UNDERGRADUATE STUDENTS' ATTITUDE TOWARDS INTERACTION WITH INFORMATION AND COMMUNICATION TECHNOLOGY DURING THE TEACHING - LEARNING PROCESS: A CASE OF KYAMBOGO UNIVERSITY

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A DISSERTATION SUBMITTED TO DIRECTORATE OF RESEARCH AND GRADUATE TRAINING IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF THE MASTERS OF EDUCATION IN EDUCATIONAL FOUNDATIONS OF KYAMBOGO UNIVERSITY

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DECLARATION

I, Apio Judith, hereby declare that this dissertation titled; Undergraduate students' attitude towards interaction with Information and Communication Technology during the Teaching - Learning process: A Case of Kyambogo University, is my original work and has never been submitted for consideration leading to academic award to any institution of higher learning.

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APPROVAL

This is to certify that this dissertation titled: Undergraduate students' attitude towards interaction with Information and Communication Technology during the Teaching - Learning process: A Case of Kyambogo University by Apio Judith has been prepared and submitted to the Directorate of Research and Graduate Training with our approval as the candidate supervisors.

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DEDICATION

This work is dedicated with love to the eternal memory of my son Joshua Obace (RIP) who looked upon my study with excitement and hope for a bright future but did not live to see its fruit.

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LIST OF ABBREVIATIONS AND ACRONYMS

AI	-	Artificial Intelligence
BED	-	Bachelor of Education
BTE	-	Bachelor of Teacher Education
CD-ROM	-	Compact Disc Read Only Memory
COVID-19	-	Corona Virus Disease, 2019
E-mail	-	Electronic mail
ICT	-	Information and Communication Technology
KYU	-	Kyambogo University
LMS	-	Learning Management System
MOODLE	-	Modular Object-Oriented Dynamic Learning Environment
UNESCO	-	United Nations Educational Scientific and Cultural Organization

ABSTRACT

Advanced technology might not be used if users fail to embrace the benefit of technology. Students' acceptance of ICT is a pivotal factor in determining the success or failure of ICT in the teaching and learning process. The purpose of this study was to explore undergraduate students' attitude towards interaction with ICT during the teaching–learning process at Kyambogo University. An explanatory cross-sectional design employing both quantitative and qualitative approaches was used in this study. Using simple random sampling, quantitative data was collected from 185 student respondents using structured questionnaire. Quantitative data was analyzed using SPPS-23 software. Qualitative data was collected from 45 randomly selected student participants using Focus Group Discussions (FGD) and from 05 purposively selected key informants using interviews. Qualitative data was analyzed thematically. The study revealed that students' ICT knowledge was influenced by orientation talks, training, exposure and self-study avenues. Students' ICT usage was found to be moderate. On use and attitude towards usage, the study revealed that students' ICT use was positively and significantly correlated with attitude ($r = 0.535$, $p < 0.01$). Conclusion: The study concluded that moderate ICT usage for teaching and learning was influenced by varying attitude towards ICT usage and ICT knowledge. There is therefore need to increase awareness of ICT applications for teaching and learning to enable students to remain updated with technology trend. Learning approaches such as problem-based and project-based learning that encourage students to use ICT devices and applications as an integral tool should be emphasized.

CHAPTER ONE

1.0 Introduction

Human beings interact with objects and are motivated to behave according to the meaning they associate with or ascribe to those objects. The meaning attributed to Information and Communication Technology (ICT) facilities and applications like computers, internet and other digital media are assumed to have direct influence on how and the extent to which users interact with it during the teaching and learning process (Michalski, 2013). In this chapter, the study background, problem statement, objectives and research questions, scope and significance of the study are discussed.

1.1 Background to the Study

1.1.1 Historical perspective

Over the years, there were numerous global and local efforts and commitments to promote students' interaction using information and communication technology (ICT), such as computers in the teaching and learning process. Universities have equally invested substantial amounts of money in procuring virtual applications like the internet to support teaching and learning (Ramadass & Shah, 2022). However, evidence showed that ever since the first computer was placed in the classroom in the 1980s, students' interaction with ICT during the teaching and learning process remained so marginal even in this twenty-first century (Seraji et al., 2017).

In the early 1980s, microcomputers for teaching basic programming, drills and practice were introduced in the classrooms in the United States of America (USA) (Chenoby, 2014). The goal was to create a student-centered learning environment that demanded active participation and discovery (Christensen, 2019). This early attempt to use computer technology for educational purposes did not progress well in the USA (Sangwan et al., 2021). Students remained cynical about computer usage for learning, which ultimately affected both

teaching and learning with ICT (Wellington, 2005). A recent study by the United States Department of Education further noted that seventy percent (70%) of learners in fifty (50) states, including the District of Columbia, still were moderately interacting with computers and other ICT applications for learning purposes, while only twenty-four percent (24%) interacted with it to a large extent (Gray & Lewis, 2021).

Furthermore, in Europe, survey of schools on the progress of ICT usage in Germany, Iceland, the Netherlands, and the United Kingdom revealed that students' interaction with ICT during lessons lagged behind as compared to their use of ICT in out-of-school activities (European Commission, 2019). Seventy-six percent (76%) of male and eighty-two percent (82%) of female students never engaged in any lesson-related activities such as group work or online lessons using ICT. This resistance by students lowered the interest of teachers, who, despite having access and positive attitude, could not implement ICT into their teaching and learning process.

Elsewhere in Malaysia, interaction with and use of web-based applications including Google, Microsoft Team, and e-learning management systems (LMS) to enhance the teaching and learning process did not progressed. Over fifty-six percent (56%) of students reportedly used these applications for communication and interaction with peers (Ramadass & Shah, 2022).

In the 1990s, the rise of internet and the World Wide Web (WWW) widened access to digital services such as email, video and teleconferencing, virtual libraries, and many more in Africa (UNESCO, 2003). On the rear of these technology advancement, artificial intelligent (AI) had been applied to education within the recent twenty years (Neha, 2020). AI is used by lecturers and students in the field of research, data illustration, intelligent tutoring, essay writing and reading among others (ibid).

Despite the fast advancement in educational ICT, Murithi and Yoo (2021) noted that students' interaction with these facilities in teaching and learning remained at infancy. In South Africa, for instance, Greunen et al. (2021) observed that despite the eighty percent (80%) increase in the overall connectivity and access to ICT facilities such as the internet, WI-FI, tablets, computer laboratories, and many more in universities, students' interaction with ICT applications for learning remained at forty-two percent (42%) only.

Kenya, despite being the leading digital hub in Sub-Saharan Africa, both educators and learners were not ready to use ICT facilities at their disposal for teaching and learning (Klarie & Jones, 2024).

In Uganda, Corona Virus Disease (COVID-19) outbreak in the year 2020 led to massive integration of ICT applications for teaching and learning in universities (Nyakito et al., 2021). Video communication, Google Classroom, Google Meet, Skype, Zoom Classroom, WhatsApp, and YouTube were among the different technologies deployed in the teaching and learning process (Aliyyah et al., 2020). The expectation was that students were competent, receptive, and effectively utilizing these applications for their learning. Despite these, there was little use of ICT for academic related activities as the majority of university students reportedly did not attend most of the online lessons (Ujeyo et al., 2022).

As noted by Dewey (1938), progressive education included socially engaging learning experiences which are appropriate for learners. Students' interaction with ICT in the teaching and learning process cultivate social learning experience. ICT connects students to knowledge, to each other, the world and promotes hands-on experiences thus experiential learning (Sikandar, 2015). However, integrating ICT in the teaching and learning process largely depended on students' attitude toward ICT usage (Bariu & Chun, 2022). If ICT is to be used effectively, students' positive views remained crucial. Consequently, an investigation of students' attitude towards interaction with ICT during the teaching-learning process was

imperious. This study thus explored undergraduate students' attitude towards interaction with ICT in the teaching- learning process at Kyambogo University.

1.1.2 Theoretical perspective

The study used Technology Acceptance Model (TAM) theory proposed by Fred Davis in 1989 (Venkatesh & Davis, 2000). TAM is an information system theory that explains how a new technology is received and utilized by the users (Davis, 1989). This theoretical basis is built on the premise that acceptance to use a new technology is derived from Perceived Ease of Use (PEOU) and Perceived Usefulness (PU). These two constructs determine the attitude of the users toward using a technology. The attitude determines the behaviour which in turn influences actual technology usage. However, external variables represented by inadequate technological knowledge/competencies, limited technology facilities, system barriers, age and gender also affect acceptance (Ghavifekr et al, 2016).

According to TAM, Perceived Ease of Use is the extent to which an undergraduate student believes that using ICT during teaching and learning will be free from cognitive effort (will not be labour consuming). That is, the ICT application is easy to learn, convenient, easy to use and ease of access to information among others (Davis, 1989). Perceived Usefulness is an individual's belief that using a system (ICT) would enhance his or her performance on a task (Davis et al.1989) This implies that perceived usefulness is the extent to which an undergraduate student believes that using ICT facilities and applications will boost his/her learning (Marikyan & Papagiannidis, 2023). Attitude towards use (ATU) is the general impression about the technology. Attitude towards use decide on students positive or negative behavior concerning using ICT. This determines the actual technology usage during the teaching-learning process (Lai, 2017).

The theoretical framework perceived ease of use of available ICT facilities directly aligns with the study objective one which seeks to find out students' knowledge of ICT for teaching

and learning. The dimension of perceived usefulness links with objective two which establishes use of ICT for learning. Attitude towards use of ICT facilities which is a critical component of TAM has direct linkage with objective three which seeks to establish students' attitudes towards ICT usage for teaching and learning.

This theory was used to investigate the attitude of undergraduate students towards interaction with ICT during the teaching and learning process, taking into account basically Perceived Ease of Use (PEOU), Perceived Usefulness (PU) and Attitudes towards usage of ICT applications.

Perceived usefulness and Perceived ease of use informed the expectation of a positive behavioural outcomes. This implied that if students believed that ICT facilities and provisions such as computers, smartphones, the internet, and other applications like Google Meet, Zoom, and WhatsApp, among others, enhanced their learning, the more they are likely to use it for learning. In addition, when an application is perceived to be easy to use, the more it is likely to stimulate acceptance of the technology.

1.1.3 Conceptual perspective

Implementation of ICT in university education is confronted with crucial factors which included among others attitude of undergraduate students towards interaction with ICT in the teaching and learning process. Undergraduate students are learners who study for a degree or diploma or certificate at a university. Undergraduate students are thus students enrolled on Bachelor of Education (BED) and Bachelor of Teacher Education (BTE) programmes at Kyambogo University.

According to Kumar and Sankar (2023), attitudes are made of elements that guides behavior of an individual which include: feeling or perceptions, will, actual use, and having knowledge or being in the know. This can be positive or negative (ibid). Undergraduate students' attitude

towards ICT therefore referred to knowledge of ICT, use of ICT and positive or negative attitude towards ICT for teaching and learning by BED and BTE students.

Students' ICT knowledge is used in this study to refer to the evaluation of BED and BTE students' potentials to use ICT facilities for learning. Students' use of ICT meant using ICT facilities optimally and maximally in the class interaction by BED and BTE students. Whereas attitude is used to refer to the positive and negative evaluation of BED and BTE students' feeling towards ICT usage during the teaching and learning process.

Interaction with ICT refers to all the activities of actively using technological resources such as computers, smartphone and other digital tools to access, share, manipulate and manage information (Hafifah, 2019). In this study, interaction with ICT is the activity of using computer and internet, YouTube, Google Meet, Google Classroom, Zoom, e-library, e-learning management system, WhatsApp among others.

Teaching and learning on the other hand is a process that brings about the transfer of worthwhile knowledge and skills from a teacher to the learner (Akarowhe, 2017). In this study, teaching and learning is used to mean online tutorials, e-lecture attendance and delivery, access and development of study materials, e-class discussion, access to and submission of course work and assignment, among others.

Interaction with Information and Communication Technology in the teaching and learning process therefore referred to technology-based teaching and learning that involved the use of video conferencing, YouTube for online tutorials, Google Meet, Google Classroom, and Zoom for e-lecture delivery and attendance, computers and the internet, university e-library, an e-learning management system (KELMS), e-modules for accessing study materials, WhatsApp for sharing class materials, and e-mail for submission of course work and assignments, among others.

1.1.4 Contextual perspective

In 2003, the Ugandan government came up with an initial ICT policy for education. This policy recognized the need to embrace ICT in order to support the education process in Uganda schools, colleges and universities (Farrell, 2007). This initial ICT policy for education was however, implemented haphazardly and abandoned at inception because motivation and willingness to integrate ICT in education were lacking (Guma et al., 2013). As a result, much of the teaching and learning remained traditional at all levels of education including higher education like Kyambogo university.

Kyambogo University (KyU), a leading universities in Uganda is charged with training teachers and teacher educators (Kasule et al, 2015). This implies that producing quality and competent future teachers, teacher educators and pedagogical leaders in line with national and global trend is key in delivering this mandate. It is for this reason that KyU was chosen as a site for this study.

The School of Education particularly through Bachelor of Education (BED) and Bachelor of Teacher Education (BTE) programmes is expected to train the prospective teachers and oversee their professional development. This calls for commitment to equip teachers with ever advancing pedagogy which supports dispensing of appropriate competencies. In order to achieve this, tremendous efforts have been made by the university to use a blended approach in its instructional process in all its faculties and schools (Mugizi et al., 2021). Google Meet, Zoom Classroom, and Google Classroom were among various ICT applications deployed in the teaching and learning process (Atwine, 2021).

Since society now demands for a digitally literate teacher due to advancing technology, Kyambogo University, a teacher trainer should serve as a role model in preparing teachers with relevant competence in ICT through technology-mediated training experiences. Consequently, it was imperative for this study to investigate KyU BED and BTE students

who are prospective teachers' ICT knowledge, use and attitude towards usage. This context formed the basis upon which this study investigated undergraduate students' attitude towards interaction with ICT during the teaching-learning process at Kyambogo University.

1.2 Problem Statement

To enhance digital literacy among students and staff and successfully utilize ICT for education purposes, integration of educational technology into the curriculum is an imperative (Okaka, 2024). Mbabazi et al. (2022) however, noted that ICT was not being used in the teaching and learning process in Uganda as required. Prospective teachers under training in Uganda are said to qualify without attaining digital literacy and were putting less efforts in rebranding their pedagogical practices including integration of ICT in the teaching-learning process (Mabongo, 2021). This implies that teacher training institutions like Kyambogo University (KyU) might not have fully integrated ICT in the training of teachers or there is lack of motivation to use ICT (ibid). As noted by Lubaale (2020), one of the major challenges KyU had in the implementation of ICT in the teaching and learning process was staff and students' limited ICT knowledge and usage.

The above concerns surrounding ICT at KyU raised an important question as to whether undergraduate in-service students enrolled for BED and BTE programmes who are tutors, instructors, and teachers were being developed into technology adept professionals to handle the dynamic technology enhanced education system in Uganda. It remains unclear whether BTE and BED students had embraced ICT during the teaching and learning process at Kyambogo University. If these prospective teachers and tutors continuously lack interaction with ICT during their training at Kyambogo University, then the use of ICT and generally the uptake of e-learning in Uganda is likely to be jeopardized. Based on the aforementioned context, this study thus investigated undergraduate students' interaction with ICT during the teaching and learning process at Kyambogo University.

1.3 Purpose of the Study

This study explored undergraduate students' attitude towards interaction with Information and Communication Technology (ICT) during the teaching and learning process at Kyambogo University School of Education.

1.4 Specific Objective

1. To explore students' knowledge of the ICT applications for teaching and learning at Kyambogo University.
2. To establish the ways in which students are using ICT for learning at Kyambogo University.
3. To establish student's attitude towards the use of ICT for teaching and learning at Kyambogo University.

1.5 Research Questions

1. What is the extent of students' knowledge of the ICT applications for teaching and learning at Kyambogo University?
2. In what ways are students using ICT for learning at Kyambogo University?
3. What is the attitude of students towards the use of ICT for teaching and learning at Kyambogo University?

1.6 Hypothesis

H_0. There is no statistically significant relationship between student's attitude and the use of ICT for teaching and learning.

1.7 Scope of the Study

1.7.1 Geographical scope

This study was conducted in the school of education at Kyambogo University (KyU) a public university in Uganda. The school of education at KyU is mandated to oversee teachers'

professional development with in-service education programmes for teachers that included among others Bachelors of Education (BED) and Bachelors of Teacher Education (BTE).

1.7.2 Content scope

The study explored Kyambogo University undergraduate students' knowledge of the ICT-based facilities and applications available for teaching and learning at the university, the ways in which undergraduate students at Kyambogo University school of education used ICT for their learning, and Kyambogo University students' attitude towards ICT usage for teaching and learning. Besides, the study also established whether there was no statistically significant relationship between students' attitude and the use of ICT for teaching and learning.

1.8 Significance of the Study

Interaction with Information and Communication Technology creates a powerful environment that transforms both the teaching and learning process in an active, self-directed, and dynamic manner. The study findings may be useful in a number of ways;

To Kyambogo University senate: This study findings will provide an up-to-date review of the nature and extent of ICT usage by students. This may be useful in improving quality of access to ICT for teaching and learning.

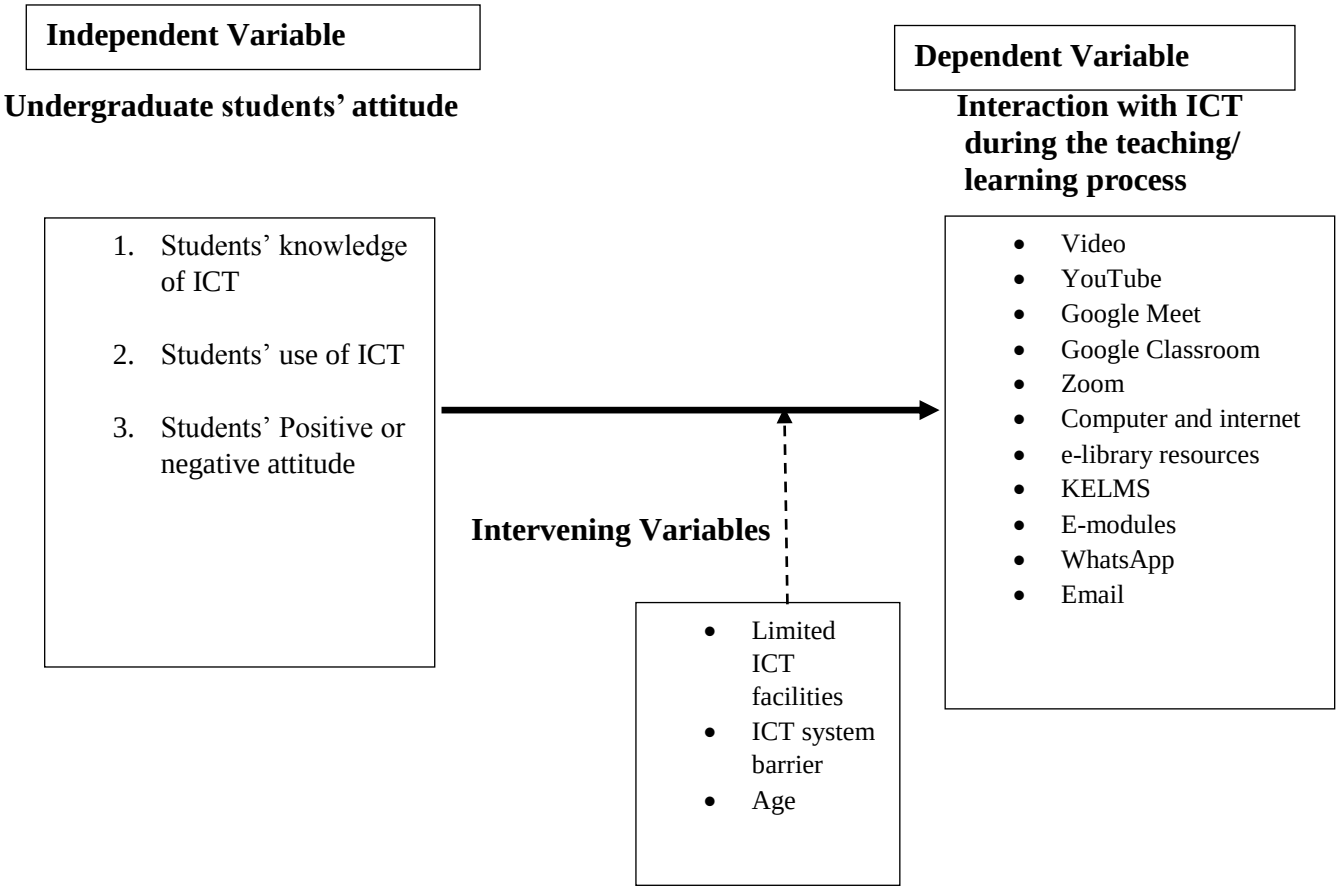
To lecturers: Findings on students' attitude towards interaction with ICT in the teaching and learning process may help the lecturers in establishing the e-readiness of learning with ICT at Kyambogo University. In addition, the findings may help lecturers to look for the most appropriate approaches to integrate ICT to support the core academic business.

To Ministry of Education and Sports (MoES): Responses from BTE and BED students who are lecturers, teachers, and tutors may be useful to the MoES and relevant stakeholders in understanding the future of ICT in education and the uptake of blended learning in Uganda since these teaching professionals represent the future of education in Uganda.

This study findings will validate earlier studies that used Technology Acceptance Model to examine users' acceptance of e-learning applications in universities in Uganda

1.9 Conceptual framework

Figure 1.1 Conceptual diagram showing the relationship between undergraduate students' attitude and interaction with ICT applications during teaching and learning.



Source: Adopted from TAM and modified by researcher, 2024

The above conceptual diagram shows the relationship between undergraduate students' attitude and interaction with ICT applications during the teaching and learning process. Independent variables undergraduate students' attitudes were taken to be students' knowledge of ICT for teaching and learning, students' use of ICT, and students positive or negative attitude towards ICT usage. While the dependent variable interaction with ICT in the teaching and learning process meant the activity of using video conferencing, YouTube, Google Meet, Google Classroom, Zoom, computers and internet, university e-library, e-learning management system (KELMS), e-modules, WhatsApp, and e-mail. This study anticipated

that undergraduate students' interaction with ICT during the teaching and learning process depended on students' knowledge of ICT-based facilities and applications for teaching and learning, students' use of ICT for learning, and students' positive or negative attitude towards ICT usage for teaching and learning.

Figure 1 also recognized the possibility of other factors influencing undergraduate students' attitude towards interaction with ICT applications in the teaching and learning process. Such factors included limited ICT facilities, ICT system barrier and age.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter presents a critical review of literature related to undergraduate students' attitude towards interaction with ICT during teaching and learning. It particularly focused on students' knowledge of ICT facilities and applications, students' use of ICT for learning, students' attitude towards the use of ICT for teaching and learning. Summary on salient issues raised in the literature review and a conclusion ended the chapter.

2.1 Students' knowledge of ICT applications for Teaching and Learning

Students' knowledge of ICT refers to the evaluation of students' potential to use the existing ICT-based facilities and applications for teaching and learning through training and self-study.

Zwilling et al. (2020) surveyed students' awareness and attitude towards online learning during COVID-19 in higher education institutions of Israel, USA, Slovenia, Thailand, Poland, and the Czech Republic. Survey revealed that more than fifty percent of students in these countries had knowledge of Zoom, Google Meet, and MS Teams for online learning.

As a result, there were effective learning outcomes. In addition, forty percent had high knowledge of social networking tools such as blogs, Wikis, WhatsApp, Facebook, Twitter, and Instagram for personal non-academic interactions, and there were ineffective study outcomes. The context of this study was outside Uganda, yet level of technology awareness for teaching and learning in higher educational institutions was low. This attracted this study to explore BED and BTE knowledge of Zoom, Google Meet, Google Class, and WhatsApp for teaching and learning at Kyambogo University.

In India, Prakash et al. (2020) surveyed awareness of teacher education students in colleges of secondary education. The survey revealed that out of two hundred and nine (209) students in colleges of education, only seven percent (7%) of students exposed to computers and the internet on a regular basis were better in their knowledge of computers usage including internet search engines such as Google, Bing, and Chrome for their learning. Seventy percent (70%) knew the use of e-mail as a communication tool. More than twenty percent had limited knowledge of ICT and were not ready for rapid shift to online learning. This study however, did not revealed whether the students had good ICT knowledge for teaching and learning purposes. Good knowledge of ICT force students to use ICT productively to enhance teaching and learning. This study motivated the current study to investigate KyambogoUniversity BED and BTE students' knowledge of ICT for teaching and learning.

Additionally, an investigation by Arundhathi et al. (2018) on awareness and impact of ICT on students' academic performance in Sharada Villa Teachers College, Mysore, showed that fifty-four percent of students knew Learning Management System (LMS) as a platform for downloading lecture notes, uploading course work and assignments, e-discussion, and online collaboration. This level of awareness was, however, attributed to enrolment in the LMS learning sites. Teaching and learning in universities today require that students be knowledgeable about the various ICT applications that could facilitate their learning. This was the motivation for this study to investigate Kyambogo University case.

In Nigeria, Okonoko and Eruvwe (2020) investigated students' awareness of Information and Communication Technology-based resources in libraries in seven colleges of education in Southern Nigeria. Results showed that eighty percent (80%) of students who were trained on computer usage had good knowledge of the use of Microsoft Word for word processing, PowerPoint for presentations, and the internet for sending or downloading email. There was

limited training on the use of online collaboration and communication tools like Google Classroom, Google Meet, Skype, Zoom Classroom, e-library, and open courseware for learning, thus low knowledge. Students ought to be trained on the latest educational technology as a safe way to use ICT for teaching and learning. Findings from Okonoko and Eruvwe (2020) informed this current study to establish the level of ICT knowledge through orientation and training on the use of Google Classroom, Google Meet, Zoom Classroom, WhatsApp, e-library among others for learning.

In addition, a study by Sharma and Poonam (2020) on awareness and use of ICT indicated that eighty-five percent (85%) of government college students in Himachal Pradesh learned ICT and internet skills by self-study. These students were found to possess moderate knowledge and skills for accessing social sites, playing games, and chatting purposes. There was low knowledge of ICT for accessing online study materials and online learning. This study recommended that training students on ICT was important to improve their ICT knowledge. This study, though conducted among college students, informed the current study to investigate the Kyambogo University case.

In Uganda, Olaniyan and Fakuade (2023) conducted a descriptive survey among two hundred students from Kampala International University and Makerere University on level of ICT availability and user competency. The results showed that participants had a relatively low level of users' competency in ICT, thus limited knowledge of ICT for learning purposes. The students' competency and knowledge levels were found to be more on using smartphones for social engagement and connectivity rather than learning purposes. With the influx of new and innovative Information and Communication Technology for teaching and learning, knowledge on latest ICT applications is necessary. This attracted the current study to explore students' ICT knowledge at Kyambogo University.

2.2 Students' use of ICT for Learning

Students use of ICT applications for learning implies ways in which undergraduate students actively used computers and internet, and other digital media such as videos, e-library, Zoom, Google Classroom, and the Learning Management System (LMS) for access to study materials, lecture attendance, tutorial sessions, and group work, among others.

Martinez-Daza et al. (2021) studied attitudes, knowledge, and ICT usage at institutions of higher education in Columbia. The study revealed that students used desktop and laptop computers and internet search engines like Google, Chrome, Bing, and Yahoo as part of their daily lives and not exclusively for learning. The majority of students used computers and internet connections for other purposes, such as reading, playing music, and playing games. Computers and internet connections enables students to access unlimited online course materials and research publications for learning. These studies informed the current study to investigate the ways in which students at Kyambogo University School of Education use computers and internet connectivity for learning.

In Uganda, an investigation into students' use of the Learning Management System (LMS) was conducted by Opati (2013). It was established that students at Makerere University College of Education and External Studies used the LMS as an artifact for monitoring their academic progress, registering for courses, and accessing marks for different examinations. They were not accessing course materials and assignments posted by their lecturers onto the system. The LMS provides a good pedagogical tool for uploading lessons, setting online assessments, directing online discussions, and updating learning materials, among others. Although Kyambogo University has the KELMS, the ways in which her students used these applications in the teaching and learning process were not known. This was a motivation for this study to establish the ways in which school of education students used KELMS.

Furthermore, Gakibayo et al. (2013) conducted a quantitative survey using questionnaire on electronic information resource utilization by students at Mbarara University, Uganda. Findings revealed that only twenty-six percent (26%) of undergraduate students were infrequently utilizing e-library e-books, e-journals, and scholarly databases to access academic content. The majority of undergraduate students did not use the e-library resources at all. The findings further showed that utilization of these e-resources was constrained by inadequate retrieval skills. These studies prompted the current study to use interview and focus group discussion guides to ascertain the ways in which Kyambogo University students utilize the e-library resources for learning.

Maziriri et al. (2020), too, studied students' use of education videos, including YouTube and video conferencing, in Malaysia. The study established that more than eighty percent (80%) of students have used YouTube tutorials for educational purposes. The study further observed that YouTube provided access to a substantial amount of education videos, making it a viable option for students to receive tutorials. Findings from these studies informed the current study at Kyambogo University to explore the use of video conferencing and YouTube for online tutorials and sharing of class materials.

In a related study, Benmansour (2021) analyzed the use of Zoom in distance learning at Mohammed Ben Ahmed University, Algeria. Fifty-three percent (53%) of the students were found to be using Zoom for online lectures, sixty-five percent (65%) used it to download lecture materials posted on the platform, forty-seven percent (47%) used it for class discussion, and forty-four percent (44%) for assignments. This evidence provided showed that Zoom is used to facilitate the teaching and learning process in various ways. This implied that the experience at Kyambogo University School of Education could be different. These observations made it necessary for this study to establish if and how Zoom technology is used for teaching and learning at Kyambogo University.

Similarly, Sidiq et al. (2022) investigated use of e-modules in implementation of the K-13 curriculum in Indonesia. The qualitative survey found that combining video, audio, text, graphics, and images motivated students to be active, creative, and independent learners. This study recommended the use of e-modules in the current era of blended learning. This recommendation guided current study to explore the use of e-modules for study materials at Kyambogo University.

Additionally, in Malaysia, Lee et al. (2023) studied WhatsApp use in a higher education learning environment in a private university, Sunway. It was established that out of the ninety-nine (99) respondents, thirty-three percent (33%) used WhatsApp for discussion among peers, thirty percent (30%) for sharing resources, sixteen percent (16%) for conducting group studies, and twenty percent (20%) for informing on education agendas. This indicated that respondents in this study used WhatsApp relatively for varying purposes. This study was purely quantitative thus triangulation was difficult. It motivated researcher to use a mixed method approach to gain deeper insight on the ways in which Kyambogo University students use WhatsApp for learning.

Documentary evidence by Nashruddin et al. (2020) on perception and use of email by students in Indonesia showed that students used the email for delivery of academic documents. The students used the email for receiving assignment materials from their teachers. In the same way, they sent assignment documents to their teachers using the email. Kyambogo University generated student email addresses for academic-based usage. The e-mail is a useful resource that is used to a greater extent but for slightly varying reasons. This study however, was conducted in different region thus it informed the current study to explored Kyambogo University students' email usage for teaching and learning purposes contextualization.

2.3 Students' Attitude towards the Use of ICT for Teaching and Learning

Students' attitude towards use of ICT for teaching and learning refer to students' positive or negative feeling or perception towards technology-based teaching and learning.

Olamide (2022) evaluated awareness and attitudes toward learning management system (LMS) among undergraduates at the University of Ibadan, Nigeria. The result revealed that over ninety-four percent (94.6%) of the one hundred fifty (150) respondents were positive towards the use of LMS for coursework. Students believed that the LMS was convenient to use and increased their productivity in coursework. The LMS is a useful repository for uploading class lecture materials, setting online assessments, directing online discussions, and updating learning materials, among others. Although Kyambogo University had KELMS, students' attitude towards its usage was not known. These findings provided a basis upon which the researcher established Kyambogo University's student attitude towards the use of KELMS for access to course content, class discussion, and submission of course work and assignments.

A cross-sectional survey in United States of America by Ngo and Eichelberger (2019) on students' attitudes towards ICT indicated favorable attitude towards the use of computers and internet for digital music with over seventy percent (70%) positive rating. Only thirty percent (30%) of university students had a positive attitude toward the use of computers and the internet for academic purposes. The study concluded that students were comfortable using computers and internet search engines like Google, Chrome, Bing, Yahoo, and Forum but not exclusively for academic purposes. This study prompted the current study investigate the attitude of Kyambogo University students on the use of computers and the internet for access and development of study materials.

In Uganda, Namugera et al. (2023) surveyed attitudes of library users toward virtual libraries at Makerere University and Uganda Christian University. Results revealed that all three

hundred ninety-four (394) respondents believed that virtual libraries could improve their learning and research, with highest mean score of 4.4. This result reflected a positive attitude with the highest recognition and value for the virtual library as a tool that enhance students' knowledge in academic pursuit. E-library resources, such as research articles, e-books, and e-journals, among others are very effective in augmenting teaching and learning. Consequently, this prompted an investigation into the Kyambogo University case. This study thus investigated the attitude of Kyambogo University students towards interaction with the e-library resources for access and the development of their study notes.

In Malaysia, Law (2021) studied students' attitude and satisfaction towards transformative learning using video conferencing for online distribution of course materials and tutorials. Findings indicated that all the ninety-seven (97) students showed favorable attitudes towards pre-recorded tutorial videos and online distribution of course materials in video format. Pre-recorded tutorial videos enabled the students to understand the course content as they watched over until they master the content. Similarly, evidence from Pakistan showed that seventy percent (70%) of students preferred online tutorial interactions using videos (Minhas et al., 2021). These studies, though limited by their contextual setting, revealed that some students preferred the use of video flips for learning. This was a basis upon which this current research investigated attitude of Kyambogo University students towards use of videos for teaching and learning.

Rana and Rana (2020) investigated ICT integration in teaching and learning at the University of Tribhuvan, Nepal, using semi-structured interviews and observation on six (6) participants. The study established that the student had a strong positive attitude towards the use of WhatsApp for creating a virtual network of colleagues with whom they interacted. Students' attitudes towards the use of WhatsApp for discussing academic contents and obtaining academic support were low. This study, though conducted with a very small sample using interviews and observations, was a motivation for the current research to be conducted among

many participants using questionnaires and focus group discussions to provide a deeper understanding on experience of using WhatsApp for learning at Kyambogo University.

In addition, Prabukumar et al. (2023) studied perception of undergraduate students on the use of e-modules in India. Their report indicated acceptance rate of e-modules for accessing study materials to be ranging from moderate to good. This implied that students had moderate positive attitude towards e-modules for access to up-to-date knowledge. Although this study was purely qualitative and its findings could not be generalized, it guided researcher to explore the attitude of Kyambogo University students toward the use of e-modules for accessing study materials.

Furthermore, in Saudi Arabia, Ahmed and Rehman (2021) examined students' attitude towards the use of Google Classroom. The study established positive attitude towards the use of Google Classroom. Students believed that Google Classroom provides the opportunity to share the most relevant study materials from lecturers. In addition, Google Classroom provided the opportunity to flip the classroom, thus increasing their participation in online class discussion. Findings from this study motivated the researcher to investigate students' attitude towards the use of Google Classroom for e-lecture attendance, participation in group work and class discussion.

Similarly, Rahimi and Zilka (2022) surveyed students' attitude towards the use of Zoom in higher education institutions in Israel. Results established that most students were satisfied with the Zoom lessons. Out of the seven hundred and twelve (712) students studied, fifty-four percent (54%) opted to study online using Zoom. Learning disorders such as non-interaction was, however, connected with students' negative attitudes towards learning with Zoom. This study's findings, though limited by its contextual setting, guided the current study to explore attitude of Kyambogo University students on use of Zoom Classroom for e-lecture attendance, participation in group work, and class discussion.

In the same way, Akcil and Bastas (2020) explored students' attitude towards e-learning using e-mail at Near East University, Northern Cyprus. Findings obtained displayed that students were not willing to use the e-mail to communicate to lecturers on issues of course content and assignments. Students believed that using e-mail for delivery of course content and assignments barred them from getting enough help from lecturers. As a result, students abstained from assessment works using e-mail. Although this qualitative study lacked numerical evidence, it thus could not be used to draw logical conclusions based on experience in other universities. It motivated this study to investigate attitude of Kyambogo University students on use of e-mail for access and submission of course works and assignments.

2.4 Summary of Literature and Conclusion

Several global researches on attitudes and interaction with ICT for teaching and learning have been done. Many studies reviewed above were conducted in other regions and educational institutions of the world. Example, Zwilling et al (2020), Olamide (2022) and Nashruddin et al (2020) hence findings from these studies could not be accurately used to situations in other universities including Kyambogo University (KyU). Therefore, there was need to contextualize by studying KyU to give a local context. In addition, some studies conducted in Uganda used small samples that could not be generalized (Opati, 2013, Gakibayo et al, 2013). There was need for an independent study at KyU with a relatively larger sample of respondents to increase generalizability. Furthermore, other studies were purely quantitative (Olamide, 2022, Namugera et al, 2023, Lee et al, 2023) thus triangulation was difficult. Thus, there was need to use mixed method approach to gain deeper insight. In this era ICT is used for; tutorials, access of study materials, e-lecture delivery and attendance, class discussion and group work among others. The current study, thus generated scientific evidence on Kyambogo University's case.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

In this chapter, the study design, location of the study, target population, sampling techniques, sample size, data collection methods and instruments, data quality controls, data analysis and ethical considerations are presented

3.1 Research Design

An explanatory mixed method cross-sectional design was used. Both the qualitative and quantitative data collection was done at the same time. In the mixed method, the qualitative approach was the dominant method. Specifically qualitative strand explored the experience of students on ICT knowledge, use and attitude towards usage. The qualitative findings provided detailed information, meaning and explanation which was corroborated with the quantitative findings. Quantitative approach was used to establish the level of students' ICT usage and attitude towards usage. It gave the numerical evidence which was quantified, and statistically processed to support or deny alternative knowledge claims (Creswell & Creswell, 2017). The cross-sectional design permitted researcher to collect data from different categories of participants from the Kyambogo University population. The participants included students, lecturers, and ICT technicians. Further exploration of the explanation of the scores provided more insight into the phenomena under study. This allowed for triangulation of study findings. This therefore was the reason why this study adopted an explanatory mixed method cross- sectional design.

3.2 Area of Study

The study was conducted in the school of education at Kyambogo University. Kyambogo University (KyU) is located on Kyambogo hill, approximately 8 kilometers (5 miles) by road east of the Kampala city center at 0^0.20'54.0" N ,32^0 37'49.0" E. The neighborhood include

Kiwatule to the North, Banda to the East, Kinnawattaka to the South East, Mbuya to the South, Nakawa to the South West and Ntinda to the West and North West (Kyambogo University location on Google Maps, 2020). Unlike other institutions of Higher education, Kyambogo University has a niche in Uganda teacher education and training and currently produces the highest number of teachers and teacher educators in the country. Through its study programmes of Bachelor of Education (BED) and Bachelor of Teacher Education (BTE), the school of education is responsible for the training of teachers, tutors and instructors on new pedagogical approaches. It is upon this basis that the school of education was chosen as location of this research.

3.3 Study Population

3.3.1 Population for quantitative study

The target population consisted of students who have been at the university for an academic year. The study population consisted of four hundred (402) undergraduate students. One hundred ninety eight (198) participants offered Bachelor of Education (BED) and two hundred and four (204) participants were Bachelor of Teacher Education (BTE) students. BED and BTE students were enlisted for the study because they are already qualified teachers, tutors, and instructors and thus expected to be knowledgeable on subject of ICT implementation in teaching and learning in schools, colleges, and tertiary institutions. In addition, BED and BTE students who studied at Kyambogo University for a minimum of one academic year were considered to be abreast with ICT usage and could relate their perspective on ICT usage in the teaching and learning process at Kyambogo University School of Education.

3.3.2 Study population for qualitative data using interviews and focus group discussion

In order to choose the study population for qualitative data collected through interviews, the relevant categories had to be determined first. In this study, the main informants included ICT

technicians and lecturers. Interviews with five (5) selected key informants who provided formal consent for the study were conducted to learn more about students' ICT knowledge, usage and attitudes of Kyambogo University students concerning ICT usage.

Additionally, study participants for qualitative study using focus group discussion were chosen according to shared characteristics, which were subjects of study or area of specialization. Participants were grouped as BED science (biology, chemistry, physics, and mathematics), BED arts (geography, history, religious studies, and English language and literature), BTE science and mathematics, BTE arts (SST, languages, and music), and vocational (BED and BTE: agriculture and business education).

3.4 Sample Size

3.4.1 Sample size for quantitative study

The study used Krejcie and Morgan's (1970) table to determine sample size for the quantitative study. Out of 402 study population, 198 (49%) were BED students and 204 (51%) were BTE students. BED had 115 (58%) males and 83 (42% females), while BTE had 122 (60%) males and 82 (40%) females. A study sample of 196 respondents was derived but the researcher added four to make 200 from the overall study population of 402 students and was distributed as follows: BED had a sample size of 98 respondents, representing 49% with 56 (58%) males and 42 (42%) females, while BTE had a sample size of 102, representing 51% with 60 (60%) males and 42 (40%) females. Respondents were further sampled according to areas of specialization or subject combinations to ensure balanced and accurate data. The areas of specialization included BTE science and mathematics, BTE arts, which included respondents offering social studies, languages, music, and special needs education. BTE vocational included participants offering agriculture. Respondents on the BED program were also considered as BED science, BED arts, BED special needs, and BED vocational.

However, with the low response rate and incompletely filled questionnaire, one hundred eighty five (185) respondents participated in this study, giving 93% response rate.

Table 3.1: Summary of Study Participants for Quantitative strand using Questionnaire (N=185).

Variable	Frequency	Percentage
Sex		
Male (M)	101	54.59
Female (F)	84	45.41
Total	185	100
Program of Study		
BED	91 (M 49, F 42)	49.19
BTE	94 (M 52, F 42)	50.81
Total	185	100

Table 3.1 showed a stratified random sample of BED and BTE study participants. There was relatively equal ratio of males (M) (n=101, 54.59%) and females (F) (n=84, 45.41%). The majority were pursuing BTE programme (n=94, 50.81%) and ninety-one (n=91, 49.19%) were BED students thus one hundred and eighty-five (185) respondents participated in this study.

3.4.2 Sample size for qualitative study

Saturation criterion based on information redundancy is the gold standard for calculating sample size in qualitative studies that include interviews (Sim. et al, 2018). When more units are sampled without eliciting new information, the sampling process is considered to be over (Konstantina & Barnett, 2018). The researcher determined that saturation had been reached when no new information was being elicited throughout the interview. Thus, five (5) participants served as the sample size for the qualitative data in this investigation. By the time data saturation was attained, two lecturers, two teaching assistants and one ICT technicians from foundation of education and teacher education had been interviewed.

Table 3.2: Summary of Participants for Qualitative Study using Interview (N=05)

Categories of participants	Number interviewed	Number of males	Number of females	Sampling techniques
Lecturers	02	01	01	Purposive sampling
Assistant lecturers	02	01	01	Purposive sampling
ICT technician	01	01	00	Purposive sampling

For qualitative study aspect that used focus group discussion, participants were carefully chosen based on their subjects of specialization. According to Nyumba et al. (2018) a group of eight to ten participants chosen according to shared characteristics can participate in a focus group discussion. Using students' course leaders, five groups of nine participants each chosen as BED science, BED arts, BTE science and mathematics, BTE arts and BED and BTE vocational participated. Therefore, a total of forty-five participants participated in focus group interviews. This number was inclusive of respondents for quantitative study.

Table 3.3: Summary of Participants using Focus Group Discussion (N=45)

Categories of participants	Number interviewed	Number of males	Number of females	Sampling techniques
BED arts	09	03	06	Purposive sampling
BED science	09	07	02	Purposive sampling
BTE science	09	07	02	Purposive sampling
BTE arts	09	03	06	Purposive sampling
BED/ BTE Vocational	09	05	04	Purposive sampling
Total	45	25	20	

From table 3.3 above, twenty-five participants were male students (n=25) representing fifty six percent (n=25, 56%) while twenty participants were female students representing forty four percent (n=20, 44%). Factors such as unwillingness to sign the consent forms downsized the number of selected participants. The researcher however, was prompted to use the available participants as long as they were representatives of the different departments.

3.5 Sampling Techniques

The target population was considered to be cross sectional in nature, meaning that it was heterogeneous. Therefore, this study employed stratified cluster sampling, simple random sampling and purposive sampling in selecting eligible respondents.

3.5.1 Stratified sampling

First, stratified sampling was used to allow the researcher to divide the study population into different homogenous strata (Taherdoost, 2016). Stratified sampling ensured that the target

population was divided according to the programme of study, sex and year of study. In the case of programs of study, the study population was divided as BED and BTE male and female students with their subject combinations or areas of specialization.

3.5.2 Simple random sampling

This was used to select eligible respondents from the various stratified clusters to ensure that all of the target population's distinct categories were proportionally represented in this study. Participants were selected at random from a pool of numbers from which to choose. This random sample presented an unbiased representative of the study population. This method was used to select students for quantitative data collection using questionnaires.

3.5.3 Purposive sampling

This involved selection of participants which met some predetermined criterion (Elfil & Negida, 2017). It is useful for collecting focused information. This study employed this technique for identifying participants who were considered to be information-rich because of the position they held and their involvement in e-teaching. Therefore, lecturers and ICT technicians were sampled using this criterion

3.6 Data Collection Methods and Instruments

3.6.1 Data collection methods

Primary data were collected from participants using survey for quantitative study, interview and focus group discussion for qualitative study.

3.6.1.1 Survey method

According to Ponto (2015), survey is the most common method of quantitative inquiry which gathers numerical data from a research population in an effort to understand human behavior. Findings obtained can then be extrapolated to draw conclusions about the larger population included in the study group. In this study, survey method was utilized to collect quantitative

data regarding the attitudes of a larger group of BED and BTE students toward the interaction with ICT during the teaching and learning process. The survey approach provided confidentiality, was affordable, flexible, and allowed respondents to complete it at their own pace. It also collected a big amount of data quickly with a high number of respondents. (Kothari, 2010).

3.6.1.2 Interview method

This involves conducting one-on-one, in-depth interviews with limited group of people to learn more about their perspectives on the issue (Monday, 2020). The interview method yields more data and a greater understanding of the subject under study (Ponto, 2015). The researcher performed in-person interviews with a selected group of lecturers and ICT technicians to gather qualitative data for this study. Using this method, the interviewer could encourage the respondent to go into further detail about particular topics by using cues or prompts (Hancock et al., 2007).

3.6.1.3 Focus Group Discussion method

Focus Group Discussion is a qualitative method in which six to ten people with similar characteristics discuss a specific topic with the help of a trained facilitator (Dzino-Silajdzic, 2018). In this study, five focus groups with nine mixed sex composition of participants were interviewed. These participants were carefully chosen based on their subjects of specialization as BED science, BED arts, BTE science and mathematics, BTE arts and BED and BTE vocational This technique was used to allow the researcher to draw on the participants' complex personal experience, belief, and perception through a mediated interaction on students' attitude and their interaction with ICT during the teaching and learning process at Kyambogo University (Nyumba et al, 2018).

3.6.2 Data collection instruments

The study used structured questionnaires, key informants interview guide and focus group discussion guide for data collection.

3.6.2.1 Questionnaire

Structured questionnaires written in English language was employed to obtain quantitative data for study objectives two and three. Where appropriate, the numerical values for each variable were coded. Student respondents were asked to provide information using coded questionnaires. There were forty-one (41) closed-ended questions on the surveys, which were divided into parts A, B, and C. Section A comprised three (3) questions designed to evaluate the respondents' socio-demographic attributes. Nineteen (19) questions in Section B measured how well students used ICT for learning. Nineteen (19) questions in Section C evaluated respondents' attitude toward use of ICT for teaching and learning. Respondents were asked to rate each item in sections B and C using a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree).

3.6.2.2 Interview guide

To gather qualitative information for the first, second, and third study objectives, a key informant interview guide was employed. The interview guide was semi structured with open ended questions. Respondents were asked to share their thoughts and opinions regarding students' ICT knowledge, use, and attitude towards use of ICT applications for teaching and learning. In in-person sessions that lasted roughly thirty (30) minutes, the researcher gave this instrument to four lecturers and one ICT technician.

3.6.2.3 Focus Group Discussion guide

This study used focused group discussion guide designed using concise and clear questions to collect qualitative data for study objective one, two and three. Open-ended questions prompted participants to give common views and narrative explanations on knowledge of

ICT applications for teaching and learning, usage of ICT for learning and attitude towards usage of ICT for teaching and learning. Discussions were audio recorded and transcribed manually. During the session, researcher took field notes to have better and accurate results.

3.7 Validity and Reliability

3.7.1 Validity

According to Heale and Twycross (2015), validity determined how well the instruments measure the phenomenon being studied.

The researcher employed face validity to assess the reliability of interview guide, focus group discussion guide, and questionnaire items. The researcher's two supervisors received these data gathering tools when she was drafting her proposal and asked for comments, guidance, and recommendations. The recommendations from the supervisors were integrated into the final instruments, and the instruments were deemed valid on their face. Trustworthiness and credibility was used by researcher to ensure that qualitative study findings were accurate. The study also used more than one research instrument, namely, the interview guide and focus group discussion guide, such that findings from one instrument complemented the other. The researcher also ensured transparency and clarity during the research process and there was triangulation of findings from interviews and focus group discussions.

3.7.2 Reliability

To ensure consistency of information contained in the questionnaire, the researcher conducted a pilot test of questionnaire at faculty of arts and social sciences, Kyambogo University before using it in this study. The purpose of piloting was to test appropriateness of the items to the respondents, find out whether the questions were clearly understood and interpreted correctly in order to improve the instrument. The degree of the reliability was analyzed using Cronbach’s Alpha reliability coefficient test so as to establish a threshold of 0.7. The questionnaire was accepted after establishing the alpha value at 0.735 (Cronbach,

1951). The outcomes of this pilot study however, did not influence any change in questionnaire and questionnaire was used in this study as it was.

The interview and focus group discussion guides were also checked for errors and mistakes to ensure their credibility. Codes were also used to represent participants and checked for consistency.

3.8 Data Collection Procedure

The data collection procedure began with researcher obtaining an introductory letter from Kyambogo University Directorate of Research and Graduate Training (DRGT) of Kyambogo University authorizing her to carry out this study. Approval was sought from the departments of Teacher Education and Foundation of Education which enabled the researcher to update records on prospective participants according to shared characteristics before contacting the study participants.

The researcher and a trained research assistant followed potential participants to their respective lecture rooms to administer structured questionnaire. Information about this study was shared with eligible participants before they expressed their verbal consent to participate in the study. Thereafter the researcher gave out the questionnaires. The researcher and participants then agreed on the date and time for the return of filled questionnaires since it was approaching examination period.

Upon return of the filled questionnaire, some participants who filled in the questionnaire were invited for focus group discussion with written consent. Forty-five (45) participants participated in the focus group discussion (FGD). This implied that the forty-five (45) participants for FGD were inclusive of the numbers which participated in quantitative survey. English language was used as a medium of discussion since all the participants could speak and write using English. The researcher guided the discussion. The discussion was audio

recorded and transcribed manually. Field notes were also taken by the researcher. Non-verbal behaviors identified during the discussion sessions were also noted. These included; head nods, smiles and frowns. Responses from focus groups were coded as KYU 1, 2, 3, 4 and 5.

Finally, the researcher interacted with the key informant who formally consented to be interviewed using a semi-structured interview guide. The researcher held one-on-one interview with four lecturers and one ICT technician to get their views on BED and BTE students' attitude towards interaction with ICT during teaching and learning. Having interviewed the key informant and noting that no new information had emerged, the researcher considered that data saturation had been reached. Responses from the lecturers were coded as UL1, 2, 3 and 4 while that of the ICT technician was coded as UT1

3.9 Data Analysis and Presentation

Data collected for research objective one was analyzed and presented using qualitative techniques. While objectives two and three data were analyzed and presented using both quantitative and qualitative approaches. However, for research objectives two and three, results from the quantitative strand informed much of this study.

3.9.1 Quantitative data analysis

The quantitative data gathered was analyzed using both descriptive and inferential statistics in the Statistical Packages for Social Sciences (SPSS) software version 23. The questionnaires were thoroughly checked for unreturned questionnaires and incompletely filled questionnaires. The one hundred and eighty-five (185) completely filled questionnaires were coded and entered in SPSS software version 23. Students' responses were tabulated. The designation of agree included all agree and strongly agree responses. While disagree designation included all disagree and strongly disagree responses. The demographics information, extend of students' use of ICT for learning (objective two) and students' attitude towards use of ICT for learning (objective three) were analyzed using descriptive techniques

and displayed in tables. To test the relationship between students' attitude and use of ICT applications for teaching and learning, Pearson's product moment correlation analysis was used at a 0.05 level of significance.

3.9.2 Qualitative data analysis

The study used thematic analytical model based on data verification and drawing conclusion in data analysis (Clarke & Braun, 2017). All interviews and focus group discussions were transcribed verbatim. During the thematic data analysis, the following procedures were followed;

Step 1: Familiarization

This involved reading through the texts, listening to the audios over and over again in order to become familiar with the data. During this stage, transcriptions of audio recordings was also done.

Step 2: Sorting

Data were sorted according to each study variables and arranged according to the study objectives and research questions.

Step 3: Coding

This involved highlighting sections of texts and transcripts that were relevant to or captured something interesting about the research questions and objectives and assigning them to a category. Each code described the idea or feeling expressed in that part of the text.

Step 4: Generating themes

Here common opinions, patterns and relationships among the codes were identified and themes derived from them. That is similar codes were merged into themes. The themes were derived according to the objectives of the study.

Step 5: Reviewing themes

To review the themes, the data set was compared against the themes to check if the themes derived were actually a representation of the data.

Step 6: Defining and naming themes

After coming up with list of themes, the themes were named and each defined. Defining the themes involved giving meaning to the different themes and how they were helpful in answering interview questions and the objectives of the study.

Step 7: involved writing up the analyzed data with direct quotes from interviews and focus group discussions with lecturers, ICT technician and student participants.

Triangulation of Findings

To draw conclusion from results for study objectives two and three, triangulation of findings from the quantitative strand and the qualitative was done during the presentation of study findings in chapter four. Findings were presented concurrently with qualitative findings providing narrative explanation to the quantitative results.

3.10 Ethical Considerations

The researcher followed all the ethical processes when gaining access to the research site, collecting, analyzing, and disseminating data (Creswell, 2014). This study was conducted after fulfilling all the institutional research requirements of Kyambogo University and upon obtaining administrative clearance from the Directorate of Research and Graduate Training.

Informed consent was obtained by clearly explaining to participants the study's purpose, methods, risks, benefits, confidentiality, and need for voluntary participation (Gustafsson, 2017). Participants who consented were made to sign the informed consent form.

While collecting data, there was respect for the study site to ensure that it was left undisturbed during and at the end of the study's data collection activities (Terrel, 2011). For instance, questionnaire surveys in this study were conducted during the free times of participants. There was no health risk to participants because the data was collected with strict observance of the COVID-19 prevention Standard Operating Procedures (SOPs) provided by the Ministry of Health.

Privacy and confidentiality: The privacy of participants was observed by interviewing them in private. The information gathered was kept confidential by coding the data collection instruments. Participants were assured that information obtained from them would be kept under lock and key and only used for study purposes and that their names would not appear in the study.

While reporting, openness and honesty were observed (Ahmed, 2024). There was no falsification of data, findings, or conclusions. A full range of findings and diversity of perspectives about the topic were reported. Writings were free from bias towards any group, age, sex, ethnicity, religion, disability, or race. Besides, plagiarism was avoided by giving credit to the work of other authors even when the material was paraphrased.

It is anticipated that the research findings will be disseminated in various ways. Copies of the research report will be given to the Kyambogo University library. The report will be disseminated through publication in a peer-reviewed journal to have wider coverage.

3.11 Study Limitations

The qualitative data using focus group discussion in this study might have been affected by presence of researcher during discussions. Participants were however, assured of confidentiality and privacy. In addition, codes were used for easy identification.

3.12 Delimitations of the Study

This study on undergraduate students' attitude towards interaction with ICT during teaching and learning process at Kyambogo University was conducted at the School of Education among BTE and BED students only. Its findings were limited to the School Education's study participants only.

CHAPTER FOUR

PRESENTATION OF FINDINGS, ANALYSIS AND INTERPRETATION

4.0 Introduction

In this chapter, a detailed description of the results obtained after data analysis is presented as per the study objective. For study objective one, the findings were presented thematically. For objectives two and three, results were presented mainly by descriptive statistics of the variables and corroborated with qualitative findings.

4.1 Students' knowledge of ICT Applications for Teaching and Learning

In order to determine students' knowledge of the ICT resources available for learning, questions about their knowledge of ICT applications like video conferencing, YouTube, Google Meet, Zoom, e-library, e-learning management system (KELMS), e-modules, email, and WhatsApp were asked. These applications could be used for online tutorials, e-lecture attendance and delivery, group projects, class discussions, sharing of course materials, and assignment submission. Individuals who gave an affirmative response were deemed to have knowledge of ICT resources and applications, as well as the teaching and learning domains in which they may be applied.

Student knowledge was implied from three aspects derived from participants' responses in focus group discussions. These included knowledge through; knowing how to use ICT applications, orientation and training and exposure through self-study. These were the major themes identified and are thus discussed herein.

Table 4.1: Students' Knowledge of ICT Application for Teaching and Learning

Theme	Sub theme
Students' knowledge of ICT applications	Knowing how to use ICT applications Orientation/ training on ICT usage Exposure through self-study

Among the many ICT applications, many respondents reported having knowledge of the university computers and WI-FI connectivity, which the students utilized for access and development of their study materials. When asked about their knowledge of ICT applications, participant had this to say:

> *We know all the university computer laboratories and all the WIFI hotspots, we also know how to use computers and internet to access learning materials online. But we use our smartphones to tap the university WI-FI connectivity to access and develop our study materials (KYU 2 participants).*

The above responses implied that students knew about computers and WI-FI connectivity and could use it for access to and development of their study materials.

In addition, participants reported high knowledge of Zoom, Google Meet, and Google Class for e-lecture attendance and delivery. When asked to share their views on this high level of knowledge, participants responded thus;

> *When students reported after the lockdown, lecturers first introduced students to Google Meet, then Google Class and later zoom to allow them to plan for online lectures (UL3).*
>
> *For online lectures, we know how to tap and use Google Meet, Google Class and Zoom because they are highly talked about within the university here but we don't like using any of them (KYU3 participants).*
>
> *We however, do not know how to create links for Google Meet, Google Class and Zoom. Links are created by lecturers.*

The above revelation inferred that students knew how to use Google Meet, Google Classroom, and Zoom for online lecture attendance.

Furthermore, the WhatsApp platform was a highly known application for class discussion and sharing class materials among participants. Most participants interviewed affirmed that they knew how to use WhatsApp for class discussion. Whereas, the majority of participants

too agreed that they knew of the use of WhatsApp for sharing class materials. When asked about their increased knowledge of WhatsApp, participants reported:

> *We know WhatsApp, it is easy to learn and use. WhatsApp enables us to mobilize for class discussion and sharing of class materials, but to a greater extent for its increased level of usage in personal non-academic issues (KYU5 participants).*

This discussion showed that students knew about WhatsApp and its usage for class discussion and sharing of class materials, but also to a larger extent for its popular usage in non-academic fields.

On the other hand, most participants did not know about the other ICT facilities and applications that are used in the teaching and learning processes. Responses from participants indicated that the use of video conferencing, YouTube, the university e-library, and KELMS were the least known applications. When asked to explain the low knowledge of these ICT applications, a participant stated:

> *How do you expect me to know what I have never used, and the lecturers are also not using such applications to teach online (KYU 2 participant)?*

There were, however, some participants who had particular knowledge about the KELMS as a supportive portal where student information is uploaded but had no knowledge on its use as a teaching and learning tool. This is narrated in the excerpt below.

> *We know KELMS as a platform for viewing fee structures and checking students' academic results, but we are not aware that it can be used for class discussion and for accessing and submitting course work and assignments (KYU 3 participants).*

The students' limited knowledge of KELMS was not a mystery to the university technician, who resonated the students' views as follows:

> *If the lecturers do not use certain applications to teach online, then students may not know that such applications also exist and can be used for learning (UT1participant).*

> *BED and BTE students who are not enrolled in KELMS may not be aware of its functionalities, added UT1*.

Low knowledge about the e-library resources was also reported by the students. This was further explained by UTI who stated:

> *Very few students inquire about e-library, particularly Masters and PhD students, and especially for research purposes. BED and BTE students rarely inquire about the e-resources available at the university, notes UT1*.

ICT Knowledge through orientation/ training & self-study

When asked to share their experience about ICT awareness, some participants reported that they were *trained* on the use of new pedagogies like Google Class, Google Meet, and Zoom and therefore had a high level of awareness. Others participants stated that they became aware of ICT usage through *exposure from fellow students* while at the university and therefore possessed low levels of awareness, while others learned through *self-study,* as reported by these participants:

> *In my class, our lecturers oriented us on use of Google Class, Google Meet, Zoom, and videos. She even informed the class about the e-library resources in the main library for course work and research (KYU1participants).*
>
> *There was also training on computers as a course unit, but this is not adequate as some of us did not master many ICT skills. Besides, most of these applications are new, which calls for proper training at the beginning of year one (KYU 3 participants).*

These responses implied that some participants became aware of ICT usage for teaching and learning through training, though inadequate, whereas others became aware through self-study, as reported below.

> *In our class, we were enrolled in the system without proper training on how to use the new pedagogies such as Google Class, Google Meet, and Zoom, among others. But we learned from friends and through trial and error (KYU 2 participants).*

For me, I learned through self-study. I was simply sent a code and was told to press and pause, which I did, but sometimes I could forget and get lost, added (KYU 5 participant).

In conclusion, students' knowledge of ICT applications for teaching and learning as explored in this study revealed that out of the forty-five (45) participants, twenty-five (25) participants (56%) affirmed having high knowledge, whereas twenty (20) participants (44%) affirmed low knowledge. The majority of participants knew the use of computers and WI-FI connections for access of study materials, Google Meet, Google Class, and Zoom for e-lecture attendance and delivery, WhatsApp for sharing class materials and class discussion, and e-mail for access and submission of course assignments. KELMS, videoconferencing, YouTube, and e-library were the least known ICT applications for teaching and learning. Participants in this study became aware of ICT for teaching and learning through training on ICT usage, but the majority of respondents got exposed to ICT while at the university through self-study and from friends.

4.2 Students' Use of ICT for Learning

To establish students' ICT use, respondents rated their responses on the basis of 1 (strongly disagree), 2 (disagree), 3 (neutral), 4 (agree) and 5 (strongly agree). For easy synthesis, the responses were merged into 1-2 (%): strongly disagree to disagree which implies not using, 3 (%): neither disagree nor agree which means undecided, 4-5 (%): agree to strongly agree meaning using thus making it categorical variables. Table 4.2 below shows descriptive statistics (frequency f, percentage %, mean M and standard deviation SD) on students' use of ICT for teaching and learning at Kyambogo University.

Table 4.2 Students' Use of ICT for Learning (N=185)

Variables	M	SD	1-2 f (%)	3 f (%)	4-5 f (%)
Participation in online tutorials					
I use video conferencing for online tutorials	2.146	1.24	129(69.73)	13 (7.03)	43 (23.24)
I use YouTube for online tutorials	2.097	1.119	134(72.43)	20(10.81)	31(16.76)
e-lecture attendance					
I use Google Meet for e-lecture attendance	3.319	1.298	66(35.67)	12 (6.49)	107(57.84)
I use Google Classroom for e-lecture attendance	3.184	1.289	70 (37.84)	8 (4.32)	107(57.84)
I use Zoom for e-lecture attendance	3.038	1.442	80 (44.32)	12 (6.49)	91(49.19)
Access and development of study materials					
I use computer and internet (WIFI) to access study materials	3.741	1.136	36 (19.46)	5 (2.70)	144(77.84)
I use university's e-library books, e-journal, research articles to access / develop study notes	2.333	1.255	127(69.05)	13 (7.14)	44 (23.81)
I use KELMS to access study materials	2.881	1.382	135(72.59)	26(14.32)	24 (13.09)
I use the e-modules for study notes / materials	2.411	1.204	119(64.32)	22(11.90)	44 (23.78)
Participation in group work					
I use Google classroom to participate in group work	2.443	1.276	123(66.50)	11 (5.90)	51 (27.60)
I use Zoom to participate in group work	2.184	1.156	144(77.84)	5 (2.70)	36 (19.46)
Participation in class discussion					
I use Google Classroom for class discussion	2.919	1.276	85 (45.94)	16 (8.65)	84 (45.41)
I use Zoom for class discussions	2.411	1.186	124(67.03)	15 (8.11)	46 (24.86)
I use KELMS for class discussion	2.184	1.068	135(72.97)	17 (9.19)	33 (17.84)
I use WhatsApp for class discussion	3.951	1.06	24 (12.97)	6 (3.24)	155(83.78)
Access and submission of course work and assignments					
I use KELMS for access and submission of course assignment and getting feedback	2.508	1.311	119(64.32)	13 (7.03)	53 (28.65)

I use e-mail for access and submission of course assignment and getting feedback	4.011	1.128	26 (14.10)	5 (2.70)	154(83.20)
Sharing of class materials					
I use WhatsApp for sharing class materials	3.389	1.294	59 (31.89)	11 (5.95)	115(62.16)
I use video conferencing for sharing class materials	2.47	1.286	130 (70.3)	15(8.11)	40 (21.59)

**1-2 (%): Strongly disagree to disagree; *3 (%): Neither disagree nor agree; *4-5 (%): Agree to strongly agree*

Findings on use of video conferencing and YouTube for online tutorials indicated that 43 (23.24 percent) of respondents used video clips to participate in online tutorials, 129 (69.73) percent) did not use videos for tutorials, and 13 (7.03 percent) were undecided. On the other hand, 31 (16.76 percent) of respondents used YouTube to participate in online tutorials; 134 (72.43 percent) did not participate in online tutorials using YouTube, while 20 (10.81 percent) were undecided. These findings showed that very few respondents used both videos and YouTube for online tutorials, as noted by the following participants:

> *In one of our course units, we participated in a tutorial presentation with our lecturer on breeds of cattle across the world using video clips (KYU 1 participants).*
>
> *I used YouTube to follow tutorial presentations with the wider student community to have a better understanding of topics related to my subject areas and shared it with my course mates since we are few (KYU 4 participants).*

The majority of participants, however, had not used both videos and YouTube for online tutorials.

> *We have never participated in any online tutorials using video conferencing or even YouTube (KYU 3 participants).*

Table 4.2 also showed that 107 (57.84 percent) of respondents used Google Meet for e-lecture attendance, 66 (35.67 percent) had not attended lectures using Google Meet, and 12

(6.49 percent) were undecided. In addition, 107 (57.584 percent) of respondents indicated that they used Google Classroom for e-lecture attendance, 70 (37.84 percent) did not use Google Classroom, and 8 (4.32 percent) were undecided. Furthermore, 91 (49.19 percent) used Zoom for e-lecture attendance, whereas 82 (44.32 percent) did not use Zoom and 12 (6.49 percent) remained undecided. This showed that the majority of students used Google Meet for e-lecture attendance, followed by Google Classroom and Zoom. The above result is supported by the following participants:

> *In our class, we began by attending lectures using Google Meet, then Google Classroom, and now we are using Zoom (KYU 5 participants).*
>
> *We attended lectures using Google Meet, but now we use Google Classroom and Zoom interchangeably depending on the choice of a lecturer at a particular time, added (KYU2 participants).*

The above revelation implied that students used Google Meet, Google Classroom and Zoom interchangeably for e-lecture attendance.

Results on access to course content and development of study materials revealed that 144 (77.84 percent) of respondents used computers and internet connections to access unlimited online study materials to develop study notes; 36 (19.46 percent) were not accessing online study materials using university computers, whereas 5 (2.70) were undecided. Additionally, 44 (23.78 percent) used the e-library resources to access study materials and develop study notes, 128 (69.18 percent) did not use the e-library resources, and 13 (7.04) were undecided. 44 (23.78 percent) reportedly used the e-modules sent by their lecturers for their study materials, and 119 (64.32 percent) did not, while 22 (11.90 percent) were undecided. Furthermore, 24 respondents (13.09 percent) downloaded study notes sent by their lecturers on KELMS, while 135 (72.59 percent) did not use KELMS, and 26 (14.32 percent) were undecided.

The above findings showed that the majority of respondents used computers and internet (WIFI) connectivity to access unlimited online study materials to develop study notes, as expounded by the following participants:

> *In our class, we use computers to access online learning materials to update our study notes. We also use university internet (WIFI) to search for online publications for course assignments and research (KYU5 participants).*
>
> *I do not possess a computer, but I use the university computer laboratory to search for all my relevant information on different topics, and then I compile my study notes. But most university computers are old and dilapidated (KYU 3 participant).AAA*
>
> *The majority of our course mates used the university WI-FI connections to search for and download study materials using our smartphones. But sincerely, in most cases, we rely on the study notes given by our lecturers (KYU 5 participants).*

When asked to comment about use of e-library resources such as e-books, e-journals, and research articles for access and development of study materials, participants from KYU 1 reported:

> *We rarely use the e-library. The site has very few books, articles, and journals, most of which are not related to our study areas. We are also given only 30 minutes to browse through.*

When asked to share views on the low level of usage of e-library and e-modules, UL3 made this observation:

> *It is true that the university e-library resources are not being used for learning to their full capabilities by undergraduate students due to limited relevant content and the fact that commercial publishers still manage access to digital content used in education on a commercial basis (UL3).*
>
> *In addition, designing e-modules and generally education videos for learning is not easy. It needs time and finances, which is why they are not being used like other applications, added UL3.*

On the use of KELMS, all participants in focus groups agreed that their programmes of study

were not enrolled on KELMS and thus were not using KELMS to access study materials. This response was further echoed by UT1, who stated that KELMS had limited capacity. As a result, BED and BTE programmes were not enrolled in the system. The result on students' use of KELMS for access to study materials was therefore rejected by the researcher.

The above responses implied that the majority of students used computers and university WI-FI connections to access and develop study materials and notes. However, a few students also used the e-library and e-modules.

Findings from table 4.2 above also indicated that 51 (27.60 percent) of respondents used Google Classroom to participate in group work, 123 (66.50 percent) did not use Google Classroom for group work, and 11 (5.90 percent) were undecided. On the other hand, 36 (19.46 percent) used Zoom to participate in group work, 144 (77.56 percent) did not participate in group work using Zoom, and 5 (2.70 percent) were undecided. This indicated limited use of Google Classroom and Zoom for group work, as observed by the following participants:

> *The use of Google Classroom and Zoom for group work is not easy given the inconvenience of the internet, time, and data involved. As a result, participation in group work is mostly done physically, then we interchange work with other group members (KYU 5 participants).*
>
> *Usually when some work is posted to students' Google e-mail, very few students use the same platform to participate in group work. Individual learners tend to download and do the work manually, added UL3.*

From these responses, the majority of respondents did not use both Google Classroom and Zoom to participate in group work.

Results on access and submission of course work and assignments using e-mail and KELMS further indicated that 154 (83.20 percent) of respondents used the e-mail to access and submit course work and assignment tasks to lecturers, 26 (14.10 percent) did not use the e-mail to

access and submit course work and assignments, and 5 (2.70 percent) were undecided. This implied that the majority of respondents used the email to access and submit course assignments and receive feedback, as noted by participants.

> *I used my e-mail to access and submit the different course works and assignments sent to me by lecturers. However, as a course leader, some students sent blank documents, and now they are missing some marks for course work (KYU 2 participant).*
>
> *As a lecturer, I used students' e-mails to send them course work and assignments with deadlines and give them feedback using the e-mail. It is much easier to access these assignments, do the work, and submit it using e-mail even if at night, added UL3.*

On the other hand, findings on the use of KELMS by BTE and BED students for access and submission of course assignments were rejected by the researcher on the basis that BTE and BED programmes were not enrolled in KELMS. Buttressing on this notion, the majority of participants used the email to access and submit the different course work and assignments sent to them by their lecturers.

Findings in table 4.2 also showed that 155 (83.78 percent) used the WhatsApp platform to participate in class discussion with course mates, 24 (12.97 percent) did not use WhatsApp, and 6 (3.24 percent) were undecided. On use of Google Classroom for class discussion, 84 (45.41 percent) used Google Classroom, 85 (45.94 percent) did not use Google Classroom for class discussion, whereas 16 (8.65 percent) were undecided. On use of Zoom for class discussion, 46 (24.86 percent) used Zoom and 124 (67.03 percent) did not use Zoom, while 15 (18.11%) remained undecided. Findings on students' use of KELMS for class discussion were rejected by the researcher. This showed that WhatsApp was a highly used ICT application for class discussions, followed by Google Classroom and Zoom. This result agreed with the following qualitative responses:

> *We mostly use WhatsApp to mobilize for class discussions and even to participate in discussion topics (KYU 2 participants).*

> *Our course coordinator created a group WhatsApp platform for our class discussion. Using WhatsApp has widened our scope of discussion. Sometimes even some of our lecturers participate in our class discussion on WhatsApp when invited, resulting in a positive impact on our learning (KYU 5 participants).*

A few students also used Google Class and Zoom for class discussion, as revealed by KYU4 participants.

> *In our course, we sometimes use Google Classroom and Zoom to participate in class discussion depending on topics for discussion, especially in science and mathematics, and this has enhanced our academic research and learning (KYU 4 participants).*

This implied that most students used the WhatsApp platform to participate in class discussion. A few students also use Google Classroom and Zoom for class discussions.

Furthermore, findings in table 4.2 revealed that 115 (62.16 percent) of respondents used the WhatsApp platform for sharing class materials, 59 (31.89 percent) did not use WhatsApp, and 11 (5.95 percent) were undecided. On the other hand, 40 (21.59%) indicated that they used video for sharing class materials, 130 (70.3%) of respondents reportedly never shared class materials using video format, and 15 (8.11%) were undecided. This finding implied that the majority of respondents used shared class materials using the WhatsApp platform, as reported by KYU 5 participants:

> *When given course work, assignments, or other learning handouts, we share using the class WhatsApp platform. In addition, any group member who scores the highest mark in a test, assignment, or course work also shares his or her work with the whole class using WhatsApp so that other course mates can read and make corrections on their work.*

In conclusion, students' level of ICT usage as presented in Table 4.2, the FGD, and the interview results indicated that students used the WhatsApp platform to create class discussion, used the e-mail to send course assignments to lecturers and get feedback, and

used computers and internet connections to access online study materials for their study notes. Few participants, however, used videos and YouTube for online tutorials.

4.3 Students' Attitude towards the Use of ICT for Teaching and Learning

To evaluate self-perceived attitude of Kyambogo University students towards the use of ICT for teaching and learning, statements indicating perceived importance of the different ICTs in the teaching and learning process was attached to different ICT applications. Table 4.3 below shows descriptive statistics (frequency f, percentage %, mean M and standard deviation SD) on students' responses to attitudinal questions regarding the use of ICTs for teaching and learning.

Table 4.3 Students' Attitudes towards the Use of ICT for Teaching and Learning (N=185)

Variables	M	SD	1-2 f (%)	3 f (%)	4-5 f (%)
Participation in online tutorials					
Using Video conferencing for online tutorials promotes active learning	2.865	1.272	82(44.32)	31(16.76)	72 (38.92)
Using YouTube for online tutorial promotes active learning	2.805	1.196	85(45.95)	35(18.92)	65(35.13)
e-lecture attendance					
Using Google Meet for lecture attendance promotes better student-lecturer class interaction	3.032	1.298	81(43.78)	19(10.27)	85 (45.95)
Using Google Classroom for lecture attendance promotes better student-lecturer class interaction	2.854	1.288	90(48.65)	23(12.43)	72 (38.92)
Using Zoom for lecture attendance promotes better student-lecturer class interaction	2.897	1.177	87(47.03)	27(14.59)	71 (38.38)
Access and development of study materials					
Using computer and internet to access study materials helps to develop up-to-date study notes	3.865	1.088	24(12.97)	15 (8.11)	146(78.92)
Using university's e-library books, e-journal, research articles to access study	3.438	1.122	39(21.08)	38(20.54)	108(58.38)

materials help to develop up-to-date study notes					
Using KELMS to access study materials help to develop up-to-date study notes	3.265	1.098	51(27.57)	43(23.24)	91(49.19)
Using e-modules for study notes / materials help to have up-to-date study notes	3.427	1.111	42(22.70)	41(22.16)	102(55.14)
Participation in group work					
Google classroom to participate in group work promotes collaborative learning	2.843	1.217	89(48.10)	28(15.14)	68 (36.76)
Using Zoom to participate in group work promotes collaborative learning	2.849	1.202	92(49.73)	29(15.68)	64 (34.59)
Participation in class discussion					
Using Google Classroom for class discussion promotes interactive online class	3.405	1.124	51(27.57)	18 (9.73)	116(62.70)
Using Zoom for class discussions promotes interactive online class	3.054	1.169	69(37.30)	32(17.30)	84(45.40)
Using KELMS for class discussion promotes interactive online class	2.859	1.162	80(43.24)	41(22.16)	64 (34.60)
Using WhatsApp for class discussion promotes academic network	4.032	.92	16 (8.65)	12 (6.49)	157(84.86)
Access to and submission of course work and assignments					
Using KELMS for course work / assignment promotes prompt feedback	3.135	1.215	67(36.22)	39(21.08)	79 (42.70)
Using e-mail for course work/ assignment promotes prompt feedback	4.005	.97	19(10.30)	11 (5.95)	155(83.75)
Sharing of class materials					
Using WhatsApp for sharing class materials is important for interactive learning	3.714	1.184	41(22.16)	13 (7.03)	131(70.81)
Using video conferencing for sharing class materials is important for interactive learning	2.859	1.208	88(47.57)	27(14.59)	70(37.84)

**1-2 (%): Strongly disagree to disagree; *3 (%): Neither disagree nor agree; *4-5 (%): Agree to strongly agree*

Table 4.3 above is derived from the quantitative survey carried out among 185 respondents. Respondents whose scores ranged from 4-5 (agree to strongly agree) were considered to have positive attitudes towards the use of ICTs for teaching and learning. Respondents whose scores ranged from 1-2 (strongly disagree to disagree) were considered to have negative attitudes towards the use of ICT for teaching and learning.

Findings from table 4.3 showed that 72 (38.92 percent) of respondents had positive attitude towards the use of videos for online tutorials, 82 (44.32 percent) of the respondents indicated negative attitude, whereas 31 (16.76 percent) were undecided with a mean value of 2.865 and a standard deviation of 1.272. On the other hand, 65 (35.13 percent) showed positive attitude towards the use of YouTube for online tutorials, 85 (45.95 percent) indicated negative attitudes toward the use of YouTube, and 35 (18.92 percent) were undecided with a mean value of 2.805 and a standard deviation of 1.196. This showed that very few respondents who interacted with videos and YouTube had positive attitude towards the use of videos and YouTube for online tutorials, as revealed by the following participants:

> *It was very interesting to observe the different breeds of cattle across the world, including those we simply used to learn only by names. In fact, the tutorial presentation using video clips made learning more practical, and the whole class was very active (KYU 1 participants).*
>
> *In our class, we explored online tutorials on YouTube in order to understand some topics that were covered online. It was very interesting, and we made our own summary on several topics, added (KYU 4 participants).*

From the above findings, it was deduced that respondents who were exposed to using video clips and YouTube had positive attitude towards the use of videos and YouTube for online tutorials. Majority of respondents who indicated negative attitude towards the use of videos and YouTube for tutorial presentations had not interacted with these applications in their learning process, as observed by UL4.

Table 4.3 also showed results on students' attitude towards using Google Meet, Google Classroom, and Zoom for e-lecture attendance. On use of Google Meet, 85 (45.95 percent) of respondents indicated that the use of Google Meet for lecture attendance promoted better student-lecturer class interaction, thus a positive attitude. 81 (43.78 percent) reported that the use of Google Meet did not promote better student-lecturer interaction, rating their attitude towards the use of Google Meet as negative. 19 (10.27 percent) were undecided, with a higher mean score of 3.032 and a standard deviation of 1.298.

From FGD, a participant KYU3 observed that:

> *Google Meet was particularly interactive during the mathematics and physics lessons. I enjoyed it for the few times I was able to access it, though most times I was not able to access it due to a network problem.*

While responding to interview questions on use of Google Meet, UL1 reported thus:

> *At the beginning, most lecturers exposed their learners to Google Meet. However, students continued to claim that online lectures were not interactive, and their attendance of online lectures remained low at all times.*

Findings also revealed that 72 (38.92 percent) of respondents showed positive attitude towards the use of Google Classroom for e-lecture attendance. 90 (48.65 percent) of respondents rated their attitude as being negative, while 23 (12.43 percent) were undecided, with a mean value of 2.854 and a standard deviation of 1.288.

When asked to share their experience of attending lectures using Google Classroom, KYU1 stated:

> *Google Classroom limits in-depth interaction with lecturers. This limited our lecture attendance using Google Classroom. As a result, most lecturers resorted to sending audio with no explanation (KYU1 participants).*

When asked to share instances where their attitude influenced usage of Google Classroom, KYU3 remarked:

We still like using this Google Classroom because it allowed work to be posted to our e-mail systematically and one could access and read it at one's own pace (KYU3 participants).

On the use of Zoom for e-lecture attendance, 71 (38.38 percent) of respondents showed positive attitude, 87 (47.03 percent) revealed negative attitude towards the use of Zoom for e-lecture attendance, and 27 (14.59 percent) were undecided, giving a mean value of 2.897 and a standard deviation of 1.177.

When asked to share experience of attending lectures using Zoom, participants reported thus:

We used to feel bored hearing only the voice of the lecturer on Zoom. On several occasions, some other students could disappear and never reappear in class, but now we are getting used (KYU 3 participants).

Lecturers tend to rush through the lessons. In addition, failure to connect to the internet impeded the smooth delivery of Zoom lessons and the natural flow of the classroom activities. Lectures could end abruptly due to a network problem, added (KYU3 participants).

When asked to share instances where their attitude influenced usage of Zoom, KYU5 made this observation:

Some of us skipped most of the online lectures using Zoom because it was very inconveniencing to attend lectures from hostels or gather in areas of WI-FI hotspots (KYU 5 participants).

According to UT1, all the e-learning software, like Google Meet, Google Classroom, and Zoom, was interactive and easy to use. However, the inability of students to physically meet and have academic discussion with their lecturers is what they described as non-interactive.

When asked to share experience on e-lecture delivery, participants stated;

It was very inconvenient to deliver lectures online, but now the attitudes of these students towards e-lectures have greatly improved. There is increased attendance and participation in e-lectures using Zoom, Google Class, and sometimes Google Meet

(UL2).

Lecturers try to make e-lectures more interactive, although it is not so perfect to deliver lectures online to students who are simply used to face-to-face interactions. But we are teaching online, and students' attendance has increased, added (UL3).

From the above, it can be deduced that although a slight majority of respondents showed negative attitude towards use of Google Meet, Zoom, and Google Classroom for e-lecture attendance, the attitude of participants towards e-lecture attendance using Zoom, Google Classroom, and Google Meet had increasingly become positive. Thus, there was increased attendance of e-lectures using Zoom, Google Classroom, and Google Meet.

Additionally, table 4.3 also showed responses on students' attitude towards the use of computers and internet connections, e-library, KELMS, and e-modules for access to study materials. Results indicated that 146 (78.92 percent) of respondents agreed that the use of computers and internet made them to access up-to-date learning materials, thus a positive attitude; 24 (12.97 percent) of respondents revealed negative attitude in using computers and internet to access learning materials, while 15 (8.11 percent) of respondents were undecided with a high mean score of 3.865 and a standard deviation of 1.088. This showed that majority of students had positive attitude towards the use of computers and the internet because they used them to access up-to-date learning materials.

From FGD, participants reported thus:

Using my computer and internet connection to access reading materials online enabled me to obtain a lot more information, which I use to update my notes (a KYU 4 participant).

Students are able to access a lot more up-to-date study materials and information from online sources using a computer or smartphone and the internet, even more than what the lecturers give (KYU 3 participants).

However, participants from KYU5 shared their experience on the use of computers and the

internet for accessing study materials, making this remark:

> *On several occasions, the whole class can come up with similar materials, which is reputed by the lecturer. You find that the way the lecturer presents work is quite unique and different from study materials obtained online. It gives knowledge, but not everything. Lecturers should also continue giving us notes.*

Despite this remark, findings showed that the majority of students had positive attitude towards the use of computers and internet connectivity for access and development of study materials. This implied that using computers and internet connectivity enabled students to develop up-to-date study notes. As a result, the majority of students use their computers and smartphones to access the university's WI-FI connections for their learning.

On the use of e-library for access of learning materials, 108 (58.38 percent) of respondents indicated positive attitude, 39 (21.08 percent) showed negative attitudes, and 38 (20.54%) were undecided with a higher mean score of 3.438 and standard deviation of 1.122. This indicated that the majority of respondents had positive attitude towards the e-library, as noted by KYU1:

> *The e-library is particularly good for research. We like the e-library because it offers technology-based information resources that enable one to access a wealth of knowledge from several scholars, particularly for research purposes.*

When asked to share their experience of using e-library, participants from KYU4 made these observations:

> *There is a lack of local content; the e-books and other e-resources available are not relevant to most of our study areas. It would be good if our lecturers could also post content there.*

These findings showed that the majority of respondents had positive attitude towards the use of e-library. This implied that using university e-library resources enabled students to develop up-to-date study notes. However, irrelevant and inadequate local e-resources might have

contributed to the negative attitude towards the e-library revealed in these findings.

Attitude towards the use of e-modules for study notes showed that 102 (55.14 percent) believed that the use of e-modules enabled them to have up-to-date study notes, 42 (22.7 percent) showed negative attitude, and 41 (22.16 percent) were undecided, giving a mean score of 3.427 and a standard deviation of 1.111.

From FGD, participants from KYU5 who reportedly used the e-modules reported thus:

> *We like the e-modules; it have text, colors, images, and animations that motivate learning. In addition, the notes are simplified and easy to read and understand.*

While responding to interview questions on personal experience with the use of e-modules, UL1 remarked:

> *Every student would have loved to learn using e-modules if all the lecturers were using it in the teaching and learning process. The e-modules are simplified and easy to read electronic notes focusing on important learning concepts including text, images, audio, and videos. These animations also boost students' creativity. It is however, not easy to come up with e-modules.*

These findings implied that majority of students had positive attitude towards the use of e-modules as it enabled them to develop up-to-date study notes. However, respondents who had no experience of using the e-modules or had not interacted with the e-modules showed negative attitude, and others were undecided.

Results from table 4.3 further revealed that 91 (49.19 percent) respondents had positive attitude towards the use of KELMS, 51 (27.57 percent) indicated negative attitude, whereas 43 (23.24 percent) were undecided with a mean score of 3.265 and a standard deviation of 1.098. This showed that a slight majority of respondents had positive attitude towards the use of KELMS for accessing study materials posted on the platform, as noted by the following participants:

When we reported in year one, we were told about the features of the LMS called KELMS that it is used to upload study notes for students to access, set online assessments, and direct online discussions, and we liked it right away. To our disappointments up to now, we were not enrolled on that system (KYU3 participants).

When asked about their attitude towards the use of KELMS, KYU1 participants stated:

For us, our attitude towards KELMS is positive, but we need to use it, added KYU1.

Responding to the interview questions, UT1 stated:

KELMS is a good platform where lecturers could post study notes and assignments for students to access for their learning. However, KELMS had capacity, which is why not all the students were enrolled on the platform.

The above voices showed that a slight majority of students had a positive attitude towards KELMS for access to up-to-date study notes even though they had not been enrolled in the system and were therefore not using it.

Furthermore, table 4.3 showed attitude of respondents towards the use of Google Class and Zoom for group work. Findings indicated that 68 (36.76 percent) of respondents agreed that using Google Class for group work would promote interactive learning. 89 (48.10 percent) showed negative attitude, and 28 (15.14 percent) of respondents were undecided, with a mean score of 2.843 and a standard deviation of 1.217. This showed that a slight majority had a negative attitude towards the use of Google Classroom for group work. When asked to share experiences about their attitude towards use of Google Classroom for group work, participants from KYU3 stated:

Google classes can be good for group work. It allowed work to be posted to individuals' e-mail, and students can participate in group work anytime at their own pace, but we have not explored using it for group work.

This finding showed that a slight majority of respondents had a negative attitude towards Google Classroom because they had not explored using Google Classroom for group work.

This implied that there was limited use of Google Classroom for group work.

On the other hand, 64 (34.59 percent) of respondents indicated that the use of Zoom for group work promotes interactive learning. A slight majority of respondents, which is 92 (49.73 percent), showed negative attitude; 29 (15.14 percent) were undecided, with a mean score of 2.849 and a standard deviation of 1.202.

When asked to share scenarios of using Zoom for group work, KYU 2 noted that:

> *There were instances where conversation ended abruptly due to network failure. Besides, failure to create links for fellow group members and very costly data made the use of Zoom for group work nearly impossible.*

This result implied that a slight majority of respondents had negative attitude towards use of Zoom for group work due to network failure and very costly data. This made the use of Zoom for group work nearly impossible.

Table 4.3 above also showed results on students' attitude towards the use of Google Classroom, Zoom, KELMS, and WhatsApp for class discussion. 116 (62.70 percent) of respondents showed positive attitude towards the use of Google Classroom, 51 (27.57 percent) showed negative attitude, and 18 (9.73 percent) were undecided with a mean score of 3.405 and a standard deviation of 1.124. This showed that the majority of respondents had positive attitude towards the use of Google Classroom for class discussion. When asked to share experience of their attitude towards Google Classroom for class discussion, KYU2 stated

> *Google Classroom enables students to interact directly with classmates and the lecturer during the course of the lesson. It also provides the opportunity to flip the classroom, increasing interaction. Besides, both the text and audio for the discussion are posted to individual students' e-mail.*

This finding implied that the majority of the respondents had a positive attitude towards the use of Google Classroom for online class discussion because it provided an opportunity for students to interact with the lecturers and course mates, thus promoting interactive online classes.

On the use of Zoom for class discussion, 84 (45.40 percent) of respondents indicated positive attitude, 69 (37.30 percent) showed negative attitudes, and 32 (17.30 percent) remained undecided with a mean score of 3.054 and a standard deviation of 1.169. This suggested that a slight majority of respondents showed positive attitude towards the use of Zoom for class discussion, as stated by these participants:

> *It is interactive to participate in online discussion using Zoom; however, the inconvenience of the internet and very costly data limits our participation in online class discussions using Zoom (KYU4 participants).*

This result implied that a slight majority of respondents had positive attitude towards use of Zoom for class discussion; however, inconvenience of the internet limited respondents use of Zoom for online class discussion.

On the use of KELMS for class discussion, 64 (34.60 percent) of respondents showed positive attitude, 80 respondents (43.24 percent) showed negative attitude, whereas 41 (22.16 percent) of respondents were undecided, with a mean score of 2.859 and a standard deviation of 1.162. This result indicated that a slight majority of respondents showed negative attitude towards the use of KELMS for class discussion. When asked to comment on their attitude towards the use of KELMS for class discussion, participants observed that they had never used KELMS in their learning process.

This implied that respondents who had never used KELMS had negative attitude towards KELMS for online class discussion.

On the other hand, 156 (84.86 percent) revealed that the use of WhatsApp platform for online

class discussion promoted interactive online class, thus positive attitude; 16 (8.65 percent) showed negative attitude, while 12 (6.49 percent) remained undecided with the highest mean score of 4.032 and standard deviation of 0.92. These responses suggested that the majority of respondents had positive attitude towards the use of WhatsApp for class discussion.

When asked to share personal experience about their attitude towards the use of WhatsApp for class discussion, KYU 3 stated:

> *WhatsApp provides a good platform for mobilizing fellow course mates for online class discussion, helps us to pass any information discussed easily, and facilitates group work. In addition, WhatsApp allows us to academically interact with our lecturers. But there are also instances where WhatsApp is used to discuss love affairs and campus politics, added KYU5 participants.*

This response implied that although students used WhatsApp to communicate among peers, there was increasing use of WhatsApp for academic purposes, including class discussion.

From the above responses, it can be deduced that majority of students had positive attitudes towards the use of WhatsApp and Google Classroom for online class discussion. As a result, the majority of students were mostly using WhatsApp for class discussions.

Additionally, table 4.3 further showed attitude of respondents towards the use of e-mail and KELMS for access and submission of course assignments. 155 (83.75 percent) of respondents indicated that submission of coursework and assignments using email enabled them to get prompt feedback, a thus positive attitude; 19 (10.30 percent) of respondents showed negative attitude; and 11 (5.95 percent) were undecided with the highest mean score of 4.005 and standard deviation of 0.97. On the other hand, 79 (42.70 percent) preferred to submit their coursework and assignment using KELMS in order to get prompt feedback; 67 (36.22 percent) of respondents had negative attitude, while 39 (21.08 percent) of respondents were undecided, giving a mean score of 3.135 and a standard deviation of 1.215. These results

indicated that the majority of the respondents showed a positive attitude towards the use of e-mail for access and submission of course assignments. These study results were expounded by the following participants:

> *It is much easier to access and submit coursework and assignments using email because it caters for distance and time (KYU4 participants).*
>
> *Students find it convenient to submit course work and assignments using e-mail, but there are instances where even though one used the email to submit coursework or assignments, lecturers still demand for hard copies, which they mark and send back to students, while there is no feedback for work sent through email apart from received notices (KYU 5 participants).*

These responses were further supported by UL4:

> *Although many students find it convenient to submit their work using the e-mail, some lecturers find it convenient to receive course work and assignments in hard copies, especially where the class has many students.*

Furthermore, a moderate number of respondents also preferred to access and submit their coursework and assignments using KELMS, as stated by a KYU 2 participant:

> *I would have also preferred to access and submit my coursework and assignments using KELMS because the system assesses, grades, and provides instant feedback.*

These study findings implied that the majority of the students had a positive attitude towards the use of email for access and submission of course assignments, hence increased usage of email by respondents. Some respondents, however, preferred to have the experience of submitting their course assignments using KELMS.

Results in table 4.3 also revealed that 131 (70.81 percent) of respondents indicated a positive attitude towards use of WhatsApp for sharing class materials, 41 (22.16 percent) indicated negative attitudes, and 13 (7.03 percent) were undecided with a high mean score of 3.714 and a standard deviation of 1.184. On the use of video clips, 70 (37.84 percent) agreed that the

use of video for sharing class materials could promote interactive learning. A slight majority of 88 (47.57 percent) expressed a negative attitude towards the use of video for sharing class materials, while 27 (14.59 percent) were undecided, with a mean score of 2.859 and a standard deviation of 1.208. These results suggest that the majority of the students have a positive attitude towards the use of WhatsApp for sharing class materials, as noted by the following participants:

> *It was very interactive and consistent to share class materials using group WhatsApp. WhatsApp makes communication and transfer of information very fast and effective (KYU 5 participants).*

Participants from KYU1 who preferred to share class materials in video format expressed their opinion thus:

> *Sharing class materials using video clips makes learning more practical and interactive. It would have been more interactive to share learning materials with students in video format, although this option had not been fully utilized, added UL3.*

From the above data, it is worth noting that the majority of respondents had a positive attitude towards sharing class materials using the WhatsApp platform. However, sharing class materials in video format would also be a better option to promote interactive learning.

In conclusion, these findings on students' attitude and their use of ICT for learning showed that the majority of students had positive attitude towards using WhatsApp for class discussion (M = 4.032) and sharing class materials (M = 3.714), using e-mail for submission of course work and assignments (M = 4.005), using computers and the internet to develop study notes (M = 3.865), using Google Classroom for class discussion (M = 3.405), and using the e-library for accessing study notes (M = 3.405). However, fewer participants showed positive attitude towards the use of KELMS for class discussion (M = 2.859), use of Zoom for group work (M = 2.849), use of YouTube for online tutorials (M = 2.805), and use of Zoom for lecture attendance (M = 2.897). This implied that the majority of students used

WhatsApp for class discussion and sharing of class materials, accessed and submitted their course assignments using e-mail, and used computers, smartphones, and the internet to access online study materials for their study notes.

4.4 Relationship between Students' Attitude and the Use of ICT for Teaching and Learning

Ho: There is no statistically significant relationship between students' attitude and their use of ICT applications for teaching and learning.

The study used Pearson's product-moment correlation analysis to establish the strength of relationship between students' attitude and ICT use.

Table 4. 4: Correlation between Attitude and ICT Use

Variables	(1)	(2)
(1) Use of ICT	1.000	
(2) Attitude	0.535*	1.000

** p<0.01*

The results in Table 4.4 shows that ICT use is positively and significantly correlated with attitude ($r = 0.535$, $p < 0.01$) thus rejecting the null hypothesis. This means that continued usage of ICT led to more positive attitudes as shown by increase in the score of ICT use and a corresponding increase in attitude score. This statistical finding implied that students increased positive attitude towards ICT had a great influenced on the use of ICT during the teaching and learning process.

CHAPTER FIVE

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

In this chapter, the key findings of the study are discussed according to specific objectives of the study. There are also conclusions drawn from research findings on the basis of research objectives and recommendations for action and for further studies.

5.1 Students knowledge of ICT Applications for Teaching and Learning

The study found that a slightly above average number of participants showed good knowledge of the ICT applications. Out of 45 participants studied, 25 participants (56 percent) reported that they could use ICT for online tutorials, lecture attendance, development of study materials, group work, class discussion, sharing of class materials, and submission of coursework and assignments. High knowledge was on the use of computers and university WI-FI for accessing study materials, use of Google Meet, Google Class, and Zoom for e-lecture attendance, WhatsApp for sharing course materials, and e-mail for submission of coursework and assignments.

Findings above concurred with a study carried out by Johnson et al. (2021) to explore awareness of University of South Pacific students towards e-learning portfolios such as Zoom, Google, and WhatsApp. In their findings, the overall knowledge of the students was above average, indicative of widespread technological awareness. This was attributed to increased uptake of digital technologies across the South Pacific region and the current trend for e-learning. Kibamusoke et al. (2020), similarly in their study conducted in Eastern, Central, and Southern Uganda, found a moderate level of ICT knowledge for learning purposes. Out of 57 respondents that they studied, 34.38 percent were familiar with the use of mobile phones for information sharing on WhatsApp and 21.88 percent for access to the internet for other purposes.

Contrarily, a study by Kibirige (2023) in Uganda on challenges in implementing ICT in Science, Technology, Engineering, and Mathematics (STEM) in the post-pandemic era in Uganda revealed a limited level of orientation into ICT usage among students and teachers. This finding of Kibirige (2023) was not any different from findings of this current study, as a few of its participants were quoted saying it was impossible for them to have knowledge of ICT applications they had never come in contact with or heard of. Applications such as Google Meet, Google Class, and WhatsApp, which were popular among the students in this study, can be credited to the fact that they had either frequently interacted with them or they had heard their friends and lecturers talk about them and use them for teaching.

This implies that ICT applications and facilities like WhatsApp, email, Computer and internet, Google Meet, Google class and Zoom were free from cognitive effort. These ICT were reported to be easy to learn, use and access information as revealed by a participant who stated; WhatsApp is easy to learn and use.

5.2 Student Use of ICT for Learning

The findings of this study established that overall, the major ICT applications used by university students were the WhatsApp platform and email. The most important learning area of usage of WhatsApp was for class discussion and sharing of class materials. This was followed by the use of email for access and submission of coursework and assignments. This study findings revealed there was high use of WhatsApp and email for learning among KYU students. WhatsApp and e-mail, though not specifically designed for learning, have continuously gained prominence among university students as means for class discussions, sharing of class materials, and submission of course assignments, among others. This high level of usage of WhatsApp and e-mail was due to the fact that these ICTs provided all the solutions to social interaction, content sharing, storing, and transferring of data. WhatsApp and e-mail can also be used as a channel for disseminating course work and assignments and

for communicating feedback. This finding on WhatsApp agreed with that conducted by Lee et al. (2023) in a private university, Sunway, which revealed that out of 99 respondents, 33% used WhatsApp for group discussion, and 16% were using WhatsApp for group studies, while 30% were for informing on education agendas. Findings on use of e-mail too agreed with an earlier study by Nashruddin et al. (2020) in Indonesia, which found that university students in Indonesia used the e-mail for delivery of academic documents.

Findings also revealed that the majority of students used Google Meet, Google Classroom, and Zoom for e-lecture attendance. There was, however, limited use of Google Meet, Google Classroom, and Zoom for group work and class discussions. This implied that the majority of students also discussed course-related matters with course mates, lecturers, and instructors in person. The current findings are in agreement with those conducted by Benmansour (2021) in Algeria and Ahmed and Rehman (2021) in Saudi Arabia. Benmansour (2021) revealed that most students used Zoom for online lectures and only a few used it for class discussion. A study by Ahmed and Rehman (2021) too agreed that the majority of students in Saudi Arabia were using Google Classroom for e-lecture attendance.

Results from this study further showed that university e-library resources, KELMS, e-modules, and education videos (YouTube and video conferencing) were among the least used ICT applications for learning. This study finding is not surprising given that similar findings were reported elsewhere in Uganda. For instance, findings by Gakibayo et al. (2013) on use of e-library resources indicated that only 26 percent of undergraduate students at Mbarara University were infrequently utilizing the e-library resources to access academic content. Opati (2013) too established that at Makerere University College of Education, students used the LMS for monitoring their academic progress, registering for courses, and accessing marks, but not for accessing study materials posted by their lecturers. Using ICT to facilitate learning requires that students should fully utilize the available ICT facilities. However,

where such an application lacked the relevant content, then it might not be fully exploited, as was the case with e-library. Besides, failure to be enrolled on the KELMS might have contributed to this low level of usage.

In addition, study findings indicated that there was an equally low level of usage of e-modules, videos, and YouTube for learning. This low usage was attributed to the fact that very few lecturers used the e-modules in their teaching processes. This study findings agreed with a report made by Bwire et al. (2020) on online learning challenges in academia in Uganda. Report showed that there was limited usage of ICT applications such as education videos and e-modules for learning in universities in Uganda. As noted by a participant in this study, designing online courses in videos and animation was time-consuming and needed very high creativity and skills on the part of the lecturers. Besides, the financial implication of designing and using e-modules, video conferencing tools, and YouTube for learning was high on the part of both the lecturers and students. This impeded the use of e-modules and education videos, including YouTube for learning.

This suggest that perceived usefulness of ICT facilities and applications like WhatsApp, email, Computer and internet, Google Meet, Google class and Zoom determined their usage. These applications were considered useful both by self-reported current usage and self-predicted future usage as noted by participants; WhatsApp helps us to mobilize for class discussion and participate in discussion topics. Perceived Usefulness thus is a direct determinant of ICT system usage.

5.3 Students Attitude towards the Use of ICT for Teaching and Learning

Major findings of this study showed that students had a high positive inclination towards the use of WhatsApp for class discussion and sharing of class materials and used e-mail for access and submission of course assignments. It is worth noting that while the current study showed that Kyambogo University (KYU) students were in favour of using WhatsApp and e-

mail for learning, those in earlier studies by Rana and Rana (2020) in Nepal and Akcil and Basta (2020) in Cyprus showed that students were in favour of using WhatsApp and e-mail but for personal non-academic purposes. This positive attitude towards the use of WhatsApp and e-mail by KYU students was because both provided a good platform for mobilization on the education agenda. In addition, it was convenient to send documents and receive feedback using WhatsApp and e-mail, as quoted by a participant who reportedly stated it was convenient to mobilize, send, and receive feedback using WhatsApp and e-mail. Familiarity with these applications might have also contributed to this positive attitude.

This study further showed positive inclination towards the use of university e-library resources (e-books, e-journals, research articles, among others) for access and development of study materials. This positive attitude towards the e-library might be because the e-library offered a collection of digital learning materials and research articles that students accessed and searched online for the development of study notes and research. The findings on e-library thus agreed with a report by Namugera (2023) in Uganda, which reflected a positive attitude with high recognition and value for the virtual library among university students.

On the other hand, use of e-modules motivated students, thus creating positive attitude. This was resonated by participants in this study who agreed that e-module animations boosted their creativity. This study's findings agreed with a study by Zainal and Yunus (2021), which reported that university students in Malaysia found e-modules made up of video, audio, text, graphics, and images convenient and easy to use. This finding thus contrasted with earlier findings by Prabukumar et al. (2023), which revealed that acceptance rates of e-modules ranged from moderate to good.

Additionally, findings from this study indicated a moderately positive attitude towards the use of Google Class and Zoom for e-lecture attendance and group work. Some students reportedly skipped more online lectures using these e-learning portfolios than face-to-face

lectures. This moderately positive attitude might be associated with complaints such as non-interaction, inaudibility, low voice recording, and the inconvenience of purchasing data. This study's findings were similar to those conducted by Hollister et al. (2022) in the United States of America, which showed that 65 percent of respondents agreed that Google classes and Zoom provide fewer opportunities for interaction in online learning and group work.

This implies that students' general impression about a technology determined by the perceived ease of use and perceived usefulness of a technology influence attitudes towards technology usage. Students develop positive attitude about a technology innovation if they perceive it to be ease of use and useful to their learning

5.4 Relationship between Students' Attitude and the Use of ICT for Teaching and Learning

This study showed that there was a significant correlation between attitude and ICT usage. ICT usage was positively and significantly correlated with attitude ($r = 0.535$, $p < 0.01$). As students' attitude become positive, their usage of ICT for learning increased. This result agreed with an earlier study by Olamide (2022) in Nigeria which revealed that increasing students' positive attitude towards ICT led to increased usage thus increased uptake of e-learning. Similarly, another study by Daud et al. (2019) in Malaysia also showed a positive significant relationship between students' attitude and ICT usage. Positive attitude towards ICT was seen to influence not only their use of ICT but also their achievement.

This showed that usefulness of ICT applications and facilities such as WhatsApp, email, computer and internet, Google Meet among others positively influenced students' attitudes towards interaction with these facilities during the teaching and learning process. This implies that perceived usefulness has predictive power over students' attitudes towards ICT usage.

This study results revealed that students had good knowledge on the use of WhatsApp, computer and internet, email, Google Meet, Google class, Zoom among others. In addition, WhatsApp, computer and internet, email, Google Meet, Google class, Zoom were the most used ICT facilities for learning. This in turn led to a positive inclination towards interaction with WhatsApp, computer and internet, email, Google Meet, Google class and Zoom during the teaching and learning process at Kyambogo University. This implied that perceived ease of use denoted by students' ICT knowledge strengthened the extent of perceived usefulness represented by students' ICT use which in turn influenced attitudes towards ICT usage during teaching and learning process.

5.5 Conclusion

The purpose of the study was to explore undergraduate students' attitude towards interaction with ICT during teaching and learning process at Kyambogo University. In this section, the researcher draws conclusions based on study objectives.

5.5.1 Students' Knowledge of the ICT applications for Teaching and Learning

The study showed that students knew the ICT applications which they interacted with on a regular basis. Participants in this study affirmed that mechanisms such as orientation and training on ICT usage, exposure, and self-study were used to obtain ICT knowledge. It is concluded that a robust orientation and training on ICT, exposure, and self-study led to increased knowledge of ICT.

5.5.2 Students' Use of ICT for Learning

The findings of this study revealed that WhatsApp, e-mail, computers, and the internet were the most used ICT facilities and applications for learning. There was also increased interaction using Google Meet, Google Classroom, and Zoom for e-lecture attendance. The study concluded that given their background of traditionally using face-to-face teaching and learning, the majority of the students had not fully embraced interaction with other ICT

resources and applications, such as e-library resources, KELMS, e-modules, video conferencing, and YouTube for learning.

5.5.3 Students' Attitude towards the Use of ICT for Teaching and Learning

This study established that the students possessed a high positive inclination towards the use of WhatsApp for class discussion and sharing of class materials, use of e-mail for access and submission of course assignments, and use of computers and the internet, e-library, and e-modules for access to study materials. Students also showed positive attitude towards the use of Google Meet and Google Classroom for e-lecture attendance. More negative attitude was however revealed on the use of Zoom for group work, KELMS for class discussion, and YouTube for online tutorials. This study thus concluded that students' attitude positively influenced interaction with specific ICT gadgets and applications for teaching and learning.

5.6 Recommendations

Based on the study findings, the followings are the recommendations:

5.6.1 Students' Knowledge of the ICT applications for Teaching and Learning

It was established that students' ICT knowledge was influenced by orientation and training. This study recommends that a robust orientation and training programmes on ICT for all the new entrants be sustained by the university to increase students' uptake and ICT knowledge.

5.6.2 Students' Use of ICT for Learning

On the usage of ICTs for learning, this study recommends that learning approaches such as problem-based and project-based learning which encourage students to use ICT devices and applications as an integral tool should be integrated in the curriculum for teachers and teacher educators.

5.6.3 Students Attitude towards the Use of ICT for Teaching and Learning

The correlation findings revealed that students' attitude towards ICT usage in the teaching and learning process at the university increased with usage. It is recommended that individual lecturers should continue to use ICT in the teaching and learning process. In addition, captivating and motivating ICT applications such as videoconferencing and e-modules, which make learning interactive should be used to improve students' learning experience at the university.

5.6.4 Recommendation for further Research

This study was limited to two programmes of study in the School of Education. The recommendation is that a similar study on the same topic with a larger sample size should be conducted for generalizability.

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APPENDICES

Appendix I: Questionnaire for Students

CODE…….

Dear respondent,

You have been chosen to participate in this study on **Undergraduate students' attitude towards interaction with ICT during the teaching and learning process: A Case of Kyambogo University.** This study is being undertaken as part of educational research. Please feel free to give your view/ opinions on the items provided by answering all the questions. Indicate your choice by putting a circle on the number corresponding to the answer you feel most appropriate. Your response will be treated with utmost confidentiality and will only be used for the purpose of this study.

SECTION A. BACKGROUND INFORMATION

Tick the most appropriate

1. Sex: Male ☐ Female ☐
2. Program of study, e.g. BED, BTE, (**Name of course) …….**
3. Year of study **(Name)……**

SECTION B: STUDENTS USE OF ICT FOR LEARNING

Please circle one number per item**, where, (1) = strongly disagree, (2) = disagree, (3) = not sure, (4) = agree and (5) =strongly agree.**

1	I use video conferencing for online tutorials with my class	1	2	3	4	5
2	I use YouTube to attend online tutorials with my class	1	2	3	4	5
3	I use Google Meet for e-lecture attendance	1	2	3	4	5
4	I use Google Classroom for e-lecture attendance	1	2	3	4	5
5	I use Zoom for e-lecture attendance	1	2	3	4	5
6	I use university's e-library resources such as e-books, e-journal, research articles to access and develop my study notes	1	2	3	4	5
7	I use computer and internet to access and develop my study notes	1	2	3	4	5
8	I use the learning management system (KELMS) to access and develop my study notes	1	2	3	4	5
9	I use e-modules to access and develop my study notes	1	2	3	4	5
10	I use Google Classroom to participate in group work	1	2	3	4	5
11	I use zoom to participate in group work	1	2	3	4	5
12	I use Google Classroom to participate in class discussion	1	2	3	4	5
13	I use the learning management system (KELMS) to participate in class discussion	1	2	3	4	5
14	I use Zoom to participate in class discussion	1	2	3	4	5
15	I use WhatsApp to participate in class discussion	1	2	3	4	5
16	I use the learning management system (KELMS) to access and submit my course work and assignment	1	2	3	4	5
17	I use the e-mail to access and submit my course work and assignment	1	2	3	4	5
18	I use WhatsApp platform to share class material with my course	1	2	3	4	5

	mates					
19	I use video conferencing for sharing class materials with my course mates	1	2	3	4	5

SECTION C: STUDENTS ATTITUDE TOWARDS THE USE OF ICT FOR LEARNING

1	Using video conferencing for online tutorials promotes active learning	1	2	3	4	5
2	Using YouTube for online tutorials promotes active learning	1	2	3	4	5
3	Using Google Meet for e-lecture attendance promotes better students- lecturer class interaction	1	2	3	4	5
4	Using Google Classroom for e-lecture attendance promotes better student-lecturer class interaction	1	2	3	4	5
5	Using Zoom for e-lecture attendance promotes better student-lecturer class interaction	1	2	3	4	5
6	Access to university's e-library resources such as e-books, e-journals, research articles help me to develop up to date study notes	1	2	3	4	5
7	Using computer and internet connections to access study materials help me to develop up to date study notes	1	2	3	4	5
8	Using KELMS to access study materials help me to develop up to date study notes	1	2	3	4	5
9	Using the e-modules for study notes helps me to develop up to date study notes	1	2	3	4	5
10	Using Google Classroom to participate in group work promotes collaborative learning	1	2	3	4	5
11	Using Zoom to participate in group work promote collaborative learning	1	2	3	4	5
12	Using Google Classroom for class discussion promotes interactive online class	1	2	3	4	5
13	Using Zoom for class discussion promotes interactive online class	1	2	3	4	5
14	Using KELMS for class discussion promotes interactive online class	1	2	3	4	5
15	Using WhatsApp for class discussion promotes academic network	1	2	3	4	5
16	Using KELMS for access and submission of course work and assignment promotes prompt feedback	1	2	3	4	5
17	Using e-mail for access and submission of course work and assignment promotes prompt feedback	1	2	3	4	5
18	Using WhatsApp for sharing class materials promotes students' interactive learning	1	2	3	4	5
19	Using video conferencing for sharing class materials promotes students' interactive learning	1	2	3	4	5

THANK YOU FOR YOUR TIME

Appendix ii: Focus Group Discussion Guide for Kyambogo University Students

1. As students, do you know the ICT applications available for teaching and learning at Kyambogo University
    - *Can you name the ICT applications available for teaching and learning at Kyambogo University that you can use in your academic endeavours?*
    - *Do you know how to use ICT for your learning? Which one can you use well?*
    - *Does the university sensitize/ orient students about the ICT applications available at Kyambogo University for teaching and learning? Have you been trained on ICT usage? Do you own / possess any ICT gadget?*
2. Have you used the following ICT applications in your learning and in which learning areas?
    i. Videos
    ii. WhatsApp
    iii. Google Classroom
    iv. Google Meet
    v. Zoom
    vi. YouTube
    vii. e-modules
    viii. KELMS
    ix. e-library
    x. E-mail

Share your experience about using the ICT applications you mentioned above in the following ways;

i. E-lecture delivery
ii. Lecture attendance
iii. Access to course content / study materials
iv. Access and submission of course work and assignments
v. Participation in group work
vi. Participation in online tutorial sessions
vii. Participation in e-discussion
viii. Sharing of class materials

3. Students' attitudes towards the use of ICT applications for teaching and learning.
    - *What is your feeling towards the use of ICT applications for teaching and learning*
    - *Share your personal experience about your attitude towards ICT applications for teaching and learning*
    - *Share your experience about scenarios or instances on how your attitudes towards ICT applications have influenced their usage in your learning endeavours.*

Appendix iii: Interview Guide for Kyambogo University Lecturers

1) In your opinion, do your students know the ICT applications available for teaching and learning at Kyambogo University
   (i) If yes, have they been orientated in using these ICT applications
   (ii) Is the university doing any sensitization and training to increase students' knowledge of the ICT application at KYU? Do your students possess ICT gadgets
   (iii)In your opinion, do students possess the necessary ICT knowledge?

2) Have you used the following ICT applications in your teaching preparations?
(i) Videos
(ii) WhatsApp
(iii) Google Classroom
(iv) Google Meet
(v) Zoom
(vi) YouTube
(vii) e-modules
(viii) KELMS
(ix) e-library
(x) e-mail

Share your experience about using the ICT mentioned above in the following ways;
(i) Lecture delivery
(ii) Participation in tutorial sessions
(iii) Access and development of learning materials
(iv) Submission of course work and assignments
(v) Sharing of class materials
(vi) Participation in class discussions
(vii) Participation in group work

3) Students' attitudes towards the use of ICT applications for teaching and learning.
   (i) What is your attitude towards the use of ICT applications for teaching and learning
   (ii) Share your personal experience about your students' attitude toward use of ICT applications for teaching and learning
   (iii) Share your experience about scenarios or instances on how students' attitude towards ICT applications have influenced their usage in your teaching endeavours.

END GOOD LUCK

Appendix iv: Interview Guide for Kyambogo University ICT Technicians.

1. Can you name the ICT applications available for teaching and learning at Kyambogo University?
2. In your opinion, are students aware of the ICT applications available for teaching and learning at Kyambogo University?

   (i)If yes, have they been orientated in using these ICT applications

   (ii)Is the university doing any sensitization training to increase students 'knowledge of the ICT application at KyU

   (iii)In your opinion, do students possess the necessary ICT knowledge?

3. From your experience, are students using the ICT applications you mentioned for learning?
4. Share your personal experience about your students' attitude toward use of ICT applications for teaching and learning.
5.

END

Appendix v: Consent Form for Participants

Introduction: I am requesting you to participate in this study on Undergraduate students' attitude towards interaction with ICT during the Teaching and Learning process: A Case study of Kyambogo University.

This study is being conducted by Apio Judith in partial fulfilment of an award of Masters of Education in Educational Foundation. The study has been cleared by the Directorate of Research and Graduate training of Kyambogo University.

Voluntarism and withdrawal from the study: Participation in this study is completely voluntary. You are free to participate or withdraw at any time.

Privacy and confidentiality: Your identity will not be revealed anywhere during or after this study. Any information gathered from you in this study will be kept confidential.

Benefits to participants: There are no direct financial benefits or material benefits to you in this study. However, data and information obtained from the study may be beneficial in influencing policies to improve utilization of ICT in Kyambogo University and other institutions.

Risks: There will be no health risks as you participate in this study.

Compensation for participation: All activities of this study will be conducted at your most convenient time without unduly interfering with your work or study schedules. Hence, there will be no monetary or material compensation for your time.

You are requested to sign below to show that you have understood and therefore consent to take part in the study.

I have read the above informed consent document and understand the information provided to me regarding my participation in this study. I do hereby give consent to take part in the study and will sign in the space provided.

Signature…… Date……

Name of person providing consent……