Integration of Technology-Enabled Learning(TEL) at Higher education in developing countries: A case of Uganda Management Institute (UMI)

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Abstract

Globally, Higher Education Institutions have adapted Technology Enabled Learning (TEL) in their strategic plans so as to improve their learning outcomes as well as fit with the new trends of digitization. Uganda Management Institute (UMI) also followed suit, however, the feasibility of integrating TEL at UMI was still unknown. An institutional survey to establish UMI's readiness to transform its pedagogical practices using TEL was therefore conducted on advisory of the Commonwealth of Learning (COL). A target population of 827 out of 3514 learners and 47 out of 59 faculty were surveyed and; institutional ICT Infrastructure and Policies audit was conducted. The findings indicated that UMI was developing preparedness, as it possessed some aspects of a TEL system, policy, and infrastructure. There existed a robust ICT infrastructure, however not well optimized for teaching and learning as staff used the laptops and desktops basically for PowerPoint presentations. Students expressed TEL readiness however , there existed inadequate ICT skills mostly among the facilitators. TEL such as Moodle, social media, OER existed but utilization remind undocumented and not shared. UMI, also lacked a specialized unit to offer TEL support to both the academic staff and students. This survey recommended that UMI's management provides continued support to the enactment of the TEL policy; establishes a TEL steering committee to guide the TEL integration; staff students TEL capacity development; designing and development of TEL content and; establishes an institutional research cluster on TEL practices. This would enable UMI benefit from increased engagements between the students , facilitators and content hence improved learning outcomes.

1.0 Introduction and Background

Higher Education (HE) is experiencing a paradigm shift today as result of digitalization of the learning and teaching processes. Digitalization in HE can be visualized through distance /blended /eLearning, technology enabled learning, cloud computing, social media platforms, tablet and mobile learning apps, digital portfolios, wikis, blogs, podcasts, video conferencing, massive open online courses (MOOCs), virtual labs, gamification, 3D printing and learning analytics, etc (Jameson (2013)). However, the impact of these technologies is still limited due to educators' lack of pedagogical knowledge on teaching and learning practices; unclear policies and strategies to mention but a few. Modern technologies are still being used to 'push' learning resources to learners, reinforcing 20th century teaching centric practices contrasting 21st century learning-centric 'pull' approaches where learners use devices to become active learners.

In Uganda, the government under the Higher Education Science and Technology (HEST) initiative supported the inclusion of ICTs for teaching and learning in HEI including UMI. To this end, Commonwealth of Learning (COL) partnered with UMI in 2017 to support the systematic institutionalization of TEL through research, consultation, capacity building, monitoring and evaluation. However, the feasibility of integrating TEL at UMI was still unknown. This report presents the findings of the baseline study of TEL at UMI.

1.1 General objective of the baseline Study

This study sought to establish the feasibility of ICT usage in teaching and learning at UMI so as to guide TEL adoption, integration and policy implementation in-order to improve the quality of learning outcomes; and fostering innovations to meet the needs of the 21st century learner.

Specifically, this study was conducted to:

- Review the existing infrastructure and policies that support TEL
- Examine facilitators' and learners' access to educational technologies
- Establish facilitators' and learners' perceptions ICT usage in teaching and learning
- Assess facilitators' ICT usage in teaching and Learning, research, and scholarship.
- Make recommendation to support the development of the TEL policy

1.2 Methodology

The baseline survey used three(3) types of questionnaires from COL's TEL implementation handbook to gather data on; Technology-Enabled Learning Infrastructure and Policies; Faculty use of Technology for Teaching and Learning; and Learners' Use of Technology at UMI. The online questionnaires provided by COL were customized by UMI research team, distributed both electronically and print to collect data. The distribution was coordinated by UMI's Office of the Director of Programmes and Students Affairs in collaboration with the Distance Learning Department, who also recruited Research Assistants to administer the printed faculty and student surveys. A few of the survey data was entered electronically by the respondents, the majority by the Research Assistants in to the Survey Monkey online system. The generated Excel data formats were made available by COL to the UMI research team for data analysis.

2.0 Findings & Discussions

The Survey Respondents

Questionnaires were developed based the *TEL Implementation Handbook* (Kirkwood & Price, 2016) provided by COL. 47 out of 59 faculty responded to the survey. A sample of 351 out of 3514 learners was targeted based Krejcie & Morgan (1970) sampling table. Of the 200 hard copy questioners distributed to classrooms, only 109 were filled while 39 responded through the survey link that was distributed by class presidents on either the WhatsApp class groups or group mails. The total respondent rate was at 148 across the four schools: School of Civil Service and Public Administration, School of Management Science, School of Business and Management, and School of Distance Learning and IT. However, 5 of the respondent's schools could not be established as they skipped the question.The demographic representation of the respondents is presented in Table 1 below.

Table 1: The demographic representation of the respondents

Faculty	Number of Students Enrolled	Number of Students in Stratum
School of Civil Service and Public Administration	799	37
School of Management Science	608	30
School of Business and Management	1952	28
School of Distance Learning and IT	155	48
Total	3514	143, 5 Skipped faculty

2.1 UMI Infrastructure Audit

The infrastructure audit indicated that UMI had quite a robust ICT infrastructure, with both broadband connectivity and wireless network connections provided through a private Internet service provider. It had an Internet speed of 10 Gbps for the entire main campus and its four satellite campuses, and this is available for officials, facilitators, learners, researchers and visitors. Internet access is provided in classrooms, libraries, faculty rooms, conference rooms and laboratories. It had about 270 desktops, 36 tablets, 55 laptops, servers and a video conference facility. UMI had a number of software packages and platforms that are used across the institute for teaching and learning, such the virtual learning environment, anti-plagiarism software (Turnitin) and a digital library. The institute also maintained an active official online presence through a number of social media avenues, such the website, a Facebook page, a WhatsApp group, Twitter, Viber, Skype, official UMI email, LinkedIn, Google +, blogs and others. The institute also runs four distance learning postgraduate programmes through the learning management system (LMS).

2.1.1 Policies and Strategy/Institutional Preparedness for TEL

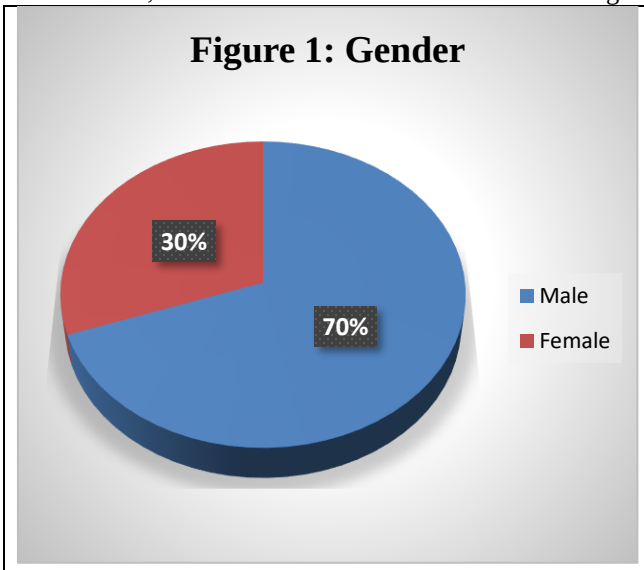
For information regarding institutional preparedness for TEL at UMI, each of the criteria was scored from 1 to 5 where: 1 = strongly disagree or does not exist; 2 = disagree or only marginally demonstrates existence; 3 = neither agree nor disagree/existence or otherwise is difficult to explain; 4 = agree or it does exist; 5 = strongly agree or it definitely exists and is well established. As per COL's TEL Implementation Handbook, the scores for UMI preparedness tallied to 101; this was in the 95–129 range, showing that UMI is "developing preparedness"; this

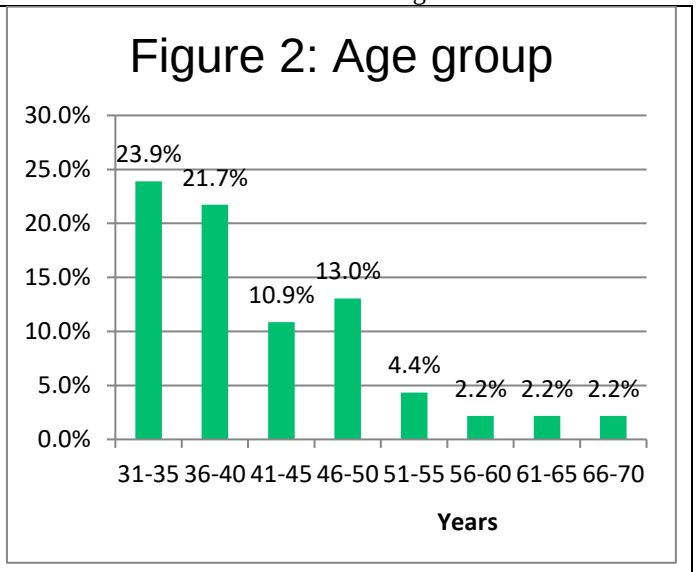
implies that UMI had put in place some of the aspects of a TEL system, policy and infrastructure and was in the process of developing a robust system. This was evident from the existing policies and plans (IT security policy, distance learning policy and strategic plan), institutional readiness and willingness, and a robust infrastructure that could support the integration of TEL. All of this suggested that UMI was ready for TEL.

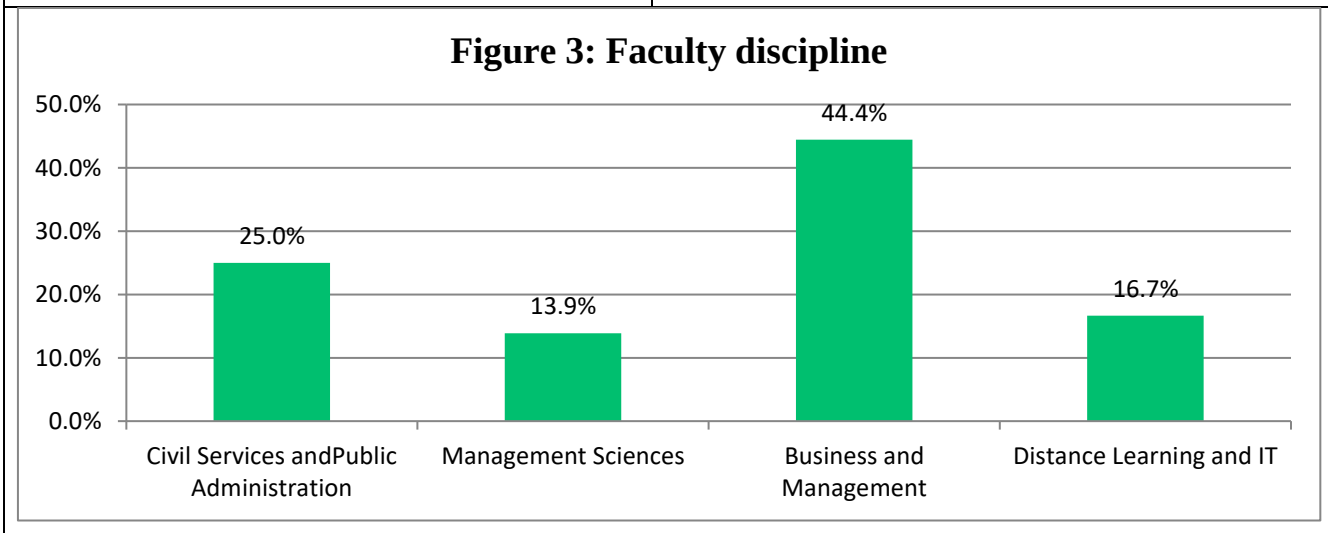
2.2 Survey of Faculty

2.2.1 Faculty Respondents' Profile

Out of the 59 faculty, 47 responded, 69.6% male and 30.4% female (Figure 1). The response rate was 80%.The respondents age distribution showed that the majority were in the 31–35 age group, followed by 36–40, then 65–70 and 21–25 (Figure 2). In the distribution of respondents across disciplines (Figure 3), 44% were from the School of Business and Management, followed by 25% from the School of Civil Service, Public Administration and Governance, 17% from the School of Distance Learning and IT and 13% from the School of Management Science.



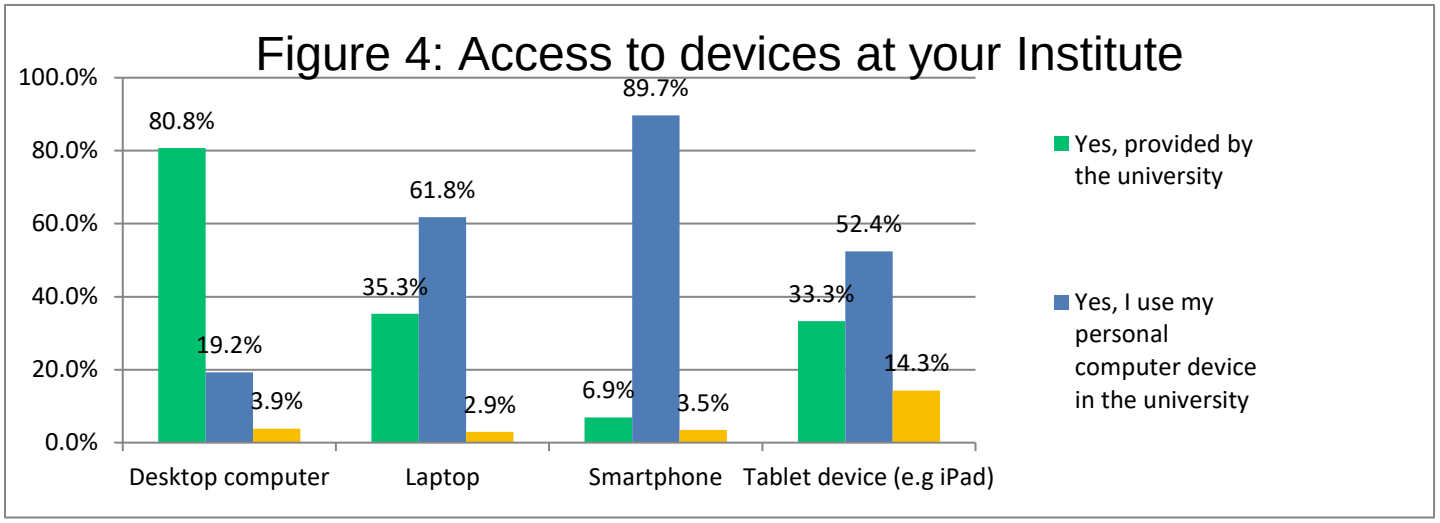




2.2.2 Access to Devices at institute

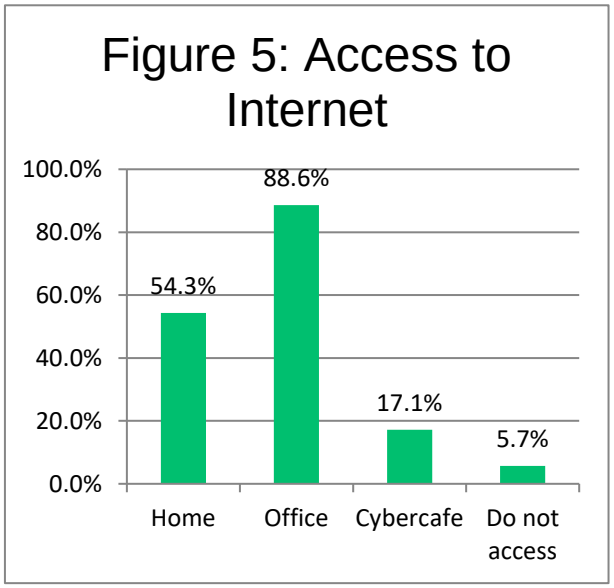
Figure 4:The majority (90%) of faculty used their own devices; of these, 90% owned smartphones, 62% laptops,

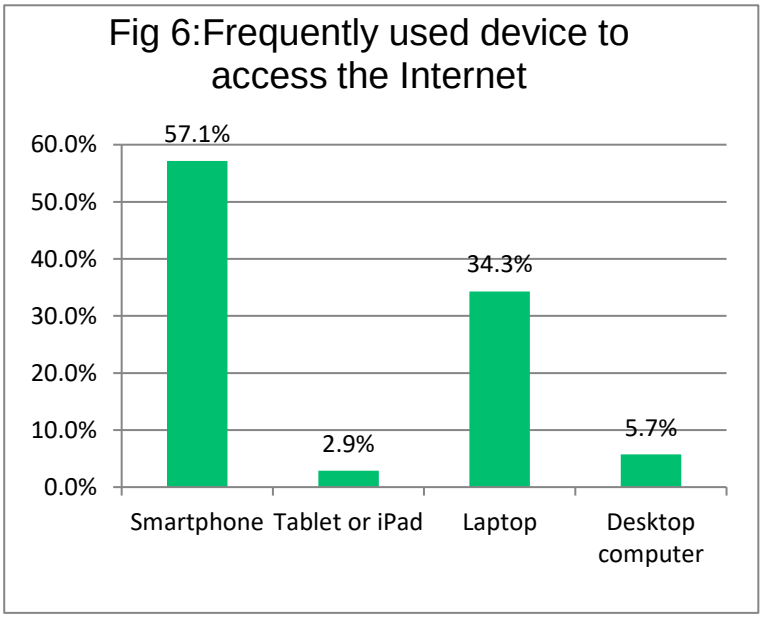
52% tablets and 19% desktops. More than 80% of faculty used devices provided by the institute; of these, 80% were provided with desktops, 35% with laptops, 33% with tablets and 7% with smartphones. Less than 15% said they did not use any device from the institute. However, the "no access" responses to using a device at the institute may not be completely correct, because all classrooms are equipped with a projector and a laptop for teaching. These findings imply a high accessibility of devices by UMI faculty, enhance and enabling environment for TEL.

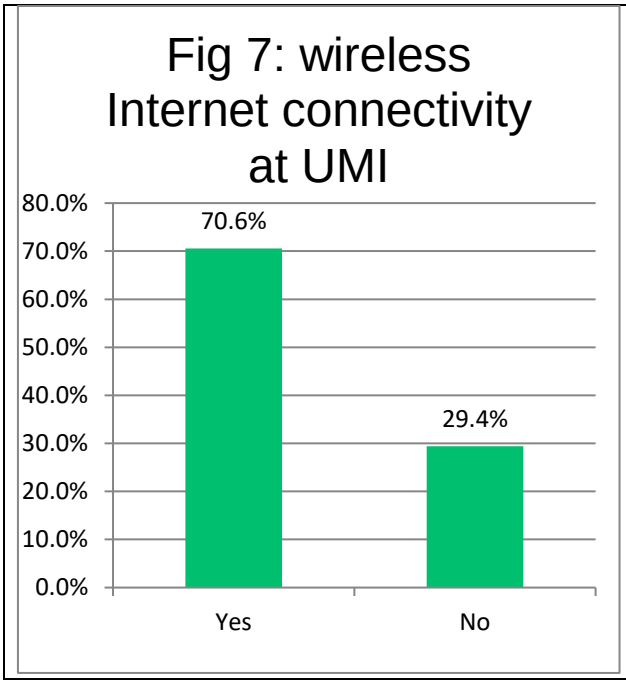


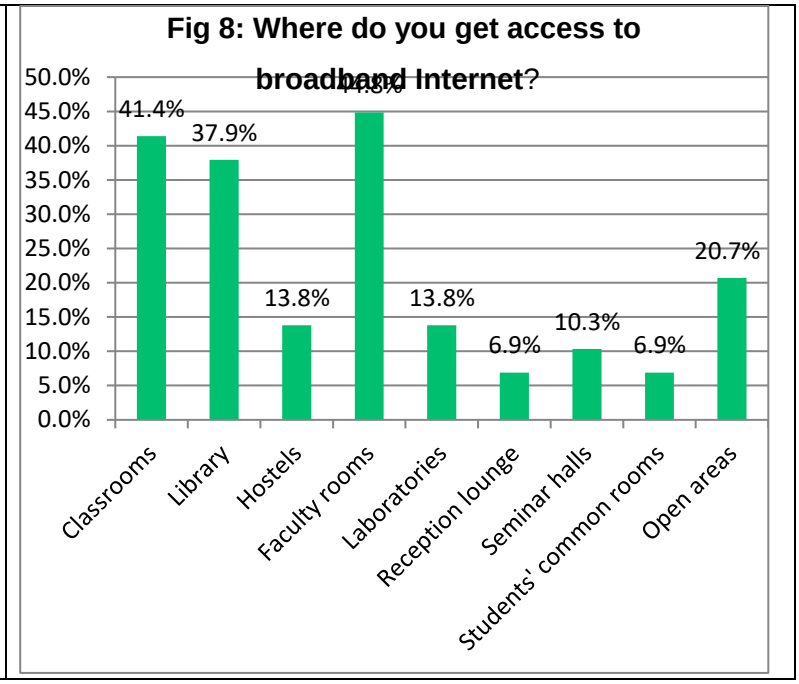
Internet Access

Figure 5 indicated that the majority of faculty (89%) accessed the Internet from their office, 54% at home and 17% at a cybercafé, while 6% had no Internet access. The most frequently used devices for Internet access were smartphones (57%), followed by laptops (34%), desktops (6%) and tablets such as iPads (3%), as shown in Figure 6. Broadband Internet access at UMI was indicated by 74%, with most faculty (45%) accessing it in faculty rooms/offices, 41% in classrooms, 38% at the library, 21% in open areas and less than 15% in hostels, laboratories, reception lounges, seminar halls or student common rooms, as shown in Figure 8. The majority of faculty (70%) rated the wireless connection positively, while 30% said it was non-existent, as shown in Figure 7, possibly because of inadequate provision of users authentication credentials. This is reasonable evidence of a wireless network at UMI , making it possible for faculty to use TEL in their classrooms if adequately supported in terms of ICT support and capacity development .









2.2.3 Nature of ICT Use for Teaching, Learning, Research and Scholarship

Social Media

Table 2 shows only 25% used. Facebook, followed by Google+(17%) and Twitter(11%) and a few teachers subscribe to research sharing sites such as Research Gate and Academia.edu. This indicates the need to integrate social media in teaching and learning.

Table 2: Staff Membership in Social Media Platforms

Social Media Platform	Frequency	Percentage
Facebook	12	24.8
Twitter	5	11.4
Google+	8	17.1
Blog	4	7.6
Slideshare	1	1.9
Photosharing	2	4.8
Research Sharing site	4	8.6
Social bookmarking sites	2	3.8
Goodreads.com	1	2.9
Missing	8	17.1
Total	47	100

Frequency of Staff Posting to Discussion Forums or Mailing Lists

Table 3: 13% frequently posted, while 22% did relatively often and 34% infrequently. This implied that faculty members were paying little attention to the major tools used for learner– teacher interactions and therefore had not yet embraced the principles of online interaction. Hence, a need to institutionalize discussion forums for online interactions between faculty and learners to enable TEL.

Table 3: Frequency of Staff Posting to Discussion Forums or Mailing Lists

Frequency of Staff Posting	# of Respondents	%
Several times a day	5	10.6
Once a day	1	2.1

Once a week	5	10.6
Once a fortnight	1	2.1
Not very frequently	16	34.0
Missing	19	40.4
Total	47	100.0

Experiences with Selected Resources/Services/Spaces Provided by the Institute

Teachers were asked to evaluate their experiences with a range of resources/ services/ spaces. Experiences were rated on a Likert scale where 0 = not available, 1 = poor, 2 = fair, 3 = neutral, 4 = good and 5= excellent. On average, the survey results revealed that most of the teachers were neutral regarding their experiences with selected Resources/Services/Spaces provided by the Institute as confirmed by the mean score of 2.62 and standard deviation of 1.541 (Table 4). This indicates that in order to enhance the teachers' experiences in TEL, there is a need to improve the TEL environment by upgrading and training of faculty on the various services so as to provide better experiences.

Table4**: Experiences with Selected Resources/Services/Spaces Provided by the Institute**

Statements	**Not Available**	**Poor**	**Fair**	**Neutral**	**Good**	**Excellent**	**Mean**	**Std. Deviation**
e-Classroom facilities (e.g. computers, projection)	0.0%	10.0%	23.3%	10.0%	43.3%	13.3%	3.27	1.258
Computer labs	0.0%	20.0%	13.3%	13.3%	36.7%	16.7%	3.17	1.416
Email services	10.3%	6.9%	17.2%	0.0%	41.4%	24.1%	3.28	1.667
Learning Management System	10.3%	6.9%	17.2%	17.2%	41.4%	6.9%	2.93	1.462
ePortfolio	29.6%	33.3%	11.1%	14.8%	7.4%	3.7%	1.48	1.451
Network bandwidth/speed of Internet	10.3%	10.3%	20.7%	10.3%	37.9%	10.3%	2.86	1.552
WiFi access	6.7%	16.7%	30.0%	0.0%	30.0%	16.7%	2.8	1.606
Online or virtual technologies	17.9%	25.0%	21.4%	10.7%	17.9%	7.1%	2.07	1.585
Access to software	20.7%	20.7%	27.6%	13.8%	6.9%	10.3%	1.97	1.569
Download and use of free and open source software	16.1%	19.4%	22.6%	6.5%	19.4%	16.1%	2.42	1.747
Support for maintenance and repair of ICTs	10.7%	21.4%	17.9%	14.3%	21.4%	14.3%	2.57	1.643
Overall score							**2.62**	**1.541**

Use and Creation of Digital Content for Teaching

Nature of classes taught

Modes of teaching currently used by staff are predominantly traditional (47%), with only 2.1% using online modes and 26% using blended modes (Table 5). This indicates that there is a considerable amount of work to change mindsets in shifting course content from traditional to blended or online modes.

Table 5**: Nature of classes taught**

Nature of class	Frequency	Percentage
Traditional face-to-face	22	46.8
Completely online	1	2.1
Blended, where some components of the study are done online	12	25.5
Missing	12	25.5
Total	47	100.0

Integrating technologies in teaching and learning

Table 6 presents the teachers' perception about the integration of technologies in teaching and learning with a rating from 1 to 5, with 1 = I can't use it, 2 = I can use it to a small extent, 3 = I can use it satisfactorily, 4 = I can use it well and 5 = I can use it very well. The survey results showed that majority of the teachers can use technologies below satisfactorily level during teaching and learning according to the mean score of 2.69 and standard deviation (1.172).

Table 6: Integrating technologies in Teaching and Learning

Technologies	**I can use it very well**	**I can use it well**	**I can use it satisfactorily**	**I can use it to a small extent**	**I can't use it**	**Mean**	**Std. Deviation**
LMS	7.4%	14.8%	37.0%	33.3%	7.4%	2.81	1.039
Online collaboration tools (Google Docs)	11.5%	19.2%	30.8%	30.8%	7.7%	2.96	1.148
ePortfolio	0.0%	23.1%	3.8%	34.6%	38.5%	2.12	1.177
eBooks/OER	15.4%	30.8%	26.9%	19.2%	7.7%	3.27	1.185
Online video/audio	12.0%	28.0%	32.0%	12.0%	16.0%	3.08	1.256
Educational games/simulations	12.0%	16.0%	20.0%	36.0%	16.0%	2.72	1.275
Lecture capture tools	4.0%	12.0%	36.0%	20.0%	28.0%	2.44	1.158
Accessible tools (for people with disabilities)	0.0%	11.5%	3.8%	30.8%	53.8%	1.73	1.002
Social media	15.4%	30.8%	15.4%	26.9%	11.5%	3.12	1.306
Overall score						**2.69**	**1.172**

Training and Staff Development

Table 7 shows that over 34% of the teachers noted that the institute does not provide regular training on the use of new technologies for teaching and learning compared to 23% that who feel training on new technologies are provided at UMI.

Table 7**: Regular training on the use of new technologies**

Response	Frequency	Percentage
Yes	11	23.4
No	16	34.0
Missing	20	42.6
Total	47	100.0

Policy issues for Technology-Enabled Learning

The views of teachers on policy issues were rated from 0 to 2, with 0 = Do not know, 1 = No, 2 = Yes as presented in table 8. The survey findings revealed that the institute possessed inadequate knowledge on most of the TEL policy related issues as represented by the mean score of 1.08 and standard deviation (0.911). Implying a need for more sensitizing of UMI management on TEL

Table 8**: Policy issues for Technology-Enabled Learning**

Policy issues	**Yes**	**No**	**Do not know**	**Mean**	**Std. Deviation**
Is there a policy for ICT use in teaching and learning in your institution?	46.2%	19.2%	34.6%	1.12	.909
Is there a strategy for TEL in your institution?	44.0%	12.0%	44.0%	1.00	.957
Is there an ICT policy in your university/institution	53.8%	7.7%	38.5%	1.15	.967
Is there a privacy and data protection policy in your institution?	50.0%	7.7%	42.3%	1.08	.977
Is there a policy on dealing with plagiarism in your institution?	80.0%	4.0%	16.0%	1.64	.757
Is there a policy for the use of open source software in your institution?	30.8%	19.2%	50.0%	.81	.895
Is there a system in place for the use of open source software in your institution?	26.9%	19.2%	53.8%	.73	.874
Is there a workflow and escalation procedure for repair and maintenance of ICTs in your institution?	50.0%	11.5%	38.5%	1.12	.952
Overall score				**1.08**	**0.911**

Access to library resources for teaching and learning

Table 9 : Teachers' responses were measured on a Likert scale from 1 to 5, with 1 = never, 2 = rarely, 3 =

sometimes, 4 = often and 5 = always. The findings revealed that most of the respondents access library resources between rarely and sometimes for teaching and learning which was confirmed by the mean score of 2.98 and standard (1.54). Implying the need for Library to carry out continuous training on the usage of the available resources

Table 9**: Access to library resources for teaching and learning**

Resources	**Always**	**Often**	**Sometimes**	**Rarely**	**Never**	**Mean**	**Std. Deviation**
e-Journals	50.0%	22.7%	9.1%	0.0%	18.2%	3.86	1.521
e-Books	40.9%	18.2%	22.7%	0.0%	18.2%	3.64	1.497
Citation databases	20.0%	20.0%	20.0%	5.0%	35.0%	2.85	1.599
e-Newspapers	19.0%	14.3%	14.3%	28.6%	23.8%	2.76	1.480
e-Theses&Dissertations	31.8%	13.6%	13.6%	13.6%	27.3%	3.09	1.659
e-Processings of conferences	15.8%	5.3%	21.1%	10.5%	47.4%	2.32	1.529
Statistical databases	15.8%	5.3%	21.1%	15.8%	42.1%	2.37	1.499
Overall score						**2.98**	**1.540**

Availability of Research support

The experiences with the resources/services/spaces provided by the institute to support research, were measured on a Likert scale from 0 to 5, with 0 = Not available, 1 = Poor, 2 = Fair, 3 = Neutral, 4 = Good and 5 = Excellent. Majority of the respondents were between fair to neutral as shown by the mean score of 2.62 and standard deviation (1.542). It is interesting to note that the mean score for plagiarism detection software is 2.87 (Table 10), though UMI provides this facility even for checking student assignment.

Table10**: Responses on availability of research support**

Resources/Services/Spaces	**Excellent**	**Good**	**Neutral**	**Fair**	**Poor**	**Not available**	**Mean**	**Std. Deviation**
Access to data storage	4.0%	40.0%	20.0%	20.0%	4.0%	12.0%	2.84	1.434
Data visualization software	4.2%	20.8%	50.0%	8.3%	0.0%	16.7%	2.71	1.398
Citation/reference management software	13.0%	17.4%	34.8%	8.7%	13.0%	13.0%	2.70	1.579
Plagiarism detection software	13.0%	30.4%	17.4%	21.7%	4.3%	13.0%	2.87	1.576

Institutional repository for sharing of research	9.1%	18.2%	36.4%	13.6%	9.1%	13.6%	2.64	1.497
Funds to support open access publications	4.3%	21.7%	21.7%	4.3%	13.0%	34.8%	1.96	1.770
Overall score							**2.62**	**1.542**

2.2.4 Perceptions of Use of TEL

Staff perceptions about the use of TEL were assessed by evaluating staff attitudes to a variety of statements, using a Likert scale with responses coded as 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree and 5 = strongly agree. Hence, individual responses ranged from 1 to 5, with 3 as the mid-point. Inspection of the results indicated that the mean responses for all items were well above average, ranging from 4.33 to 4.54 (Table 11).

In general, the survey highlighted that the teachers had a strong positive attitude towards technology-enabled learning as shown by mean score 4.5 and a low standard deviation 0.637 which showed limited variation among the teachers implying a strong willingness to adopt the technology. This is consistent with Davis's theory of technology acceptance - the Technology Acceptance Model (Davis 1989) wherein users' perception about the use of technology is a key factor in determining their acceptance of it. Within the context of the Technology Acceptance Model, the more positive the perception of use, the more likely users are to employ the technology.

Table 11**: Perceptions /Attitudes of staff to the use of TEL**

Attitude about Technology Enabled Learning	**Strongly Agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly Disagree**	**Mean**	**Std. Deviation**
TEL can solve many of our educational problems.	56.0%	36.0%	4.00%	0.0%	4.0%	4.56	0.583
TEL will bring new opportunities for organising teaching and learning.	64.0%	28.0%	4.00%	0.0%	4.0%	4.64	0.569
TEL saves time and effort for both teachers and students.	58.3%	33.3%	4.2%	0.0%	4.2%	4.58	0.584
TEL increases access to education and training.	66.7%	25.0%	4.2%	0.0%	4.2%	4.67	0.565
TEL increases my efficiency in teaching.	54.2%	37.5%	8.3%	0.0%	0.0%	4.46	0.658
TEL enables collaborative learning.	54.2%	37.5%	8.3%	0.0%	0.0%	4.46	0.658
Technology-Enabled Learning can engage learners more than other forms of learning.	50.0%	33.3%	16.7%	0.0%	0.0%	4.33	0.761

TEL increases the quality of teaching and learning because it integrates all forms of media: print, audio, video, and animation.	58.3%	33.3%	8.3%	0.0%	0.0%	4.5	0.659
TEL increases the flexibility of teaching and learning.	62.5%	25.0%	12.5%	0.0%	0.0%	4.5	0.722
TEL improves communication between students and teachers.	50.0%	41.7%	4.2%	4.2%	0.0%	4.48	0.593
TEL enhances the pedagogic value of a course.	45.8%	41.7%	12.5%	0.0%	0.0%	4.33	0.702
Universities should adopt more and more TEL for the benefit of their students.	58.3%	37.5%	4.2%	0.0%	0.0%	4.54	0.588
Overall score						**4.504**	**0.637**

2.2.5 Barriers to the Use of TEL

Barriers to the use of TEL by teachers was assessed using Likert scale items, with 1 = very weak barrier, 2 = weak barrier, 3 = average barrier, 4 = strong barrier and 5 = very strong barrier.
In general, the survey results indicated that most of the teachers were strongly affected by barriers towards the use of technology-enabled learning as highlighted by the mean score 3.611 and standard deviation (1.044). All of the identified factors (except intimidation by the technology) were strong barriers to the uptake of TEL (Table 12). However, lack of technical support in the Institute, poor access to Internet and networking in the Institute followed by lack of training on TEL and lack of instructional design support for TEL are significant barriers that needs to be removed, if TEL implementation is to be a success.

Table 12**: Barriers to Staff Use of TEL**

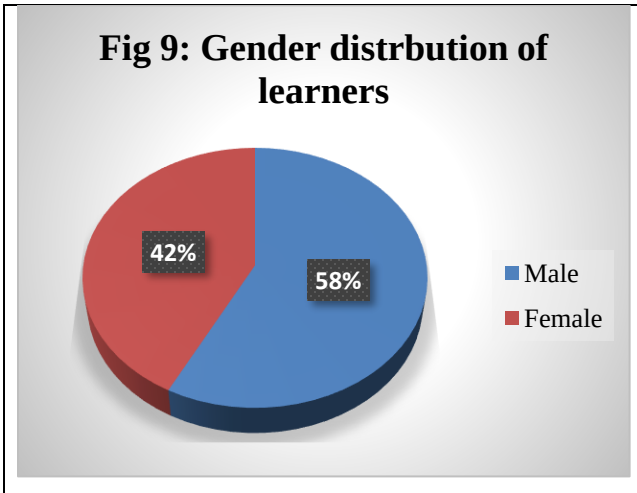
Barrier	**Very strong barrier**	**Strong barrier**	**Average barrier**	**Weak barrier**	**Very weak barrier**	**Mean**	**Std. Deviation**
Concern about faculty workload	12.5%	20.8%	50.0%	12.5%	4.2%	3.25	0.989
Concern about students' access to technology	25.0%	37.5%	29.2%	4.2%	4.2%	3.75	1.032
Lack of training on TEL	33.3%	45.8%	16.7%	4.2%	0.0%	4.08	0.830
Lack of technical support in the University	45.8%	37.5%	12.5%	4.2%	0.0%	4.25	0.847
Lack of institutional policy for TEL	41.7%	16.7%	25.0%	16.7%	0.0%	3.83	1.167
Lack of professional prestige	33.3%	16.7%	16.7%	29.2%	4.2%	3.46	1.351
Concern about the quality of e-courses	20.8%	33.3%	25.0%	20.8%	0.0%	3.54	1.062

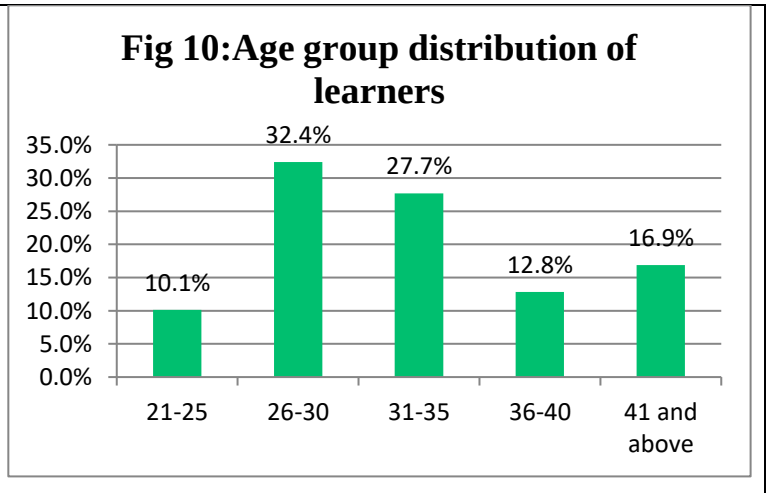
Lack of incentives to use TEL	20.8%	33.3%	20.8%	25.0%	0.0%	3.50	1.103
Lack of credit towards promotion	21.7%	30.3%	26.1%	13.0%	8.7%	3.43	1.237
Intimidated by technology	0.0%	20.8%	33.3%	29.2%	16.7%	2.58	1.018
Concern about security issues on the Internet	12.5%	25.0%	29.2%	33.3%	0.0%	3.17	1.049
Inadequate availability of hardware and software	29.2%	37.5%	25.0%	8.3%	0.0%	3.88	0.947
Poor Internet access and networking in the university	43.5%	39.1%	13.0%	0.0%	4.4%	4.17	0.984
Lack of time to develop e-courses	29.2%	33.3%	20.8%	12.5%	4.2%	3.71	1.160
Lack of instructional design support for TEL	29.2%	45.8%	25.0%	0.0%	0.0%	4.04	0.751
No role models to follow	13.0%	21.7%	43.5%	8.7%	13.0%	3.13	1.180
Overall score						**3.611**	**1.044**

2.3 Survey of Learners Use of Technology at UMI

2.3.1 Demographic Information for the Respondents

As mentioned in the methodology section, a stratified sample was drawn from the four faculties, based on the number of enrolments per faculty. A total of 148 students completed the survey, comprising 42% females and 58% males (Figure 9). Figure 10 presents learners by age group, showing that 32.4% of the sample were in the 26–30 age group, while 27.7% were in the 30–35 age bracket, meaning that 60% of the learner participants were between 26 and 35.





2.3.2 Learners' access to media and technology

Access to Devices while at the Institute

Regarding device access within the UMI premises, Desktop access is provided mostly (over 74%) by the Institute itself (Figure 11). A large number of respondents use their own devices (laptops, smartphone, and tablets) on campus, as seen from the results (79%, 84% and nearly 64% respectively). There were some misconceptions about the institute's policy on private device usage on campus, as quite a number of learners indicated that the institute does not allow the use of these devices. These results imply that TEL will benefit from the use of personal devices and UMI should be encouraging this while the students are at the institute.

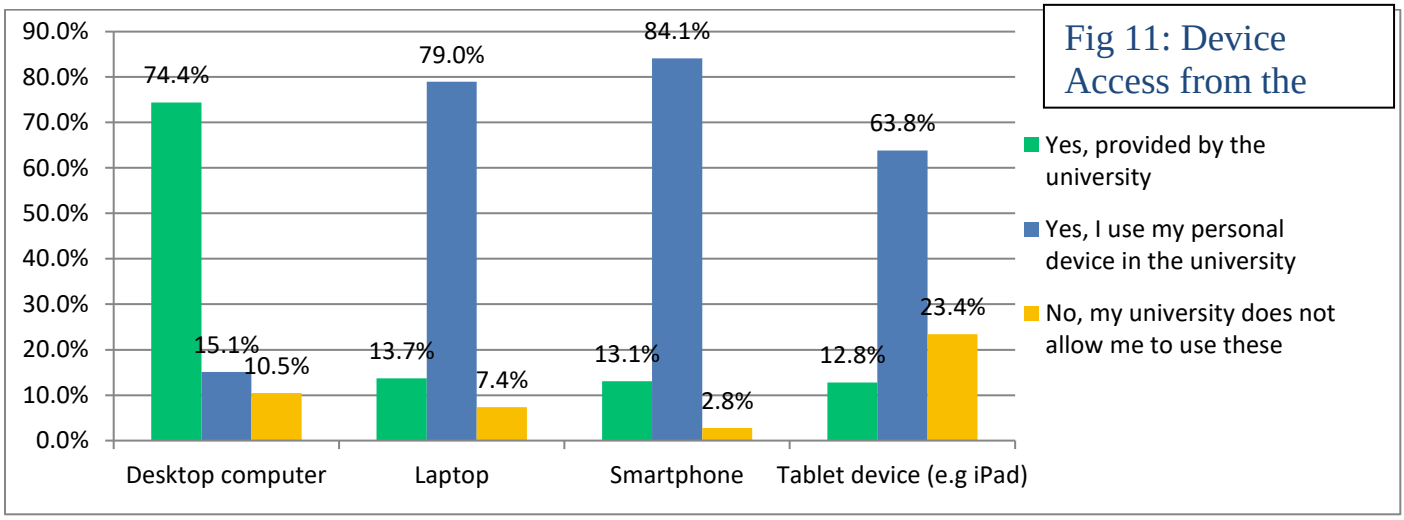


Fig 11: Device Access from the

Internet Access

The majority of respondents predominantly accessed the Internet from the office (70.5%), followed by from home (64.8%), while a few (18.7%) access from cyber cafés and a significant 7.2% have no Internet access at all. This result implies that more than 93% of the respondents can access the Internet for their learning in their private time (Figure 12), which is very promising. Nearly 90% of respondents accessed the Internet through mobile devices and 67% via wireless technologies (Figure 13). These findings reflect the increasing prominence of wireless use and the pervasiveness of mobile technology in Uganda, with a tele-density of over 64% (UCC Q32015).

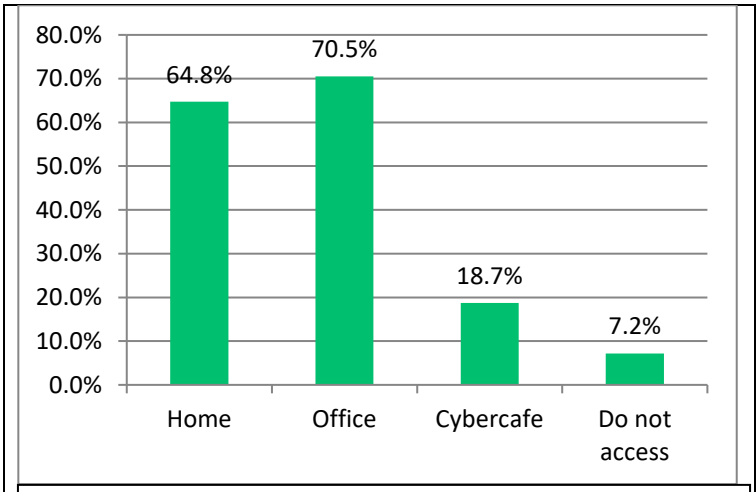


Figure 12: Internet Access locations

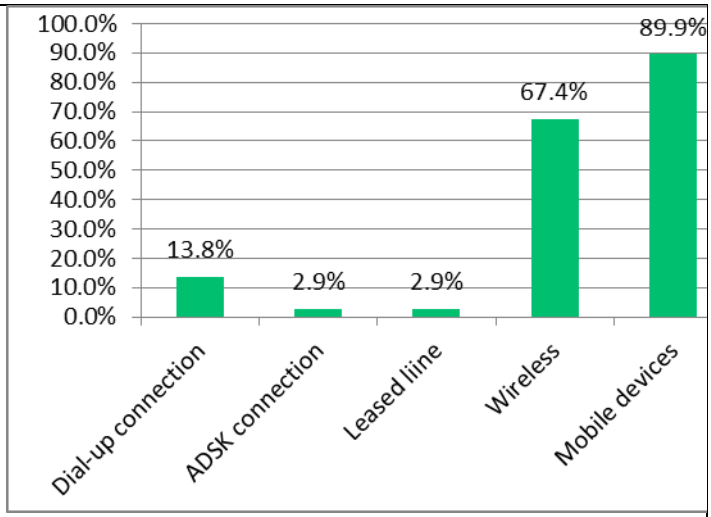


Figure13: Internet Access Means

2.3.3 Nature of ICT Use for Teaching, Learning, Research and Scholarship

Social Media

Nearly 97% (96.75%) of surveyed learners indicated having profiles or accounts on social media platforms. The majority had accounts on Facebook (30%), followed by Google+ (21%) and Twitter (17%). Photo-sharing platforms such as Instagram had 8%). These findings, (Table 13), have implications for what social media platforms UMI should consider for use in TEL.

Table 13**: Social Media Platforms Popularity**

Social Media Platform Used	# of respondents	%
Facebook	44	29.6
Twitter	25	16.9
Google+	31	21.0
Blog	6	4.1
Slideshare	7	4.5
Photosharing	12	7.9
Research Sharing	11	7.6
Social bookmarking sites	4	2.6
Goodreads.com	3	2.1
Missing	5	3.6
Total	148	100.0

Mailing Lists and Discussion Forums

Of the 71% who held membership to a mailing list and a discussion forum, 66% had subscription to between one and five email-based discussion forums and 7% to more. Of these, the biggest percentage at 49% had never moderated any forum compared to the 28% who had. This finding indicates that there exists a knowledgeable and active students population using mailing lists and discussion forums however there is need for faculty to use it more in coursework distribution and discussion so as to increase the students' usability.

2.3.4 The TEL Environment

Experiences with Selected Digital Resources/Services/Spaces

Learners experiences with a range of resources/services/spaces were rated on a Likert scale, where 0 = not available (N/A), 1 = poor, 2 = fair, 3 = neutral, 4 = good and 5 = excellent. Overall, learners' experiences were fair as confirmed by the mean score 2.35 and standard deviation (1.453). The level of experience ranged from fair to neutral implying the need for improvement and upgrading of the selected services and; increased exposure and training to specially e-theses and dissertations, patent databases, e-proceedings.

Table 14**: Experiences with Selected Digital Resources/Services/Spaces**

Digital Resource/ Service/ Space	**N/A**	**Poor**	**Fair**	**Neutral**	**Good**	**Excellent**	**Mean**	**Std. Deviation**
eClassroom facilities (computers, projectors)	3.2%	5.5%	18.1%	13.4%	44.1%	15.8%	3.37	1.277
Computer labs	1.8%	11.4%	19.3%	19.3%	35.1%	13.2%	3.14	1.296
Email services	7.0%	15.7%	15.7%	12.2%	35.7%	13.9%	2.96	1.53
Learning Management System	13.0%	11.1%	14.8%	22.2%	30.6%	8.3%	2.71	1.529
ePortfolio	19.2%	24.0%	18.3%	29.8%	6.7%	1.9%	1.87	1.322
Network bandwidth/speed of Internet	11.9%	19.3%	24.8%	15.6%	21.1%	7.3%	2.37	1.489
WiFi access	8.6%	21.4%	21.4%	15.4%	18.8%	14.5%	2.58	1.566

Online or virtual technologies	12.2%	23.4%	16.8%	23.4%	16.8%	7.5%	2.32	1.49
Access to software (applications, SPSS)	19.1%	25.7%	13.3%	23.8%	11.4%	6.7%	2.03	1.528
Download and use of free and open source software	10.3%	20.6%	16.8%	23.4%	21.5%	7.5%	2.48	1.475
Support for maintenance and repair of ICTs	14.3%	23.8%	17.1%	23.8%	15.2%	5.7%	2.19	1.468
Access to data storage	13.1%	23.4%	17.8%	23.4%	16.8%	5.6%	2.24	1.459
Data visualization software	17.3%	25.0%	18.3%	22.1%	12.5%	4.8%	2.02	1.455
Citation/reference management software	15.8%	18.8%	17.8%	27.7%	15.8%	4.0%	2.21	1.437
Plagiarism detection software	17.5%	16.5%	16.5%	25.2%	16.5%	7.8%	2.3	1.552
Institutional repository for sharing of research	13.9%	20.8%	16.8%	27.7%	15.8%	5.0%	2.26	1.44
e-Journals	12.0%	18.5%	18.5%	19.4%	27.8%	3.7%	2.44	1.461
e-Books	9.4%	19.6%	17.8%	18.7%	28.0%	6.5%	2.56	1.474
Citation databases	12.2%	21.5%	15.0%	26.2%	19.6%	5.6%	2.36	1.463
Bibliographic databases	12.8%	21.6%	15.7%	29.4%	17.7%	2.9%	2.26	1.393
e-Newspapers	14.3%	21.9%	21.9%	15.2%	23.8%	2.9%	2.21	1.459
e-Theses and dissertations	15.7%	28.4%	14.7%	23.5%	13.7%	3.9%	2.03	1.438
Patent databases	16.2%	32.3%	14.1%	22.2%	10.1%	5.1%	1.93	1.437
e-Proceedings of conferences	17.7%	32.4%	13.7%	19.6%	14.7%	2.0%	1.87	1.412
Statistical databases	16.8%	29.7%	13.9%	16.8%	20.8%	2.0%	2.01	1.473
Overall score							**2.35**	**1.453**

Learner Perceptions/ Attitudes towards Technology

Students were asked to respond to statements on their attitudes towards technology, using Likert scale items with 0 = do not know, 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4= agree and 5 = strongly agree. Table 15 indicated a positive response, with a mean responses ranging from 1.88 to 3.25. About 59.46% of learners did not agree that online lectures would make them more likely to skip classes. Learners highly agreed that technology made them more connected to the university, teachers and other students. The majority showed concern about privacy and cyber-security issues, and technology interfering with their concentration on their studies. About 89% of learners indicated they wished teachers to use and integrate more technology into their teaching.

Majority of the learners have a positive attitude towards technology which was represented by the mean score 3.88 and standard deviation (1.063).

Table 15: **Learner perceptions/ Attitudes towards Technology**

Statement	**Strongly Agree**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly Disagree**	**Do not know**	**Mean**	**Std. Deviation**

I get more actively involved in courses that use technology.	25.2%	47.8%	11.7%	7.2%	7.2%	0.9%	4.03	0.939
I am more likely to skip classes when materials from course lectures are available online.	9.0%	20.7%	9.9%	39.6%	19.8%	0.9%	3.36	1.313
When I enter college, I was adequately prepared to use the technology needed in my courses.	25.7%	40.4%	9.2%	13.8%	10.1%	0.9%	3.95	1.075
Technology makes me feel connected to other students.	33.6%	43.6%	9.1%	3.6%	9.1%	0.9%	4.23	0.874
Technology makes me feel connected to teachers.	33.6%	40.9%	10.0%	3.6%	10.9%	0.9%	4.24	0.888
Technology interferes with my ability to concentrate and think deeply about subjects I care about.	13.3%	16.8%	15.0%	32.7%	20.4%	1.8%	3.46	1.343
I am concerned that technology advances may increasingly invade my privacy.	11.6%	27.7%	20.5%	25.9%	13.4%	0.9%	3.49	1.178
I am concerned about cyber security	27.9%	46.9%	10.8%	7.2%	6.3%	0.9%	4.05	0.942
In-class use of mobile devices is distracting to my teacher.	20.4%	33.6%	15.0%	17.7%	10.6%	2.7%	3.7	1.231
Use of tablets/laptops in-class improves my engagement with the content and class	19.6%	40.2%	17.9%	10.7%	9.8%	1.8%	3.83	1.081
Multitasking with my technology devices sometimes prevents me from concentrating on or doing the work that is most important	13.5%	33.3%	17.1%	19.8%	15.3%	0.9%	3.68	1.144
When it comes to social media like to keep my academic life and social life separate	31.3%	38.4%	10.7%	10.7%	7.1%	1.8%	3.99	1.103
I wish my teachers in the university would use and integrate more technology in their teaching.	31.5%	51.4%	4.5%	3.6%	8.1%	0.9%	4.24	0.823
Technology makes me feel connected to what's going on at the	38.4%	47.3%	4.5%	3.6%	5.4%	0.9%	4.29	0.832

college/university.								
In-class use of mobile devices is distracting to me.	20.4%	31.0%	15.0%	21.2%	11.5%	0.9%	3.71	1.178
Overall score							**3.88**	**1.063**

3.0 Conclusions and Recommendations

3.1 Major Findings

As per COL's TEL Implementation Handbook, the scores for UMI preparedness tallied to 101; this was in the 95–129 score range, which showed that UMI has a "developing preparedness." This implies that UMI has put in place some of the aspects of a TEL system, policy and infrastructure and is in the process of developing a robust system.

It was also evident that UMI has a robust ICT infrastructure in place. However, it is not being utilised optimally. This has created numerous limitations around Internet accessibility, such as unstable and unreliable connectivity, leading a number of faculty to not use the LAN or webmail. Faculty and students struggle to connect wirelessly on campus. Teachers also expressed a need for more support for ICT use.

Both teachers and students expressed readiness to use technology in teaching and learning. This is a strong signal that learners are open to more use of ICT in their courses, though their ICT skills also need improvement to use advanced tools. Some key findings from the survey of teachers and students are as follows:

Teachers

- Teachers' use of technology for teaching is very basic at UMI and traditionally oriented, as seen by the predominant use of projectors and PowerPoint presentations; however, there are traces of faculty using technology to write distance learning instructional materials, specifically in the development of active learning (videos) and the use of discussion forums. Such activities are still in the initial stages.
- Teachers' access to media and technology at UMI is very high. Most teachers have access to a smartphone and a laptop. Those who do not have access are planning to purchase one in the next 12 months.
- Internet is accessed from the UMI campus by 89% of teachers. A smartphone is the predominant device for using the Internet.
- Teachers have advanced levels of office skills, such as the use of presentation tools, word processing programs and spreadsheets. However, their skills in using advanced ICT tools such as graphic tools, digital audio, video editing, webpage design and Web 2.0 tools, are very poor.
- Teachers are not active on social media.
- Teachers' ICT experiences were average. This indicated a need optimization of ICT facilitates through faculty training .
- Teachers' contradictory views on policies related to ICT for teaching /learning show a strong need for developing and creating awareness about such policies.
- Teachers express positive attitudes towards the use of technology for teaching, despite their low level of ICT skills. This is a good foundation for providing training and developing blended courses.
- Teachers indicated lack of technical support ,poor access to the Internet and poor computer networks in the institute, followed by lack of training on TEL and lack of instructional design support for TEL, are significant barriers that need to be removed if TEL implementation is to be a success.

Learners

- Leaners' access to media and technology is high as seen from the fact about 74% of the desk tops are freely available at UMI while 100% of the leaners own a smartphone and other laptops. Overall, the use of ICT is almost universal among learners.
- Leaners' access to internet is also high as most learners accessed the Internet at the institute, followed by at home. However, about 7.2% indicated having no Internet access. This is an important finding that may indicate inadequate provision of learners' authentication credentials.

- Most students at UMI access the Internet using a smartphone.
- While their computer skills are satisfactory for office applications, their skills related to the use of advanced ICT tools to create and use digital resources are very limited. This calls for increasing the digital literacy of learners at UMI.
- About 30% of the leaners are active on social media using Facebook.
- Learners' satisfaction about the TEL environment at UMI is below average. Though they are happy with the facilities in the classrooms, many ICT facilities that should be available in a standard higher education institution received low scores, indicating either an absence of the facilities or a lack of awareness. For example, plagiarism detection software is available at UMI but may not be accessible to learners.
- Students are positive about the use of technology for teaching and learning, and they look forward to the innovative use of ICT tools to improve their learning experiences at UMI.
- Using technology in teaching would help improve students' learning, as they are positive towards the use of technology and have increased exposure to using ICT through the Internet and social media. While their skills in using advanced ICT tools need improvement, integrating ICT in teaching and learning at UMI would push learners to acquire new digital literacy skills that would be useful to them as lifelong learners.

3.2 Recommendations

Based on the above findings, the following recommendations are made to the institute: There is a need to /for;

- Institutionalize TEL at UMI through continuous sensitization, policy development and the inclusion of TEL in UMI's mission and vision statements.
- Fine tune the wireless connections in and around classroom and office areas to increase Internet access in teaching / learning.
- The ICT support department to host and outsource some of these services and to acquire training in how to support modern learning technology equipment.
- Training and support for faculty and students in the use of advanced technologies so as to improve learning outcomes through participation, collaboration and information sharing; however, the technologies for which training is provided need to be aligned with the ICT affordances at UMI (Bower & Sturman, 2015).
- Appoint a TEL steering committee to provide appropriate direction about streamlining TEL at UMI.
- Strengthen faculty's and students' support systems to reduce downtime and authentication limitations, and to increase accessibility and capacity building.
- Develop guidelines for e-content development to integrate the use of OER and mobile learning as well as applications such as WhatsApp and Moodle.
- Develop a guidebook for learners on how best to effectively utilise ICT at UMI, and make it available to all learners.
- UMI to start using a blended learning approach to offer courses, integrate LMS for all its course by piloting, evaluating and institutionalization .
- UMI to start sharing its educational materials through an open access repository by adopting an OER policy as an integral part of the institute's TEL policy.

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