure were not available for example Mobile phone provided by the school (97.4%), an E-reader (a device to read books and newspapers on screen) (93.9%), Interactive whiteboard (93.1%), Digital camera or camcorder (87.9%), Non-internet-connected laptop, tablet PC, netbook or notebook computer (84.8%), Internet-connected laptop, tablet PC, netbook or notebook computer (84.4%), Scanner (79.2%), Desktop computer with internet access (67.0%), Projector (63.4%).

However, for computers for students, 44.2% of the respondents reported that they were available but insufficient, for Computer laboratories 28.4% reported that they were very Insufficient and for Printing/Photocopying Facilities 29.7% said that they were very Insufficient though available. This means that most of the schools lack ICT facilities though some have ICT facilities e.g 20.7% reported that they had sufficient Computer laboratory, Projectors (13.4%), and Printing/Photocopying Facilities (13.4%).

**Table 2: ICT Infrastructures Currently Available**

	<b>Infrastructure</b>	<b>Not Available</b>	<b>Very Insufficient</b>	<b>Insufficient</b>	<b>Sufficient</b>	<b>Mode</b>
1	Mobile phone provided by the school	97.4	1.7	0.4	0.4	1
2	E-reader (a device to read books and newspapers on screen)	93.9	1.7	3.5	0.9	1
3	Interactive whiteboard	93.1	3.5	2.6	0.9	1
4	Digital camera or camcorder	87.9	7.3	3.4	1.3	1
5	Non-internet-connected laptop, tablet PC, netbook or notebook computer	84.8	5.7	7.0	2.6	1
6	Internet-connected laptop, tablet PC, netbook or notebook computer	84.4	8.7	3.5	3.5	1
7	Scanner	79.2	6.9	8.7	5.2	1
8	Desktop computer with internet access	67.0	22.2	6.1	4.8	1
9	Projectors	63.4	10.3	12.9	13.4	1
10	Desktop computer without internet access	41.7	28.3	27.8	2.2	1
11	Printing/Photocopying Facilities	29.3	29.7	27.6	13.4	2
12	Computer laboratory	25.4	28.4	25.4	20.7	2
13	Computers for students	22.3	27.5	44.2	6.0	3

In summary, the results showed that most schools especially in the rural setting lacked ICT equipment and infrastructure such as; Mobile phone provided by the school, E-reader (a device

to read books and newspapers on screen) ,Interactive whiteboard, Digital camera or camcorder, on-internet-connected laptop, tablet PC, netbook or notebook computer ,Internet-connected laptop, tablet PC, netbook or notebook computer, Scanner, Desktop computer with internet access, Projectors, Desktop computer without internet access ,Printing/Photocopying Facilities, Computer laboratory, and Computers for students as evidenced in the Table 3 above with average mode of 1 [ Not available]. This is in line with the findings that most schools lack Computers, Printers, Scanners, Photocopy (Ndawula, Kahuma and Mwebembezi, 2013)

However, Schools in Urban setting had some of the equipment and infrastructure but not sufficient for example, most schools have a few desktop computers with Internet connection.

This finding was supported by qualitative findings from the ICT staff during interviews from an urban school.

“The school management has tried to procure a few computers, a photocopier, printer and scanner. Two computers in the computer laboratory are connected to the Internet”

A teacher from a rural school said.

*“Our school does not have a computer laboratory, projectors, scanners, photocopiers and no Internet connection.”*

### 4.3 Objective 3: Challenges Faced in Integrating ICT

#### 4.3.1. ICT Infrastructure Challenges

Table 3 below shows which infrastructural challenges affect integrating ICT teaching and learning and from the respondents’ majority agreed that the entire ICT infrastructure affected them a lot (Mode of 4). For example, insufficient number of interactive whiteboards (58.8%), Insufficient Internet bandwidth or speed (57.1%), insufficient number of internet connected computers (55.7%), insufficient number of laptops/notebooks (50.9%), Insufficient number of computers (50.6%), School computers out of date and/or needing repair (47.8%), Lack of stable power connection (41.5%). This means that majority of schools ICT infrastructure is hindering them in integrating ICT in teaching and Learning.

**Table 3: ICT Infrastructure Challenges**

	ICT Infrastructure	Not at All	A little	Partially	A lot	Mode
1	Insufficient number of interactive whiteboards	23.2	5.2	12.9	58.8	4
2	Insufficient Internet bandwidth or speed	18.2	8.2	16.5	57.1	4.0
3	Insufficient number of internet connected computers	15.7	12.6	16.1	55.7	4
4	Insufficient number of laptops/notebooks	20.9	11.3	17.0	50.9	4
5	Insufficient number of computers	2.6	26.6	20.2	50.6	4
6	School computers out of date and/or needing repair	16.1	20.0	16.1	47.8	4
	Lack of stable power connection	9.4	26.3	22.8	41.5	4

### 4.3.2. Students (Characteristics, Competencies and Perceptions)

Table 4 below shows that the response mode was 4 meaning majority of the responses on Students (Characteristics, Competencies and Perceptions) was that they affected them a lot. For example, Lack of adequate content/material for learning (55.2%), Lack of adequate ICT skills (52.8%), Lack of models on how to use ICT for learning (40.5%), Most students not in favor of the use of ICT at school (39.2%), No or unclear benefit to use ICT for learning (37.3%), Lack of interest of students (36.4%). However, 29.3% of the respondents reported that most students not in favor of the use of ICT at school don't not affect integration of ICT in Teaching and learning.

**Table 4: Students (Characteristics, Competencies and Perceptions)**

No	Students (Characteristics, Competencies and Perceptions)	Not at All	A little	Partially	A lot	Mode
1	Lack of adequate content/material for learning	5.2	20.7	19.0	55.2	4
2	Lack of adequate ICT skills	8.7	18.2	20.3	52.8	4
3	Lack of models on how to use ICT for learning	4.3	32.8	22.4	40.5	4
4	Most students not in favor of the use of ICT at school	21.6	22.8	16.4	39.2	4
5	No or unclear benefit to use ICT for learning	29.3	19.1	14.2	37.3	4
6	Lack of interest of students	30.7	21.1	11.8	36.4	4

### 4.3.3. Supporting Context

Table 5 shows that the mode of the responses was 4 meaning majority of the respondents accepted that Insufficient technical support for students and Lack of refresher training in ICT affected them a lot. For example, 51.3% agreed that insufficient technical support for students affect them a lot while 54.1% also agreed that Lack of refresher training in ICT affected them a lot. This means there is need of Continuous refresher trainings in ICT and technical support for students in secondary schools. These are in agreement with the findings of Resta, (2002) who noted that during the integration of the ICT in education, technical support is so much needed for technology use throughout curriculum delivery since the lack of it may cause difficulties and result in diminished support for the curriculum.

**Table 5: Supporting Context**

No	Supporting Context	Not at All	A little	Partially	A lot	Mode
1	Insufficient technical support for students	14.2	22	12.5	51.3	4
2	Lack of refresher training in ICT	9.2	18.8	17.9	54.1	4

### 4.3.4. Skills Evaluation

Table 6 below evaluated the extent to which students were confident in the different skills sets. The results showed that majority of the respondents did not possess ICT skills with mode response of 1 meaning none of the skills except producing a text using a word processing Programme where students had little confidence. For example respondents reported that they possessed none of the following skills; Create and maintain blogs or web sites (68.4%), Download or upload curriculum resources from/to websites or learning platforms for students to use (68.0%), Edit text online containing internet links and images (65.1%), Download and install software on a computer (57.6%), Create a presentation with video or audio clips (57.3%), Participate in a discussion forum on the internet (56.7%), Create and/or edit a questionnaire online (56.1%), Use a spreadsheet to plot a graph (55.7%), Create a presentation with simple animation functions (55.0%), Capture and edit digital photos, movies or other images (54.1%), Email a file to someone (54.1%), Create a database (52.8%), Use emails to communicate with others (49.4%), Participate in social networks (47.6%), Use a spreadsheet (e.g., Excel) (45.5%), and Organize computer files in folders and subfolders (44.1%).

**Table 6: Skills Evaluation**

No	To what extent are you confident in the following? *	None	A little	Somewhat	A lot	Mode
1	Create and maintain blogs or web sites	68.4	11.7	6.5	13.4	1
2	Download or upload curriculum resources from/to websites or learning platforms for students to use	68.0	11.7	5.6	14.7	1
3	Edit text online containing internet links and images	65.1	14.2	4.3	16.4	1
4	Download and install software on a computer	57.6	15.7	9.2	17.5	1
5	Create a presentation with video or audio clips	57.3	16.4	11.2	15.1	1
6	Participate in a discussion forum on the internet	56.7	18.6	9.5	15.2	1
7	Create and/or edit a questionnaire online	56.1	23.0	6.5	14.3	1
8	Use a spreadsheet to plot a graph	55.7	19.6	7.0	17.8	1
9	Create a presentation with simple animation functions	55.0	13.4	11.3	20.3	1
10	Capture and edit digital photos, movies or other images	54.1	19.7	7.4	18.8	1
11	Email a file to someone	54.1	27.7	6.9	11.3	1
12	Create a database	52.8	21.5	6.4	19.3	1
13	Use emails to communicate with others	49.4	22.7	15.9	12	1
14	Participate in social networks	47.6	29.1	7.9	15.4	1
15	Use a spreadsheet (e.g., Excel)	45.5	26.8	10.0	17.7	1
16	Organize computer files in folders and subfolders	44.1	27.5	7.9	20.5	1
17	Produce a text using a word processing Programme	30.0	32.6	18.5	18.9	2

In summary the respondents were not confident in Creating and maintaining blogs or web sites, Downloading or uploading curriculum resources from/to websites or learning platforms for students to use; Editing text online containing internet links and images ,Downloading and installing software on a computer, Creating a presentation with video or audio clips, Participating in a discussion forum on the internet; Creating and/or editing a questionnaire online; Using a spreadsheet to plot a graph ;Creating a presentation with simple animation functions ;Capturing and editing digital photos, movies or other images; Emailing a file to someone; Creating a database; Using emails to communicate with others ;Participating in social networks ;Using a spreadsheet (e.g., Excel); Organizing computer files in folders and subfolders; Producing a text and using a word processing Programme as represented by the average mode of [None]. This is in line with the findings of Ihmeideh (2009) and Tapan (2009) who noted that Lack teachers' lack of knowledge and skills is one of the main hindrances in the use of ICT in education.

This finding was supported by qualitative findings from the ICT staff during interviews.

*“Most of the teachers lack ICT skills that can enable them effectively integrate usage of ICT in the teaching and learning process for example most of us cannot create presentation with simple animation functions, participation in live online discussions, however; a good number of teachers have some skills in using word processors, using emails, using excel and to teach students online if resources are available”.*

#### **4.4: Objective 4: Model Development**

The study proposed two models.

##### **(1) Logistic regression model for the association of Location, Type of School, Year of Existence, Students' Classes and Gender on the adoption of ICT**

The first model estimates the association of Location, Type of School, Year of Existence, Students' Classes and Gender on the adoption of ICT among secondary school students in Kigezi region using binary logistic regression model.

**Table 7: Logistic Regression Model**

<b>Variable</b>	<b>Model</b>
<b>Dependent Variable</b>	<b>ICT Adoption</b>
<b>Independent Variables</b>	
Location (Urban) (Rural)	1.383*(0.001)
Class (S2) (S3) (S4) (S1)	2.313(0.753) 2.015(0.092) 1.185(0.049)
Year of Existence (Above 15 Years) (Less than 15 Years)	1.185(0.002)
Gender (Male) (Female)	1.008(0.161)
Number of Respondents	233

Pseudo R <sup>2</sup>	0.453
Prob > chi <sup>2</sup>	0.001

The coefficients before the brackets are the adjusted odds ratio (AOR). AOR >1 means that the event (success) is more likely to occur in the first group. This analysis tested the association of Location, Type of School, Year of Existence, Students' Classes and Gender on ICT adoption among secondary schools' students in Kigezi region. From the model, the intercept / constant is the expected mean value of ICT adoption when all independent variables are zero. The results in Table 7 indicate that the likelihood of adopting ICT was higher among students in Urban secondary schools (AOR=1.383; p\_value=0.001) and the result is significant. Also, students in S2 are more likely to adopt ICT (AOR=2.313, p\_value=0.753), followed by students in S3 (2.015, p\_value=0.092), followed by students in S4 (AOR=1.185, p\_value=0.049) but the result is not significant. Students in secondary schools that were founded and in existence for above fifteen (15) years are more likely to adopt ICT (AOR=1.185, p\_value=0.002) compared with those students who attend secondary schools in existence for less than fifteen (15) years and the result is significant. ICT adoption was approximately equal for both genders. The likelihood ratio (LR) chi-square of 45.3 with a p-value of 0.001 tells us that our model fits significantly. Therefore, location of the schools and the year of existence were found to be significant while class and gender were found to be insignificant to ICT adoption in secondary schools in Kigezi region.

## (2) Multiple Regression Model

The second model is a multiple regression model and it is described as follows:

$$Y = \beta_0 + \beta_1 U + \beta_2 I + \beta_3 C + \varepsilon_i$$

Where;

Y: is the ICT adoption

U: is the ICT usage

I: is the ICT infrastructure

C: is the ICT challenges

V<sub>i</sub> = Random error term

**Table 8: Multiple Regression Model**

Variables Regressed	Adjusted R <sup>2</sup>	Standard Error	F-value	Sig.	Interpretation	Decision on H <sub>0</sub>
ICT Adoption Vs ICT usage, ICT infrastructure, ICT challenges	0.406	0.5819	37.435	0.000	Significant effect	Rejected
Coefficients	Beta	Standard Error	t-value	Sig.		
(Constant)	1.928	0.446	4.322	0.000	Significant Effect	Rejected
ICT usage	0.490	0.142	3.449	0.001	Significant Effect	Rejected

ICT infrastructure	-0.250	0.058	-0.420	0.675	No Significant Effect	Not Rejected
ICT challenges	-0.343	0.056	-6.090	0.000	Significant Effect	Rejected

Results in Table 8 indicate the multiple regression analysis carried out to model the ICT Adoption on ICT usage, ICT infrastructure and ICT challenges. The results show that ICT usage, ICT infrastructure, ICT challenges accounts for a total of 40.6% improvement on the ICT adoption in secondary schools in Kigezi region. The results further indicate that both ICT usage ( $\beta= 0.490$ , Sig=0.001) and ICT challenges by students ( $\beta= -0.343$ , Sig=0.000) are significant while availability of ICT infrastructures has no significant effect ( $\beta=-0.250$ , Sig=0.675). The students' ICT usage has a positive impact on their learning and therefore, this increases their level of adoption of ICT in the schools. However, availability of ICT infrastructures is negative implying that there is no adequate provision in these schools. Although, this inadequate provision is not significant implying that it does not affect students and does not discourage them from adopting ICT in their learning. This can be due to the students having their own smart phones and laptops at home. Finally, ICT challenges by the students in secondary schools in Kigezi region contributes negatively and it is significant.

The model for estimation is given as:

$$Y \hat{=} 1.928 + 0.490U - 0.25I - 0.343C$$

## 5. Conclusions & Recommendations

The findings from this study formed a report which can help in improving the community engagement services provided by the Faculty of Computing, Library and Information Services, the department of Information Technology and IT in particular by using their expertise and skills in ICT to help teachers use ICT to foster better education. This can also help the faculty of Education to start refresher courses for example ICT usage in Teacher Training. Successful execution of the recommendation, there is expected to be improved relationship between Kabale University and the neighbouring communities through community outreaches tailored on ICT skills acquisition. The relevance of the University in solving community problems is expected to improve greatly as well since the University can organize community outreaches aimed at acquisition of ICT skills to the Teachers

### 5.1: Conclusion

In view of the study findings, the following conclusions were made.

- i. In terms of how ICT is used during Teaching and learning, most teachers and students cannot download/upload homework, create their own digital learning/teaching materials, Use ICT to provide feedback, attempt online work or assignment, evaluate digital learning resources, make presentation slides and communicate online with colleagues.

- ii. The ICT Infrastructure for example computers, computer Laboratory, photocopiers, printers among others, were not sufficient in most urban schools and was not available in the rural schools.
- iii. The following were identified as the major challenges hindering Integration of ICT in Teaching and Learning process; Lack of adequate ICT Infrastructure, Lack of ICT Skills and Competences and lack of Technical Support for both students and Teachers.
- iv. The model shows that location of the schools and the year of existence were found to be significant while class and gender were found to be insignificant to ICT adoption in secondary schools in Kigezi region. It was also noted that the students' ICT usage has a positive impact on their learning and therefore, this increases their level of adoption of ICT in the schools.

## **5.2: Recommendation**

In view of the study findings, the following recommendations were made.

The following were identified as the major challenges hindering Integration of ICT in Teaching and Learning process; Lack of adequate ICT Infrastructure, Lack of ICT Skills and Competences and lack of Technical Support for both students and Teachers. Therefore, the following were recommended.

- i. Provision of ICT Infrastructure to schools by government and stakeholders
- ii. Recruitment of qualified computer teachers with the required ICT skills
- iii. Recruitment of computer laboratory technicians to provide the necessary technical support to teachers
- iv. Continuous retooling of both students and staff through community outreaches by the University
- v. Encourage ICT usage at home so that students can replicate its usage at school.
- vi. The faculty of Education should incorporate in the curriculum courses that can help teachers acquire the required ICT skills while still at the university

## **References**

- 1) Ali, W. A. W., Nor, H. M., Hamzah, A., & Alwi, H. (2009). The conditions and level of ICT integration in Malaysian Smart Schools. *International Journal of Education and Development using ICT*, 5 (2), 1-7.
- 2) Asabere N; Togo G; & Acakpovi A, 2017."AIDS: An ICT model for integrating teaching, learning and research in Technical University Education in Ghana" *International Journal of Education and Development using Information and Communication Technology (IJEDICT)*, Vol. 13, Issue 3, pp. 162-183
- 3) Bagchi, K. and Godwin, U. (2007). Factors that affect the adoption of information and communication technology in Africa and OECD set of nations. *University of Texas*, 3 (2).

- 4) Baylor, A. L., & Ritchie, D. (2012). What factors facilitate teacher skill, teacher moral, and perceived student learning in technology using classroom. *Computers and Education*, 39 (2), 395-414.
- 5) Bingimlas, K.A. 2009. "Barriers to the successful integration of ICT in teaching and learning environments: A review of the literature", *Eurasia Journal of Mathematics, Science and Technology Education*, vol. 5, no. 3, pp. 235-245
- 6) Cowie, B., & Jones, A. (2015). Digital horizons: Laptop for teachers evaluation study update on secondary teacher's experiences.
- 7) Dexter, S. L., Anderson, R. E., & Ronnkvist, A. M. (2002). Quality technology support: What is it? Who is it? And what differences does it make? *Journal of Educational Computing Research*, 26 (3), 265-285.
- 8) Farrell, G. (2007). Survey of ICT and education in Africa: Uganda country report. [http:// www.infodev.org](http://www.infodev.org) 11/08/2020
- 9) F. M. Ihmeideh, Barriers to the Use of Technology in Jordanian Pre-school Settings, *Technology, Pedagogy and Education*, 18(3), 2009, 325-341.
- 10) Gary, J.W. 2002. "Advantages and disadvantages of online learning", [Online] Available from: <http://www.comminit.com/ict-4-development/content/advantages-and-disadvantagesonline-learning>, [Accessed 8th June, 2020]
- 11) Haslam, T., Mumcu, F. K., & Usluel, Y. K. (2008). Integration of ICT Into The Teaching-Learning Process: Toward A Unified Model. *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2008* (pp. 2384-2389). Chesapeake, VA: AACE.
- 12) Katundu, D. (2000). The use and sustainability of Information Technology (IT) in academic and research libraries in Tanzania. Unpublished Ph.D. Thesis. Pietermaritzburg, University of Natal.
- 13) Katushabe, A. and Kisambira, E. (2002). E-learning face with daunting challenges in Uganda. [Http: // www.icconnect online.org](http://www.icconnectonline.org). Retrieved on 13/8/2020
- 14) Keeves, J. (1988). *Education research methodology and measurement. An international handbook*, New York: Pergamon press oxford.
- 15) Keniston, K. (2002). Grassroots ICT projects in India: some preliminary hypotheses. *Information Technology in Developing Countries*, 11(3), 60–64.
- 16) Khan, M., Hossain, S., Hasan, M. and Clement, C.K. 2012. "Barriers to the introduction of ICT into education in developing countries: the example of Bangladesh", *International Journal of Instruction*, vol. 5, no. 2, pp. 61-80.
- 17) Kirkwood, A. 2013. "ICT in higher education: policy perspectives", In: *ICT Leadership in Higher Education*, Hyderabad, India, pp. 36–43.
- 18) Kombo and Tromp (2006) *Proposal and thesis writing* Don Bosco Printing Press Makuyu Kenya
- 19) Krejcie, R.V., & Morgan, D.W. (1970). Determining Sample Size for Research Activities. *Educational and Psychological Measurement*, 30, 607-610
- 20) Magambo, J. (2007). Use of Information and Communications Technologies (ICTs) in teacher education in Sub-Saharan Africa: Case studies of selected African universities. [http:// deposit.ddb.de/cgi-bin/pdf](http://deposit.ddb.de/cgi-bin/pdf).

- 21) Margaret, P. (1995). *Social science research methods: a hand book for Africa*, (2nd ed), Nairobi: Educational publishers ltd.
- 22) Moses, P., Khambari, M. N., & Luan, W. S. (2008). Laptop use and its antecedents among educators: A review of literature. *European Journal of Social Sciences*, 7 (1), 104-114.
- 23) Mugisha, B. (2007). Problems affecting ICT implementation in the curriculum of core primary teachers in Kabale District. A case study of Bukinda core primary teachers' college. Unpublished Bachelors' research, Mbarara University of science and technology, Mbarara, Uganda.
- 24) Munyantware, D. B. (2006). Problems affecting teacher's adoption of technology in classrooms in secondary schools in Kisoro District. Unpublished Bachelors' research, Uganda Christian University, Mukono, Uganda.
- 25) Ndawula, Stephen, et al. "Getting Schools Ready for Integration of Pedagogical ICT: the Experience of Secondary Schools in Uganda." *International Journal of Academic Research in Business and Social Sciences* (2013): 46-61.
- 27) Nomsa Mndzebele, 2013. "Challenges Faced by Schools when Introducing ICT in Developing Countries" *International Journal of Humanities and Social Science Invention* ISSN (Online): 2319 – 7722, ISSN (Print): 2319 – 7714
- 29) Noor-Ul-Amin, S., 2013. "An effective use of ICT for education and learning by drawing on worldwide knowledge, research, and experience: ICT as a change agent for education", *Scholarly Journal of Education*, vol. 2, no. 4, pp. 38-45.
- 30) Odongo, M. (2007). ICT integration and its influence on teaching-learning process in selected secondary schools in central Uganda. Unpublished Masters Dissertation, Makerere University, Kampala, Uganda.
- 31) Omwenga, E. (2007). Pedagogical issues and issues E-learning cases: Integrating ICTs into teaching and learning process. Nairobi University, Kenya.
- 32) Resta, P. (Ed.). (2002). *Information and communication technologies in teacher education: A planning guide*. United Nations Educational Scientific and Cultural Organization, Division of Higher Education, UNESCO. France: Paris.
- 33) Rogers, E. M. (2003). *Diffusion of Innovations*. (5th ed). New York, NY: The Free Press.
- 34) Salih, U. (2004). Factors affecting the application of information and communication technologies in distance education in Turkey. *Turkish Online Journal of Distance Education*, 5 (1).
- 35) Samuel, R. J., & Bakar, Z. A. (2016). The utilization and integration of ICT tools in promoting english language teaching and learning: Reflections from english option teachers in Kuala Langat District, Malaysia. *International Journal of Education and Development using Information and Communication Technology (IJEDICT)*, 2 (2), 4-14.
- 37) Sarantokos, S. (1997). *Social research* (2nd ed), Palgrave Publishers limited.
- 38) Shiue, Y. M. (2007). Investigating the sources of teachers' instructional technology use through the decomposed theory of planned behavior.

- 39) S. M. Tapan, Using ICT in Teaching–Learning at the Polytechnic Institutes of Bangladesh: Constrains and Limitations, *Teachers World-Journal of Education and Research*, 33-34, 2009, 207-217
- 40) Surry, D. W. and Ely, D. P. (2001). *Adoption, diffusion, implementation, and institutionalization of educational innovations*. Upper Saddle River, NJ: Prentice-Hall.
- 41) Uzunbolyu, H., & Tuncay, N. (2010). Divergence of the digital world of teachers. *Educational Technology & Society*, 13(1), 186–194.
- 42) Vanderlinde, R., & van Braak, J. (2010). The e-capacity of primary schools: Development of a conceptual model and scale construction from a school improvement perspective. *Computers & Education* (2010), doi: 10.1016/j.compedu.2010.0216
- 43) National Policy on Information and Communication Technology (ICT) In School Education (2012), India
- 44) Rabah, J., 2015. “Benefits and challenges of information and communication technologies (ICT) integration in Québec English schools”, *TOJET: The Turkish Online Journal of Educational Technology*, vol. 14, no. 2, pp. 24-31.
- 45) Yilmaz, O. 2015. “The effects of live virtual classroom on students achievement and students opinions about live virtual classroom at distance education”, *Turkish Online Journal of Educational Technology*, vol. 14, no. 1, pp. 108–115.