

Factors influencing the uptake of technology for teaching, learning and assessment at Makerere University



May, 2013

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EXECUTIVE SUMMARY

In March 2011 a study was implemented in Makerere University to establish the factors that influence the uptake of technology for teaching, learning and assessment. This was a multi-site study, implemented in seven African universities namely: University of Dar es Salaam in Tanzania; Catholic University of Mozambique; Ibadan University and Jos University in Nigeria; Kenyatta University in Kenya; University of Education Winneba in Ghana, and Makerere University in Uganda. However, each of the seven universities set out independently to find answers to the following general research questions:

- 1) What technologies are being used for teaching, learning and assessment in the institutions?
- 2) How are these technologies being used?
- 3) What is the context within which technologies are used?
- 4) Who is using the technologies?
- 5) What are the reasons proffered for the uptake of technology?
- 6) What are the enablers of technology uptake for teaching, learning and assessment?
- 7) What are the constraints to technology uptake?

In Makerere University the study was implemented as cross-sectional research, employing both qualitative and quantitative methods of data collection, with three study objectives: to explore the extent and nature of technology uptake for teaching, learning and assessment in Makerere University; to determine how technology is being used for teaching, learning and assessment in Makerere University and to identify the factors which enable or challenge the uptake of educational technology.

Study respondents were drawn from among the academic staff, non-academic staff and students. Findings show factors that enable and those that constrain the uptake of ETs in Makerere University. In teaching, enabling factors were mainly at the institutional level and included staff skills training, and the context within which staff use the available ETs. The context was diverse, with a closely neat array of factors, for example ease of access to ET, particularly the computers; availability of stand-by generators to bridge the power cuts gaps; and relative ease of Internet connectivity. Enabling factors for ET use in learning included easier access to ETs, such as computers provided by the university; Internet access while on campus; as well as computer ownership.

Findings further revealed that teaching was constrained by a number of factors seen at institutional, technical, and personal levels: Lack of institutional support to staff efforts was the most frequently mentioned factor, and this was expressed as dissatisfaction with remuneration, and comments on the lack of a clear policy on rewards, appointments and promotion. Time and accountability were mentioned. Technical barriers identified were the same for both teaching and learning, and included the functionality and availability of the ETs. This was crucial, as it had implications for access. It was noted that more male than female staff commented that hardware and software were outdated and inappropriate. Students experienced more challenges with computer viruses than the staff did.

There was a strong association between access to ETs, such as the Internet, and issues around power, bandwidth and connectivity, for both teaching and learning. It was also found that access and connectivity affected perceptions, particularly among the staff, as it meant that time was wasted in futile endeavours.

At the personal level, staff use of ETs for teaching was affected by their attitudes. There was a lot of uncertainty regarding copyright of their e-content, as well as their own continued relevancy to the university should there be full uptake of ET in teaching. Job security was thus a major question in the minds of those considering the use of ETs, and a lack of clear answers slowed the rate of uptake.

Some staff perceived use of ETs in teaching as time consuming, resulting in reduced time for sourcing research funding for publishing, and therefore for their economic survival, at a time hit by increased cost of living, against meagre salaries.

Very insignificant use of ETs in assessment was found, probably resulting from limitations in knowledge and skills. The study revealed that there is an urgent need for policies regarding routine repair, servicing and maintenance of ETs in the university. Appropriate maintenance policies would help promote sustainable and practical access to ETs for both teaching and learning. In addition, bandwidth should be addressed urgently because whenever connectivity is affected the activities of searching for information, the major practice for both the students and staff, is affected.

In conclusion, the findings of this study show that there is greater use of ETs for learning than for teaching. Students are not restrained by their lecturers' conservatism regarding the adoption and use of technology.

However, there are more constraining than enabling conditions in Makerere University for both staff and student uptake of ETs. Computers are the most recognised and appreciated ETs, followed by the Internet. Use of the Internet is basically for information. Very limited use of learning management platforms and web 2.0 tools was found.

ACKNOWLEDGEMENTS

This report was made possible by the generous support of a number of people who cannot all be mentioned here. However, we wish to acknowledge the following:

- The contribution made by the Partnership for Higher Education in Africa (PHEA) for the funding of this research project. We thank the Centre for Educational Technology (CET) staff, particularly Dr. Monica Mawoyo, for the guidance, reviews and coordination of the project that have assisted in bringing it to a successful end.
- Our colleagues in the other six universities involved in this collaboration, who worked as a team during the planning, preparation and implementation of the project, and whose engagement enriched us as researchers.
- The Makerere University research team, particularly the Research Assistants, who, through their data collection, made it possible to include field data.
- The academic and non-academic staff of Makerere University, as well as the students, all of whom gave their time through participating in the study. Without their cooperation, this research would not have been concluded successfully.
- The several reviewers, but particularly Ann Stead for the commitment to meticulously edit this report.

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ACRONYMS

Acronym	Description
AT	Activity Theory
CAES	College of Agriculture and Environmental Sciences
CEDAT	College of Engineering, Design, Art and Technology
CEES	College of Education and External Studies
CET	Centre for Educational Technology
CHS	College of Health Sciences
CHUSS	College of Humanities and Social Sciences
COBAMS	College of Business and Management Sciences
COCIS	College of Computing and Information Sciences
CONAS	College of Natural Sciences
COVAB	College of Veterinary Medicine, Animal Resources and Bio-security
ETs	Educational Technologies
ETI	Educational Technology Initiative
FGD	Focus Group Discussion
HCI	Human-Computer Interaction
KII	Key Informant Interview
Mak	Makerere University
MUELE	Makerere University e-Learning Environment
MXD	Mixed
P.A.S	Public Address System
PHEA	Partnership For Higher Education In Africa
SM	Survey Monkey
TAM	Technology Acceptance Model
TV	Television

1. Background to the study

The use of educational technologies (ETs) has gained unprecedented approval from educators on the grounds of the potential benefits that come with their use in supporting activities like teaching, learning and assessment. A number of testimonies, such as one by Johnson, Adams and Cummins (2012) attest that life has become increasingly busy, to the extent that today learners must balance work, home and school life. They expect to be able to work, learn and study whenever, and wherever they want, and this sounds a call for a paradigm shift for educators to integrate the use of ETs in ways that will provide alternatives to the face-to-face teaching method. This testimony comes seven years later, but confirms Kofi Annan's announcement on the benefits of using ET, made at the 2005 world summit on the information society, held in Tunisia. Annan is quoted as saying, *"We are living in a world of rapid change, where technologies play a multitude of roles. How we tap this technology's potential will shape our future."* (Africa, 2006, p. ii). Many other scholars have endorsed the benefits of technology to education: Four years after Annan, Bon stated that *"All universities need to connect to the global knowledge backbone in order to enhance research, innovation, teaching and learning"* (2010, p. 63). It is imperative that universities make full use of available technologies if they are to reap the benefits of educational technology. However, university uptake of ETs is obviously limited (Blin & Munro, 2008; Nsibirano, 2012), slow (Bakabulindi, 2007) and gendered (Nsibirano, 2008, , 2012). In order to inform strategies to promote the uptake of educational technology, it is useful to interrogate the factors that influence the uptake of technologies for teaching, learning and assessment in Makerere University. This interrogation will shed light on the degree of uptake and its nature, thereby enabling the institution to make an informed decision about what it can do to enhance uptake.

In this report the research questions are posed, followed by an outline of the theoretical framework and the conceptual model that has been used to inform and guide the study. Following this, the research design and the context in which ETs are used are then mapped out, highlighting some of the reviewed cases from other African universities. This is followed by a discussion of the national context in general, and the Makerere University context in particular. The discussion of the Makerere context creates the backdrop for the presentation, and discussion of the study findings.

1.1 Research questions

This project sets out to answer the following questions:

- 1) What technologies are being used for teaching, learning and assessment in the institutions?
- 2) How are these technologies being used?
- 3) What is the context within which technologies are used?
- 4) Who is using the technologies?
- 5) What are the reasons proffered for the uptake of technology?
- 6) What are the enablers of technology uptake for teaching, learning and assessment?
- 7) What are the constraints to technology uptake?

2. Conceptual and theoretical framework

This section presents both the conceptual and theoretical frameworks. The conceptual framework adopted was developed for the PHEA ETI projects by Hodgkinson-Williams and Wickham (2009). While the two theories comprising the theoretical framework are the Technology Acceptance Model (TAM) by Rogers (2008), and the Activity Theory (AT) by Vygotsky (Benson, Lawler, & Whitworth, 2008; Engestrom, 2001; Nardi, n.d; Ryan & Bernard, 2003). A careful blend of these theories is found suitable for studying the factors influencing ET uptake in Makerere University (Mak).

The PHEA ETI conceptual framework acknowledges that adoption of ETs is a layered and complex process, with five levels of ET interaction influencing uptake:

1. The global level, which considers international developments in the use of technology for education;
2. The national level, which is informed by how the context of a particular country hinders or enables technology uptake;
3. The institutional level, which defines factors in the university that determine educational technology use;
4. The disciplinary level, which determines how discrete disciplines e.g. the sciences or the humanities, engage with educational technology;
5. The course level, which considers how different courses interact with educational technology. Implicit at the course level is the individual level, which regards how individual lecturers, and groups of lecturers, deal with educational technology.

Intersecting with these five levels are other key factors, including the socio-political, organisational, pedagogical and epistemological, as well as the technical factors that can support or constrain the uptake of ETs.

The conceptual framework is useful for mapping out how levels and factors relate in influencing uptake. However, the conceptual framework falls short in providing an explanation of how users' attitudes, actions and experiences support or limit ET uptake. This gap is filled by the Activity Theory (AT) and the Technology Acceptance Model (TAM), which provide a useful framework for interrogating student and staff experiences as they interact with ETs during university activities. Using the variables of perceived ease of use and perceived usefulness, as provided in TAM, and the social matrix of AT, the factors that influence the adoption of ETs in Makerere University are analysed and expounded.

2.1 Activity Theory (AT) application

Activity theory (AT) focuses on practice, and it is used to gain a better understanding of everyday experiences in the real world. AT theorists argue that acceptance is achieved from everyday actions and practice. Each individual is what he/she does, and what each individual does becomes embedded deeply within them. This they term the social matrix, which, in the case of ETs, consists of people (staff and students) and the ETs themselves. In the social matrix people consciously interact with artefacts through the activities of their everyday lives. It is in such activities that artefacts (ETs) act as mediators of human thought and behaviour. AT proposes that a person's consciousness is an essential tenet for behaviour (Nardi, n.d). AT enables a deeper understanding of the factors that influence whether staff and students adopt ETs, the reasons why they adopt them, and for what activities they utilize ETs in Mak, with particular reference to their teaching, learning and assessment activities. AT enables an exploration of ideas of intentionality, history, and mediation collaboration in the construction of consciousness, as explained by Vygotsky (Nardi, n.d). Consciousness in this research means the awareness and acceptance of taking up ETs.

Acceptance can be seen from what individuals consciously do in their social matrix as they interact with the ETs. There is a need to understand the individual consciousness underlying staff and students' daily practice (i.e. the intention of the interaction with an ET, and the role of that ET in teaching, learning and assessment). However, it was also found that, as much as AT was useful in enumerating the constituents of the social matrix, it did not clearly bring out the implications of individually formed perceptions about the artefact, as one (student or staff) interacted with ET for the different activities

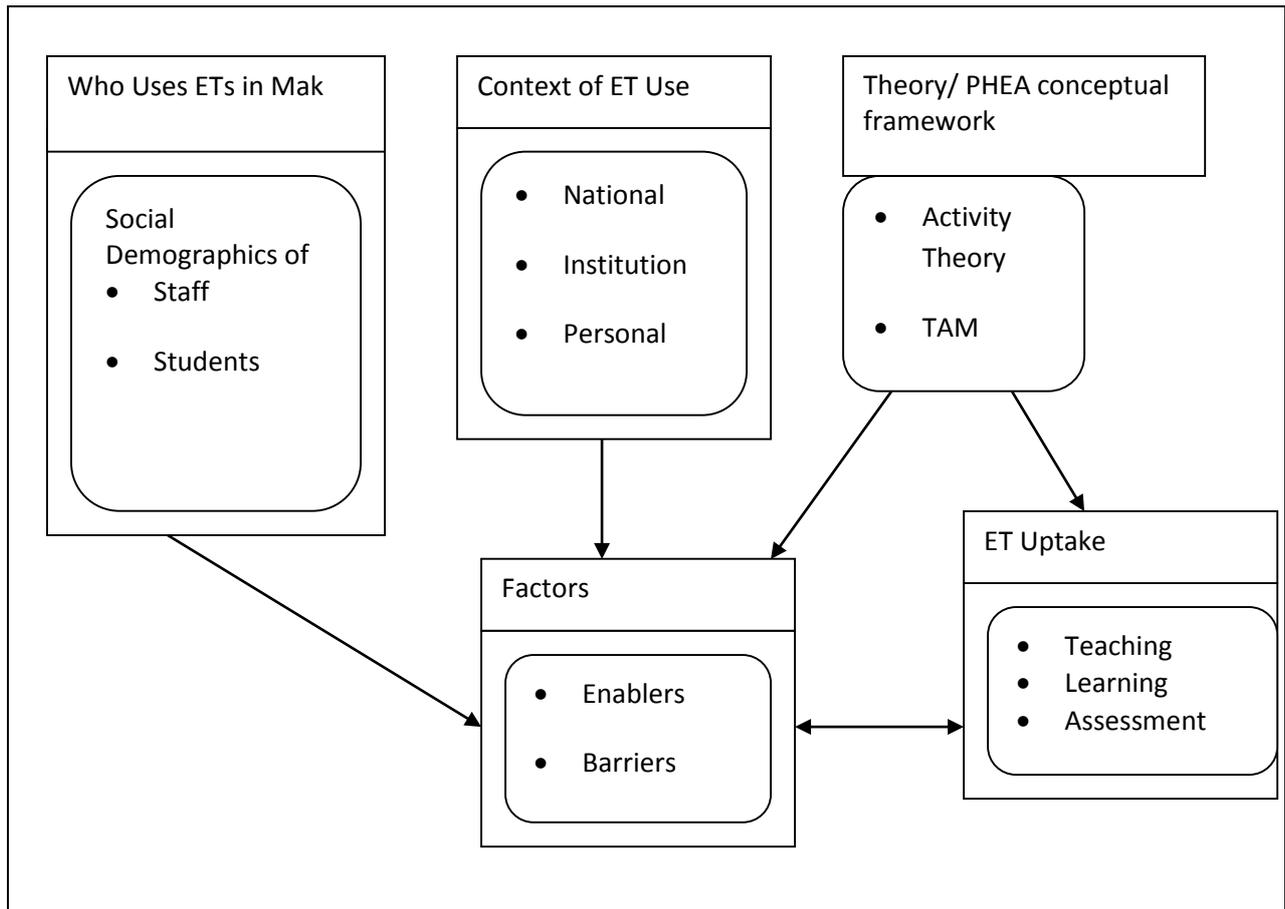
performed in daily practice. Thus the Technology Acceptance Model was adopted, because it expounds on the individual's perceptions in this interaction.

2.2 Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) was originally proposed by Davis in 1986, but has now evolved and gained acceptability among researchers as a generally useful model (Afshari, Bakar, Luan, Samah, & Fooi, 2009; Amoako-Gyampah & Salam, 2003; Chuttur, 2009; Luan & Teo, n.d; Park, 2009; Sandberg & Wahlberg, n.d; Venkatesh, 2000). TAM helps to explain why a user accepts or rejects a technology, by providing a basis from which one can trace how external variables influence attitude and intention to use. The two variables TAM proposes are perceived ease of use and perceived usefulness. As in AT, TAM recognises that the individual's actual use of a technology is influenced by intentions and attitudes. To these two, intention and attitude, TAM adds perceptions of the interaction with the artefact, in this case, with educational technology (ET). Park (2009) argued that there are external factors that affect intention to use a technology by mediating the activity. As such, the subject (staff or student) who executes an activity with the use of an artefact (an ET) can find it useful or not useful, and easy or not easy, hence affecting uptake or failure to uptake. It is from this position that Park concluded that, with TAM, one is able to account for up to 40% or 50% of a user's acceptance.

Acceptance of technology by users is an area that has received much attention from researchers and educators. This is particularly due to the fact that much investment has been made, yet there is recognisable under-utilisation (Venkatesh, 2000). There is an apparent need to establish what factors influence uptake, and in this study we proposed to find these out in Makerere University. Our conception of the variables is shown in the conceptual framework below.

Figure 1: Conceptual Framework of Factors Influencing ET Uptake



According to Figure 1 above, the uptake of ETs for teaching, learning and assessment is dependent upon factors related to the social demographics of the potential users, and the national, institutional and individual realities as staff and students interact with the different artefacts. During interaction, staff and students form perceptions about the technology, which then influences their intentions, attitudes and decisions in relation to the use of the ETs.

2.3 Context of ET use

The framework designed for PHEA studies, which this study adopted as one of its analytic frameworks, meets the need to interrogate the factors influencing ET uptake at five different levels: the global, national, institutional, disciplinary and course levels. This section presents the status of ET at a national level, followed by a general look at ET use in African Universities, including policy issues. It then focuses on the specific context of ETs in Uganda, and in Makerere University.

2.3.1 ETs at national level

Issues relating to the status of technology in education have been of concern to scholars for a long time now (Tamim, Bernard, Borokhouski, Abrami, & Schmid, 2011). Some scholars have focused on technology in the educational sector (Adam, Butcher, & Tusubira, 2011), and others on gender differences in the use of educational technology (BECTA, 2008; Berg et al., 2002; Bimber, 2000; Czerniewicz & Brown, 2006a; Gunn, 2003). Other researchers have interrogated access issues, perceptions and attitudes towards ET (Deters, Cuthrell, & Stapleton, 2010; Gosmire, Morrison, & Osdel, 2009), staff use of ET (Agbonlahor, 2005; BECTA, 2008; U. D. O. Education, 2000; Fresen, 2011; Giannoni & Tesone, 2003; Luo, Chen, & Hsieh, 2011) and students' use of ET (Jones & Czerniewicz, 2010; Jones & Healing, 2010; Kelly, Baxter, & Anderson, 2010; Loh & Smyth, 2010). There have also been studies on ET use by region (Adam, 2003; Farreu & Isaacs, 2007; Glen, Isaacs, & Trucano, 2007; Ng'ambi, 2006); as well as individual country studies that depict national positions (Khan, Hasan, & Clement, 2012).

From a survey carried out in 53 countries in Africa, the authors concluded that the status of IT adoption in individual African nations is complex, and at varied levels of development (Glen, Isaacs, & Trucano, 2007). Investigations show that countries like Algeria, Burkina Faso, Botswana and Uganda, have national ICT policies, and policies specifically relating to ICT in education. Botswana, for example, has a national ICT policy with a specific commitment to ICT use in schools in support of teaching and learning; while, Angola and Burundi, do have national ICT policies, but with no policies dedicated to ICT in education. Benin was the first country in West Africa to be connected to the Internet in 1995, yet only one of its three universities is connected to the Internet. It has also been noted that Benin does not have a national ICT policy, and this affects implementation of ICT throughout the country.

Infrastructure too, is at varied levels in different nations. This literature survey showed that Algeria faces problems of poor infrastructure, and has connectivity issues. In Angola the long period of civil strife has destroyed the infrastructure. However, with the liberalization policy, the infrastructure in Angola, as in Uganda, is improving. Botswana has very good infrastructure, owing to its historical ties with South Africa, however, it is poorly utilized. South Africa, so far, has the best infrastructure, while Burkina Faso, Malawi, Niger, Ethiopia and the Central African Republic lag behind. This confirms some scholar's (Adam, 2003; Adam, Butcher, & Tusubira, 2011) argument that adoption of ETs in Africa remains uneven. The national ICT status is important because, to a large extent, it influences institutional status. Fortunately, many institutions of higher education in these countries are not

sitting still in this regard. Strategies are being put in place to integrate, and so benefit from, the advantages of ET adoption, as will be shown in the next section.

2.3.2 Educational technologies in African universities

African universities have increasingly been affected by global, regional and national waves of change, arising from political and economic transformation (Sawyerr, 2004). These changes have interacted and have affected different universities in varying ways. For example, transformation has affected funding policies, and this has led to reduced funding for higher education, yet increased enrolment, against a background of poor infrastructure. This predicament faces many African universities and has given rise to questions about the quality of the teaching and learning that is happening. Consequently, universities are increasingly seeking ways of revitalizing themselves to recover their previous academic status (Okokoh, 2007; Sawyerr, 2004). This is being done through a number of strategies, and in particular through the improvement of ICT infrastructure, content and skills, so as to meet the growing needs of both students and staff (Adam, 2003).

Adam maintains that, although previously ICT was omitted from the university reform process, there is now evidence that universities have recognized and accepted that if positive change is to come among academics, attention has to be paid to the use of technology. Thus, African universities are increasingly implementing policies that support the integration of educational technologies into the teaching, learning and assessment activities of the university (Adam, 2003; Demps, Lincoln, & Cifuentes, 2011; Park, 2009).

Despite this growing awareness, Adam (2003) asserts that the progress in adoption of ETs in African universities has remained uneven. He points out that universities with funds have embraced ETs more enthusiastically, while those without funding adopt a piecemeal, add-on approach. Furthermore, in most African universities, adoption of ETs is happening within the context of low bandwidth connections, and frequent breakdowns, and this explains some of the complexities around their adoption.

Sometimes the move to adopt ET use appears forced, as staff members are pushed to integrate ET use into their teaching (Demps, Lincoln, & Cifuentes, 2011). Sometimes this push happens before the staff are fully convinced that there is a need to change their way of teaching (McPherson & Nunest, 2008). However, there are also many documented cases where the integration is desired, and strategies have been put in place to support the process.

Available literature also reveals that the hype around implementation is influenced by a multitude of factors, including the anticipation that integration of ETs into the classroom will enhance the teaching and learning experiences (Agbatogun, 2011; Demps, Lincoln, & Cifuentes, 2011; Ming, Hall, Azman, & Joyes, 2010; Mlitwa, 2007; Spector, 2001); support the paradigm shift from a teacher-centered to a student-centered classroom (Agbatogun, 2011; Park, 2009); fit in with the current ET revolution driven by social pressures and market branding; and acquire for the institution a fashionable, forward looking image (Selwyn, 2007). ET integration is supported by increased access to the wide range of technological innovations now available to university education (Agbatogun, 2011; Ogwang, 2008; Wang, 2008).

However, as Adams (2003) also observed, comprehensive and up-to-date information on ET uptake in specific universities in African countries is not readily available. It is against this background that we, through this study, seek to understand the factors that constrain, and those that enable, the uptake of ETs in universities for use in teaching, learning and assessment.

2.3.3 Overview of ICT and educational technology in Uganda

A consideration of the national use of ICTs in Uganda, with special reference to university use of ETs, highlights the need to understand the existing status. There is limited awareness about the successes and challenges facing the universities in Uganda. The National Council of Higher Education report (2010) reports that the Uganda higher education sub-sector has continued to expand, not only in terms of the number of institutions, but also in terms of student enrolment. Student enrolment growth has been particularly noticeable since 2000, and between 2006 and 2010, student numbers increased by 34.1%. There was also a gain in female enrolment, for example, in 2006, there were 57,721 registered female students in higher institutions of learning (42.1% of the student population) and in 2010 there were 80,391 (44% of all students). However, the number of academic staff in these institutions has not increased in line with the growth in student enrolment. While student numbers grew by 34.1% over the four year period, staff numbers grew by only 20%. That is, from 6,465 academics in 2006 to 7,783 in 2010. This growth in the numbers of both students and staff has occurred in the face of declining, or at best stagnant, unit cost funding for educational facilities, infrastructure and academic staff remuneration.

2.3.4 Overview of educational technology context at Makerere University

Established in 1922 as a humble technical college with only 14 day students, Makerere University gradually grew in eminence and size. In 1935 it became the first and only institution offering higher learning in East Africa. Two years later, in 1937, it began offering post-school certificate courses, and in 1949 it became affiliated to the University College of London, a relationship that in 1963 gave birth to an independent University of East Africa. During this time, as stated by Foster (1961), and cited in (Sicherman, 2005), the name “Makerere” was an icon of education, power, wealth, emancipation and more. It was held in high regard by both the students and the wider community, which included all three states of East Africa (i.e. Kenya, Tanzania and Uganda). In the words of Ruhumbika, (1969) cited in (Sicherman, 2005, p. 4), any-one who qualified and attained admission to this university “*reached the end of it all. People forgot his [or her] name and simply referred to him [or her] as Makererean.*”

On July 1st, 1970, Makerere became an independent national university of the Republic of Uganda, offering undergraduate and postgraduate courses leading to its own awards, and this prestigious status has continued. It still is the oldest and most prestigious university in Uganda. By 2009 Mak (Makerere) had moved from its 10 faculties, five institutes, three schools, and one college, to a full collegiate system. Three study programmes, i.e. day, evening and external, are offered, and the current student population stands at 38,692 (18,091 female and 20,601 male) undergraduates, and 1,919 (718 female and 1,201 male) postgraduates (both Ugandan and International) (Makerere University., 2009). Makerere however, has become conscious of the need to safeguard against a decline in the quality of activities like teaching, learning and research. This concern was emphasized by Hanna-Sida in 1999 as an issue that necessitated a wave of transformation (Tusubira, Mulira, Kahiigi, & Kivunike, 2007). Today, Mak is ambitiously promoting the uptake of educational technologies in all its activities, and particularly in teaching and learning, as may be seen in its ICT policy.

Mak has in place an ICT Policy and a Strategic Plan as guiding frameworks in its efforts to reposition itself as a leading institution for academic excellence in Africa, and in its mission of providing innovative teaching, learning and research (Makerere University, 2005, , 2007). Mak also has an Educational Technology Strategy expressed through the following vision:

“To use educational technologies for innovative teaching, learning, research, partnership, networking and internationalization, so as to achieve academic excellence.” (Makerere University, 2009, p. 14).

The ET strategy at Mak has three key principles:

1. *The incorporation of educational technology in the core functions of the university through integrated planning processes;*
2. *The provision of institutional support – financial and technical – to ensure the sustainability of educational technology; and*
3. *The provision of systematic training and capacity development programmes for staff and students (Makerere University, 2009, p. 15).*

Both the ET vision and key principles shed light on how much Makerere University desires to integrate the use of ETs into teaching and learning. It wishes to attain academic excellence, and to be a leading university in Africa and beyond, with graduates who have the required knowledge base and skills to enter the world of work, and to contribute to national development (Makerere University, 2009). However, like most African universities, the university is faced with a number of challenges as it strives to integrate the use of ETs into its activities, namely in teaching, learning and assessment. Available records show variations in the number of academic staff and available ETs, particularly computers, vis-à-vis the number of students. The variations are an indication both of the need to adopt ET use, and also of the existing limitations in the capacity of the different colleges, and of the university as a whole, to effectively implement the use of ETs. The following tables present information about academic staff, computers and student numbers. These statistics were drawn from the Makerere University fact book (Makerere University, 2012), and indicate that the institution has a total of 126 undergraduate (14 diplomas and 112 bachelors) programmes, and 127 (13 post-graduate diplomas and 114 masters) programs. Student admissions by College in 2011/12 are shown in Table 1.

Table 1: Undergraduate Admissions by College and Mode of Admission, 2011

College	Disability ¹	District Quota	International	National Merit	Private	Sports	Total
CAES	1	76	16	219	685	2	999
CEDAT	1	0	20	237	840	3	1,101
CHS	4	0	14	140	281	5	444
CHUSS	4	242	112	39	3,829	2	4,228
COBAMS	1	74	52	253	2,354	4	2,738
COCIS	2	4	21	109	2,478	3	2,617
CEES	1	68	59	116	3,023	0	3,2617
CONAS	0	0	7	165	565	1	738
COVAB	0	1	2	36	303	2	344
LAW ²	6	0	30	90	254	8	388

Source: Adopted from (Makerere University, 2012, p. 11).

In Mak, government sponsorship pays for roughly 6% of students. Statistics reveal that the majority of students admitted come from the central region of the country, followed by those from the western region, as shown in Table 2.

Table 2: Admitted Students by Region and College

Region	Central		Eastern		Northern		Western		Non Ugandan		Not specified		Total		Grand total
	F	M	F	M	F	M	F	M	F	M	F	M	F	M	
Sex															
College															
CAES	206	22 0	89	99	49	60	137	123	6	10	0	0	487	512	999
CEDAT	186	33 4	75	115	28	49	107	187	2	18	0	0	398	703	1101
CHS	93	95	39	59	20	25	46	36	5	13	5	8	208	236	444
CHUSS	1068	90 2	411	384	200	179	517	450	54	50	8	4	2258	1969	4227

¹ NB Disability refers to those students admitted with special consideration for their physical impairment, district quota represents students admitted on the basis of the extension of opportunities to districts less advantaged in terms of educational resources, and therefore with lesser chances of qualifying through the normal stiff competition; national merit are those students, who would previously have qualified for government funding due to merit, but now following a change of government funding policy, are retained as scientists. The private students meet the costs of their own academic stay at university; while sports are those students who get special treatment due to their talent in sports.

² Law is the only school that did not transform to the college system.

Region	Central		Eastern		Northern		Western		Non Ugandan		Not specified		Total		Grand total
	F	M	F	M	F	M	F	M	F	M	F	M	F	M	
COBAMS	506	69 3	235	269	115	140	316	411	15	38	1	1	1187	1553	2740
COCIS	537	69 4	211	288	68	117	282	398	4	16	0	1	1102	1514	2616
CEES	825	66 9	342	307	126	138	410	370	27	43	1	9	1731	1536	3267
CNS	107	21 7	55	82	21	46	64	138	1	6	0	1	248	490	738
COVAB	70	76	43	42	24	27	25	35	0	2	0	0	162	182	344
LAW	84	58	44	33	28	11	55	45	10	19	1	0	222	166	388
Total	7,895		3,450		1,547		4,327		341		42		17,602		181
	44.9%		19.6%		8.8%		24.6%		1.9%		0.2%		100%		17602

Source: adopted from the fact book (Makerere University, 2012, p. 12)

Reviewed literature shows variations in the number of academic staff per college as is shown below:

Table 3: Academic Staffing by College

	Designation								
	Prof.	Assoc. Prof	Senior lecturer	Lecturer	Assistant lecturer	Teaching Assistant	Total Fulltime	Total part time	Grand total
College									
CAES	10	22	24	42	48	19	165	30	195
CEDAT	3	9	21	39	51	34	157	19	176
CEES	1	3	14	40	42	16	116	8	124
CHS	13	23	33	101	58	42	270	20	290
CHUSS	10	23	41	74	90	40	278	19	297
COBAMS	2	1	11	18	58	11	101	28	129
CNS	12	12	15	42	37	31	149	13	162
COCIS	3	2	9	6	43	21	84	9	93
COVAB	11	7	12	15	19	38	102	4	106

The following table shows the number of students admitted, the available teaching space and the number of computers to be shared.

Table 4: Teaching Space and Computers by College 2011/2012

College	Undergraduates	Graduate Students	Total	Space m2	Lab space	Space per student (Sq m)	No of Computers	Number of Students per Computer
CAES	1487	210	1697	1653	2976	2.73	379	4:1
COCIS	5181	192	5373	3355	-	0.62	2035	3:1
COBAM	6104	366	6470	1399	-	0.22	190	34:1
CHUSS	8212	465	8677	2504	-	0.29	440	20:1
CNS	1081	44	1125	1273	3470	4.22	100	11:1
CEDAT	3013	69	3082	2790	1817	1.49	381	8:1
CEES	6406	73	6479	1687	159	0.28	247	26:1
COVAB	536	34	570	479	-	0.84	150	4:1
CHS	1132	347	1479	575	1760	1.58	701	2:1

A review reveals that the students-to-computer ratio is best in CHS and worst in COBAM.

2. 3. Methodology

The conceptual and theoretical framework that was applied in the study design helped to establish the social matrix and to answer the research questions (See section 1). This section of the report presents the methodology that was adopted in executing the study to investigate factors that influence the uptake of ETs in Makerere University. The following sub-section presents the research design that guided the study, the sampling strategy, methods of data collection and analysis techniques, as well as the challenges encountered.

3.1 Research design

This study is part of a multi-site study between seven universities: Dar es Salaam; Catholic University of Mozambique; Ibadan; Jos; Kenyatta; Makerere; and the University of Education, Winneba. In Makerere University a cross-sectional research design was used, and both qualitative and quantitative data were collected during the months of December 2011, to April 2012. A cross-sectional design was preferred because it is useful in interrogating a number of variables known from the theoretical framework to be useful in answering the research questions. Academic units in Makerere University are at varied levels of ET adoption, and for this reason purposive sampling was used to select study

respondents from only those units that have integrated the use of ETs in their teaching, learning and assessment. Both field and online data were integrated for analysis.

3.1.1 Research tools development and piloting

Quantitative data were collected from the staff and students in Makerere University, using structured questionnaires jointly designed with the other universities undertaking the multi-site research. The Makerere University research team customised the collaboratively developed tools to suit the Makerere context. After adaptation, the instruments were piloted and further changes embraced, such as the naming of the units, the academic programs from which respondents were drawn, etc. The staff and students' questionnaires are provided as Appendices A and B, respectively.

Key informant interview guides for staff (Appendix C) and Focus Group Discussion guides (FGDs) for students (Appendix D) were also developed, and piloted to prepare them for qualitative data collection. Out of the 12 Research Assistants (RAs) previously involved in PHEA 1³ research, five were chosen for this study. Four of them (one male and three female) were to be involved with data collection, while a male RA was to handle the quantitative data analysis. The choice of this RA team was based on their proven ability to collect and analyse data as demonstrated during earlier research. In addition, their participation in the first PHEA research project had built their capacity and understanding of educational technology issues. They were first sent out to pilot the questionnaire with 10 students from different academic units. The pilot subjects were purposively selected from those classes where teaching staff use ETs in teaching. After the pilot, preparatory meetings were held to review the pilot results, and the feedback from the pilot was then utilized in the adaptation of the tools in preparation for the data collection process.

3.1.2 Sample description

Staff and students were all drawn from the College of Business and Management Science (COBAMS), The College of Education and External Studies (CEES), or from the College of Computing and Information Sciences (COCIS). These three colleges were selected for the following reasons: In all three, ETs are available, and are variously used in teaching, learning and assessment. The other justification for selection was the uniqueness of the colleges: COBAMS was chosen because it offers disciplines that are close to the humanities and social sciences, and yet it provides the business

³ PHEA supported the first ET research in Makerere University, undertaken in 2009 with the aim of establishing Makerere University staff and students perceptions on access and use of educational technology in teaching and learning.

administration and management context that would be missed if a purely humanities or social science unit was chosen. COCIS was chosen because it incorporates the scientific approach, and earlier studies (Nsibirano, 2006, , 2012; Nsibirano, Kabonesa, Madanda, Kasozi, & Okumu, 2012) indicate that it has a better ICT Infrastructure (see Appendix I) and higher uptake for both staff and students relative to both COBAMS and CEES. The education and external training college, CEES, was selected because it has an ET unit used to train their educators. Data was also obtained from an online survey that was intended to increase the response rate from teaching staff using ET. Twelve respondents participated in this survey, and these included staff from outside the three (i.e. COBAMS, CEES and COCIS) colleges.

2.1.1.1 Academic staff respondents

Having noted recommendations from college staff about colleagues who used ETs most in their activities, a total of 30 academic staff was purposively identified to participate in the field survey. Of these, 27 completed and returned the questionnaires. The same questionnaire was also uploaded on the Makerere University e-Learning Platform (MUELE), and an additional 12 staff members (eight male and four female) participated, and filled in the online survey.

A total of 39 respondents (27 from the field survey, and 12 from the online survey) thus constituted the staff study sample. Table 5 provides a summary of staff demographics.

Table 5: Staff demographics from field and online surveys

	Male		Female		Total	
	Freq	%	Freq	%	Freq	%
Gender	26	66.7	13	33.3	39	100
Designation						
Assistant Lecturer	12	52.2	5	41.7	17	43.6
Lecturer	8	34.8	3	25	11	28.2
Senior Lecturer	2	8.7	1	8.3	3	7.6
Teaching Assistant	1	4.3	3	25	4	10.3
Not Indicated	-	-	-	-	4	10.3
Sub Totals	23	100	12	100	39	100
Terms of Service						

	Male		Female		Total	
	Freq	%	Freq	%	Freq	%
Contract	2	8	4	30.8	6	15.4
Permanent	22	88	9	69.2	31	79.4
Part timers	1	4	-	-	1	2.6
Not Indicated	-	-	-	-	1	2.6
Sub Total	25	100	13	100	39	100
Age						
20	1	3.8	0	0	1	2.6
21 – 30	1	3.8	5	38.5	6	15.4
31 – 40	12	46.2	4	30.7	16	41
41 – 50	8	30.8	2	15.4	10	25.6
51 – 60	4	15.4	2	15.4	6	15.4
Sub Total	26	100	13	100	39	100
Staff per College						
CEDAT* ⁴	1	4	-	-	1	2.6
CEES	8	32	5	38.5	13	33.3
CHS*	1	4	-	-	1	2.6
CHUSS*	-	-	1	7.7	1	2.6
CNS*	1	4	-	-	1	2.6
COBAM	7	28	1	7.7	8	20.5
COCIS	5	20	5	38.5	10	25.6
COVAB*	1	4	1	7.7	2	5.1
CAES*	1	4	-	-	1	2.6
Not indicated	-	-	-	-	1	2.6
Sub Total	25	100	13	100	39	100

Source: Summarised from Makerere University field data, 2011

Table 5 indicates that there are more male staff respondents i.e. (66.7%) than females i.e. 33.3%. Most respondents (43.6%) were Assistant Lecturers, 28.2% were lecturers, while the smallest number

⁴ * Indicates Colleges not initially in sample, but included in the online survey.

(7.6%) were Senior Lecturers. Most staff, (79.4%) were in permanent positions, and only 15.4% were on contracts. Results also indicate that the largest group of staff (41%) were in the 31 – 40 years age bracket. More male staff fell in the age bracket of 31 – 40, while more female staff fell within the 21 – 30 age bracket. The study results also reveal that largest group of staff who participated in the study had been drawn from the CEES.

2.1.1.2 Student respondents

A total of 240 students from the three colleges⁵ participated in the study. However, five students, four from COBAMS, and one from CEES, did not specify their sex. Thus, in questions that are interested in highlighting the gendered context, only 235 respondents are considered. The colleges are the same as those from which the staff were drawn for the field survey. Students who participated in the survey were selected randomly from the classes of teaching staff that are known to use ETs.

Table 6: Students' social demographics

Gender	Year of Study				
	1 st	2 nd	3 rd	4 th	Total
Male	15 (6.3%)	48 (20%)	56 (23.3%)	4 (1.7%)	123 (51.3%)
Female	9 (3.8%)	46 (19.2%)	55 (22.9%)	1 (0.4%)	111 (46.3%)
Not Specified	-	-	-	-	5 (2.0%)
Missing case	-	-	-	-	1 (0.4%)
Sub Total	24 (10%)	94 (39.2%)	111 (46.3%)	5 (2.1%)	240(100%)
Colleges					
	COBAMS	CEES	COCIS		Total
Male	36 (47.4%)	48 (56.5%)	40 (50.6%)	-	124 (51.7%)
Female	36 (47.4%)	36 (42.4%)	39 (49.4%)	-	111 (46.3%)
Not Specified	-	-	-	-	5 (2.0%)
Sub Total	72 (30%)	84 (35%)	79 (32.9%)	-	240 (100%)
Program					
	Day	Evening	External	-	Total
Male	76 (32.1%)	40 (16.9%)	6 (2.5%)	0	122 (50.8%)

⁵ College of Business and Management Science (COBAMS); College of Education and External Studies (CEES) and College of Computing and Information Sciences (COCIS).

Female	70 (29.5%)	34 (14.3%)	6 (2.5%)	0	110 (45.8%)
unspecified*	3 (1.3%)	1 (.4%)	1 (.4%)	-	5 (2.1%)
Missing Case	-	-	-	-	3 (1.3%)
Sub Total	149 (62.1%)	75 (31.2%)	13 (5.4%)	0	240 (100%)
Age					
	<20	21-30	31-40	-	Total
Male	10 (4.2%)	113 (47.1%)	1 (.8%)	0	124 (51.7%)
Female	16 (6.7%)	93 (38.8%)	2 (1.8%)	0	111 (46.3%)
unspecified*	-	5 (2%)	-	-	5 (2%)
Sub Total	26 (10.8%)	211(87.9%)	3 (1.3%)	0	240 (100%)

Source: Field data from Makerere University, 2011 NB: * unspecified cases

According to Table 6, the largest group of students who responded to the question inquiring about their year of study were 3rd years, comprising 23.3% of males and 22.9% of females from the whole group of respondents. More students were participating in the day program than in the other two programmes.

The views of the students regarding learning with ETs, and of the teaching staff regarding teaching with ETs, were captured. The intention was also to ensure that staff using ETs in teaching explain why, and how, they do so.

3.1.3 Student and staff data gathering process

This section presents the process by which data was gathered from the students and staff, starting first with the quantitative, then the qualitative data collection.

Quantitative data from the 240 student respondents was collected with the help of a self-administered questionnaire. The questionnaire was administered to them in December 2011, but because this period was busy with university exams, students were busy reading for exams and so data returns were slow, necessitating a follow-up of the process. Thus student data collection continued after the December term break, through to the second semester in February, and finally through to April 2012.

For the qualitative student data collection, eight focus group discussions were organised, consisting of four groups for male students only, two for female students only, and two of mixed gender. The groups, on average, were comprised of 14 students, and although they were intended to last for about

one and half hours, they lasted a little longer as the participants were always so interested in the discussion.

The academic staff data collection was the most challenging, as the majority were out of office, either marking away from the university, or supervising students in the field. However, arrangements were made to meet on appointment. On many occasions their busy schedules disrupted these appointment schedules. However, alternative appointments were made, and the staff members who were particularly difficult to meet with were substituted for by others, who were also making use of ETs in teaching and assessment. In addition, a copy of the survey tool was uploaded on MUELE for slightly over three weeks, i.e. from April 24th to May 10th 2012.

The qualitative data collection for staff included in-depth interviews conducted with eight staff members (four males and four females). Because some of the respondents who had earlier been identified, and with whom appointments had been made, could not subsequently be traced, finding substitutes for them brought on board staff members from the College of Engineering, Design, Art and Technology (CEDAT) and from the College of Agricultural and Environmental Science (CAES).

3.1.4 Data Analysis

2.1.1.3 *Quantitative data*

Quantitative data analysis was done in three phases: quantitative data from students was analysed first by one of the research assistants who is proficient in quantitative data analysis, using SPSS. Quantitative staff data, from the field survey, was similarly analysed. Analysis of the online survey was done by a partner from South Africa who is conversant with the use of Survey Monkey- software for analysing online surveys. Data from these two quantitative staff data sets was merged, and frequencies generated.

2.1.1.5 *Qualitative data*

All the collected data from the academic staff interviews, and student focus group discussions (FGDs), were transcribed, soft copies of the recordings were made and synchronised with the hand written copies. Using ATLAS.ti, a computer program, the transcripts were coded. Reading the copies over and over again, while listening to the recordings, helped control for errors in the typing, and it

helped the research work by ensuring complete and correct records of the interviews, in the analysis of which a gender perspective was used.

3.1.5 Validity and Reliability

2.1.1.7 *Ethical issues*

Ethical issues arise at various stages of the research process (Bryman, 2001) and these must be addressed by the researchers to increase the validity and reliability of the research outcomes. For this study issues concerning validity were handled as follows: First letters of introduction were written, and submitted to the College Principals and the individual staff respondents who would be involved in the in-depth interviews (Appendices F and G). This was to ensure that the research conducted would be an acceptable activity.

2.1.1.8 *Research team*

The principal investigator identified co-researchers and research assistants, taking note of their research track records. Additionally, research assistants were re-trained because each research project has different objectives. A series of preparatory meetings was held in which issues concerning development of the research tools were handled.

2.1.1.10 *Research tools*

The developed tools were piloted in Makerere University, and in order to enhance the validity of the tools, all the items of the tools (questionnaire and interview guide) were reviewed by the team, and later shared with the wider, inter-institutional research team. The project coordinator was involved in the review process, and she provided the tool audit. All noted and suggested revisions were made before the data collection commenced.

3.1.6 Study limitations

The samples selected for both the student and staff data sets were too small to warrant generalizations. Nonetheless, important insights may be drawn from the findings that help to understand the status of ET uptake in Makerere University. Both quantitative and qualitative methods were used to collect data, and together these generated huge volumes of data, not all of which were presented. However, care was taken to extract as much useful information as possible to explain the factors that influence ET uptake in the university.

3.1.7 Successes and study challenges

The greatest success to report is that a multi-site study was designed and implemented. Initially, as a team, and as an individual research group, we were anxious about doing a study of this magnitude in more than one institution. We were expected to work independently as an institution, and yet in collaboration. How was this going to be possible, given that many of the members were junior researchers. However, the initial fears were overcome through commitment and team work, and these enabled us to implement this study successfully.

Many studies have been done in Makerere University that involve both staff and students, and some of these studies are on ICT. This study took place at the close of the semester, and was therefore complicated by exams, marking, and break off. Some of the respondents, particularly the academic staff, were very reluctant to participate, probably because of research fatigue and its being such a busy time of year. Nevertheless, some staff and students were still willing to participate.

The team coordinator indicated to the research team that the project needed to be done on a meagre budget. There were concerns that this would undermine some of the activities that had to be accomplished. However, the fact that we were able to jointly develop, and pilot the tools, and also collect the data in record time, is a success story to share. This was made possible by the zeal of the research team that allowed them to set aside personal priorities for the greater good of the study.

3. 4. FINDINGS

In this section the research results from the various data sources are systematically presented. The findings of this study are representative of the different levels at which the factors that influence the uptake of ETs were interrogated.

4.1 Access to and Use of Educational Technologies

In this subsection, data is presented on the availability of ETs, ownership and usage.

4.1.1 Staff

Staff members were asked to name all ETs available in their respective units. It emerged that there are a number of ETs available in Makerere University, as shown in Table 7. According to these findings, the ETs more readily available to the staff include: the Internet (with 88.5% of males and 92.3% of females using it), desktop computers (used by 76.9% of male and female staff combined), printers (used by 69.2% of males and 84.6% of females) and laptop computers (57.7% of males and 84.6% of females). Although staff mentioned using the same ETs, the findings did indicate variations in the use of certain ETs by gender. Female staff mentioned the Internet, laptop computers and printers as the most available ETs in their units, while male staff mentioned the Internet, desk top computers and printers, in that order. The ETs available, but mentioned by fewer staff, included the learning management system, MUELE, tablet computers and smart phones, all of which were mentioned at the same rate of 3.7%.

Table 7: ETs Staff said were available in units, and used by gender

ETs Available	Sex of user	Frequency(out of 26 males and 13 females)	% within Gender	Overall %
Overhead Projector	Male ⁶	15	57.7	62
	Female	9	69.2	
Multimedia projector	Male	6	23.1	28.2
	Female	5	38.5	
Interactive Whiteboard	Male	8	30.8	38.5
	Female	7	53.8	
Laptop Computer	Male	15	57.7	66.7

⁶ Male are 26 and Female 13

ETs Available	Sex of user	Frequency(out of 26 males and 13 females)	% within Gender	Overall %
	Female	11	84.6	
Desktop Computer	Male	20	76.9	76.9
	Female	10	76.9	
Television (TV)	Male	7	26.9	25.6
	Female	3	23.1	
Internet	Male	23	88.5	89.7
	Female	12	92.3	
Public Address System (PAS)	Male	10	38.5	38.5
	Female	5	38.5	
Printer	Male	18	69.2	74.4
	Female	11	84.6	
Digital Camera	Male	6	23.1	28.2
	Female	5	38.5	

Source: Staff Data Set. NB: This is drawn from a multi choice questionnaire, indicating percentages within gender, and percentages calculated from total number of cases.

It is also clear that there are differences in access to the various ETs, with some more easily accessed by staff than others. This was clearly shown when staff members were asked about which technologies they are able to use easily, whenever they need to. Their responses are tabulated in Table 8.

Table 8: ETs That Staff can Readily Access for Use

ET Type	Male (26)		Female (13)		Total (39)	
	Freq	%	Freq	%	Freq	%
Overhead projector	8	30.8	5	38.5	13	33.3
Multimedia projector	4	15.4	3	23.1	7	17.9
Interactive white board	5	19.2	2	15.4	7	17.9
Laptop computers	10	38.5	7	53.8	17	43.6
Desktop computers	18	69.2	8	61.5	26	66.7
Television	5	19.2	2	15.4	7	17.9
Smart phones	0	0	1	7.7	1	2.6
Radio	3	11.5	2	15.4	5	12.8
Internet	23	88.5	12	92.3	35	89.7
Public address system	6	23.1	2	15.4	8	20.5
Printer	10	38.5	9	69.2	19	48.7

ET Type	Male (26)		Female (13)		Total (39)	
	Freq	%	Freq	%	Freq	%
Scanner	8	30.8	3	23.1	8	20.5

Source: Summarised from multi-choice Field data; % calculated within gender of respondents

Table 9 shows that compared to the available ETs, personal ownership of ETs by staff in Makerere University is limited. Of the ETs owned personally, laptop computers, digital cameras and printers are the most prevalent, followed by smart phones.

Table 9: ETs personally owned by staff

ET Type	Male (26)		Female (13)		Total (39)	
	Freq	%	Freq	%	Freq	%
Smart phones	7	26.9	3	23.1	10	25.6
Desktop computers	6	23.1	1	7.7	5	12.8
Laptop computers	21	80.8	12	92.3	33	84.6
Internet	5	19.2	3	23.1	8	20.5
Printers	8	30.8	5	38.5	13	33.3
Digital cameras	10	38.5	6	46.2	16	41
Ipod	2	7.7	3	23.1	5	12.8

Source: Field data

Table 9 shows that limited numbers of ETs are personally owned by staff in Makerere University. The few that are owned personally have different rates of ownership, with laptop computers, digital cameras and printers among the most prevalent privately owned ETs, followed by smart phones.

3.1.1.1 ETs available in Makerere for teaching

Data also shows that there are disparities in the rate at which different ETs are used in teaching. The most frequently used ETs, based on the number of respondents citing them, were the Internet, desktop computers, laptop computers and overhead projectors, while the least used were multimedia projectors and interactive white boards. Staff also used ETs for research, and information dissemination, as shown in Table 10.

Table 10: ETs and how staff use them to support teaching

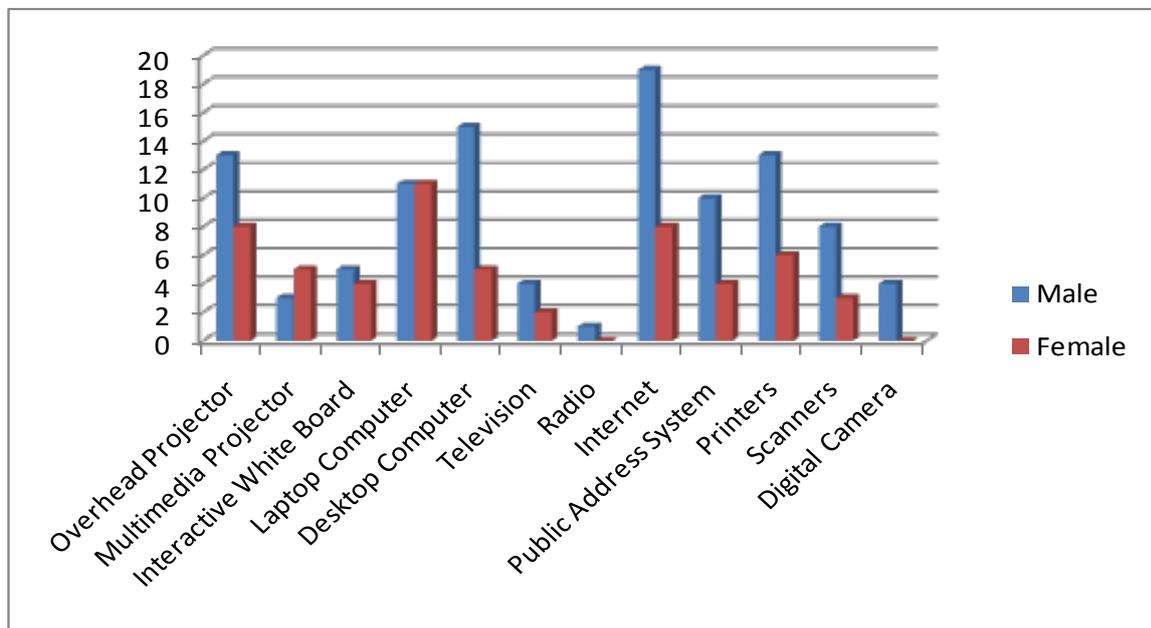
ET Type	How they are used
Overhead projector	Classroom presentations PowerPoint presentations

ET Type	How they are used
	Display of notes and videos Teaching Demonstration
Multimedia projector	Discussions Editing and display Communication Class facilitation
Laptop computer	Typing lecture notes Accessing Internet for resources Presentations Animations Preparation of presentations
Desk top computer	Typing lecture notes Accessing Internet for resources Presentations Communications
Television (T.V)	Viewing and playing video clips Teaching Showing documentaries Illustrations
Radio	Teaching Research Demonstrating audio media packages
Internet	Teaching Research Accessing research grants Surfing for general purpose information Communication Course uploading Distribution of information
Public address system (P.A.S)	Lecturing to many Outdoor presentation
Printers	Printing lecture notes and exams Illustrations
Scanners	Scanning information resources for distribution
Digital cameras	Taking pictures that capture scenes for teaching

Results on ETs used in teaching were also cross-tabulated by gender, and findings are shown in Figure 2, below. Figure 2 shows that both male and female staff in Makerere University make most use of overhead projectors and the Internet. This finding is consistent with staff responses that summarise findings regarding ETs used with the most ease. These were identified as desk top computers and the Internet (Table 8). These were followed by printers, laptop computers and the public address system. It is interesting to note that by gender, male staff dominated the use of most of the ETs used for teaching. Disparities are indicated in the use of particular ETs, such as the desktop and laptop

computers, with slightly more female staff using laptop computers than desktops, while more male staff use desktop computers than use laptops. The radios, televisions and digital cameras are seen to be the ETs with least usage.

Figure 2: ETs Staff use to Support Teaching, by Gender



Source: Summarised from table on ET use in units

Staff were asked if they use ETs in all their classes and 31 (21 males and 10 females), representing 79.5%, said yes. This finding shows that more than half of the staff use some form of ET in their teaching.

Staffs were also asked about the ETs provided by the University for teaching use. From the survey, staff mentioned the same ETs as those mentioned as available in the units: The Internet, printers, overhead projectors, desk top computers, and scanners were the most prevalent, followed by the public address system, multimedia projectors, T.V. and digital cameras. Staff data further revealed that some ETs, like the interactive white board, are provided by the university, but not in all units, and these received the lowest scores for availability. Data from staff also revealed that the university does not provide laptop computers. This can be explained from the fact that almost all staff that use laptop computers use either personal laptop computers, or laptops acquired through project work.

Although staff members know the value of using ETs, a number of them indicated that they would have loved to use ETs, but cannot. They indicated that they would love to use multimedia projectors

for simulations, presentations in class, and illustrations, particularly in big classes. They also added that interactive white boards would be handy for handling large classes, and for facilitating interaction, illustrations and active designing. They said that digital cameras would be useful for video recording, and for taking still pictures, and for capturing scenarios, as the latter can be used in both teaching and documentation.

When responding to the question about which ETs they would like to use for teaching, but are not currently using, staff also mentioned reasons why their use of such ETs has not been possible. These results are presented in Table 11.

Table 11: ETs Staff Wish to Use for Teaching But not Currently Using and Reasons

Reasons for Non Use	ET
Not available/not readily available	Scanner Multimedia projector Interactive white board Television Smart phones Radio Public address system
Damaged	Overhead projector Interactive white board Desktop computer Printer
Overtaken by newer ET	Overhead projector
Lack of /limited skills	Multimedia projector Interactive white board
Connectivity issues	Internet
Not required in a small sized class	Public address system

Source: A Summary of responses from both field and online surveys

The Use of ETs in teaching has made an impact on the teaching experiences of staff. When asked if their teaching experience had improved with the use of ETs, the majority of staff (18 males out of 26, and 11 females out of 13, i.e. 69.2% and 84.6% respectively) said it had.

The reasons provided as to why the teaching experience of staff had benefited from the use of ETs are presented in Table 12.

Table 12: Ways Teaching Experience Benefits from the Use of ETs

Male	Female	Both male and female
<ul style="list-style-type: none"> • Takes less time for delivery and communication with learners • Use up-to-date information for teaching • Students can reach staff member anytime • Once set, course can run for sometime • Lecture notes are easily updated • Learners are exposed to resources early • More interactive during face to face 	<ul style="list-style-type: none"> • Can address difficulties with large classes • Quick access to teaching resources • Speedy delivery of content to learners • Access more material • Class is less stressful • Class exciting • Richer discussions with learners • Learn from students • Illustration is possible • Research • Communication 	<ul style="list-style-type: none"> • More confidence • More involvement • Better communication

Survey data confirms the above, and corroborates that use of ETs facilitates research and illustrations, and hence better understanding by students. This was said by 33.3% of male and 28.6% of female staff. Another 30.8% of male and 22.2% of female staff said that use of ETs in teaching makes their work simple, and that they are able to do a lot more in a short time. Only 15.4% of male staff indicated that use of ETs in teaching makes access to resources, and particularly e-resources, and information easier. The advantage of the greater involvement by students, that is made possible by the opportunity for a hands-on experience, was greatly appreciated by female staff, at a rate of 44.4%, but less appreciated by male staff (7.6%). Only 15.4% of male staff, and 11.1% of female staff expressed appreciation for the easier communication that they said comes with the use of ETs.

Some staff did not find any benefit deriving from the use of ETs in teaching. The reason most mentioned, and by equal numbers of male and female staff, was a lack of training in how to use the ETs. The other reason that staff gave in saying that they did not think ETs have enhanced their teaching experience, was a lack of equipment. Further probing revealed that 70% of staff do not think that the use of ET has negatively affected their teaching experience. However, they were in agreement that

there are factors that can culminate in creating a negative effect on teaching. The following factors were mentioned: One female staff said that when there is no electricity, the ETs cannot be used, and this affects students' concentration in class, and thereby negatively affects the teaching. The fact that there are too many students relative to the available facilities was also mentioned by 40% of the staff as another reason why their teaching is sometimes negatively affected. These reasons are consistent with the constraints later presented in section 4.4.

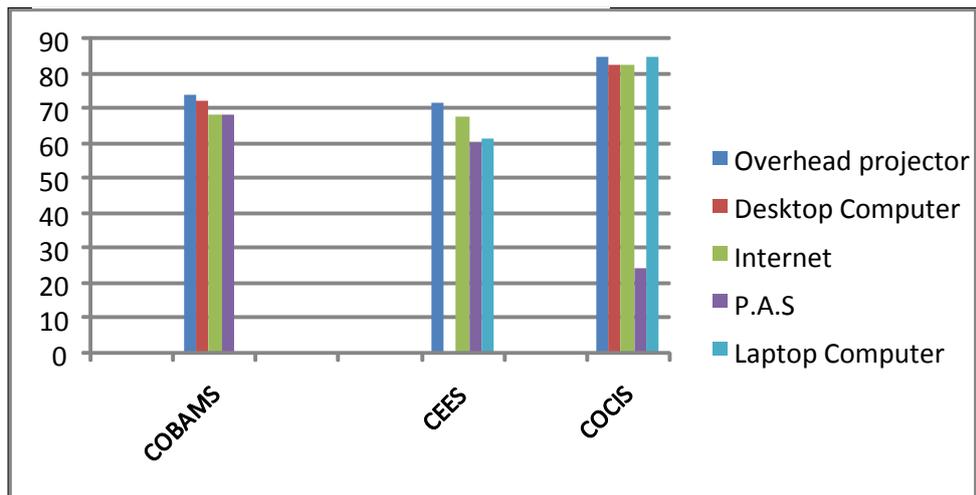
3.1.1.3 ET use for assessment

Staff were asked if their assessment skills had improved with the use of ETs. A sizeable group of those who responded, i.e. 41% (28.2% males and 12.8% females) said yes, they had. Staff also said that ETs are valuable for assessment in that students can conduct peer reviews of each other's work, thereby improving their performance. This was mentioned by 11.1%, while 55.6% said that staff can post course-work online. The other way in which ET is found to be valuable in assessment is that staff are able to refresh their skills, and this was mentioned by 33.3%.

4.1.2 Students

Students were also asked to comment on the availability, as well as on the use of ETs in their respective units, by naming the ETs available and used for teaching, and those they use for learning. The students said that the ETs used most for teaching included: overhead projectors, desktop computers, Internet, public address systems, and laptops, as shown in Figure 3.

Figure 3: ETs Students Mentioned as Used For Teaching by Units.



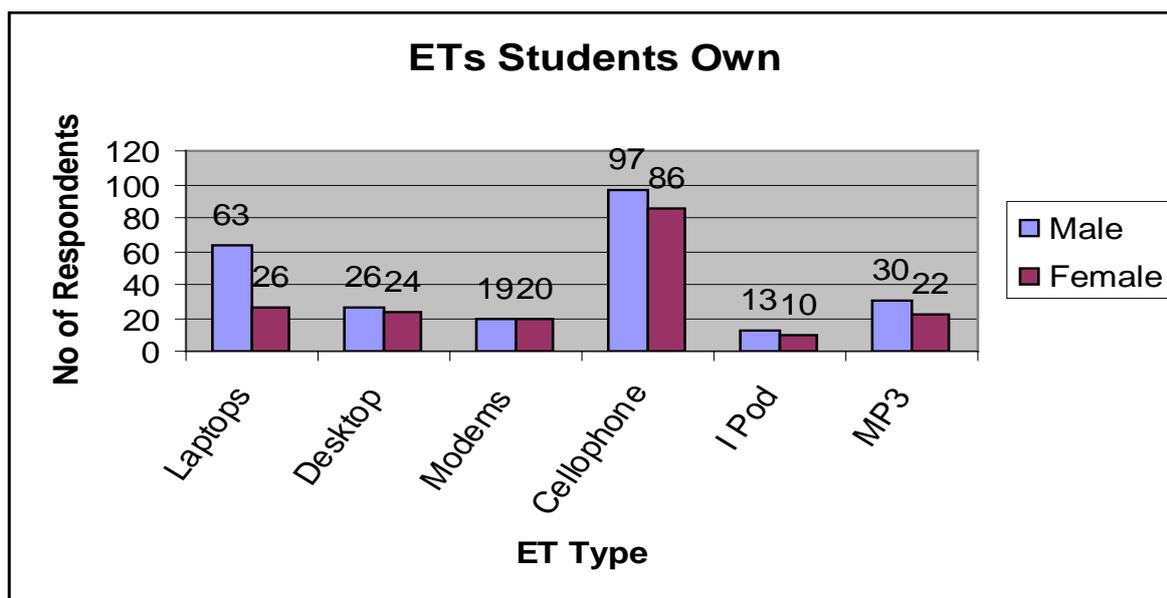
Source: As Summarised from students' data set

Figure 3 indicates that there are five main types of ET that are used to support teaching. Disparities are shown in the extent of ET use between colleges. For example, the College of Computing and Information Services (COCIS) shows higher use of ETs than the other two. In addition, there is greater use of the P.A.S. in the College of Business and Management (COBAM) and in the College of Education (CEES) than in COCIS. This is probably due to the size of the classes, and the mode of teaching. Unlike in COCIS, in COBAMS and CEES teaching is mostly through face-to-face lectures, and the classes are normally big. It was also apparent that in the CEES there is greater use of laptop computers than of desktop computers, while in COBAM, there is greater use of desktop computers. This is probably because COBAMS has more computers, and so students have less motivation to find their own computers, which would normally be laptop computers (Appendix I).

3.1.1.5 ET available in the colleges for learning

ETs available to students are either provided by the university or personally owned. The two ETs most frequently owned by students are cell phones and laptop computers, as indicated in Figure 4.

Figure 4: ETs Owned by Students



Source: Field data

Students were asked about the technologies that they do not have access to, but would be happy to use. Results are summarised in Table 13 below.

Table 13: Technologies Students would Like to Use, but have no Access to

Technologies	COCIS		COBAM		CEES	
	Male	Female	Male	Female	Male	female
Overhead projector	3 (8%)	7 (18%)	7 (19%)	11 (31%)	23 (51%)	14 (40%)
Multimedia projector	22 (56%)	20 (51%)	19 (53%)	18 (50%)	22 (49%)	12 (34%)
Interactive white board	6 (15%)	9 (23%)	8 (22%)	5 (14%)	12 (27%)	10 (29%)
Laptop computers	9 (23%)	9 (23%)	13 (36%)	14 (39%)	24 (53%)	18 (51%)
Desktop computers	2 (5%)	3 (8%)	8 (22%)	7 (19%)	13 (29%)	11 (31%)
Television	3 (8%)	5 (13%)	4 (11%)	11 (31%)	16 (36%)	9 (26%)
Radio	2 (5%)	4 (10%)	3 (8%)	6 (17%)	7 (16%)	8 (23%)
Internet	7 (18%)	9 (23%)	5 (14%)	4 (11%)	14 (31%)	12 (34%)
Public address system	6 (15%)	8 (21%)	5 (14%)	7 (19%)	12 (27%)	7 (20%)
Printer	11 (28%)	18 (46%)	19 (53%)	21 (58%)	13 (29%)	9 (26%)
Scanner	15 (39%)	19 (49%)	17 (47%)	17 (47%)	12 (27%)	10 (18%)
Cell phone	3 (8%)	4 (10%)	2 (6%)	2 (6%)	7 (16%)	8 (23%)
Mp3 e.g. CDs	5 (13%)	6 (15%)	7 (19%)	12 (33%)	10 (22%)	5 (14%)

Table 13 suggests that students at different colleges have varied levels of access to ETs. Students in CEES indicate a higher desire to use, but have no access to many of the mentioned ETs, such as overhead and multimedia projectors, interactive whiteboards, laptop computers, desk top computers, television, Internet, public address systems, Mp3, as well as printers and scanners. Students from COBAM have the greater desire to use printers and multimedia projectors, but find access to be an issue, while in the COCIS, students indicated their greatest need to be for multimedia projectors.

4.2 Enablers of educational technology uptake

Enablers in this study refer to all those supportive factors that promote access and the smooth use of ET at any of the analysis levels (global, national, institutional, disciplinary and course) and this will be the topic of the next section on teaching and learning.

As the purpose of the study was to establish the factors that enable or constrain the use of ETs in teaching and learning in Mak, staff and students were asked to comment on how ET use has improved their teaching and learning experiences. An understanding of the experience of ET use helped the researchers to identify both the enablers and the constraining factors.

4.2.1 Enablers of Educational Technology (ET) Use in Teaching

3.1.1.6 Teaching experience

As already presented in Table 12, the survey data shows that the majority of staff agree that their teaching experiences have benefited from the use of ETs. They identified an increased ability to use updated information for teaching since teaching materials can be quickly accessed. ET makes it easy to update lecture notes and facilitates communication with students, and the teaching of large classes. One female member of staff said that because learners are exposed to the resources earlier, there is more interaction during face-to-face teaching, and as a result this makes the class less stressful, and therefore more exciting for both the teachers and students.

However, two male members of staff indicated that ETs had not added anything to their teaching experience. The reason for this negative attitude regarding the use of ETs was because they did not find them applicable for the courses they teach: namely ceramics, which is practical and uses clay. One female member said that for the theory of education course she taught, the use of ETs was not

applicable. This illustrates that experiences with ETs are not the same for all users. In some situations ET is appropriate and helpful, in others it is not.

3.1.1.7

3.1.1.8 *Training and ET competence*

Some level of competence is required for the use of ETs in teaching, learning and assessment. In this sub-section, the results presented highlight institutional and personal factors that enable uptake. It was reported that the university offers skills training in some areas of ET use, such as in the use of the learning management system, and how the staff should design and upload their courses. This training builds their competency and thus should enable them to use ETs successfully for teaching and assessment. The majority of staff respondents (62%) confirmed that they had been trained in the use of ETs. This is an indication that training is a crucial factor if staff are to use and enhance their teaching experience. This explains why those who have not received training in the use of ET said that their teaching had not benefited from its use.

3.1.1.10 *Context of ET use for teaching*

A Likert scale was used to understand the environment within which ETs are used for teaching in Mak. Analysis shows that the institutional context has both enablers and constraining factors. A limited power supply was mentioned by the majority (60%) as an institutional constraining factor in the use of ETs. Internet connectivity was also a challenge, in part because it is power dependant.

Space in the class rooms, and in the technology rooms, such as the computer laboratories, was questionable. Fifty percent of the staff thought that the space was adequate, while 40% felt that it was not. As a consequence of the limited space, 70% of the staff said that the flexibility required for group work was made difficult by the small class rooms.

Respondents agreed that there is technical support in their faculties to assist whenever staff get into difficulties with technology. However, technical challenges were bound to happen, due to the lack of maintenance, as revealed by 30% of staff who said that they could not be sure of the status of the ETs in their units.

The majority of staff, 20 out of 39, or 51.3%, commented on the functionality of the available ETs, and said that not all available ETs were functional, while another 5 (18.5%) were uncertain of the status of available ETs. Findings also indicated the staff's limited knowledge about institutional ICT policy. Only 15 (38.5%) out of the 39 respondents were aware of this policy, while 14 (35.9%) expressed ignorance of it. The staff indicated that they work in an environment with an unreliable power supply, characterised by blackouts. This was mentioned by 24 (61.5%) of the 39. A further 16 of the 39 (41%)

indicated that the laboratories are not well ventilated. A desire for the institution to offer incentives for ET use was indicated by 16 (61.5%) of the 26 males and by 9 (69.2%) of the 13 females.

During interviews and focus group discussions, staff identified three factors as the biggest enablers of ET uptake. The first factor mentioned was the support received through projects. *“So under this we were able to improve our server and put a router that connects the school of public health and Vet” (Male staff, COVAB).* Another said: *“The ETs we have are through projects” (Female staff, CEDAT).*

The second factor mentioned concerned staff attitudes. In order for staff to uptake ET use in teaching, a positive attitude is required, and they said such an attitude was held by younger staff, while many elderly staff have adopted a negative attitude towards the use of ETs :

“We may need to go slow with the older staff members who feel ETs are not for them. We also need to encourage them, or even replace them with new stock of young ones because ETs are important. [It is only] with attitude change [that] we will be able to do better” (Male staff, COVAB).

The third factor mentioned concerned institutional support, particularly to those staff that have a positive attitude, and are doing something to promote the use of ETs in teaching activities:

It all goes back to time...if the university invested in our time that we use to put together e-content, and also makes us accountable through recognising our efforts, we will use ETs more....But now whether you are using ETs or not, it does not add anything, except it just adds on one’s workload (Female staff, Food Science).

Another staff member said:

The strategic policy only points to shifting you from our conventional way of delivery and integrating now ICT, and yet the motivation that would otherwise get people take ICT as a media for you know delivering of their lectures do not seem to be reflected in that policy, the people have no incentives. ...You know it takes time to sit down and do what I have done here and maybe get 1 or 2 courses running, you know on the learning management system, and yet that is not even acknowledged, I mean who cares that you have 4 lectures running. The University does not consider or promote development of e-courses in their promotion policy. Its emphasis is more on publication only. But if what I do, like this, whatever lecture I get into the learning management system, if it can attract, maybe even a half a days’ weight of a publication, then people will have motivation to take on ETs (Male staff, COVAB).

4.2.2 Enablers of educational technology use in learning

3.1.1.11 *Students and ET ownership*

Data indicated that a significant number of students own their own ETs, and this is by far the greatest enabler. Some of the ETs owned by students included: cell phones owned by 79.7%, radios owned by 50.4%, laptop computers by 47.9%, Mp3s by 22.9%, desktop computers by 21.6%, and Internet modems by 7.4%. What this shows is that, despite institutional access barriers, students are keen on technology, and are investing their own funds to acquire these technologies for their personal use.

3.1.1.13 *Students' skills in using ETs for learning*

Students were asked whether they had been trained in the use of ETs. It emerged that the university has in place strategies to train students in the use of ETs, and particularly in use of the computer. Findings show that 237 students out of 240 responded positively to the question inquiring whether they had received university training on the use of ETs. This group included 122 males and 110 females, while 5 did not specify their gender. Of the 232 who gave their gender, 77% of the males, and 80.9% of the females, indicated that they had received training.

Qualitative data shows that students also appreciate the training received in the use of computers, and that this serves as an enabler of ET use:

In schools we were not all computer literate, but at the university, we all are taught how to start a computer (MS, male FGD, Science).

Yes introductory programs are taught to us. Boys are always eager to learn ETs. Girls crowd behind boys during the training because of big numbers of students and so they wouldn't learn as much. The drive behind the training was that the students needed to move at the same pace with those who know. [now], It is inevitable for a student here on campus to know technology (MS, mixed FGD).

Students also said that because of the competence level they have, they are able to use ETs in class. Data shows that slightly more female students (53.6%) than male (45.9%) are able to use ETs in class.

Students were asked to comment on whether their learning experience had improved through the use of ETs. Their responses of the majority of students, i.e. 87.7% of males and 88.1% of females, were in

the affirmative. Some of the ways in which students observe improvement in their learning include: there is easy access to information from the Internet, they are able to save time, and research is made easier. Further, through the use of ETs for communication, interaction with the lecturers and their colleges is better. They are also able to access their results online.

3.1.1.14 Context within which ETs are used for learning

A Likert scale question was set to determine the context within which students use ETs for learning. As indicated in Table 14, the curriculum is supportive of ET use. However, access is still a challenge for many (92.7% of males and 95.3% of females), who agreed that they would make better use of ETs for learning if access were easier.

The qualitative data obtained elucidates that although the university's provision of training to the students is an enabling factor, limitations in students' skills, particularly during their initial year at the university, is still a barrier to ET uptake, as expressed during a male FGD:

We think students here to some extent have some skills to use ETs like the computer. However, we all come from different places, some of us come from the villages with no electricity and so you cannot talk of technology. The university should therefore teach students how to use ETs. There are some students who cannot even type or send an e-mail, they do not even have email accounts (P7, MS in 2nd male FGD, Science).

This was supported by a female member of staff:

Their case is different. Most of them are not good at using computer, but we train them when they come in first year. They also don't have access to computers and Internet (Female staff, food Science).

Data further shows that students have been able to move ahead of their lecturers in the use of ETs for learning, even where the teaching context does not compel them to use them. This, and more information on the context, including power, and technical support, is summarised in Table 14.

Table 14: *Context as an Enabler of ET Use in Learning*

Statement	Sex	Agree		Neutral		Disagree	
		Freq	%	Freq	%	Freq	%
The curriculum of my institution encourages the use of technology in the classroom for my course.	M	95	76.6	7	5.6	22	17.7
	F	87	80.6	8	7.4	13	12
I will make better use of technologies for learning if I have easy access to these technologies.	M	115	92.7	6	4.8	3	2.4
	F	102	95.3	4	3.7	1	.9
It will be easy for me to use these technologies if I have technical support.	M	111	91	6	4.9	5	4.1
	F	94	90.4	2	1.9	8	7.7
The number of technologies available, relative to the number of students, is not adequate.	M	91	75.8	12	10	17	14.2
	F	71	67.6	16	15.2	18	17.1
In my institution there is ICT capacity development training regularly.	M	31	25.6	29	24	61	50.4
	F	36	35.3	31	30.4	35	3.3
There are incentive schemes in place to encourage teachers who use technologies.	M	25	20.5	55	45.1	42	34.4
	F	25	23.4	56	52.3	26	24.3
Power supply within the institution is reliable.	M	52	44.1	9	7.6	57	48.3
	F	53	50.5	5	4.8	47	44.8
The available supply of power enables me to use technology for learning.	M	73	60.3	4	3.3	44	36.4
	F	68	63.6	3	2.8	36	33.6
I am free to use technologies for my learning, even though my lecturers are not using technology.	M	91	76.5	5	4.2	23	19.3
	F	75	70.1	11	10.3	21	19.6

Source: summarised from field survey

3.1.1.15 Internet and computer access

Although students identified Internet connectivity as a challenge to uptake, they also mentioned that it is relatively easier to gain access to the Internet while on-campus than off-campus. Thus, to them, the limited connectivity received is an enabler of ET uptake, and as one student mentioned: *"I prefer using Internet on university for studying because there is free and easy access"* (P4, FS in MXD FGD).

Data also show that many times when the students talk about ETs, they have a computer in mind, and prevalent personal computer ownership is one of the factors enabling students to use ETs for learning.

4.3 Constraints to educational technology uptake

Constraints are the negative factors affecting the uptake of educational technologies. Negative factors identified in this report include all those issues acknowledged by the respondents as posing challenges

or barriers, and thus reducing the possibility of successful use of ETs. These are divided into three main categories: the first relates to the institution, such as university policy on ET use, and organisational issues, for example how staffing and management are conducted. The second category includes the technical factors, such as those involving access and connectivity, while the third category covers personal factors, such as skills, attitude and course or academic unit, as enumerated below.

4.3.1 Constraints to ET use in teaching

Survey data presents staff responses to five statements on constraints on a Likert Scale, and is summarised in Table 15 and discussed in the following sub-sections of this report.

Table 15: Barriers to ET Use in Teaching

Statement	Sex	Disagree		I do not know		Agree		Not indicated	
		Freq	%	freq	%	Freq	%	Freq	%
Hardware available is outdated.	M	5	12.8	6	15.4	12	30.8	3	7.7
	F	7	17.9	3	7.7	3	7.7	0	0
Some of the software available is inappropriate.	M	3	7.7	7	17.9	12	30.8	4	10.3
	F	7	17.9	2	5.1	4	10.3	0	0
There is poor Internet access in the school.	M	14	35.9	1	2.6	8	20.5	3	7.7
	F	7	17.9	0	0	6	15.4	0	0
I am not a confident user of some of these ETs.	M	15	38.5	1	2.6	7	17.9	3	7.7
	F	10	25.6	0	0	3	7.7	0	0
I do not think my students are competent enough to use ETs for learning.	M	7	17.9	4	10.3	12	30.8	3	7.7
	F	5	12.8	3	7.7	5	12.8	0	0

NB: percentages calculated from total number of respondents

Data shows that there are gender disparities in the intensity experienced in relation to the barriers to ET use. For example, while 30.8% of male staff agreed that the hardware available is out-dated, and that this constrains their uptake, only 17.9% of female staff thought this. Similarly, while more male staff agreed with the statement that some of the software available is inappropriate, the female staff generally disagreed.

Findings in another instance, got when staff were asked to comment about their competence as a constraint in the context of ET use show that majority of staff (64%) disagreed that they are not confident users of some of the ETs, suggesting that they are competent users. However, their own

skills limitations is still a constraint for roughly twice as many male staff (17.9%), as opposed to female staff (7.7%), as these members of staff identified with the statement that they are not confident users of the technologies.

Data also shows that many staff hold the belief that students are not competent to use ETs in the learning process. This poses a barrier to staff use of ET in teaching, but is experienced more by the male staff (30.8%) than the female staff (12.8%).

Qualitative findings revealed a number of factors that constrain staff uptake of ETs. These will be discussed in relation to the different levels, institutional, technical and personal.

3.1.1.17

4.3.2 Institutional constraints affecting staff

3.1.1.18 *Lack of motivation*

Data shows that staff members continue to nurture the view that in order to motivate them to adopt ETs in teaching, the university should reward them in some way. Staff felt that if they were supported, and their efforts acknowledged, they would be encouraged to utilise ETs in their teaching. In their own words they said:

If what I do, whatever lecture I get into the learning management system, if it could attract may be even a half a day's weight of a publication, then people will have motivation to take on.... For now I think the motivation is not encouraging...we do not normally ask for much motivation... we feel acknowledgement would give us motivation to move on and the best equipment we ask for is to be supported with technologies. Now that we go to college system, let colleges find ways of motivating instructors (⁷P6).

Also, other staff have been slow to take this up, partly due to the digital environmental issues stemming from the university policies and the reward systems, with few and overworked staff, but with little remuneration (P5, Male, Health).

Remuneration is number one. If people are paid to do their work, if they get what they are worth, then they are likely to do as much work as possible. But if they have to spend a lot of

⁷ Letter P is used to identify the respondents without mentioning the names for confidentiality purposes

time trying to survive then it isn't going to work. They [only] work to make sure things [teaching] are done, but they cannot work that extra mile when actually they need that extra time to try to make a living (P9, Female, Food Science).

This female staff from food science (P9) also added:

We are talking about houses [rent], food, school fees for children. You are here teaching, but in your heart, you are saying maybe my children may never get here [in the university]...those are real issues...you can't talk about ET (P9, Female, Food Science).

Another staff member said:

We need the university to take responsibility. You just cannot keep on milking the cows that are not feeding. They just have to take the responsibility and invest in this (P9, Female, Food Science).

In these quotations the respondents highlight the need for motivation, and they bring out the need for the university and its management to find ways and resources to support the process of ET integration. The need for appropriate remuneration now, more than ever before, is made more urgent by the changing economic situation. One female staff attests to this: *“As the demands increase...you begin to wonder more about surviving than teaching...you set priorities, is it technology or to deliver content” (P9, Female, Food Science).*

3.1.1.19 Monitoring, support and involvement

The staff generally reported that the university does not provide support, nor does it expect accountability for the work staff do, particularly with e-teaching:

Another thing that this system lacks is that it does not make me accountable - whether I use it [ETs, MUELE] or not, the system does not take into account whether one has uploaded or not, whether you are using it [what you uploaded] or not. [Yet] it does not add anything whether one uses it [ETs] in teaching or not. It just adds on my workload. No body [in reference to university administrators] even says this is good or bad, nobody is interested (P9, Female, Food Science).

Another staff member from CEDAT seems to agree that lack of support from the university is a constraint to uptake. This weakness on the part of Makerere University as an institution can be seen in a number of ways. For example, staff said that lack of support is also seen when staff initiatives in using ETs in teaching are neither recognised nor supported:

The reason why we have not up-scaled this yet [e-course development, filming and recording of clips] is because the support we asked for has not been given to us here by the college. You know it takes time to sit down and do what I have done here, and get one or two courses running...and yet that is not even acknowledged...who cares that you have four lectures

running? The university does not promote development of e-courses. In the promotion policy its emphasis is more on publication (P6, Male, Vet).

For us to upscale what we are doing, we need to have a multi-media unit as vet, or as a college, so that we are able to do it on large scale for the benefit of so many, but we have not got the support up to now. But I tell you, if we were supported with [an appropriate sound-proof room] for recording, a good computer, which can be able to absorb all the programs that I need...to get a good output (P6, Male, COVAB).

Another said:

Most people will develop IT, and even those who are developing modules must be putting prices on them – not necessarily money but maybe in the form of recognition. They would also like to find out whether course development does contribute to one's qualifications. Is it part of something which will lead to a promotion? The promotion is also one big thing, and one of the areas to focus on. If some of those things could be looked at in terms of promotion, I am sure everybody would do an e-course. Because promotion is money. I should be able to earn at least that extra thing, even if I do not have money. At least extra respect (P9, Female, Food Science).

There is nothing on the ground from the university to support our initiatives (P6, Male, COVAB).

I do not think the university is doing enough, because it is one thing to tell me... to use this, but it is also another to aid me. I need a supportive environment for me to use ETs (P9, Female, Food Science).

Yah, something tangible should be done by the university...then they should also enable people to be able to become better in terms of acquisition of materials through research, and these [ETs] are some of the equipment that we can use (P3, Female, CEDAT).

All the issues raised in the quotations suggest that the limited involvement of the university in implementing the policy on ET adoption not only negatively affects staff attitudes, it also creates mixed reactions regarding the role and commitment of this institution in promoting ET uptake, and creates a significant barrier.

3.1.1.20 Maintenance and repair of ETs

The university lacks a policy and clear strategies regarding maintenance of ETs. The poor working condition of ETs leads to frustration, and staff give up using ETs in their teaching. Staff attitudes are affected because they see this as a sign that the university is not sufficiently mindful of the need to integrate the use of ETs:

First of all, it is a new approach [the use of ETs in teaching]... it is a deviation from the traditional methods of passing on information, but it has not taken root, it has not been cultivated, in spite of the electronic ideas we are now having, because of office reasons - maintenance, just getting a bulb for a projector is a problem (P3, Female, CEDAT).

Yah, we had two, but now one is currently no longer functional... because of the improper usage, or maybe it was the power, the power fluctuations that it blew (P11, Female, CHUSS).

We had them, but I think they were old, they have taken some time, when the lamps started dying, All of them, actually now, very few are standing. There is one in the dean's office, also has a projector, they are not more than 4 that are surviving, so most of them are dead (P6, Male, COVAB).

3.1.1.22 Staffing

Interviews revealed that staffing is another challenge to the integration of ETs in Mak: The university has had a ban on recruitment for some time now. As a result, the few staff available are overworked, and feel they cannot cope with still more work by working on ETs. Although the staff appreciate the benefits of integrating the use of ETs into their teaching, the extra time required initially makes it difficult. As one member of staff put it: *“When you are beginning, the time you put in to put up material, that too is an issue. Of course once the material is up then it is easier” (P9, Female, Food Science).*

Quantitative findings from the student data set confirm that staffing is indeed a barrier to use of ETs, in both teaching and learning. Students said that they experience challenges as they use the ETs, and that they sometimes get no assistance. As a result they end up abandoning ET use: *“These lab attendants are over-worked because of understaffing” (P4, MXD).*

4.3.3 Technical constraints affecting staff

3.1.1.23 Poor infrastructure and systems

Qualitative data shows that when the ET equipment is faulty, staff adoption efforts are affected. Staff said that poorly managed systems frustrate teachers' efforts to use ET, and in their own words they confirmed: *"When there are equipment malfunctions, or the ET does not respond the way you want it to, such an experience, and also those moments, I really get frustrated"* (P3, Female, CEDAT). All but one unit had old or damaged ETs. A staff from the College of Veterinary Medicine said: *"We had them, but I think they were old, all of them actually now, very few are standing, they are not more than 4 [projectors] that are working, and most of them have broken down"* (P6, Male, COVAB). The data also shows that system status can be a constraint to uptake: *"I love to see systems that work, people come and ask me about this grading thing of a student. I want to use it in MUELE, but have failed"* (P9, Female, Food Science). Another said, *"Poor quality of service provided, e.g. the computers procured, is a problem. The new ones are all broken down"* (P5, Male, CHS).

3.1.1.25 Internet connectivity

The data indicates that connectivity to the Internet is another challenge: *"We use the computer mainly for accessing reading materials on the Internet. So the greatest problem we have is lack of Internet, low bandwidth"* (P1, Male, CHUSS). Another male staff member from the College of Health Sciences said: *"Issues of bandwidth are the challenges that make it difficult to access the system, especially when outside campus, and this limits what one can do for the students"* (P5, Male, CHS).

Other staff members said:

There are access issues, for example bandwidth, which leads to the system shutting down in the middle of a test. So I get a lot of distress e-mails from students whose tests shut down on them in the middle of an attempt. This is a loophole that is hard to verify as we know it is an issue in the system (P5, Male, CHS).

MUELE, I was using it, but the problem with MUELE is that the Internet is slow. Students were complaining that they have a problem with access. (P9, Female, Food Science).

These qualitative statements are supported by the quantitative data, and confirm that Internet connectivity is a major constraint in Mak.

3.1.1.27 ET access

Staff sometimes face difficulties in obtaining access to ETs, and this makes their efforts to use ETs difficult, expensive, or even impossible:

Sometimes you have to use your private resources - the modem. And that too has cost implications. So if I am talking about students' work, if you have to download things, do you want to download using private resources to do university work? That is a limitation and Internet access to me is a big issue (P9, Female, Food Science).

Across all colleges, connectivity and access constraints on staff limit their uptake of ETs: *"Access is still a problem. In fact you are better off if you own most of the tools [otherwise, access] can be a challenge" (P5, Male, CHS).* Another said: *"For Internet how much do we access? There even sometimes we would want to download materials from YouTube and I understand they were blocked" (P9, Female, Food Science).* Staff also said that *"There are very few tools to support group work. The focus is very heavy on the individual's performance, yet we want students to work in teams" (P5, Male, CHS).*

3.1.1.29 Power outages

Lack of electricity as a challenge to uptake was mentioned by a number of respondents:

Take the example of MUELE, if power goes off we are off. Surely is that useful? No. I think that one cannot access the LMS without power. When power goes that computer also stops and so I stop. And as I stop, I think why am I using this thing? So those little things are the ones that may deter [use of ETs] (P9, Female, Food Science).

Another said:

While using technology for teaching it becomes a problem when power is not stable. Without power here many times the Internet goes off and without Internet the teacher gets difficulties. My biggest challenge which I face in access is when there is no power or poor Internet connection (P10, Female, CHS).

3.1.1.31 Cost

Data shows that although staff have been able to sacrifice personal resources to acquire ETs, particularly computers, they find the cost of ETs a challenge to the uptake of ETs for teaching: *"The other disadvantage of ETs is that they are expensive" (P.10, Female, CHS); "Sometimes it is affordability... the last time I talked to the person who actually keeps the LCD projector, just getting a bulb for the projector is a problem, the thing goes with hundreds of thousands of shillings" (P.3, Female,*

CEDAT). Further, due to the costs involved, sometimes staff feel reluctant and unhappy to use their resources to support teaching activities which they believe should be a cost borne by the university:

Yah, something tangible should be done by this university..., I mean they should also enable people [teaching staff] to be able to become better teachers in terms of acquisition of material through research, and these are some of the instruments, [the ETs] that we can actually use and need to update our ourselves with literature and for publication. [But] we are missing out on some of the things. One can say that you know, a lecturer can afford that equipment, yes we can, but why should we [acquire and use personal ETs instead of the university providing]? If a university can provide for other things, it is a basic requirement in this time and age for it to provide staff with ETs as a basic requirement. But instead, all these computers, if you ask, each one of us has his/her personal PC, they all come with their own personal PCs (P3, female, CEDAT).

4.3.4 Personal constraints affecting staff

3.1.1.32 Staff attitude

Qualitative findings indicated that staff attitudes frequently influence uptake of ETs for teaching, either negatively or positively. One male staff said that it is not right to promote ET use unselectively because not all ETs are useful to all: *“We know about ETs, but do we have to use all of them? For example, can’t one teach science without a laboratory” (P1, Male, CHUSS)*. These words echo a negative attitude, and a very high likelihood of limited or non ET uptake. Another male staff with a negative attitude said: *“However, I find that it is very time consuming to use ETs in teaching, more demanding and more engaging than the simple chalk and dust lecturers.” (P5, Male, CHS)*

Some staff have the attitude that if they are to use ETs for teaching they must be provided with these ETs. Staff wish to see a university that “walks the talk”:

A lecturer can afford that equipment, yes. But why should we acquire and use personal ETs instead of the university providing. If the university can provide for other things, [ETs too] are a basic requirement in this time and age (P3, Female, CEDAT)

Attitudes also differ according to age. Some younger staff blame the slow uptake of ETs on their more senior colleagues who are reluctant, thereby affecting the trend towards integration:

Our own experience has shown that the old generation many not be so much interested in this kind of task. They are not like the young ones...who use ETs as a hobby...that is why even when you call for a training meeting or workshop, the demographics tell you that it is mainly the

young ones. These are teaching assistants, assistant lecturers, very few lecturers, but professors, I have not seen even one! (P6, Male, COVAB).

3.1.1.34

3.1.1.35 *Copyright*

A perception of insecurity is another factor that affects that rate at which staff freely and fully engage with the use of ETs in teaching. Staff indicated their mistrust, and negative attitudes towards the use of ETs, thinking that they will lose their intellectual property rights, or become irrelevant and later lose their jobs:

Can the university protect what you have generated? I have fear that after putting lectures online... will I not be dismissed? [Secondly] how relevant can I remain when the students have all the notes...if the university can commit itself on how it can guarantee the intellectual property rights (P6, Male COVAB).

3.1.1.37

3.1.1.38 *Time*

Staff revealed that shortage of time is a barrier to the use of ETs in teaching:

It all goes back to time, because the time I am putting there is the time I need to write and be a Mamdani, or be in Kalelwe [an open market in Kampala] or write a proposal...time to me is a big thing. So if the university invested in our time [then] we should put together this material (P9, Female, Food Science).

This lecturer reveals the link between staff remuneration, time, university support and involvement. She added that: *"If you really took people for a week to focus on this [course development] and upgrading modules and you [the university] are watching that this is done, then I will use the staff [e-content] that I develop" (P9, Female, Food Science).*

Another female and two male staff said the following:

Time is a challenge...I have so many students here that I have to supervise, on average I supervise 8 to 10 undergraduates every year, and in addition to this, teaching and several assignments. For purposes of knowledge transfer and networking I am a member on several committees, and this further limits my time, yet when one is beginning to work on content, the time you put into it, to put up the material, is an is issue (P6, Male, COVAB).

And I think the university does not give us time to invest in developing materials...But if you do not give me time to develop the material [and yet] you expect me to teach, then am just going

to teach with what I have available. Time to prepare [is important] because some content needs concentrated time. For us to revise the curriculum we need to agree and say now this time - one or two weeks - is for you [us] to concentrate. Then I will invest time, then I will have better material (P9, Female, Food Science).

I am busy staff, though I still create some time to develop this thing, [ET content]. We do not have ICT personnel here [in the college of Veterinary Medicine] so in addition to teaching and supervising, still I have to help out whenever there is need... this is too much for us (P6, Male, COVAB).

These quotations help to show that staff have heavy workloads, which they have to balance with teaching activities like e-content development. They feel that they need more technical support to liberate time for concentrating on key activities, rather than trouble-shooting, as currently happens.

3.1.1.40 Skills

Limited skills among staff are a constraint to the use of ETs in teaching. Skills variations were noted among staff by students. One student said, *“Some not all. I have seen some female lecturers in class who are not sure of what to do. They even call students to help, as they are fidgeting to use the ETs” (P4, MXD FGD).* Staff agree that, although they would have loved to use ETs, their limitation in skills affects uptake: *“Things like calendars, this we are not empowered, we do not know how to use the technology we have” (P9, Female, Food Science).*

4.3.5 Constraints to ET use in learning

Students’ data reveals the factors that are a barrier to uptake of ETs in learning:

Table 16: Barriers to ET Use in Learning

Statement	Sex	Disagree		Neutral		Agree	
		Freq	%	Freq	%	Freq	%
Hardware available is outdated.	M	49	40.8	26	21.7	45	37.5
	F	44	41.9	33	31.4	28	26.7
Some of the software available is inappropriate.	M	38	31.4	23	19	60	49.6
	F	36	34	22	20.8	48	45.3
There is poor Internet access in the school.	M	49	42.2	6	5.2	61	52.6
	F	55	52.4	8	7.6	42	40
	M	62	51.2	7	5.8	52	43

Am not a confident user of some of these ETs.	F	37	34.6	9	8.4	61	57
I do not think my teachers are competent enough to use ETs for teaching.	M	56	46.3	37	30.6	28	23.1
	F	66	61.1	23	21.3	19	17.6

Table 16 shows that students have varying levels of perception regarding the environment in which ETs are used for learning. More male students than female agreed that inappropriate software and Internet access constrain uptake, while more female students cited limited skills.

4.3.6 Institutional constraints affecting students

3.1.1.42 Staff remuneration

It was interesting to note that students identify poor staff remuneration as a factor that has greatly affected the uptake of ETs in Makerere University. The students said that poor pay of staff is a challenge, as the staff do not feel motivated to integrate ETs into their teaching methods, which in the long term affects students' use of ETs for learning:

We also have a challenge of keeping lecturers around. Our lecturers have many opportunities to make money outside, I mean in other places. The university pays staff peanuts. Take for example an engineer in a power company or a telecom; he earns more money than even a professor. The one million that Makerere pays to a lecturer cannot keep them around. We find that we lose very good lecturers who would have given us the feel of the field simply because they cannot be paid well (P2, Male FGD, CEDAT).

Students also commented on the issues of part-time staff, and they highlighted, that it is an effect of poor pay:

In addition, the university is phasing out part-timers, so instead of becoming a full-timer and earn one million, they would rather leave teaching and work elsewhere in big companies and earn handsomely...I think the university should allow the policy of part-timers to continue, and the university should look into lecturers payments so that they can stay. They need to be motivated (P2, Male FGD, CEDAT).

4.3.7 Technical constraints affecting students

During the interviews students said that some of the ETs, particularly the computers, are faulty, and that this affects their uptake. As was commented on by the staff, lack of maintenance also affects the use of ETs for learning by students: *“They have tried to buy computers, e.g. in Adult and Continuing Education we have 40 computers in the lab, but most computers are not working” (P4, MXD FGD).*

3.1.1.44 Computer viruses

Sometimes students access the Internet and download useful information and even course documents which they then save on flash drives for later use. However, “secondary access” to the Internet is hampered by computer viruses. During the interviews students said that many computers, and sometimes whole computer labs, are infested and this affects their use of ET to support their learning: *“The other problem we find is the computer virus, which also destroys our data and flash drives, yet we pay a lot of money for technology fees (P7, FGD).*

3.1.1.46 Connectivity

Students said that use of ETs for learning is affected by issues of connectivity:

The other challenge we find is that Internet is slow. You can wait, and the thing is just showing that it is rotating. Then you can even give up. Even wireless does not help us much because Mak air is not reliable, at times even when it is on, it is slow, so you give up using it. For example, for the whole of this semester, it has been on for only 2 times (P2, Male FGD, CEDAT).

Other students in the same group added: *“Yes, sometimes students cannot access Internet, and when given coursework, they do not want to use ETs and prefer looking for knowledge in the library”.* Another said: *“Yes, issues of bandwidth are the challenges that make it difficult to access the system”;* while another said: *“We also have a problem of lab attendants who switch the internet off in COBAMS in order to reduce the number of students in the computer lab” (P4, MXD FGD).*

3.1.1.48 Access to ETs

Access is another factor that students find affecting the use of ETs:

Now we have a few computers, in physics the computer lab has 40 computers and only 15 are working (P7, Male FGD, Science).

Another student added that:

We find that at the university we cannot access books online. The university invests more in hard copy books, [yet] you find that there are only four or five copies in the library. So why doesn't the university buy e-books and maybe provide a password which the students can use? (P2, Male FGD, CEDAT).

Other students had this to say about access: *"Small labs with limited computers and most times students lack access [is the problem to us] there are very few computers for student" (Female MXR FGD, CEES).* A male student from CEES, in the same FGD said, *"Yes, students use ETs, but the first years do not access [ETs] apart from second and third years. This is because labs are small. In case of access you need to come very early in the morning" (P4, MXR FGD).*

Computers are few. The university puts restrictions on computers because if we could freely go to wherever there is a free computer then that would be okay. If...my faculty does not have computers, why can't I be allowed to go where they are? (P7, Male FGD, Science).

3.1.1.50 Maintenance

Routine servicing, repair and maintenance of the available ETs is lacking in the university and this, students said, is a challenge to uptake: *"Now we have few computers like in Physics [but even those] 40 computers [cannot be maintained] and only 15 are working, the wireless Internet [too] has been off since last semester' (P7 Male FGD, Science).*

4.3.8 Personal constraints affecting student uptake

3.1.1.51 Skills

Students experience challenges in using ETs to enhance their learning experience due to their limited skills. Qualitative findings, however, reveal that not all students are at the same skills level. Although both male and female students are affected by limited skills, interview responses indicated that more female students than males are affected by deficiencies in skills levels: *"Some students are more knowledgeable with ETs, especially boys. They connect and use ETs in church, cinema etc." (FS, COBAMS).* Those that have limited skill said they find use of ETs difficult. Staff and students both acknowledged that students' limited skills were a negative factor affecting ET uptake: *"Most of them [students] are not good at using computer, but we train them when they come in first year"(P10, Female, CHS).* Variations in skills were also noted between disciplines, with students in science based

colleges better placed to use ETs. Students said that the different contexts they came from also influenced their experiences, as well as their skills levels:

We think students here, to some extent, have some skills to use ETs like the computer. However, we all come from different places, some of us come from the village with no electricity and so you cannot talk of technology...there are some students who cannot even type or send an e-mail, they do not even have e-mail accounts (P7, Male FGD, Science).

Students spoke of: *"Lack of skills which consume students' time in the case of MUELE. When students lack skills to use it, they shun and copy work from their friends"(P4, FS, MXF FGD, COBAMS).*

4. 5. Discussion

In this study we set out to interrogate factors that influence the uptake of technologies for teaching, learning and assessment in Makerere University. The theoretical framework used provides space to discuss the results using the PHEA ETI framework, together with the Technology Acceptance Model, and the Activity Theory. The Activity Theory position is that whatever potential users or subjects, in this case the students and staff, think about or do with the ETs will support or limit their ET uptake. The Technology Acceptance Model argues that the adoption of ETs for use in teaching, learning and assessment will depend on whether the staff and students find them easy to use and useful, or not. These two perspectives spell out the important influence of experience on adoption. Thus, the Activity Theory (AT) and Technology Acceptance Model (TAM) guide the interrogation of student and staff experiences as they interact with ETs in the three university activities of teaching, learning and assessment, in the search for factors that support ET uptake.

Scholars have, for some time, been interested in interrogating factors that influence uptake of ETs. Yi and Hwang (2003) cited in (Park, 2009), commented that the identifying of critical factors related to user acceptance of technology continues to be an important issue. Lee, Chen and Hewitt (2011) argued that identifying the barriers encountered in the use of ETs will help develop relevant coping strategies to lessen the effects of, or even totally eliminate, those factors that inhibit the use of ETs. While Luo et al. (2011) commented that issues of how and what incentives should be in place to encourage the uptake of ETs remains largely unknown. In this chapter the factors that influence the uptake of ETs are discussed. The first section highlights the enabling and constraining factors in the use of ETs in teaching by staff, and the following section discusses the enabling and constraining

factors in the use of ETs for learning by students. In the concluding section we mention what needs to be in place in the university to incentivize the uptake of ETs in teaching.

5.1 Use of ETs in teaching

Many benefits are acknowledged to result from the use of ETs in teaching (Tayo, Ajibade, & Ojedokun, 2009). However, the choice of whether to use or not is influenced by a number of factors. Factors identified in earlier studies have included: technological infrastructure (Lee, Chen, & Hewitt, 2011); graduate competency; faculty effort, such as willingness to accept ETs (Buabeng-Andoh, 2012; Damme, Haan, & Ledema, 2005); cost (Lee, Chen, & Hewitt, 2011); and student satisfaction with ETs, among others (Park, 2009).

In this study, conducted in Makerere University, findings indicate that the use of ETs for teaching, learning and assessment is clouded in both enablers as well as constraining factors. Unlike earlier scholars, some of whom grouped these factors into intrinsic and extrinsic factors (Tabat & Johnsrud, 2008), first order and second order factors, or external and internal factors (Khan, Hasan, & Clement, 2012), we have grouped these factors into the three levels: institutional, personal and technological, as provided by the PHEA ETI framework.

5.1.1 Enabling factors

This study found that, although the level of ET uptake is as yet minimal, there are some pockets of success, as may be seen from those members of staff who have integrated the use of ETs into their teaching. Staff from different units, who were using ETs, identified the factors that had enabled them to make use of ETs in their teaching: At the institutional level three factors were mentioned, these included technical support, availability and easy access to the ETs, as well as institutional support and motivation.

At a personal level motivation happened in two ways: The first way in which motivation can boost ET usage in teaching was found to be either directly, through enhanced salaries, or indirectly, through promotion. Staff wished that the efforts they put into designing and developing e-learning content should generate points to be considered during promotion. At the present moment only teaching, research and publications contribute to promotion. This finding corroborates Bower's (2001) suggestion that staff should be rewarded. Bower added that all humans operate, and are motivated

by, positive reinforcement, such as salary, promotion or adjustment of workload. This factor suggests that if this endorsement, through salary enhancement, promotion or adjusted workload that would create space for ET, does not happen, this will actually inhibit uptake.

The second, personal way in which motivation was mentioned, was not tied to monetary rewards, but to a desire for recognition of input and level of staff commitment. Staff said that they would love to see their input or efforts appreciated. If their efforts with ETs were recognised as important, this would translate into recognition. One female member of staff indicated that she gets disappointed when no-one notices that she has four courses running on MUELE. She indicated that only the students recognised her as a good teacher, but not the university. This finding confirms the contention of earlier proponents of incentivising the use of ETs. They argued that the primary faculty incentives for online teaching include self-gratification and professional recognition (Rockwell, Schaver, & Fritz, 2001). This finding also concurs with Bower's (2001) views that in many research institutions there is a need to maintain a balance between research and teaching. He suggested that the time spent developing e-content for example, or delivering course content using ETs, should be recognised, because if it is not, then it is as good as wasted, because it will not count towards the points required for promotion.

At a technical level, staff mentioned that the presence of technical support staff is crucial in the use of ETs for teaching. They argued that if more support could be provided to individuals using ETs, this would be an indication that their efforts are appreciated and supported. This finding was consistent with other studies that have shown that if a faculty gets technical support, then the time involved in initial preparation, and actual use of ETs, can be reduced (Demps, Lincoln, & Cifuentes, 2011; Giannoni & Tesone, 2003). This finding also augments Giannoni and Tesone's (2003) idea that some factors that motivate use are intrinsic. Therefore, providing technical support will express appreciation and support for the individual as they integrate ETs into their teaching.

The availability of ETs is frequently the determining factor as to whether ETs are to be used. Some ETs are provided only by the institution, while others can be owned by the individuals, and therefore their use is facilitated by easier access. In instances where the institution does not provide for the availability of the ET, and there is no personal ownership, this becomes a challenge for those who would potentially use an ET. This finding concurs with the statement that access and use are very much interlinked (Czerniewicz & Brown, 2006a, , n.d).

5.1.2 Constraining factors

It is evident that ETs, when used, provide opportunities for universities to enhance teaching experiences (Demps, Lincoln, & Cifuentes, 2011). However, as Tabat and Johnsrud (2008) (cited in (Demps, Lincoln, & Cifuentes, 2011) specify, there are a number of factors that stand in the way, and thwart the full attainment of this benefit. The study conducted in Makerere University confirms the existence of factors linked to the institution, such as limited motivation, support and involvement from the university; deficiencies in technical aspects, such as access and Internet connectivity; staffing and cost. Then there are the individual/personal factors, like teaching staff attitudes. These factors are all significant in influencing the rate and intensity of ET uptake.

At the institutional level, factors related internally to the institution determine whether staff will or will not use the ETs for teaching. The institutionally related factors identified included the presence of a skills training program. Staff said that training is crucial, and that it should be accompanied by context specific provision of ETs to units which at the moment are lacking these resources.

For the successful use of ETs in teaching, access is equally instrumental, and in this study we found that it is mainly facilitated by the infrastructure set up by the university. ETs accessed most for teaching include the Internet, desktop computers, printers, laptop computers and overhead projectors. However, the numbers of available ET equipment are inadequate to allow for their full uptake in teaching.

Another factor that was found to constrain ET use in teaching arose from the need for staff to be motivated. We found that university staff are generally convinced that they can carry on teaching in the same way that they have always done, without the additional bother of integrating ETs. Thus, if they are to go “the extra mile”, the staff desire motivation to compensate for the extra time and effort needed. At the moment, the university does not offer any motivation to staff, and this has greatly reduced the rate of ET uptake. Staff mentioned that motivation ought not to be only monetary, but could be broadened to include recognition, and reward of those staff showing a clear commitment to the integration of ETs into their teaching.

The lack of university management involvement, monitoring and support for staff was also found wanting, and this limited efforts made to use ETs. This factor is related to the institution, but affects the staff at a personal level, as it influences their attitudes towards using ETs in a negative way. Teachers said the university never recognised their efforts at all, neither did it support them, and this

was taken as a sign that use of ETs in teaching is not a priority to management. As a result, they feel their time is wasted, their input neither called for, nor needed. As argued by (Buabeng-Andoh, 2012), whenever there is a lack of support, teachers become frustrated and unwilling to use. This corroborates the contention of Korte and Husing (2007) that support by school leadership was a strong enabling factor for ET use in British and Netherlands schools. It also confirms the view of Staples et al. (2005) that in any change effort, the role of the administrators, at every stage of implementation, is critical. The attitudes and actions of school leaders in relation to new technologies have the potential to encourage and support teachers as they engage, and will also ensure that ET use is prioritised, and that teachers come to feel comfortable with using technology.

At a technical level, findings show that access to ETs is greatly affected by the lack of a maintenance policy, or strategies to repair ETs when broken down. This further limits the availability ETs for use. This in turn affects staff attitudes, because of the frustrations caused by the poor condition of the ETs. This finding is consistent with the findings of other scholars that a poor ICT infrastructure on the campus slows down the implementation of technology supported instructional methods (Omwenga, Waema, & Wagach, 2004).

Issues of bandwidth and internet connectivity were also found to slow down the use of ETs (Omwenga, Waema, & Wagach, 2004). The other factor that affects internet access and connectivity is the undependable power. It was found that in Makerere University, once the power is off, one cannot connect to the Internet, even though the reserve generator is on. This finding corroborates what was found in a study on the use of computers in Nigeria, that the erratic nature of the electricity supply poses a challenge to the use of ETs (Tayo, Ajibade, & Ojedokun, 2009).

At a personal level, there are factors that inhibit the uptake of ETs and, as argued by Rogers in the Technology Acceptance Model (Rogers, 2008), one is more likely to uptake a technology if one thinks it is easy to use. As stated by Omwenga, Waema and Wagach (2004), the use of ETs in teaching is a relatively new concept, and so staff tend to have varying perceptions about it. We found that some staff still hold negative perceptions about the benefits that can be derived from using ET.

Many held the fear of losing their jobs should use of ETs be fully integrated into teaching. They argued that if ETs are embraced, and content suitable for the online mode of delivery developed, then it would become easy to dismiss staff members, as their value in the chain of teaching and learning would be reduced. This finding indicated an ignorance about the widely held view that the use of ETs enriches

the existing teaching and learning processes, but does not replace it (Tayo, Ajibade, & Ojedokun, 2009).

Further, some Makerere University staff were found to believe that they would lose copyright over the e-content they created, and this was a factor that reduced impetus in uptake of ETs. This finding corroborates what Omwenga, Waema and Wagach (2004) found in a study conducted in the University of Nairobi. They concluded that teachers' attitudes are a significant factor hampering the uptake of ETs.

Staff perceptions are indeed a constraint if they are negative, and not in favour of employing ETs. During the interviews staff indicated that it is more demanding to teach with technology, as compared to lecturing. As is explained in Activity Theory, we are what we do. Those staff members who perceive ET as a valuable tool in teaching, will make use of it. Otherwise, they will assume that they are going to need a lot of time to prepare for online course delivery, and therefore will not use it. This finding was consistent with a comment by Schifter (2000) (cited in (Giannoni & Tesone, 2003), that faculty members resist use of ETs because they perceive it as being more time consuming, and challenging, than the traditional face-to-face lecture mode of teaching.

The staff also had fears of losing their jobs, or the authenticity of their course material. Issues of copyright regarding designed material were not adequately explained to them, and this was found to be a factor that prevented them from uploading course material, and actively participating in the design of content. This finding was consistent with findings elsewhere showing that uncertainty concerning ownership, and copyright issues of the content developed, not only influenced innovation, but also affected willingness to make use of ETs in teaching (Omwenga, Waema, & Wagach, 2004).

From the above, we were able to note that staff attitudes towards the use of ETs are crucial in the uptake of ETs in teaching, and in learning as well. A positive attitude will influence staff preparedness to integrate ETs into teaching, while negative attitudes, such as fear, anxiety and a lack of confidence, will mitigate against uptake (Buabeng-Andoh, 2012). This finding is consistent with Schanks' (2001) argument that teachers usually are at ease with teaching in a particular way. They are inherently conservative, and so want to teach in ways that are familiar. Therefore, if their attitude about an ET is that its integration will not be easy, or will be clouded with technicalities, then they will develop a negative attitude towards its use.

5.2 Use of ETs in learning

As argued by Khan, Hasan and Clement (2012), the growth of ETs has the potential to reshape the learning process through the rich and powerful environment created. There are global investments (Buabeng-Andoh, 2012), as well as efforts at both institutional and personal levels, to promote and support the uptake of ETs in Makerere university. However, there are a number of factors that challenge efforts to use ETs (Fresen, 2011; Khan, Hasan, & Clement, 2012). Such challenges curtail the uptake of ETs in learning. This subsection discusses such barriers to the use of ETs for learning as revealed through this study conducted in Makerere University.

5.2.1 Enabling factors

The study found that there are fewer factors enabling the use of ETs for learning than those that were found to constrain uptake. This agrees with what Schifter (2000) cited in (Afshari, Bakar, Luan, Samah, & Fooi, 2009), found in a study done in the United States of America, where it was concluded that it was much easier to determine the factors that deter, than those that facilitate use. Findings also show that there is interconnectedness between the institutional, technical and personal factors that either enable or constrain the uptake of ETs. Enabling factors, if missing, have the potential to act as factors that will constrain uptake. For example, students indicated that at the institutional level the university conducts end user training, particularly on how to use the computer for word processing. Enhanced student skills in word processing in turn enable them to use the ETs. However, a lack of end user training as an institutional factor, inflates differences in skill competencies at the individual level.

The second factor shown from the results involves Internet connectivity on campus, which the students do perceive to be easier and better than the off-campus access.

5.2.2 Constraining factors

Regarding ET use in learning, findings indicated that it is primarily access, as an institutional and also technological factor, that constrains use. Students said that ETs, and particularly computers, are few in number, as compared to the student population. Yet, even the few that should be available are not properly serviced and maintained. There were more broken computers in all the computer labs than those in good working order. This finding confirms the findings of a study in Bangladesh, that lack of equipment, as well as its unreliability, is a first barrier to effective use. Effective use of ETs would require the availability of equipment and its proper maintenance (Khan, Hasan, & Clement, 2012).

Coupled with equipment availability, is the factor of cost, the effect of which is seen at both institutional and personal levels, affecting both teaching and learning. Because of the high costs involved in the acquisition of both hardware and software, the study found that the university is not able to cope with the rate at which newer ETs become available, nor is it able to purchase an optimum amount of equipment, such as the computers and projectors required for learning and teaching, as well as the necessary bandwidth. This corroborates the argument that ETs demand huge funding, which universities in developing countries find hard to obtain (Khan, Hasan, & Clement, 2012), affecting not only their use for teaching, but for learning as well. According to Mumtazi (2000), cited in Khan, Hasan and Clement (2012), lack of the funds needed to obtain both hardware and software is one of the reasons ETs are not used in classes. Yet, if teachers are unable to use ETs for teaching, it compromises the likelihood that students will use them for learning. This emphasises the fact that efficient and effective use of ETs depends on availability of both hardware and software (Afshari, Bakar, Luan, Samah, & Fooi, 2009).

At the personal level, both students and staff indicated that, because of costs, they are not able to have all the equipment needed to support learning. Students said that the cost involved in owning a personal computer is still too high for some students. As a result of this, not all students are able to afford personal ownership of a computer. The inability of students to own computers reduced their chances of using computers for learning purposes, due to their limited access. This finding was consistent with Lee, Chen and Hewitt's (2011) finding that when the cost is high, it reduces the opportunities to purchase computers. This also confirms the earlier contention that access and use are to a great extent interconnected (Czerniewicz & Brown, 2006b; Nsibirano, 2008, , 2012).

The factor of equipment maintenance significantly affects use, as many times the little equipment available, is removed from access and use due to malfunction. It was found that in Makerere University there is no policy on maintenance, servicing or repair of equipment. This factor is significant at all three levels, as a barrier to the use of ETs in learning. From a broader perspective, this lack of a clear institutional strategy to service the few and dated equipment, affects availability, access, and ultimately their use for learning. This finding further confirms Khan, Hasan and Clement's (2012) argument that ET use requires proper maintenance of equipment.

In this study, skills, particularly computer user skills, were another key factor found to constrain use of ETs in learning. This was consistent with the findings of Nsibirano et al. (2012) that limited skills

constrain students' use of computers, and also limit the academic activities from which they are able to benefit, in addition to word processing and information searches. Thus, the advantages to their learning experiences, derived from use of ETs, are still minimal.

Coupled with limited skills, is the fact that technical support was found to be lacking. Findings indicated that many times when students faced technical problems, there is no-one to help them. They seek help from their peers, but if no-one in the group can solve the problem, they abandon use. This finding confirms the argument that a lack of technical coordinators, with a lack of on-site support, is one of the barriers to use (Afshari, Bakar, Luan, Samah, & Fooi, 2009).

5. 6. Conclusion

In this study we set out to interrogate the factors that enable, and those that constrain, the uptake of ETs for teaching, learning and assessment in Makerere University. Findings show that unlike in the use of ETs for teaching and learning, there was no significant use of ETs for assessment. Findings also indicated that use of ETs for teaching and learning varied between units, as well as among staff and students. The cause for the differences in the use of ETs for teaching and learning could partly be explained by the circumstances within which the technologies are used. A number of factors were mentioned that facilitate or hinder staff and students from using ETs.

Use of ETs for teaching was largely constrained by institution related factors, such as those directly affecting the motivation of staff. Staff desire that the university recognize the burden involved as one implements teaching with ETs. In the light of this, they desire that the university should reform policies on promotion as a way of motivating usage.

They also desire that greater support, such as the availability of ETs, as well as recognition and remuneration, be extended to whoever uses ETs. This was a clear voice from staff participants, and leads to our conclusion that mere availability of ETs is not sufficient to drive the use of ETs in teaching. There should be deliberate efforts to revise policy and the reward system of the university. For example, the awarding of points should be considered for those who use ETs in their teaching, when applying for promotion. Unlike the current position, where only research and publications count for promotion, the use of ETs should be counted as a weighted component in promotion.

Findings further indicated that there are fewer factors enabling the use of ETs for both learning and teaching, than there are constraining factors for the uptake of ETs.

Findings also show that there is interconnectedness between institutional, technical and personal factors that either enable, or constrain, the uptake of ETs. This was found to be true for both teaching and learning. In addition, teaching and learning were found to be connected, in that those conditions or factors that enable or constrain uptake for teaching, eventually affect uptake for learning. Successful use of ETs for teaching would most likely lead to successful use in learning.

However, successful uptake of ETs for teaching or learning, as was also stated by Afshari, Bakar, Luan, Samah and Fooi (2009), is not dependent on just one enabling factor or on the absence of constraining factors, either at the institutional, technical or personal levels. Rather, this is a dynamic and complex process, involving a set of interrelated factors that need to be understood and addressed at all three levels. Therefore, to enhance the uptake of ETs for teaching and learning, implementation strategies should be dynamic, flexible and context specific.

7. Recommendations

The university should seriously look into issues of incentives so as to boost the uptake of ETs among the staff. This can be done in a number of ways such as, revising the appointments and promotion policy to embrace recognition for use of ETs, and improved provision of equipment with prompt technical support for teachers. Teachers need to know that they will have technical help when the equipment fails, because they do not have time to trouble- shoot while teaching. In addition, use of ETs should be recognised in the teaching load, otherwise it will continually be seen as an added burden. Failing this, the teachers will continue with the older ways of teaching that are less technically challenging.

Findings indicated that assessment is almost entirely based on summative evaluation, and so, if the university is to benefit from the tools now available to measure learning, there is a need to revise the policy on examining.

Students were very concerned with the limited access, and so it is recommended that to improve the uptake of ETs in learning, the university should remedy the issues that affect access. Students said that

they are many, and yet the computers are few. They also think the university needs to create commercial labs (these are labs that support commercial training, such as CISCO) and student labs, and increase the bandwidth as well. For all this to be successfully accomplished, the university should make ET a priority, and set aside resources to service the malfunctioning ETs, and replace the old ones.

Students also said that the university needs to acquire technical people to work on the faulty computers. This is because the faulty computers constitute a major problem and most times students do not know where to report, due to the bureaucracy.

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7. APPENDICES

8. Appendix A: Staff Questionnaire

This questionnaire is designed to generate data for a multi-site study that explores Factors which influence the use of educational technologies in seven PHEA partner universities. Study results are intended to support the integration of education technologies in higher education in Africa. Your responses will be treated in confidence and used for the purposes of this study only.

SECTION A: Demographic Information

This section contains questions that will help us understand the answers you provide better (*Fill in the appropriate response*).

College		Sex	Male	Female
Department/School				
Designation	Terms Of Service (tick)	Contract	Part time	Permanent
Duration of service in Makerere (Years)	Age (Please tick) < 20 _____ 21-30 _____ 31-40 _____ 41-50 _____ 51-60 _____ >60 _____			

Name the courses you teach:

Semester One	Semester Two
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.

SECTION B: Access to Educational Technologies (ETs)

1. What educational technologies are available in your unit (please tick as many as applicable)

Technologies	Tick	Technologies	Tick
Overhead projector		Radio	
Multimedia projector		Internet	
Interactive white board		Public Address system	
Laptop Computers		Printer	
Desktop Computers		Scanner	
Television		Digital camera	
iPad		Smart phones	

Others not listed (Specify)

2. Which of the listed ETs can you use whenever you need to use it for personal reasons? Please indicate the purpose.

Technologies	Tick	Technologies	Tick
Overhead projector		Radio	
Multimedia projector		Internet	
Interactive white board		Public Address system	
Laptop Computers		Printer	
Desktop Computers		Scanner	
Television		Digital camera	
Smart Phones		ipad	

Others not listed (Specify)

3. Which of the following technologies do you personally own?

Technologies	Tick	Technologies	Tick
Overhead projector		Radio	
Multimedia projector		Internet	
Interactive white board		Public Address system	
Laptop Computers		Printer	
Desktop Computers		Scanner	
Television		Digital camera	
Smart Phones		ipad	

Others not listed (Specify)

4. Which other ETs would you like to use for teaching but are not currently using (Please tick)

Technologies	Tick	Technologies	Tick
Overhead projector		Radio	
Multimedia projector		Internet	
Interactive white board		Public Address system	
Laptop Computers		Printer	
Desktop Computers		Scanner	
Television		Digital camera	
Smart Phones		iPad	

Others not listed (Specify) -----

5. Please indicate the reasons why you cannot access these ETs for teaching

Educational Technologies I need for Teaching but cannot access	Reasons why I cannot access these ETs for teaching

6. State how you wish to use these technologies for teaching

Technologies	How I wish to use them
Overhead projector	
Multimedia projector	
Interactive white board	
Laptop Computers	
Desktop Computers	
Television	
Radio	
Internet	
Public Address system	
Printer	
Scanner	
Digital camera	

7. Which of the following ETs does the University provide for Use in Teaching?

Technologies	Tick	Technologies	Tick
Overhead projector		Radio	
Multimedia projector		Internet	
Interactive white board		Public Address system	
Laptop Computers		Printer	
Desktop Computers		Scanner	
Television		Digital camera	

8. Where are the ETs used for teaching kept?

Educational Technology for Teaching	Places of Storage	Person in charge	Comments
Overhead projector			
Multimedia projector			
Interactive white board			
Laptop Computers			
Desktop Computers			
Television			
Radio			

Internet			
Public Address system			
Printer			
Scanner			
Digital camera			

Section C: Use of Educational Technologies in Teaching

9. I teach with some component of Educational Technology in the following courses:

Course	Explain Why
1.	
2.	
3.	
4.	

10. I do not teach with any component of Educational Technology in the following courses

Course	Explain Why
1.	
2.	
3.	
4.	

Section D: Training in ET Competence

11. I have been trained in the use of ETs Yes No

12. I use ETs for all my classes Yes No

13. My teaching experience has been improved with the use of ETs Yes No

b) If Yes How?

If No Why?

14. My teaching experience is affected negatively by use of ETs. Yes No

15. Please state how your teaching is affected negatively by using ETs

16. When I have a problem with technology in class, I can easily fix it on my own

Yes No

17. When I have a problem with technology in class, I have someone I can call to fix it

Yes No

18. I know how to design an online course. Yes No

SECTION E: ASSESSMENT USING ETs

19. My assessment skills has been improved with the use of ETs

Yes No

b) If Yes How?

c) If No Why?

SECTION F: Context within which technologies are used

20. Please tick as applicable

		Disagree	I don't know	Agree
	My institution has adequate power supply			
	My institution has adequate Internet connectivity			
	The lecture rooms and laboratories where these technologies are used can adequately accommodate students			
	The lecture rooms and laboratories are properly lit			
	ecture rooms and laboratories are well ventilated			
	The sitting arrangement in the lecture rooms/laboratories is fixed, it cannot be re-arranged for group work			

	There is technical support in my faculty to assist with difficulty I may have with technology			
	All the technologies available are functioning			
	I am aware of the ICT policy in my institution			
	I am confident to use technology for teaching			

21. Enablers of technology uptake

		Disagree	I don't know	Agree
	The curriculum of my institution encourages the use of technology in the classroom for my course			
	I make better use of technologies for teaching because I have easy access to these technologies			
	It will be easy for me to use these technologies if I have technical support			
	The number of technologies available to the number of students is not adequate			
	In my institution there is ICT capacity development training regularly			
	There are incentives in place to encourage teachers to use technologies			
	Power supply within the institution is reliable			
	The available supply of power enables me to use technology for teaching without interruption			

22. Barriers to technology up take

		Disagree	I don't know	Agree
	The hardware available is outdated			
	Some of the software available is inappropriate			
	There is poor Internet access in the school			
	I am not a confident user of some of these technologies			
	I do not think my students are competent enough to use technology for learning			

THANK YOU

9. Appendix B: Students Questionnaire

This questionnaire is designed to generate data for a multi-site study that explores factors which influence the use of educational technologies in seven PHEA partner universities. Findings are intended to support the integration of education technologies in higher education in Africa. Your responses will be treated in confidence and used for the purposes of this study only.

SECTION A: Demographic Information

1. College:.....
2. School/Department:.....
3. Course (e.g. BA SS)
4. Which year of Study are you?

Which programme are you? Please Tick. Day () Evening () External ()

5. Age (Please tick one)

- a. <20years []
- b. 21-30years []
- c. 31-40 years []
- d. 41-50 years []
- e. 51-60 years []
- f. >60 years []

6. Sex

- a. Male []
- b. Female []

SECTION B: Access to Educational Technologies

7. Which of the following technologies are used in your Unit for teaching?

(Tick as many as applicable)

Technologies	Tick
a. Overhead projector	[]
b. Multimedia projector	[]
c. Interactive white board	[]

d.	Laptop Computers	[]
e.	Desktop Computers	[]
f.	Television	[]
g.	Radio	[]
h.	Internet	[]
i.	Public Address system	[]
j.	Printer	[]
k.	Scanner	[]
l.	Digital camera	[]
m.	Others not listed (Specify)	

Where do you access technologies from? Tick as many as applicable					
	Laboratory	Lecture Room	Cyber cafe	Anywhere in the School	Library
a.	Overhead projector				
b.	Multimedia projector				
c.	Interactive White Boards				
d.	Laptop Computers				
e.	Desktop Computers				
f.	Television				
g.	Radio				
h.	Internet				
i.	Public Address system				
j.	Printer				
k.	Scanner				
l.	Digital Camera				
m.	Others (Specify)				

10. Which of the following technologies do you personally own?

Technologies	Tick
a. Overhead projector	[]
b. Multimedia projector	[]
c. Interactive white board	[]
d. Laptop Computers	[]
e. Desktop Computers	[]
f. Television	[]
g. Radio	[]
h. Internet	[]
i. Public address system	[]
j. Printer	[]
k. Scanner	[]

l. Cell Phone	[]
m. I-pad	[]
n. Mp3	[]
11. Which technologies do you not have access to, but would be happy to use if you had access to them?	
Technologies	Tick
a. Overhead projector	[]
b. Multimedia projector	[]
c. Interactive white board	[]
d. Laptop Computers	[]
e. Desktop Computers	[]
f. Television	[]
g. Radio	[]
h. Internet	[]
i. Public address system	[]
j. Printer	[]
k. Scanner	[]
l. Cell Phone	[]
m.-pad	[]
Mp3 e.g. CDs	[]

SECTION C: Use of Educational Technologies for Learning

12. For what purpose do you use the following ETs? (Tick as Applicable)					
	In Class	Research	Social Interaction	Assignments	Tests
a. Overhead projector					
b. Multimedia projector					
c. Interactive White Boards					
d. Laptop Computers					
e. Desktop Computers					
f. Television					
g. Radio					
h. Internet					
i. Public Address system					
j. Printer					
k. Scanner					
l. Digital Camera					
m. Cell Phone					
n. Social Network					
o. Skype					
p. Email					
q. I-pad/I-pod					
r. Mp3					
s. CD/DVD					
t. Others (Specify)					

13. Do you use the following applications on the computers? (Tick as applicable)			
	Yes	No	Purpose for which you use it
a. Word Processor (e.g. MS Word)			
b. Presentation Software(e.g. MS PowerPoint)			
c. Spreadsheet software (e.g. MS Excel)			
d. Email programme (e.g. MS Outlook)			
e. Internet browser (e.g. Internet Explorer)			
f. Learning Management System			
g. CD/DVD player			

h.	Others, please specify					
14. If you use the above, indicate where you often use it from (Tick as applicable)						
	My own computer	Computer Lab	Lecture Room	Internet Cafe	Library	Others
a.	Word Processing (e.g. MS Word)					
b.	Presentation (e.g. MS PowerPoint)					
c.	Spreadsheet software (e.g. MS Excel)					
d.	Email programme (e.g. MS Outlook)					
e.	Internet browser (e.g. Internet Explorer)					
f.	Learning Management Systems					
g.	CD/DVD player					
	Others, please specify					

15. Do you use these technologies for any of the following purposes?

Task/Purpose	Cell Phone	iPod/Ipad	Laptop/PC	Others (Specify)
	a. Word processing			
b. Calculations				
c. Managing information in spreadsheets				
d. Creating presentations (e.g. in PowerPoint)				
e. Communication				
f. Using specialised data management and analysis software (e.g. InVivo and SPSS)				
g. Finding information on the Internet/Browsing on the Internet				
h. Social networking (e.g. Facebook, Linked In)				
i. Online shopping (e.g. eBay)				
j. Internet banking (e.g. BIM)				
k. Other (Specify)				

16. Indicate who uses these technologies in your College? Tick as applicable

	Lecturers	Students	Admin Staff
a. Overhead projector			
b. Multimedia projector			
c. Interactive White Boards			
d. Laptop Computers			
e. Desktop Computers			

f. Television			
g. Radio			
h. Internet			
i. Public Address system			
j. Printer			
k. Scanner			
l. Digital Camera			
Others not listed (Specify)			

SECTION D: Training and ET Competence

17. I have been trained in the use of ETs Yes No
18. I use ETs in all my classes for study Yes No
19. My learning experience has been improved with the use of ETs Yes
 No

b) If Yes How?

c) If No Why?

20. My assessment during learning has been improved with the use of ETs

Yes

No

b) If Yes How?

c) If No Why?

21. My learning experience is affected negatively by use of ETs.

Yes

No

If Yes How?

22. Please state how your learning is affected negatively by using ETs

23. When I have a problem with technology in class, I can easily fix it on my own

Yes No

24. When I have a problem with technology in class, I have someone I can call to fix it

Yes No

SECTION D: Context within which technologies are used

25. Please tick applicable option for each statement.

	Disagree	I don't know	Agree
a. My institution has adequate power supply			
b. My institution has adequate Internet connectivity			
c. The lecture rooms and laboratories where these technologies are used can adequately accommodate students			
d. The lecture rooms and laboratories are properly lit			
e. The lecture rooms and laboratories are well ventilated			
f. The sitting arrangement in the lecture rooms/laboratories is fixed, it cannot be re-arranged for group work			
g. There is technical support in my faculty to assist with student difficulty with use of technology			
h. All the technologies available are functioning properly			
i. I am aware of the ICT policy in my institution			

j.	Lecturers are confident to use technologies			
----	---	--	--	--

26. Enablers of technology uptake

		Disagree	don't know	Agree
	The curriculum of my institution encourages the use of technology in the classroom for my course			
	I will make better use of technologies for learning if I have easy access to these technologies			
	It will be easy for me to use these technologies if I have technical support			
	The number of technologies available to the number of students is not adequate			
	In my institution there is ICT capacity development training regularly			
	There are incentive /schemes in place to encourage teachers who use technologies			
	Power supply within the institution is reliable			
	The available supply of power enables me to use technology for learning			
	I am free to use technologies for my learning even though my lecturers are not using technology			

27. Barriers to technology uptake

		Disagree	I don't know	Agree
a.	The hardware available is outdated			
b.	Some of the software available is inappropriate			
c.	There is poor Internet access in the school			
d.	I am not a confident user of some of these technologies			
e.	I do not think my teachers are competent enough to use technology for teaching			

THANK YOU

10. Appendix C: KI Interview for Staff

This is a multi-site study, undertaken under the Partnership for Higher Education (PHEA) on factors influencing the uptake of technology for teaching, learning and assessment in seven universities in Africa. You have been identified as a resource person to participate in the research. All information you provide will be used for only this study purpose.

1. Do you use any technologies for teaching?
2. Which technologies do you use?
3. How do you use these technologies for:
 - a. Teaching
 - b. Assessment
4. Which of these technologies are useful for teaching and or assessment? (In which way are they useful?)
 - a. Overhead projector
 - b. Multimedia projector
 - c. Interactive white board
 - d. Laptop Computers
 - e. Desktop Computers
 - f. Television
 - g. Radio
 - h. Internet
 - i. Public Address system
 - j. Printer
 - k. Scanner
 - l. Digital camera
 - m. Others
5. If you are not using the technologies- why not?

6. How do you use the technologies for the following and why?

- a. Research
- b. Social Interaction
- c. Assignments/Tests

7. What are some of the advantages of using technology for teaching?
8. What are some of the disadvantages of using technology for teaching?
9. What challenges do you face in your quest to use ETs for teaching/Research/ Social Interaction/tests/Assessments?
10. Have you been discouraged in times past and stopped using technology for teaching/ Research/ social interactions and assignments? Why?
11. Why did you start using ETs
12. How has the university successfully promoted ETS use in teaching and learning?
13. Is it easy for you to access technology?
14. Where do you get access?
15. What are the barriers to access to technology?
16. What are the barriers to use of technology?
17. What would you consider to be enablers to technology use?
18. Do you think you are good with technology? Explain your answer.
19. Do you think your students are good with technology? Explain your answer.
20. Are you adequately using technology for teaching and assessment? Explain your answer.
21. Does the university have an ICT policy? What does it say in relation to technology for teaching and learning?

11. Appendix: D Focus Group Discussion Guide for Students

PARTNERSHIP FOR HIGHER EDUCATION MULTI-SITE RESEARCH ON FACTORS INFLUENCING THE UPTAKE OF TECHNOLOGY FOR TEACHING, LEARNING AND ASSESSMENT IN SEVEN UNIVERSITIES IN AFRICA

Do you use any technologies for learning?

Which of these technologies are you using and how?

Overhead projector

Multimedia projector

Interactive white board

Laptop Computers

Desktop Computers

Television

Radio

Internet

Public Address system

Printer

Scanner

Digital camera

Others

If you are not using the technologies- why not?

How do you use the technologies for the following (*also probe how technology is used for the other specific learning areas as follows*)

b. Studying

c. Research

d. Social Interaction

e. Assignments

f. Tests

Why would you use technology for learning? (Probe: Studying, research, social interaction, assignments and tests)

What are some of the advantages of using technology for learning?

What are some of the disadvantages of using technology for learning?

What challenges do you face in your quest to use ETs for learning/ studying/Research/ Social Interaction/tests/Assessments?

Have you been discouraged in times past and stopped using technology for learning/ Research/ social interactions and assignments? Why?

Why did you start using ETs

How has the university successfully promoted ETS use in learning?

Is it easy for you to access technology?

Where do you get access?

What are the barriers to access technology?

What are the barriers to use technology?

What would you consider to be enablers to technology use?

Do you think you are good with technology? Explain your answer.

Do you think your lecturers are good with technology? Explain your answer.

Is technology use for teaching by your lecturers adequate? Explain your answer.

12.

13. Appendix E: Research Matrix

Research Question	Sub – questions	Variables of Interest	Data Sources	Methods of Information Collection	Data Collection Tool	Sample Size
What technologies are being used for teaching, learning and assessment in Makerere University?	<p>What technologies do students and academic staff have access to?</p> <p>Where can they access these technologies from?</p> <p>Which are some technologies personally owned?</p>	<p>-Who (age, unit, course, designation)</p> <p>Access and use</p> <p>-Gender</p> <p>Who(age, course)</p> <p>Access and use in learning</p>	<p>Lecturers responses to questionnaire and KI interviews</p> <p>Students responses to questionnaire and FGDs</p>	<p>-Self-completed questionnaire</p> <p>-KII</p> <p>-FGDs</p>	<p>Questionnaire</p> <p>FGD guide</p> <p>KII guide</p>	<p>240 Students</p> <p>30 Staff</p>
How are these technologies being used?	In what ways do lecturers and students make use of technologies?	In the teaching, learning and for Assessment.	Academic Staff and Students	<p>Self-completed questionnaire</p> <p>Interview</p> <p>Focus group</p>	<p>Questionnaire</p> <p>Interview schedule</p>	<p>240 students</p> <p>30 staff</p> <p>Convenient sample for FGD</p>

What is the context within which technologies are used?	What are the national contexts? What are the institutional contexts in terms of leadership support; infrastructure, technical support etc.?	ICT Infrastructure (including policy)	Academic Staff and Students Institutional leadership	Self-completed questionnaire Interview Focus group Documentary reviews	Questionnaire Interview schedule	All available Documents
Who is using the technologies?		Social Demographics of staff and students	Academic staff and students	Survey: Self-completed questionnaire	Questionnaire	
What are the reasons proffered for the uptake of technology?	What are your reasons for using technology for teaching, learning and assessment? What for you are the advantages of using technologies in education? What are the advantages of ET use?	Pedagogy Efficiency Access	Students and Academic Staff	Self-completed questionnaire Interview Focus group	Questionnaire Interview schedule	Sample

What are the enablers of technology uptake for teaching, learning and assessment?	Do you have adequate access to technologies in your institution? Does the leadership support use of technology? Are there incentive schemes for teachers who use technology? Are there programs that support technology uptake?	Environment Motivation	Students and Academic Staff	Self-completed questionnaire Interview Focus group	Questionnaire Interview schedule	Sample
What are the constraints to technology uptake?	Same as above	Same as above		Self-completed questionnaire Interview Focus group	Questionnaire Interview schedule	Study Sample of students and staff

14. Appendix F: General Introductory Letter

MAKERERE

P.O. Box 7062 Kampala, Uganda
Cables: MAKUNIKA



UNIVERSITY

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Mobile 256-713-531484
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Email: wgs@ss.mak.ac.ug

COLLEGE OF HUMANITIES AND SOCIAL SCIENCES
SCHOOL OF WOMEN AND GENDER STUDIES
Office of the Dean

Our Ref:

Your Ref:

12th December 2011

All Staff
Makerere University

**Re: Research on Factors Influencing the Uptake of
Technology for Teaching, Learning and Assessment in
Seven Universities in Africa**

The School of Women and Gender Studies, College of Humanities and Social Sciences is participating in a study to generate data on Factors Influencing the Uptake of Technology for Teaching, Learning and Assessment in Seven Universities in Africa. The seven universities include: Dar es Salaam university; Catholic University of Mozambique; University of Ibadan; Jos University; Kenyatta University; University of Education Winneba and Makerere University.

This study seeks to support the Integration of Education Technologies in Higher Education in Africa and is schedule to take place from 12th – 23rd February 2011. The purpose of this letter is to request for your support towards generating this data. Please accord the bearer of this letter all the necessary support. Thanks.

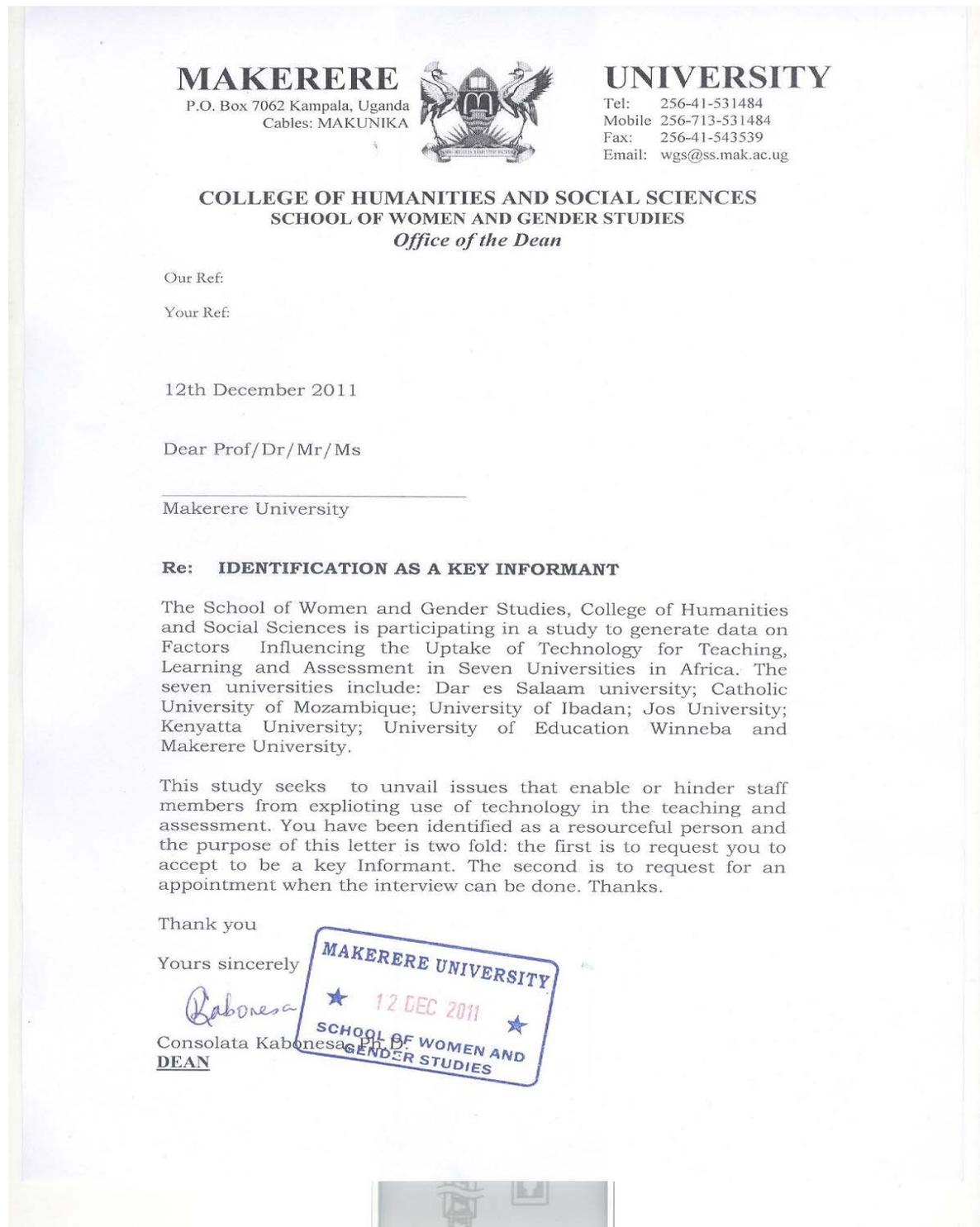
Thank you.

Yours sincerely

Consolata Kabonesa, Ph.D.
DEAN



15. Appendix G: Introductory And Appointment Letter To Staff Key Informants



16. Appendix H: Qualitative Data of Respondents

Students Focus Group Discussions (FGDs)		
P.2 Male FGD from CEDAT		P.4 Mixed FGD
P.7 Male FGD, Science		
Staff Key Informant Interviews (KII)		
P.1 Male staff from CHUSS, substituted for COBAMs	P.3 Female, CEDAT	
P.5 College of Health Sciences	P. 9 Female, Food science	
	P.10, Female , College of Health Sciences	

17. Appendix I: It Infrastructure In Selected Units

Unit	Computer: student ratio	Computers available
COCIS		
• Computer Science	2	2,000
	17	34

• Library & Information Science		
CEES		
• I.A.C.E	5	130
• School of Education	32	115
COBAMS	17	150
Other units		
CEDAT		
• Technology	6	350
• Industrial and Fine Art	13	37
CHUSS		
• Social Sciences	8	300
• Psychology	54	20
• M.I.S.R	-	35
• Arts	23	161
CAES		
• Agriculture	3	315
• Forestry and Natural Resources	150	1
• Institute of Environment and Natural Resources	50	4

Source: Makerere University Fact Book (MakerereUniversity, 2010)