UGANDA MANAGEMENT INSTITUTE

Report of the Baseline Study on Technology-Enabled Learning at Uganda Management Institute

COMMONWEALTH *of* LEARNING

The Commonwealth of Learning (COL) is an intergovernmental organization created by Commonwealth Heads of Government to promote the development and sharing of open learning and distance education knowledge, resources, and technologies.

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Executive Summary

This report presents results from an institutional survey regarding the utilisation, management and support of technology-enabled learning (TEL) at Uganda Management Institute (UMI). For brevity, TEL is defined as any pedagogical activity or practice that is conducted and transformed using ubiquitous and emerging technologies (ETs). Some of the ETs at UMI include: open educational resources (OER, such as MIT OpenCourseWare, the Directory of Open Access Journals, and OER Commons); learning management systems (such as Moodle); collaborative writing and communication tools (such as Adobe Connect and Google Docs); e-portfolios; e-books; educational games and simulations; lecture recording tools; and social media, among others. This survey sought to establish UMI's readiness to transform its pedagogical practices by integrating TEL. The following summarises the findings and recommendations.

It was established that UMI has no policy on TEL, although the institute's leaders generally demonstrate a high level of commitment to supporting the use of modern technology to achieve institutional strategic and academic goals. Given that guided and sound integration of information and communication technologies (ICT) in education has the potential to transform teaching and learning practices at UMI, it is recommended that UMI's management support the formulation and enactment of its own TEL policy.

Although UMI has an IT Department, which handles the installation and maintenance of institutional ICT, it has no particular unit that can offer its academic staff and students specialised support in TEL. To support academic staff in the use of ICT to transform their pedagogical practices, UMI should establish a TEL steering committee that works closely with the IT Department and the Distance Learning Department (DLD).

It was established that the institute has a robust ICT infrastructure. However, much of it is not being maximised for teaching and learning. A number of staff have access to laptops and desktops, which they utilise mainly to prepare PowerPoint presentations for teaching. To maximise the potential of ICT in teaching and learning, UMI should build the capacity of academic staff in TEL.

Presently, UMI has a handful of staff in DLD dedicated to guiding the development of e-content. These staff are available to support faculty in delivering their course content using the institute's virtual learning environment. However, owing to limited logistical support, very few courses have so far been converted and put online. Converting courses for online use has the potential to attract more distance learning students to UMI. Hence, management support is needed to increase such access to higher education.

Although some academic staff are utilising various ICT to innovatively transform their pedagogical practices in their disciplinary fields, many such discipline-specific pedagogical innovations go undocumented and unshared. It would be good for the institute to institutionalise the practice of documenting and sharing TEL innovations — for example, by establishing an institutional journal of TEL or conducting research workshops.

It was noted that UMI's leadership is supportive of TEL. Management's efforts to improve TEL at UMI could be enhanced by the drafting and operationalising of an appropriate TEL policy and strategic plan.

Faculty use of technology for teaching remains basic at UMI and traditionally oriented, as seen in the predominant use of projectors and PowerPoint presentations. However, some faculty use technology to create distance-learning instructional materials, specifically active-learning resources (i.e., videos and OER), and employ discussion forums. Such use is, though, still in the initial stages.

Students' use of technology for learning is evident in their positive perceptions of and attitudes towards the use of technology, and their increasing exposure to and use of technological tools such as social media, massive open online courses and OER to improve their learning experiences. This was found to be independent of age, gender and faculty discipline.

The survey also established the need for continuous professional development among staff in the area of TEL. Although the IT Department and DLD are committed to training and building the capacity of academic staff to integrate ICT in their teaching and learning, these departments still have inadequate human resources to satisfy the institute's training needs. UMI management therefore should staff the IT and DL departments with more people who understand TEL.

Chapter 1: Introduction and Background

Higher education is experiencing a paradigm shift in teaching and learning as a result of the digitalisation of the learning and teaching processes. The digitalisation of education takes on many forms, including educational technologies, technology-enabled learning (TEL) and technology-enhanced classrooms, to name a few. The digitalisation of teaching and learning in higher education has advanced significantly and can be experienced through distance/blended/eLearning, diverse learning environments, cloud computing, social media platforms, tablet and mobile learning apps, digital portfolios, crowdsourcing facilities, wikis, blogs, podcasts, video conferencing, massive open online courses (MOOCs), new geographic information systems, wearable technology, virtual labs, gamification, 3D printing and learning analytics, among other means (Jameson, 2013). However, the impact of these technologies can be limited by educators' lack of pedagogical knowledge about new teaching and learning practices, unclear policies and strategies, and other factors.

In Uganda, the government's Higher Education Science and Technology initiative supported the inclusion of information and communication technologies (ICT) for teaching and learning in higher education institutions, including at Uganda Management Institute (UMI). However, teaching practices have remained unchanged despite huge investments in ICT infrastructure. Modern technologies are still being used to "push" learning resources to learners, reinforcing 20th-century teaching-centric practices. These contrast with 21st-century learning-centric "pull" approaches, whereby learners use devices they own to become active learners. In African contexts, including at UMI, these challenges have led to an emerging phenomenon: professional development to equip educators with pedagogical knowledge.

The Commonwealth of Learning (COL) in its Strategic Plan 2015–2021 lays out its mandate to support the adoption and implementation of policies and strategies for TEL, to improve the quality of learning outcomes and foster innovation. To this end, in 2017 it partnered with UMI. A contribution agreement was signed in August 2017, according to which COL would support the systematic institutionalising of TEL at UMI through research, consultation, capacity building, monitoring and evaluation. TEL refers to the application of digital technology to teaching and learning in an educational context, specifically the use of appropriate technology to support students' learning (Kirkwood & Price, 2016).

The activities to be implemented under the partnership included:

1. a baseline study of TEL at UMI;
2. TEL policy development;
3. TEL implementation and evaluation plan development; and
4. TEL capacity building in faculty and learners.

The overall objective of this partnership was to integrate TEL at UMI so as to improve faculty's and learners' teaching/learning experiences through the effective use of ICT. Activity 1 has been concluded, and this report documents the findings of the baseline study of TEL at UMI.

1.1 Technology at UMI

UMI is a competence-based institution whose reputation is largely built on its ability to produce highly skilled graduates. However, with the new breed of 21st-century learners, who use technology to learn, UMI needs to adopt TEL. The UMI strategic plan for 2013–2018 references ICT usage, and the institute has made huge investments in ICT infrastructure, including increased broadband, video conference facilities, and a virtual learning system. However, teaching/learning practices have remained unchanged. Even the few faculty members who have adopted modern technologies are simply using them to "push" learning resources to learners, reinforcing 20th-century teaching-centric practices. This challenge has led to ongoing staff development in ICT pedagogical knowledge, but that is only in the early stages at UMI.

1.2 General Objective of the Baseline Survey

This study sought to establish the feasibility of ICT use in teaching and learning at UMI to guide the adoption, integration and implementation of policies and strategies for TEL. The aim is to improve the quality of learning outcomes and to foster innovation at UMI to meet the needs of the 21st-century learner.

Specific Objectives

Specifically, this study was conducted to do the following:

- Review the existing infrastructure and policies that support TEL.
- Examine facilitators' and learners' access to educational technologies.
- Establish facilitators' and learners' perceptions about ICT use in teaching and learning.
- Assess facilitators' use of ICT in teaching, learning, research and scholarship.
- Make recommendations to support the development of a TEL policy for UMI.

1.3 Methodology

The baseline investigation of TEL at UMI consisted of two survey instruments administered to faculty/facilitators and students. In addition, there was a self-review of institutional facilities related to technology at UMI. The online questionnaires provided by COL were customised by UMI's research team and then distributed both electronically and as printed copies for data collection. The distribution was coordinated by UMI's Office of the Director of Programmes and Student Affairs in collaboration with DLD, which also recruited research assistants to administer the printed faculty and student surveys and then enter the data into an online system. In a few instances, the survey data were entered electronically by the respondents, but the majority were entered by the research assistants. Upon completion of the data entry, Excel spreadsheets were generated and made available by COL to the UMI research team for data analysis.

Data Collection Tools

Three types of questionnaires from COL's *TEL Implementation Handbook* (Kirkwood & Price, 2016) were used to gather data: Technology-Enabled Learning Infrastructure and Policies; Survey of Faculty Use of Technology for Teaching and Learning; and Survey of Learners' Use of Technology. The questionnaires were modified and adapted to the UMI setting.

Survey Respondents

Forty-seven out of 59 faculty and staff responded to the survey. A sample of 351 out of 3,514 learners was obtained based on Krejcie and Morgan's (1970) sampling table. Of the 200 hard-copy questionnaires distributed to classrooms, only 109 were filled out, while 39 respondents used the survey link that was distributed by class presidents via WhatsApp class groups or group emails. The 148 learners who responded were distributed across UMI's four schools: Civil Service, Public Administration and Governance (CSPAG); Management Sciences; Business and Management; and Distance Learning and Information Technology. Five of the respondents did not indicate their school of study.

The demographic distribution of the respondents is presented in Table 1.

Table 1: The Demographic Distribution of the Respondents

Faculty	Number of Students Enrolled	Number of Student Responses
School of Civil Service, Public Administration and Governance	799	37
School of Management Sciences	608	30
School of Business and Management	1952	28
School of Distance Learning and IT	155	48
Total	**3,514**	**143** (5 did not respond)

Chapter 2: Policy Review and Infrastructure Analysis at UMI

2.1 Institutional Profile

UMI, Uganda's national centre for training, research and consultancy in the field of management and administration was established in 1969 as the Institute of Public Administration (IPA) and as an agency of the Ministry of Public Service, with the responsibility to provide in-service training to public servants in Uganda. UMI has changed tremendously over the years. From the very beginning, the institute was conceived of as a critical component in the country's transformation and development and was deemed responsible for strengthening the management capacities of the managers at various institutions. The enactment of the UMI Statute in 1992 transformed IPA into UMI and granted it semi-autonomous status to develop its own certificate, diploma and degree programmes. The institute remained an agency under the Ministry of Public Service until 2001. The enactment of the 2001 Universities and Other Tertiary Institutions Act (UOTIA) repealed the UMI Statute and placed the institute under the Ministry of Education and Sports. The UOTIA as enacted did not quite capture the UMI mandate, which led to the amendment of the Act in 2006, allowing UMI to be classified as an "Other Degree Awarding Institution" (section 19). As such, UMI as a management development institute is mandated to award degrees without necessarily becoming a university.

UMI's primary function is to strengthen the management capabilities of the country's public, private and civil society sectors by offering a rich blend of short- and long-term courses for various levels of managers and leaders across its four satellite campuses, using both face-to-face and distance learning modes of delivery. The institute also undertakes research and provides consultancy services. UMI has an approximate student population of 3,514, distributed among four schools: Business and Management; CSPAG; Distance Learning and IT; and Management Science.

2.2 UMI Learning Environment

UMI has quite a robust ICT infrastructure, with both broadband connectivity and wireless network connections provided through a private Internet service provider. It has 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 has about 270 desktops, 36 tablets, 55 laptops, servers and a video conference facility.

UMI has a number of software packages and platforms that are used across the institute for teaching and learning, including a virtual learning environment, anti-plagiarism software (Turnitin) and a digital library. The institute also maintains an active official online presence through a number of social media avenues, such as an up-to-date 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, of which two were developed last year under the Higher Education Science and Technology project, a government

grant; these are currently awaiting student admission. The distance learning programmes are run on a semester basis. The learners have two weeks of face-to-face sessions and spend the rest of the five months online through the learning management system (LMS). The content is characterised by videos, audio, case studies, role plays, newspaper extracts and authentic learning activities on the virtual learning environment platform.[1]

The institute runs periodic staff and learner capacity development in the use of ICT for teaching and learning, based on end-of-semester surveys, totalling approximately 86 hours annually. Forty-five academic staff and 200 students are trained annually. However, there is no ICT policy to guide the integration of ICT in teaching and learning, and faculty adaptation occurs on an individual basis, although institutional plans to adopt TEL are in place. A few associated ICT policies do exist, including a distance learning policy and anti-plagiarism policies.

2.3 Policies, Strategy and Institutional Preparedness for TEL

Table 2 presents 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 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. This is 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 can support the integration of TEL. All of this suggests that UMI is ready for TEL.

Table 2: Scores for and Remarks on UMI Preparedness for TEL

No.	Statement		Score (1 to 5)	Remarks
1	Policy	There is a well-documented TEL policy.	1	UMI has no policy on TEL and little documentation of its strategic mission and vision but demonstrates a high level of commitment from institutional leaders to use modern technology to achieve its strategic academic goals. The score in institutional preparedness for TEL for the Policy criterion is 8 out of 20.
		The vision and mission of the TEL policy are aligned with the mission of the organisation.	1	
		The vision and mission of the TEL policy are well understood across the organisation.	1	
		There is a commitment on the part of institutional leaders to use technology to achieve strategic academic goals.	5	
2	Strategic Plan	There is a strategic plan for the implementation of TEL.	2	The institute has no strategic plan in this area but has

[1] http://vle.umi.ac.ug/

No.	Statement		Score (1 to 5)	Remarks
		The strategic plan for TEL has measurable goals and outcomes.	1	recently revised its overarching strategic plan to include the use technology in teaching and learning. The score in institutional preparedness for TEL for the Strategic Plan criterion is 4 out of 15.
		The strategic plan for TEL is approved by the senior management of the organisation and is supported by adequate financial provisions.	1	
3	IT Support Department	The organisation has an IT department that handles the procurement, installation and maintenance of technologies for teaching and learning.	5	UMI has an IT support department that handles the procurement, installation, and maintenance of technologies for teaching and learning. The head of the IT department is able to manage the technological requirements of the institute. The score in institutional preparedness for TEL for the IT Support Department criteria is 20 out of 20.
		There is an ICT policy in place, which is implemented by a high-powered committee in the organisation.	5	
		The head of the IT support department reports to senior management and is responsible for the overall functioning of technology in the organisation.	5	
		The head of the IT support department is well qualified and up to date in order to manage the technological requirements of the organisation.	5	
4	Technology	There is adequate hardware infrastructure for teaching and learning (e.g., access to computers for students and learners).	2	The institute has a relatively good ICT infrastructure, although it's not being utilised to capacity. Faculty have access to a laptop or a desktop for teaching, and students have access to an inadequately equipped computer lab. UMI has provided Internet access, and even an intranet has been created, connecting the campus virtually, although it is a little unstable. The score in institutional preparedness for TEL for the Technology criterion is 9 out of 20.
		There are adequate applications and software for teaching and learning (e.g., access to appropriate software, intranet, learning management system, etc.)	2	
		There is adequate networking infrastructure in the organisation (e.g., access to adequate bandwidth).	2	
		There are adequate policies and procedures in place to protect privacy and organisational data	3	

No.	Statement		Score (1 to 5)	Remarks
5	Content	There are instructional designers in the organisation, or faculty members are trained to organise learning content appropriately.	2	A dedicated team at DLD guides the development of e-content for the institute. Faculty's capacity is still developing, but they have access to the online system to create online courses. The score in institutional preparedness for TEL for the Content criterion is 6 out of 15.
		There is support available for the creation of digital multimedia content in the organisation (e.g., e-courses, audio and video materials, animation, etc.)	2	
		Teachers have adequate access to online systems to develop courses for TEL.	2	
6	Documentation	There is a variety of help available to support teachers and students in using technology effectively.	4	Presently, the workflow processes and responsibilities for implementing TEL have yet to be well documented in the institute. The score in institutional preparedness for TEL for the Documentation criterion is 6 out of 15.
		Lessons learned in the implementation of TEL are stored and shared within the organisation for others to access and learn from.	1	
		The workflow processes and responsibilities to implement TEL are well documented in the organisation.	1	
7	Organisational Culture	Faculty and staff members are willing to learn about new technology in the organisation.	4	Faculty members are eagerly and effectively involved in skill development training programmes. Faculty and staff members are willing to learn new technology applications in the organisation. Faculty and staff support each other in implementing the teaching methods effectively. There is a culture of knowledge creation and sharing. The score in institutional preparedness for TEL for the Organisational Culture criterion is 11 out of 15.
		Faculty and staff members support each other easily.	4	
		There is a culture of knowledge creation and sharing in the organisation.	3	
8	Leadership	Leaders are involved in implementing TEL.	4	The institutional leadership is supportive of TEL and provides encouragement and motivation to the faculty and
		Senior management in the organisation regularly review,	4	

No.	Statement		Score (1 to 5)	Remarks
		monitor and evaluate the progress of TEL.		staff to achieve their academic goals. The score in institutional preparedness for TEL for the Leadership criterion is 12 out of 15.
		The top leadership of the organisation is supportive of TEL and provides encouragement and motivation to the faculty and staff to achieve their academic goals.	4	
9	Human Resources and Training	Faculty members are qualified and trained to use technology for teaching and learning.	2	Faculty members are qualified and trained to use technology for teaching and learning. Faculty development in TEL is regular only for the distance learning programmes. The institute has a structure in place to create teams for TEL content development and delivery. Faculty do not trust the support received from the instructional designers and technology support staff while developing and delivering courses, although the IT staff members are skilled and trained to provide the support needed. The score in institutional preparedness for TEL for the Human Resource and Training criterion is 10 out of 30.
		Faculty and staff members receive regular training to update them on using TEL.	2	
		There are adequate staff to support TEL.	2	
		The organisation has a structure in place to create teams for content development and delivery of TEL.	1	
		Faculty members trust the support received from instructional designers and technology support staff while developing and delivering courses.	1	
		The IT staff members are highly skilled and trained to provide the needed support	2	
10	TEL Champions	There are early adopters of TEL in the organisation.	4	DLD has championed the adaptation of TEL by training faculty in appropriate ICT pedagogies. Faculty members are taking leadership roles in developing several institutional policies and are involved in developing a TEL strategy for the organisation. The score in institutional preparedness for TEL for the TEL Champions criterion is 14 out of 20.
		There are TEL champions in the organisation who support and care about pedagogic innovations.	4	
		There are faculty members who can take leadership roles in developing appropriate policies and a TEL strategy for the organisation.	4	
		There are TEL champions to research and disseminate good practices in TEL.	2	
Total score for all statements			**101**	

Chapter 3: Survey of Faculty

3.1 Faculty Respondents' Profile

Out of the 59 facilitators working at UMI, 47 responded to the TEL usage survey, of whom 69.6% were male and 30.4% were female (Figure 1). The response rate was 80%, which was useful for gaining a general understanding of facilitators' access to and use of technology in teaching and learning at UMI. The age distribution of respondents shows that the majority were in the 31–35 age group, followed by 36–40, then 65–70 and 21–25 (Figure 2).

The vast majority of respondents worked as consultants, followed by a much smaller percentage of lecturers and very few professors (Figure 3). The bar graph in Figure 4 presents the highest qualification achieved by the respondents; almost 77% had a master's degree, followed by 24% with a PhD. Over 96% of the respondents were involved in teaching at the graduate and postgraduate levels, while 4% were involved in teaching at the doctorate level (Figure 5). Thirty-nine per cent of the respondents had five years or less of teaching experience, 32% had between six and ten years, 16% had between 11 and 15 years, and less than 5% had between 16 and 45 years (Figure 6). In the distribution of respondents across disciplines (Figure 7), 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.

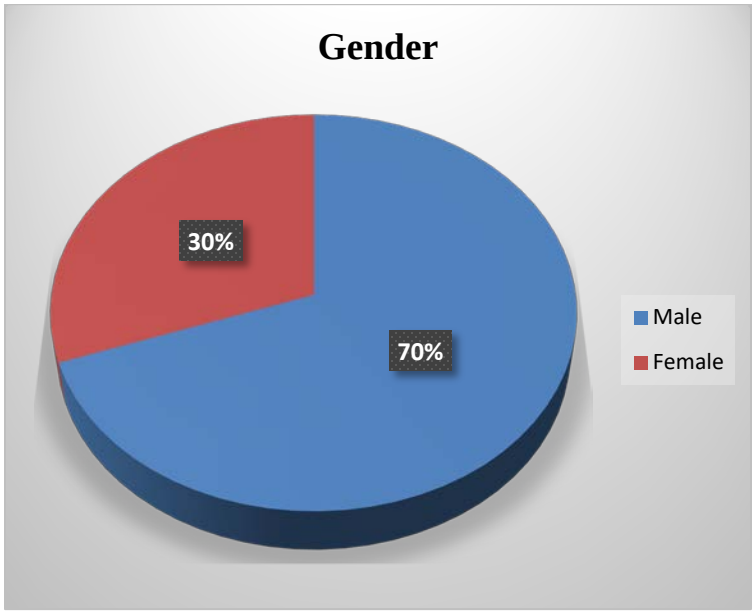

Figure 1: Gender distribution of faculty

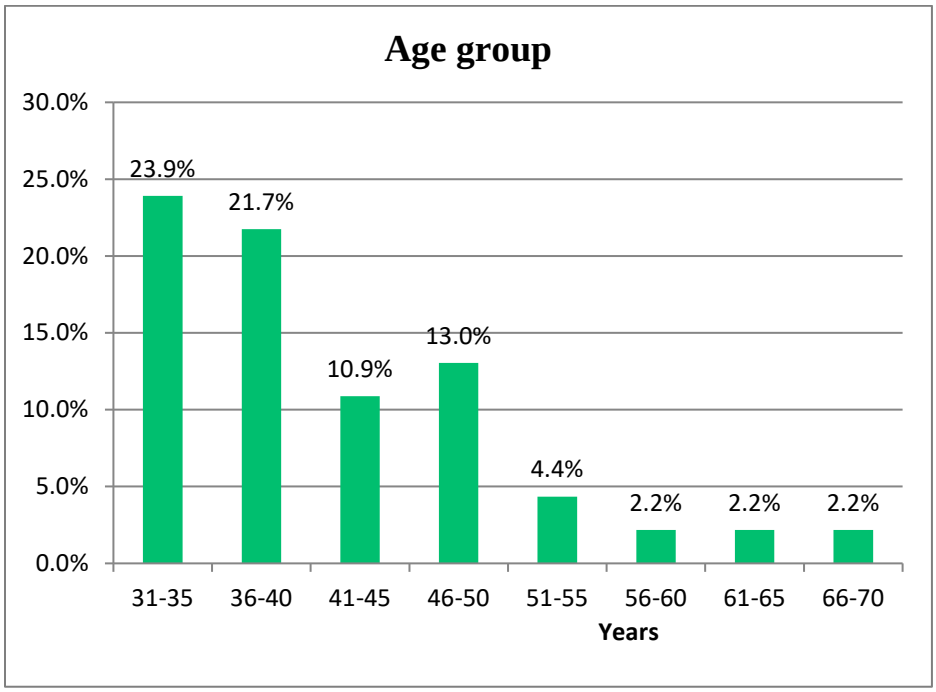

Figure 2: Age distribution of faculty

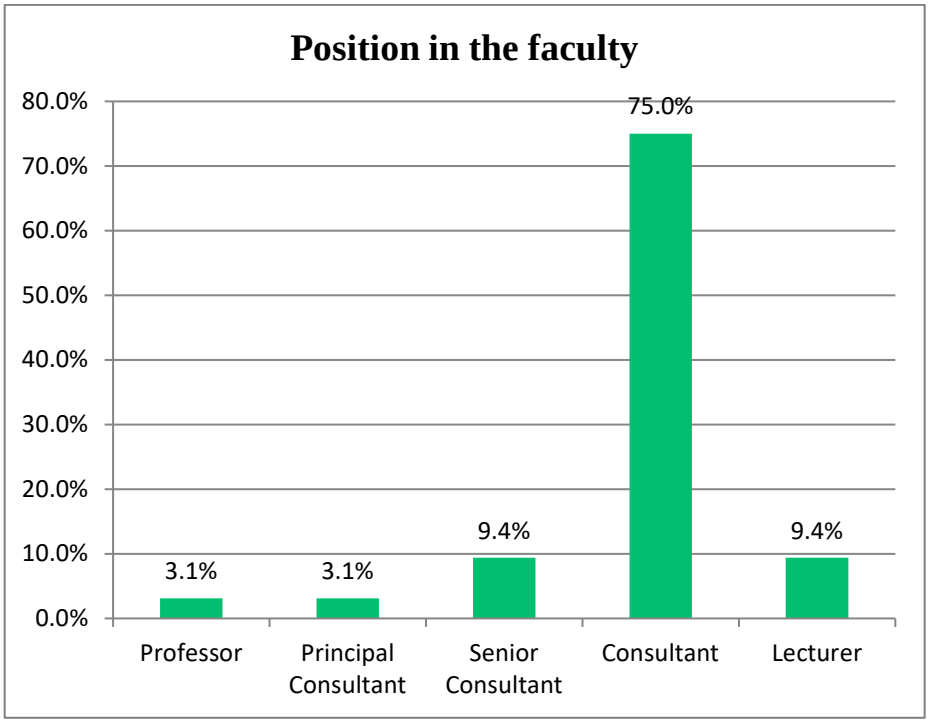

Figure 3: Position distribution of faculty

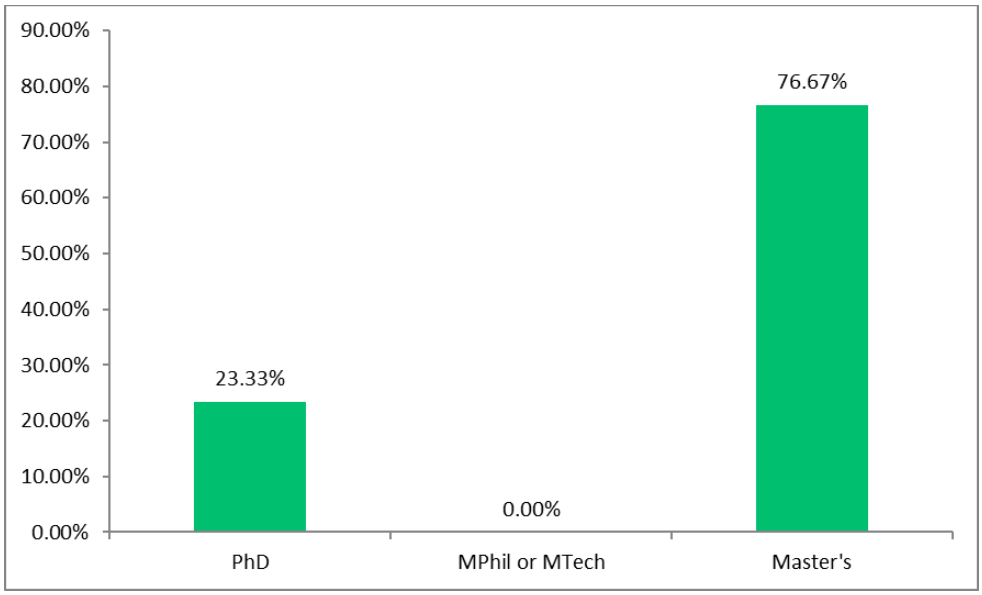

Figure 4: Highest qualification of faculty

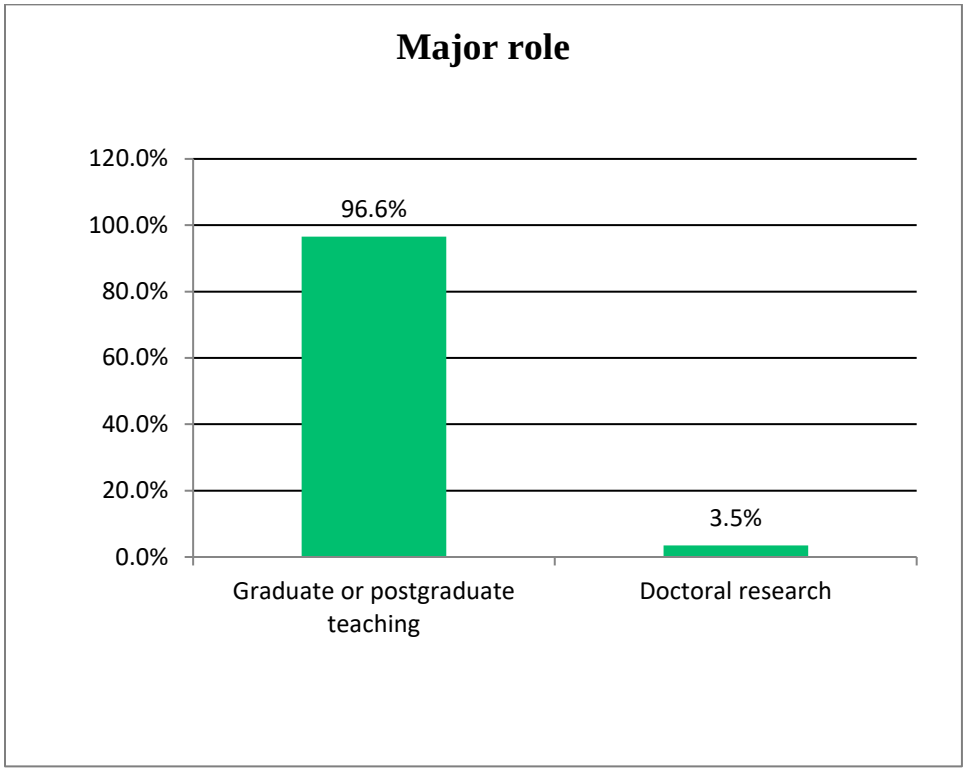

Figure 5: Major role of faculty

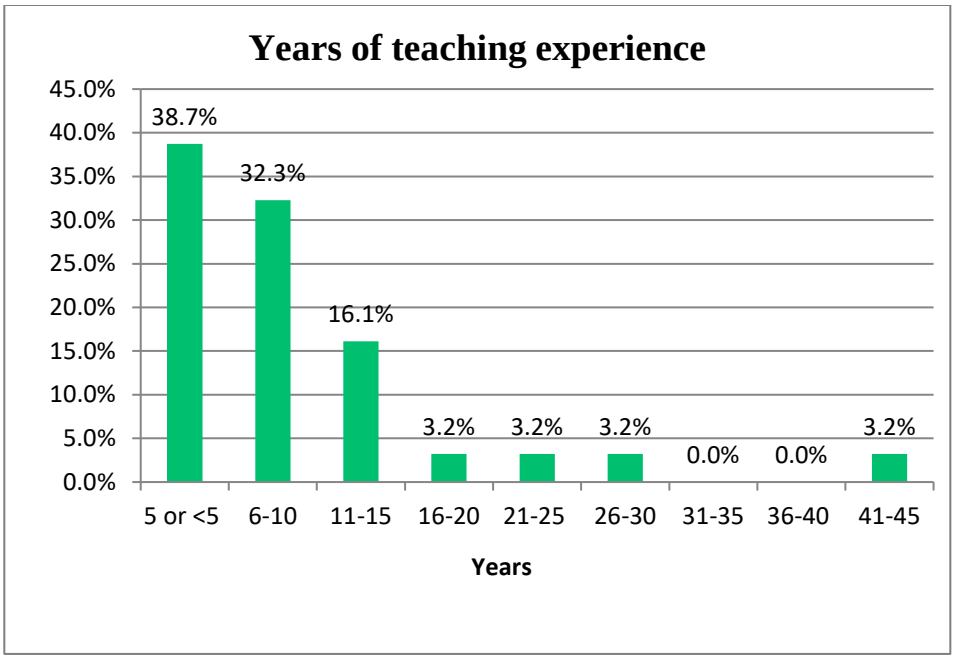

Figure 6: Teaching experience of faculty

3.2 Access to Media and Technology

This section presents findings on the faculty's access to media and technology. Figure 8 shows that over 97% of faculty used smartphones, 92% laptops, 71% desktops and 60% tablets, while less than 15% indicated they did not use any device but were planning to buy one in the next 12 months. On the other hand, less than 25% indicated they did not use desktops or tablets and were not planning to buy any in the next 12 months. That some faculty indicated not using any device is surprising, given that classroom teaching is done using a projector and a laptop. However, due to inadequate ICT skills, some faculty still use chalk and a blackboard, which points to a need for training and support to create TEL.

Access to Devices at the Institute

Figure 9 indicates that 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, and every facilitator uses the ICT equipment for teaching, which raises questions about how those particular facilitators are preparing for and/or teaching their classrooms. Some of the responses do not align with the actual availability of devices at UMI, indicating a need for increased training and awareness building.

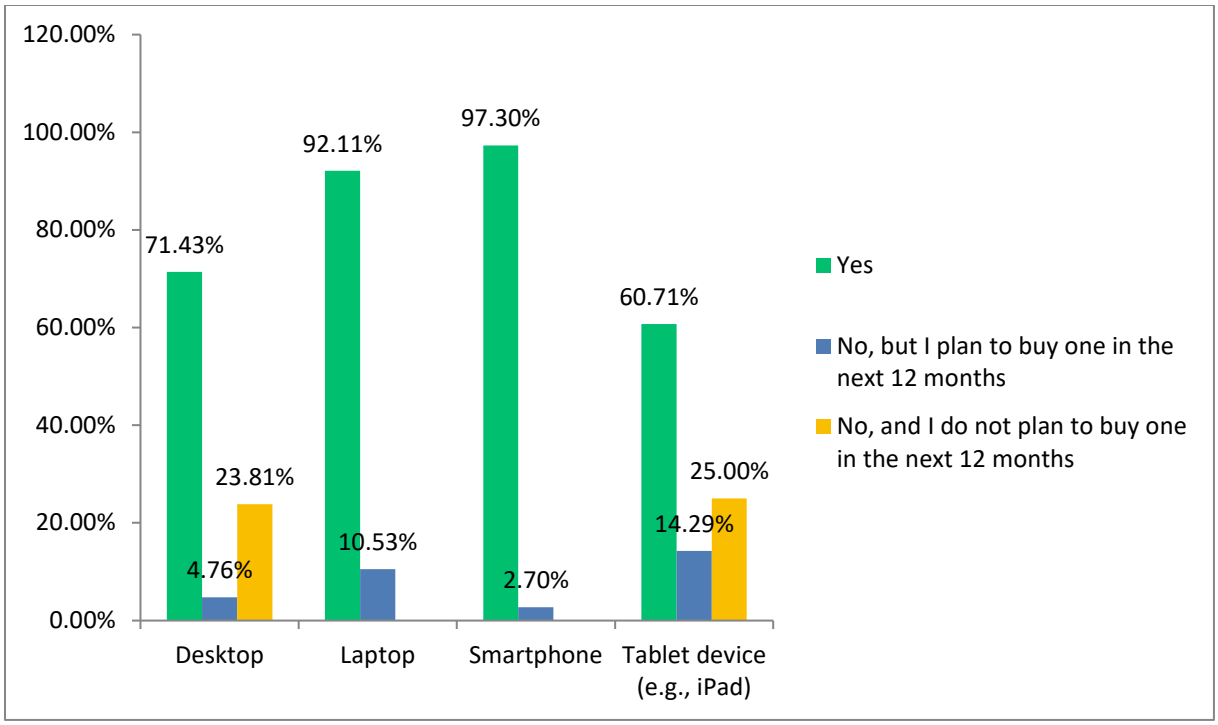

Figure 7: Devices used

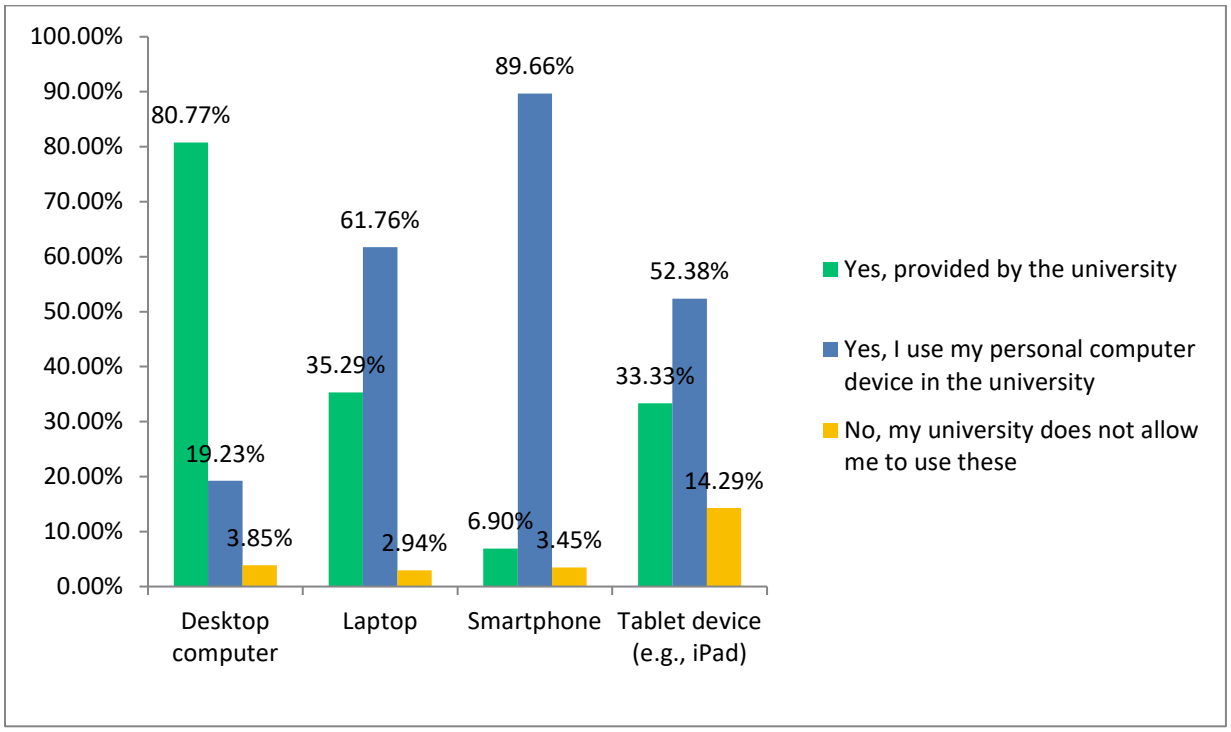

Figure 8: Access to devices at the institute

Internet Access

Figure 10 indicates 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 majority (74%) accessed the Internet through wireless and mobile devices, followed by 17% through a dial-up connection and 9% through both an ADSL connection and a leased line, as indicated in Figure 11. 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 12. 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 14. The majority of faculty (70%) rated the wireless connection positively, while 30% said it was non-existent, as shown in Figure 15, possibly because users need to log in to the wireless network and some faculty are not aware of how to do this or have no login credentials. However, the rate of Internet usage at UMI was high, with 86% of faculty using it daily, 6% rarely and 3% irregularly, on alternate days or never. This is reasonable evidence of faculty being ready to use TEL in their classrooms if some guidance and capacity development are provided.

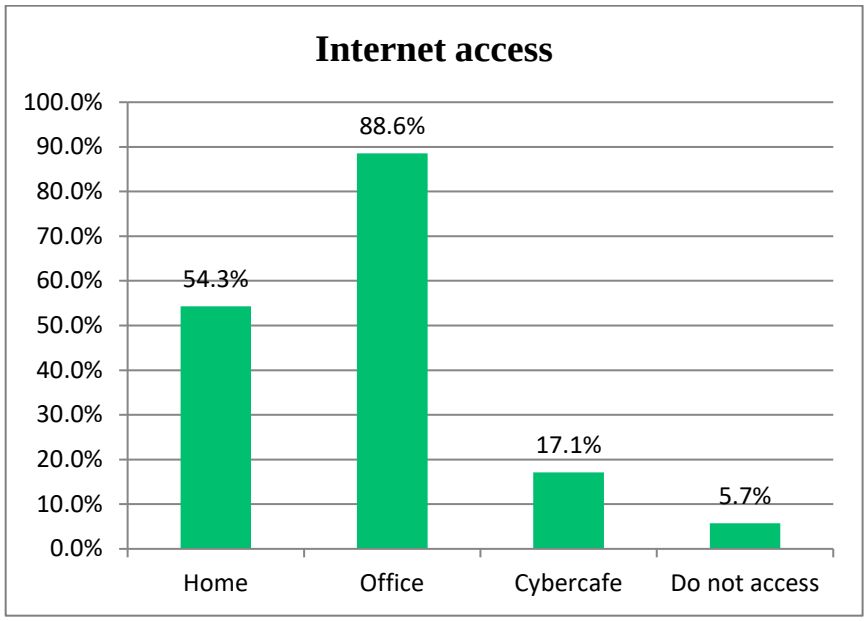

Figure 9: Access to Internet

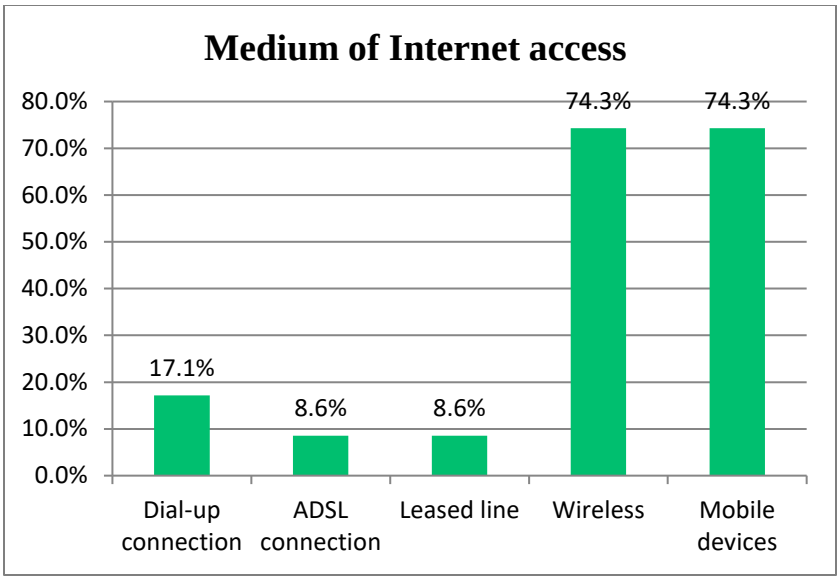

Figure 10: Medium of Internet access

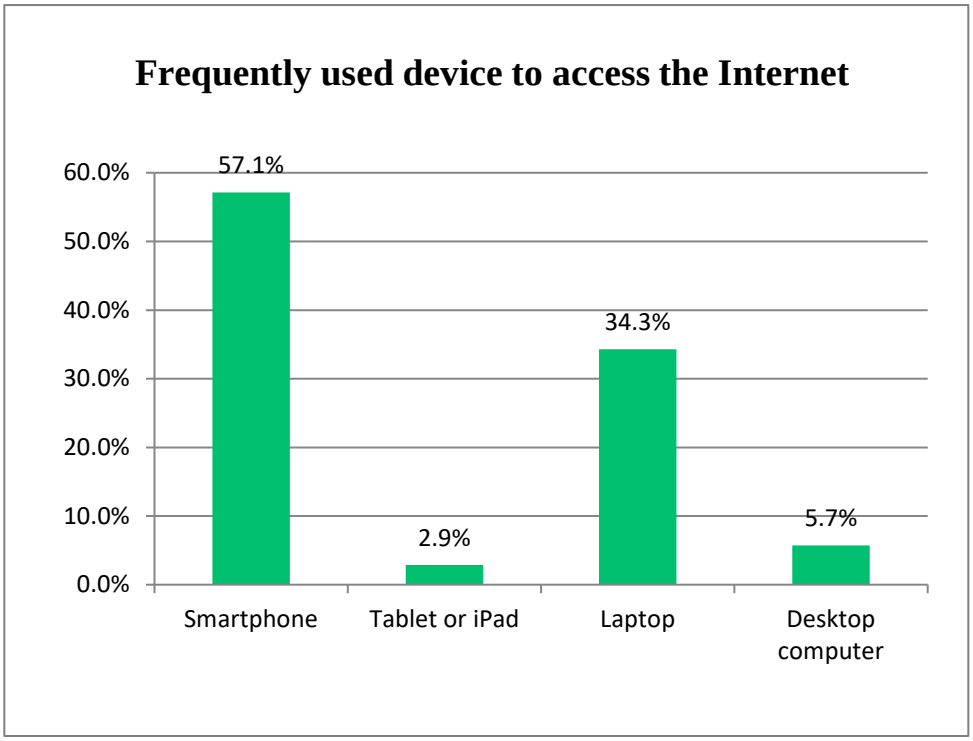

Figure 11: Device for accessing the Internet

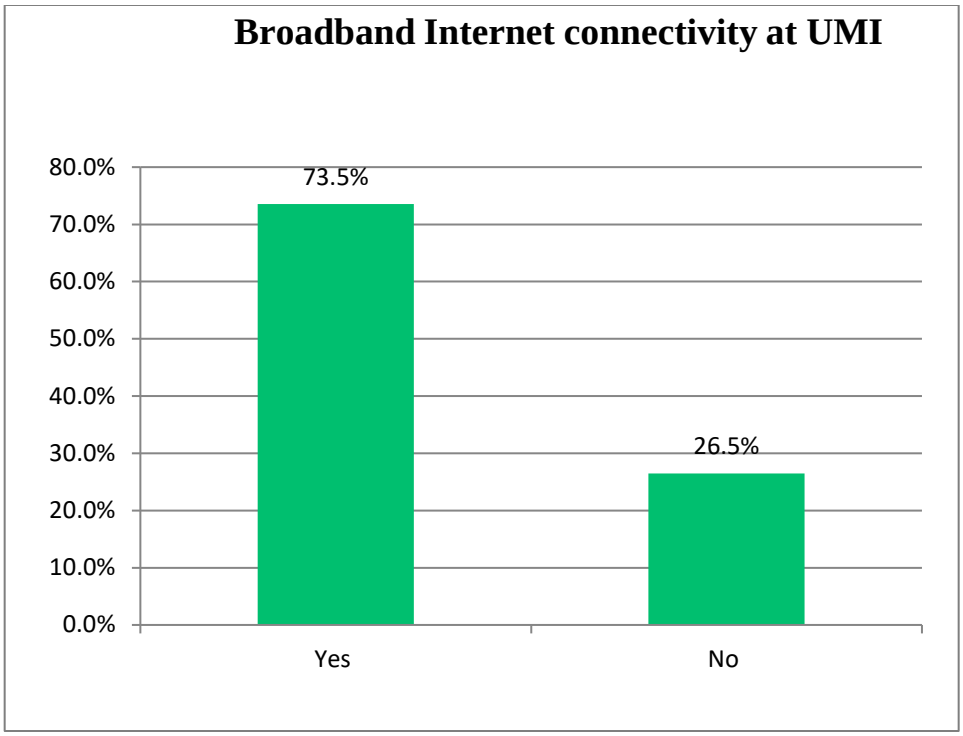

Figure 12: Broadband Internet connectivity

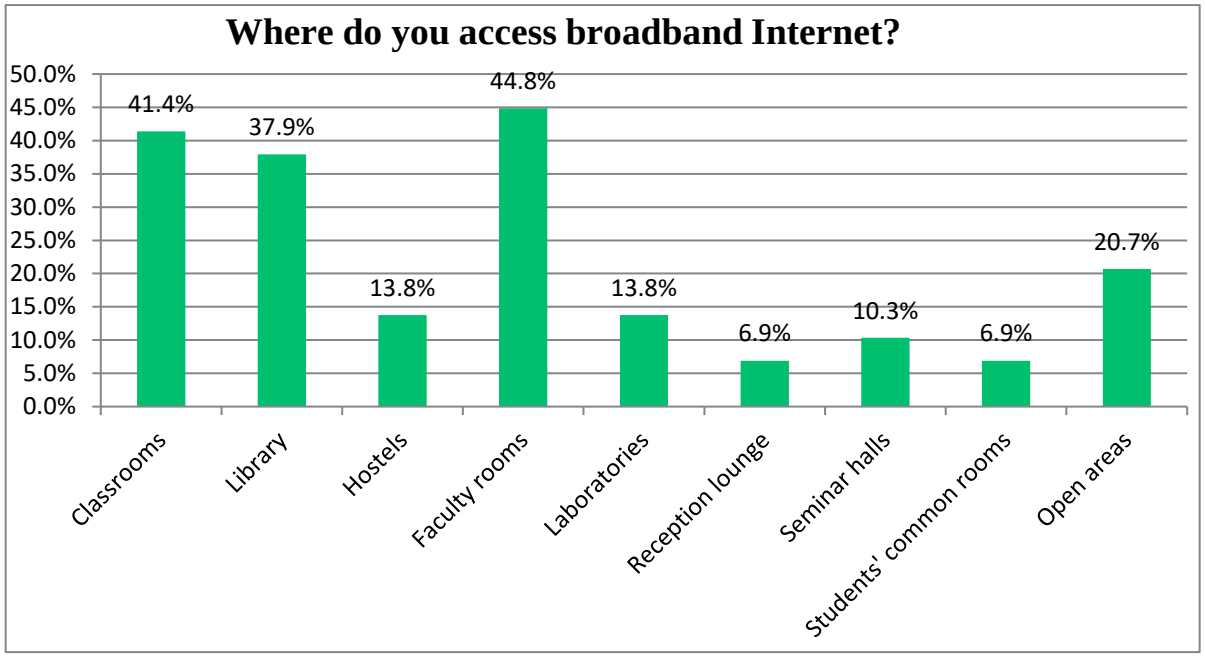

Figure 13: Broadband Internet access

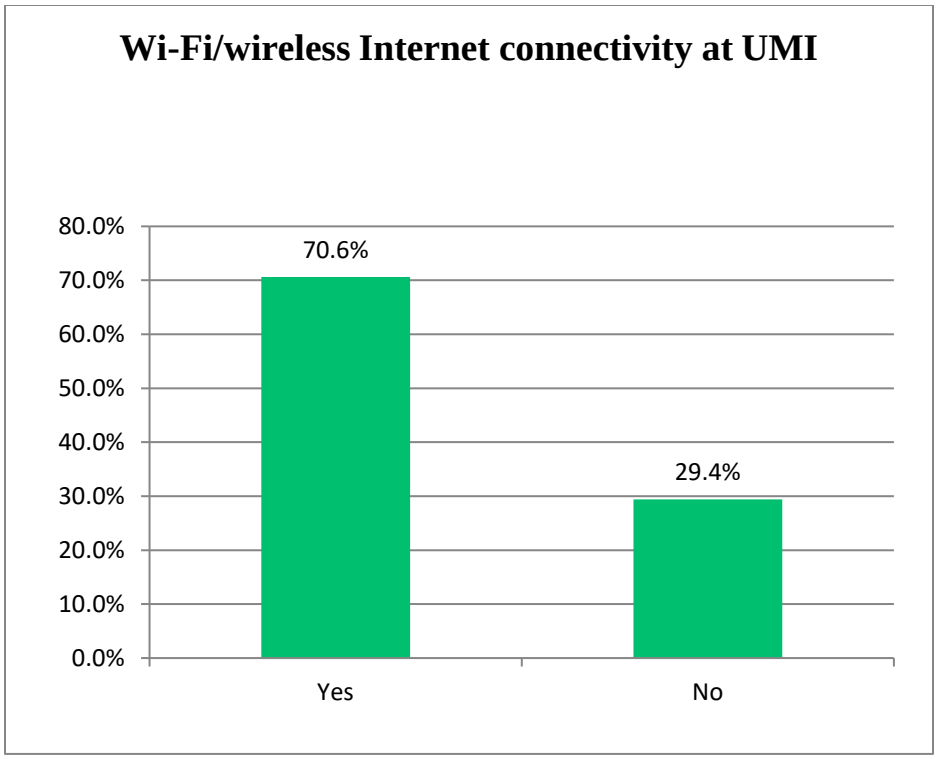

Figure 14: Wireless Internet connectivity at UMI

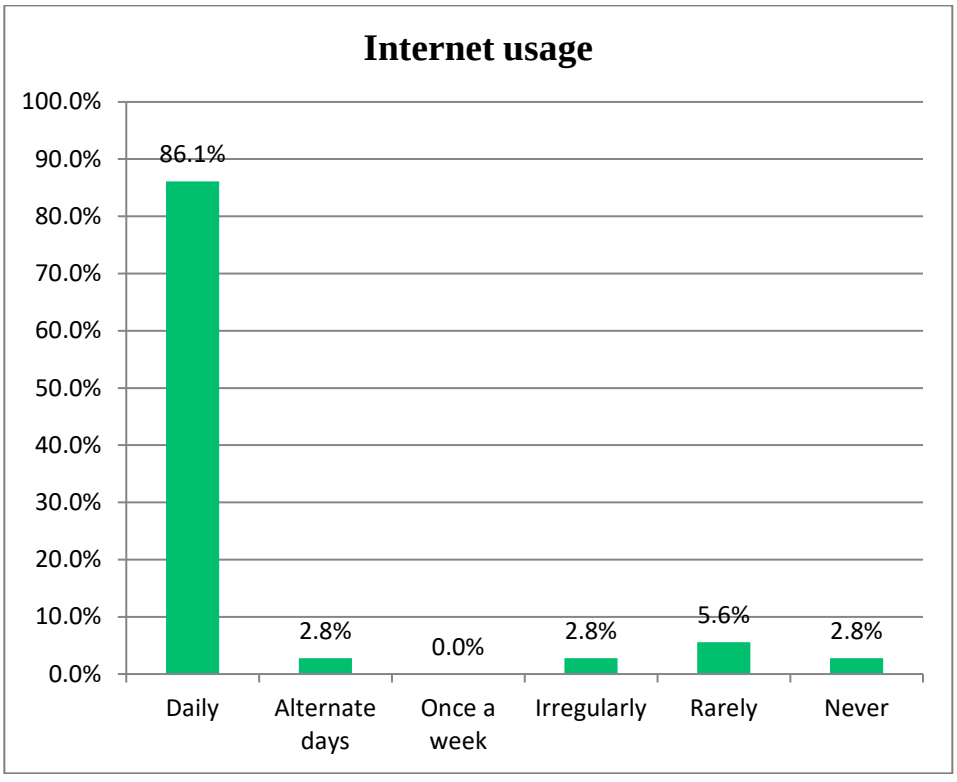

Figure 15: Internet usage

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

Comfort Level of Staff with Computer-related Skills

Respondents were asked to rate their level of comfort with using various computer-related skills. Table 3 indicates that the majority of the surveyed teachers are expert users and can comfortably use word processing, spreadsheets, presentation software and email. Furthermore, all of the teachers responded to the online survey using email, which is another useful tool for communicating and for participating in online learning. The number of skilled teachers diminishes and of non-users increases in the areas of graphics, video and audio editing, and webpage design. These are skills in which teachers at UMI require further training to effectively use TEL. Generally, the respondents have intermediate computer skills, as shown by the mean score of 2.66 and standard deviation of 1.003. This is promising for staff up-skilling in TEL.

Social Media

Social media is perhaps the fastest growing area of computer use in terms of membership and the most transformative in its potential advantages. The distribution of accounts on the various social media platforms is presented in Table 4. Only 25% of respondents specified which social media they use. Facebook, followed by Google+ and Twitter, were the most popular social media. It was also interesting to note that quite a few teachers subscribe to research sharing sites such as ResearchGate and Academia.edu. These findings are important as there is a need to investigate the potential for using social media, especially Facebook, in teaching and learning, and to train and sensitise faculty in the use of other social media types.

Table 3: Comfort Level of Staff with Using Computer-related Skills

Computer-related Skill	Expert Level (trainer)	User Level (advanced)	User Level (intermediate)	User Level (basic)	Non-user Level (N/A)	Mean	Std. Dev.
Word processor (e.g., Word)	42.4%	39.4%	9.1%	9.1%	0.0%	4.15	0.939
Spreadsheets (e.g., Excel)	24.2%	24.2%	33.3%	18.2%	0.0%	3.55	1.063
Presentation (e.g., PowerPoint)	36.4%	42.4%	12.1%	9.1%	0.0%	4.06	0.933
Email	45.5%	36.4%	6.1%	9.1%	3.0%	4.12	1.083
Databases	18.2%	12.1%	24.2%	39.4%	6.1%	2.97	1.237
Multimedia authoring	3.1%	6.3%	21.9%	37.5%	31.3%	2.13	1.040
Graphic editing	3.0%	6.1%	12.1%	42.4%	36.4%	1.97	1.015
Digital audio	0.0%	6.1%	9.1%	45.5%	39.4%	1.82	0.846
Video editing	0.0%	0.0%	9.1%	30.3%	60.6%	1.48	0.667

Computer-related Skill	Expert Level (trainer)	User Level (advanced)	User Level (intermediate)	User Level (basic)	Non-user Level (N/A)	Mean	Std. Dev.
Webpage design	0.0%	3.1%	9.4%	28.1%	59.4%	1.50	0.803
Learning management system	3.1%	9.4%	15.6%	25.0%	46.9%	1.97	1.150
Web 2.0 tools (wikis, blogs, social networks)	3.1%	18.8%	15.6%	21.9%	40.6%	2.22	1.263
Overall score						**2.66**	**1.003**

Table 4: Staff Membership in Social Media Platforms

Social Media Platform	Frequency	%
Facebook	12	24.8
Twitter	5	11.4
Google+	8	17.1
Blog (using Blogger or WordPress or within institutional website/LMS)	4	7.6
Slideshare or similar presentation platform	1	1.9
Photo sharing (Instagram/Flickr/Picasa Web, etc.)	2	4.8
Research sharing (Academic.edu, ResearchGate, etc.)	4	8.6
Social bookmarking sites (Delicious, Scoop.it, Pinterest, etc.)	2	3.8
Goodreads.com or similar (for connecting with authors and readers)	1	2.9
Missing	8	17.1
Total	**47**	**100**

Frequency of Staff Posting to Social Media

When asked how frequently they post to discussion forums, only one of the 47 respondents admitted to updating their social media status more than daily, while three indicated once daily. Four and three respondents updated their social media status once a week and fortnightly, respectively, while 15 reported posting infrequently, as shown in Table 5. Hence, faculty at UMI demonstrated a low social media presence.

Frequency of Staff Posting to Discussion Forums or Mailing Lists

Respondents were asked how often they posted to discussion groups and mailing lists (Table 6). About 13% frequently posted, while 22% did relatively often and 34% infrequently. This finding demonstrates that faculty members are paying little attention to the major tools used for learner–teacher interactions and therefore have not yet embraced the principles of online teaching. Hence, there is a need to institutionalise discussion forums/online interactions between faculty and learners to enable TEL.

Table 5: Frequency of Staff Posting to Social Media

Frequency of Staff Posting	# of Respondents	%
Several times a day	1	2.1
Once a day	3	6.4
Once a week	4	8.5
Once a fortnight	3	6.4
Not very frequently	15	31.9
Not at all	3	6.4
Missing	18	38.3
Total	**47**	**100.0**

Table 6: 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. The survey results revealed that on average, most of the teachers were neutral regarding their experiences with the selected resources/services/spaces provided by the institute, as confirmed by the mean score of 2.62 and standard deviation of 1.541 in Table 7. This indicates that to enhance the teachers' experiences of TEL, the TEL environment needs to be improved by upgrading what is available and training faculty in the various services.

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, as shown in Table 8. This indicates that there is a considerable amount of work ahead to change mindsets so as to shift course content from traditional to blended or online modes.

Table 7: Experiences with Selected Resources/Services/Spaces Provided by the Institute

Resource/Services/Space	Not Available (%)	Poor (%)	Fair (%)	Neutral (%)	Good (%)	Excellent (%)	Mean	Std. Dev.
e-Classroom facilities (e.g., computers, projection systems, lecture-capture systems, SMART boards, etc.)	0.0	10.0	23.3	10.0	43.3	13.3	3.27	1.258
Computer labs (for practical and Internet access)	0.0	20.0	13.3	13.3	36.7	16.7	3.17	1.416
Email services (institutional)	10.3	6.9	17.2	0.0	41.4	24.1	3.28	1.667
Learning management system (e.g., Moodle, etc.)	10.3	6.9	17.2	17.2	41.4	6.9	2.93	1.462
e-Portfolio	29.6	33.3	11.1	14.8	7.4	3.7	1.48	1.451
Network bandwidth/speed of Internet (download and upload)	10.3	10.3	20.7	10.3	37.9	10.3	2.86	1.552
Wi-Fi access	6.7	16.7	30.0	0.0	30.0	16.7	2.8	1.606
Online or virtual technologies (e.g., network or cloud-based file storage system, web portals, etc.)	17.9	25.0	21.4	10.7	17.9	7.1	2.07	1.585
Access to software (e.g., MATLAB, GIS applications, statistical software, qualitative data analysis, graphics software, textual or image analysis programs, etc.)	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 for teaching and learning	16.1	19.4	22.6	6.5	19.4	16.1	2.42	1.747
Support for maintenance and repair of ICT	10.7	21.4	17.9	14.3	21.4	14.3	2.57	1.643
Overall score							**2.62**	**1.541**

Table 8: Nature of Classes Taught

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

Frequency of Use of Digital Resources/Platforms in Teaching

Teachers were asked to indicate their frequency of use of a range of digital resources and platforms in their teaching. Frequency was rated on a Likert scale from 1 to 5 where 1 = never, 2 = rarely, 3 = sometimes, 4 = often and 5 = always. Hence, 3 was the natural midpoint. The weighted average for each resource is indicated in Figure 17. Inspection of the mean responses indicates above-average or heavy use of some digital resources: images, presentations and Word files.

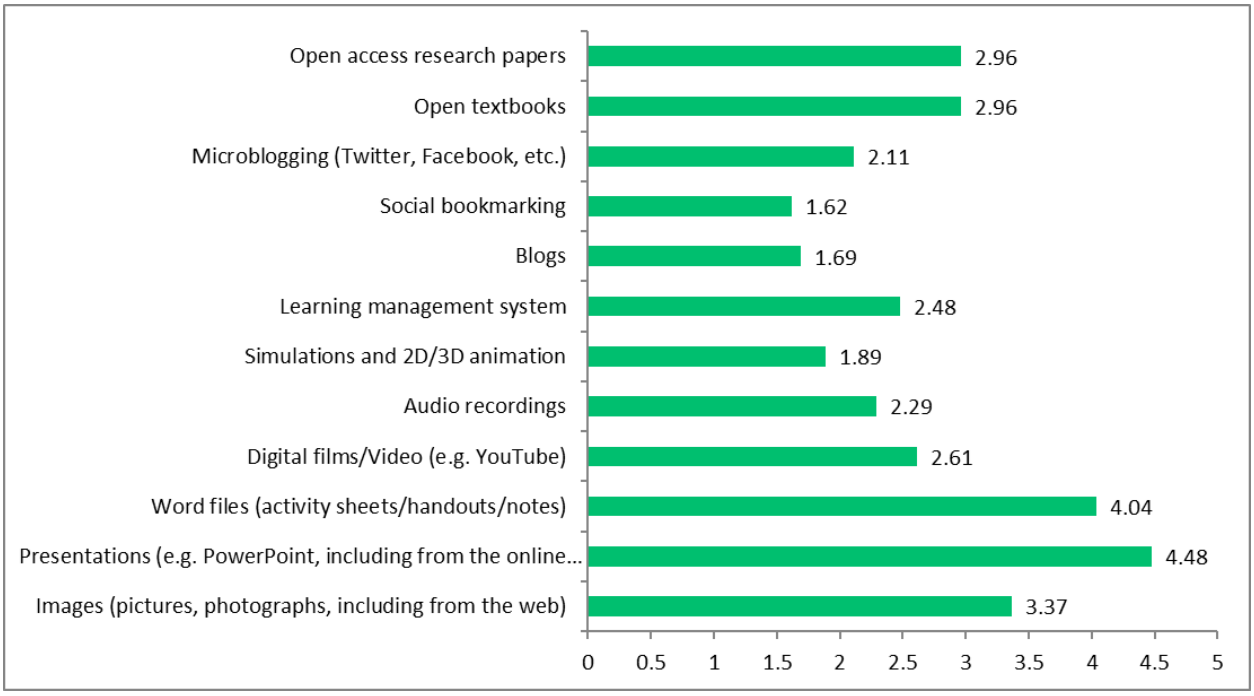

Figure 16: Weighted average of frequency of use of each digital resource

Creation and Sharing of Teaching and Learning Resources

Teachers' experience in creating and sharing teaching and learning resources is an important indicator of their level of expertise in a given area. This was assessed using Likert scale questions where 1 = never, 2 = yes but not shared with others and 3 = yes and shared under an open licence. The results of the weighted average (where 2 is the midpoint) show that a considerable number of academics had created teaching and learning resources using presentations or Word files but had not shared them (Figure 18). However, in some areas, the majority of the respondents had never used certain digital technologies for creating and sharing teaching and learning resources: graphics, digital films, audio recordings, simulations, blogs and course packs.

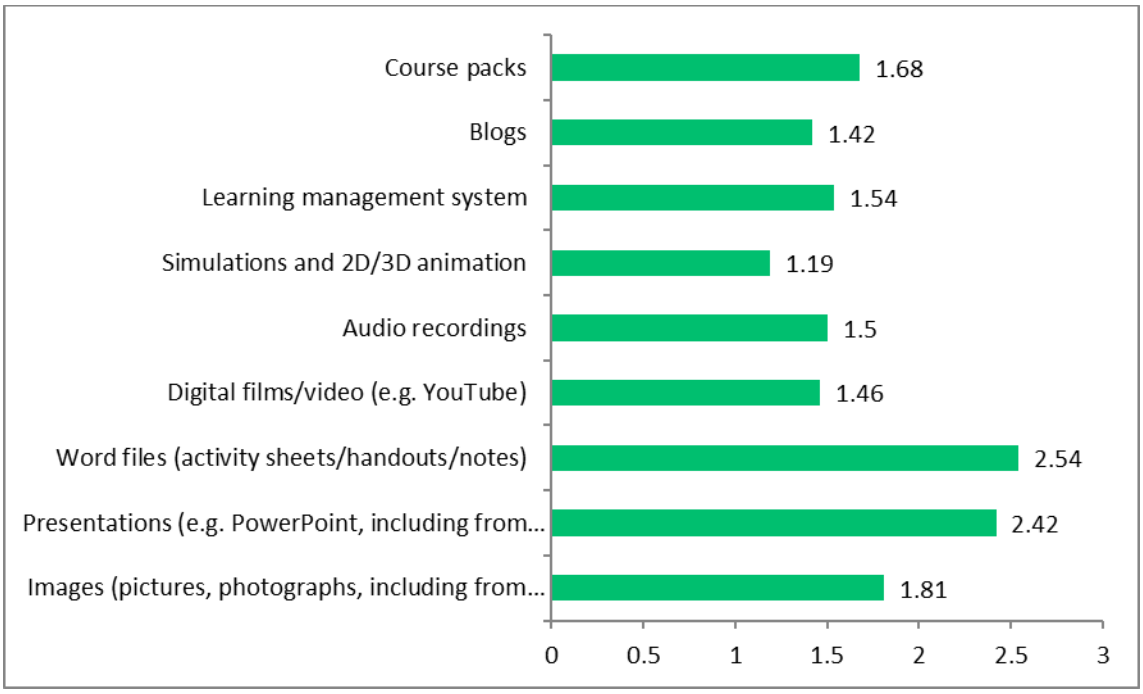

Figure 17. Creating and sharing teaching and learning resources

Awareness of OER

In the provision of access to quality resources, OER are of critical importance. A probe of teachers' awareness about the availability of OER in their discipline showed that 29.8% of staff were aware (Table 9). The large number (44.7%) of missing responses could have been due to those respondents being unsure of what the term OER meant. This indicates the need to promote an understanding of OER to move forward with implementing TEL at UMI.

Table 9: Awareness of OER

Response	Frequency	%
No	12	25.5
Yes	14	29.8
Missing	21	44.7
Total	**47**	**100.0**

Use of OER Platforms in Teaching

The teachers were asked to indicate how often they used OER platforms during teaching and learning, based on a Likert scale from 1 to 5 where 1 = never, 2 = rarely, 3 = sometimes, 4 = often and 5 = always, as shown in Table 10. The responses revealed that most of the teachers rarely used OER platforms, as indicated by the mean score of 1.74 and standard deviation of 1.075. Since OER availability in management areas is high, it would be useful to focus on OER training for the faculty at UMI.

Table 10: Use of OER Platforms in Teaching

OER Platforms/Sources	Always (%)	Often (%)	Sometimes (%)	Rarely (%)	Never (%)	Mean (%)	Std. Dev.
OER Commons	12.0	16.0	8.0	12.0	52.0	2.24	1.535
Saylor Academy	0.0	4.2	8.3	8.3	79.2	1.38	0.824
WikiEducator	8.7	8.7	4.3	17.4	60.9	1.87	1.359
OpenStax College	0.0	4.3	4.3	13.0	78.3	1.35	0.775
BCcampus Open Textbooks	0.0	0.0	16.7	16.7	66.7	1.50	0.78
NPTEL, India	0.0	4.3	13.0	13.0	69.6	1.52	0.898
MIT OpenCourseWare	4.2	4.2	20.8	12.5	58.3	1.83	1.167
OpenLearn, UK	4.0	20.0	12.0	8.0	56.0	2.08	1.382
College Open Textbook	0.0	4.5	27.3	9.1	59.1	1.77	1.02
Directory of Open Access Journals	8.7	13.0	8.7	21.7	47.8	2.13	1.392
Directory of Open Access Books	0.0	8.7	17.4	13.0	60.9	1.74	1.054
MERLOT	0.0	0.0	12.5	16.7	70.8	1.42	0.717
Overall score						**1.74**	**1.075**

Integrating Technologies in Teaching and Learning

Table 11 presents the teachers' perception about the integration of technologies in teaching and learning, with a Likert rating scale from 1 to 5 where 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 show that the majority of the teachers' ability to use technologies in teaching and learning is below satisfactory, with a mean score of 2.69 and standard deviation of 1.172.

Table 11: 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. Dev.
LMS (e.g., Moodle)	7.4	14.8	37.0	33.3	7.4	2.81	1.039
Online collaboration tools (e.g., Adobe Connect, Google Docs)	11.5	19.2	30.8	30.8	7.7	2.96	1.148
e-Portfolio	0.0	23.1	3.8	34.6	38.5	2.12	1.177
e-Books/e-textbooks	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 (blogs, wikis, etc.)	15.4	30.8	15.4	26.9	11.5	3.12	1.306
Overall score						**2.69**	**1.172**

Training and Staff Development

Responses from teachers about receiving training in the use of ICT indicated that most had (34%), as shown in Table 12. However, a relatively bigger proportion of respondents (23%) had not yet received training in the use of ICT for teaching and learning.

Table 12: Training in the Use of ICT

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

The survey results in Table 13 show that over 34% of the teachers noted that the institute does not provide regular training in the use of new technologies for teaching and learning, compared to 23% who feel training in new technologies is provided at UMI.

Table 13: Regular Training in the Use of New Technologies

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

During the survey, the teachers were asked whether they had ever participated in any online training. The survey results in Table 14 reveal that most of the respondents (47%) had participated in online training, yet 11% had not. This is not necessarily related to the use of ICT.

Table 14: Participation in Online Training

Response	Frequency	%
Yes	22	46.8
No	5	10.6
Missing	20	42.6
Total	**47**	**100.0**

As shown in Table 15, a bigger percentage of teachers (45%) had not attended massive open online courses (MOOCs), compared with only 13% who had.

Table 15: Attendance in MOOCs

Response	Frequency	%
Yes	6	12.8
No	21	44.7
Missing	20	42.6
Total	**47**	**100.0**

As shown in Table 16, the teachers were asked which MOOC platforms they were aware of, and the largest percentage (43%) indicated they were not aware of any of the listed platforms. Only 6% of the respondents were aware of Coursera and FutureLearn, followed by a very few teachers (3.7%) who were aware of EdX. Hence, there is a need to expose the UMI faculty to emerging trends in MOOCs.

Table 16: Awareness of MOOC Platform

MOOC Platform	Frequency	%
Coursera	3	6.4
Udacity	0	0.0
EdX	1	2.1
iVersity	0	0.0
FutureLearn	3	6.4
None	20	42.6
Missing	20	42.6
Total	**47**	**100.00**

Knowledge of TEL Policy Issues

The survey collected information on teachers' knowledge of TEL-related policy issues, with teachers rating from 0 to 2 where 0 = do not know, 1 = no and 2 = yes, as presented in Table 17. The teachers possess inadequate knowledge of most of the issues provided, as indicated by the mean score of 1.08 and standard deviation of 0.911. There is therefore a need for more sensitising about TEL at UMI.

Table 17: Knowledge of TEL Policy Issues

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

Access to e-Resources in the Library

According to Table 18, just over 38% noted that the library provides access to subscription-based e-resources, followed by 12% who did not know about these subscriptions and 4% who had no access to the e-resources.

Table 18: Access to Subscription-based e-Resources

Response	Frequency	%
Yes	18	38.3
No	2	4.3
Do not know	6	12.8
Missing	21	44.7
Total	**47**	**100.0**

Access to Library Resources for Teaching and Learning

The survey collected responses on the kinds of resources regularly accessed by teachers for teaching and learning, as shown in Table 19. Teachers' responses were measured on a Likert scale from 1 to 5 where 1 = never, 2 = rarely, 3 = sometimes, 4 = often and 5 = always. The findings revealed that most of the respondents accessed library resources rarely or sometimes, which was confirmed by the mean score of 2.98 and standard deviation of 1.54.

Table 19: 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 and dissertations	31.8	13.6	13.6	13.6	27.3	3.09	1.659
e-Proceedings 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 teachers' experiences with the resources/services/spaces provided by the institute to support research were measured on a Likert scale from 0 to 5 where 0 = not available, 1 = poor, 2 = fair, 3 = neutral, 4 = good and 5 = excellent. The majority were fair to neutral in their responses, as shown by the mean score of 2.62 and standard deviation of 1.542. It is interesting to note that the mean score for plagiarism detection software is 2.87 (Table 20), though UMI provides this resource even for checking student assignments.

Table 20: Availability of Research Support

Resources/Services/Spaces	Excellent (%)	Good (%)	Neutral (%)	Fair (%)	Poor (%)	Not Available (%)	Mean	Std. Dev.
Access to data storage	4.0	40.0	20.0	20.0	4.0	12.0	2.84	1.434
Data visualisation 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**

3.4 Perceptions of Use of TEL

TEL can solve many educational problems and provide much-needed support for teaching and learning. Staff perceptions about the use of TEL were assessed by evaluating the respondents' 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, 3 was the midpoint. The mean responses for all items were well above average, ranging from 4.33 to 4.54 (Table 21).

In general, the survey highlighted that the teachers have a strong positive attitude towards TEL, as shown by the mean score of 4.5 and low standard deviation of 0.637, with little variation among the teachers. The teachers' highly positive perceptions about the use of technology in their teaching are very promising, as they imply a strong willingness to adopt 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 21: Perceptions/Attitudes of Staff about the Use of TEL

Attitude about TEL	Strongly Agree (%)	Agree (%)	Neither Agree Nor Disagree (%)	Disagree (%)	Strongly Disagree (%)	Mean	Std. Dev.
TEL can solve many of our educational problems.	56.0	36.0	4.00	0.0	4.0	4.56	0.58
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

Attitude about TEL	Strongly Agree (%)	Agree (%)	Neither Agree Nor Disagree (%)	Disagree (%)	Strongly Disagree (%)	Mean	Std. Dev.
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
TEL 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 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**

A two-way ANOVA was conducted to determine the effects of gender and faculty discipline on teachers' perceptions about the use of TEL. Our dependent variable, teachers' perceptions, was normally distributed for the groups formed by the combination of the levels of faculty discipline and gender, as assessed by the Shapiro-Wilk test. There was homogeneity of variance between groups, as assessed by Levene's test for equality of error variances. There was a statistically significant interaction between the effects of gender and faculty discipline on teachers' perceptions about using TEL, $F(3, 17) = 4.321$, $P = .019$. Simple main effects analysis highlighted that teachers within the Business and Management faculty revealed statistical significance in the use of TEL ($P = .001$), but there were no gender differences in the use of TEL in CSPAG ($P = .606$), Management Science ($P = .776$) or Distance Learning and IT ($P = .857$).

These results suggest that the use of TEL really has an effect on teachers within the Business and Management faculty. Specifically, they suggest that when teachers within that faculty use TEL, they increase their efficiency in teaching and other aspects. However, it should be noted that gender and faculty discipline in the faculties of CSPAG, Management Science, and Distance Learning and IT do not appear to significantly affect teachers' perceptions about the use of TEL.

Table 22: Two-way ANOVA for Effects of Gender and Faculty Discipline on Teachers' Perceptions about the Use of TEL

Tests of Between-Subjects Effects					
Source	Type III sum of squares	df	Mean square	F	Sig.
Corrected model	3.121[a]	7	.446	2.571	.053
Intercept	256.598	1	256.598	1479.748	.000
Gender	.430	1	.430	2.479	.134
Faculty_discipline	1.326	3	.442	2.549	.090
Gender * Faculty_discipline	2.248	3	.749	4.321	.019
Error	2.948	17	.173		
Total	509.527	25			
Corrected total	6.069	24			

[a] R squared = .514 (adjusted R squared = .314)

Univariate Tests						
Faculty discipline		Sum of squares	df	Mean square	F	Sig.
Civil Service, Public Administration and Governance	Contrast	.048	1	.048	.276	.606
	Error	2.948	17	.173		
Business and Management	Contrast	2.669	1	2.669	15.394	.001
	Error	2.948	17	.173		
Management Science	Contrast	.015	1	.015	.084	.776
	Error	2.948	17	.173		
Distance Learning and IT	Contrast	.006	1	.006	.033	.857
	Error	2.948	17	.173		

Each F tests the simple effects of gender within each level of combination of the other effects shown. These tests are based on linearly independent pairwise comparisons among the estimated marginal means.

3.5 Motivation to Use TEL

The second probe, about teachers' motivation to use TEL, was done using a Likert scale for several items, with responses of 1 = very weak motivator, 2 = weak motivator, 3 = average motivator, 4 = strong motivator and 5 = very strong motivator.

Generally, the survey showed faculty was highly and strongly motivated, as revealed by the mean score of 4.00 and standard deviation of 1.001. This is a very encouraging finding, as it shows staff are highly motivated to integrate TEL into their teaching. Examining the different factors critically reveals that personal interest, intellectual challenge, training and self-gratification, release time/reduction in existing workload, training in TEL, technical support, better bandwidth, trend-setting and improved infrastructure were the main motivators, while credit towards promotion and peer recognition and status were considered comparatively less significant, which is a positive indicator. It can be concluded that almost all of the listed factors play a role in motivating teachers to adopt TEL (Table 23).

Table 23: Motivators for Using TEL

Motivator	Very Strong Motivator (%)	Strong Motivator (%)	Average Motivator (%)	Weak Motivator (%)	Very Weak Motivator (%)	Mean	Std. Dev.
Personal interest in using technology	70.8	20.8	8.3	0.0	0.0	4.63	0.647
Intellectual challenge	50.0	41.7	8.3	0.0	0.0	4.42	0.654
Self-gratification	50.0	29.2	16.7	4.2	0.0	4.25	0.897
Training on TEL	45.8	37.5	16.7	0.0	0.0	4.29	0.751
Better Internet bandwidth at workplace	45.8	25.0	20.9	0.0	8.3	4.00	1.216
Credit towards promotion	27.3	18.2	27.7	13.7	13.7	3.32	1.393
Professional incentives to use TEL	37.5	25.0	29.2	8.3	0.0	3.92	1.018
Technical support	36.4	36.4	18.2	9.1	0.0	4.00	0.976
Peer recognition, prestige and status	29.2	12.5	20.8	29.2	8.3	3.25	1.391
Improved infrastructure (hardware and software) deployment	41.7	20.8	33.3	0.0	4.2	3.96	1.083
Release time/Reduction in existing workload	41.7	29.2	25.0	0.0	4.2	4.04	1.042
To be a trendsetter by early adoption of technology in education	29.2	37.5	25.0	8.3	0.0	3.87	0.947
Overall score						**4.00**	**1.001**

The scores for teachers' motivation to use TEL were subjected to a two-way ANOVA with two levels of gender (male, female) and five levels of age group (31–35, 36–40, 41–45, 46–50 and 51–55), as shown in Table 24. The dependent variable, teachers' motivation to use TEL, was normally distributed for the groups considered by combining levels of gender and age group, as assessed by the Shapiro-Wilk test. Not all effects were statistically significant at the .05 significance level, as the main effect of teachers' motivation to use TEL yielded an F ratio of $F(1, 13) = .436$, $p > .05$, indicating that teachers' motivation to use TEL did not differ significantly between genders and age groups. Our results suggest that the teachers' gender and age do not significantly influence their motivation to use TEL.

Table 24: Two-way ANOVA on Gender and Age Groups and Teachers' Motivation to Use TEL

Tests of Between-Subjects Effects					
Source	Type III sum of squares	df	Mean square	F	Sig.
Corrected model	1.961[a]	10	.196	.390	.929
Intercept	235.290	1	235.290	468.395	.000
Gender	.847	1	.847	1.687	.217
Age_group	1.818	8	.227	.452	.868
Gender * Age_group	.219	1	.219	.436	.520
Error	6.530	13	.502		
Total	393.704	24			
Corrected total	8.491	23			

[a] R squared = .231 (adjusted R squared = –.361)

3.6 Barriers to the Use of TEL

We conducted a third probe, on barriers to teachers' uptake of TEL. This was assessed using Likert scale items where 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 to the use of TEL, as highlighted by the mean score of 3.611 and standard deviation of 1.044. Specifically, the findings indicated that all of the identified factors except feeling intimidated by technology were strong barriers to the uptake of TEL (Table 25). However, lack of technical support in the institute, poor Internet access and 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 succeed.

Table 25: Barriers to Staff Use of TEL

Barrier	Very Strong Barrier (%)	Strong Barrier (%)	Average Barrier (%)	Weak Barrier (%)	Very Weak Barrier (%)	Mean	Std. Dev.
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 institute	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

Barrier	Very Strong Barrier (%)	Strong Barrier (%)	Average Barrier (%)	Weak Barrier (%)	Very Weak Barrier (%)	Mean	Std. Dev.
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 networks 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**

Overall, faculty at UMI had good access to technological devices. However, most of them used their own devices, and the most common devices for access were smartphones, followed by laptops, desktop and tablets. The Internet was accessed mostly in offices through smartphones and other mobile devices using a wireless connection.

The findings also indicate a reasonable level of faculty ICT capability with basic technologies such as word processing, spreadsheets and presentation software. However, teachers have inadequate skills in graphics, video and audio editing, webpage design and Web 2.0 tools.

In general, faculty satisfaction with the availability of ICT services, such as in classrooms and computer labs, was above average; however, there was notably poor experience with LMSs, emails, network bandwidth/speed of Internet, Wi-Fi access, online or virtual technologies, access to software, OER, and support and maintenance for ICT.

The design, development and teaching of authentic and interactive online courses are still below average. However, a few teachers at UMI are using PowerPoint presentations, images, Word files, YouTube, LMSs, open textbooks and open access research papers in their teaching and learning.

There is a need for training, mentorship and benchmarking in the design, development and teaching of online courses and in the use of OER, LMSs and other common digital resources. Faculty at UMI were positive and highly motivated about the use of technology in teaching and learning. However, a number of barriers were cited, including poor Internet access and networks, lack of training on TEL and lack of instructional design support for TEL.

Chapter 4: Survey of Learners

4.1 Demographic Information about 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 19). Figure 20 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. Over 85% of the learner participants were from postgraduate programmes (69.7% postgraduate diploma, 14.48% master's degrees and 1.38% doctoral degrees), and about 15% were diploma or certificate students (Figure 21). Distance Learning and IT students accounted for 33.57% of the respondents, followed by 25.87% from CSPAG (Figure 22).

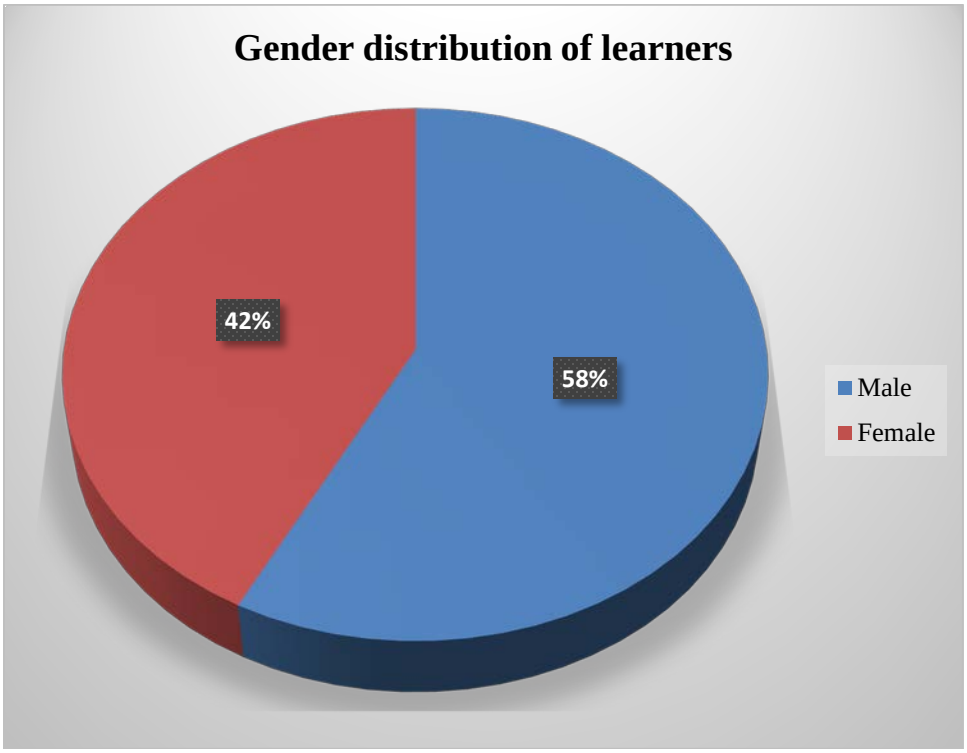

Figure 18: Gender distribution of student sample

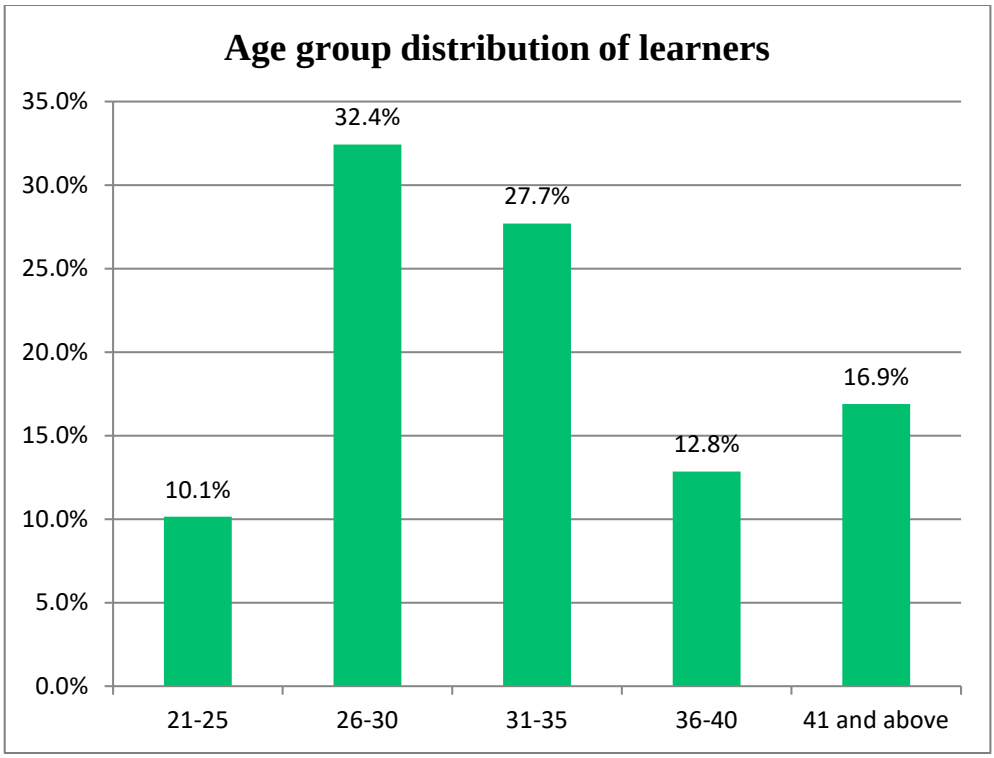

Figure 19: Age distribution of student sample

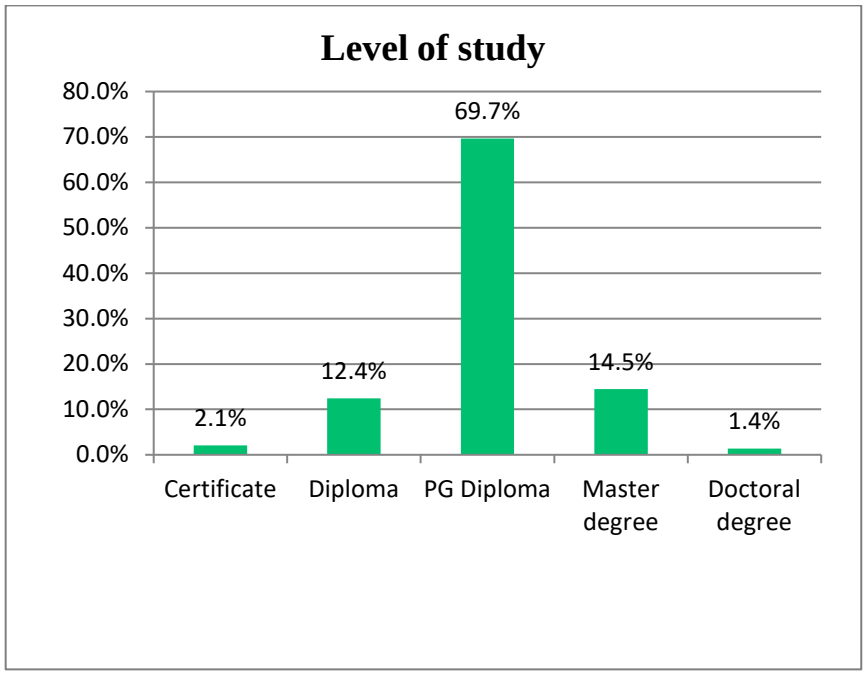

Figure 20: Study level of student sample

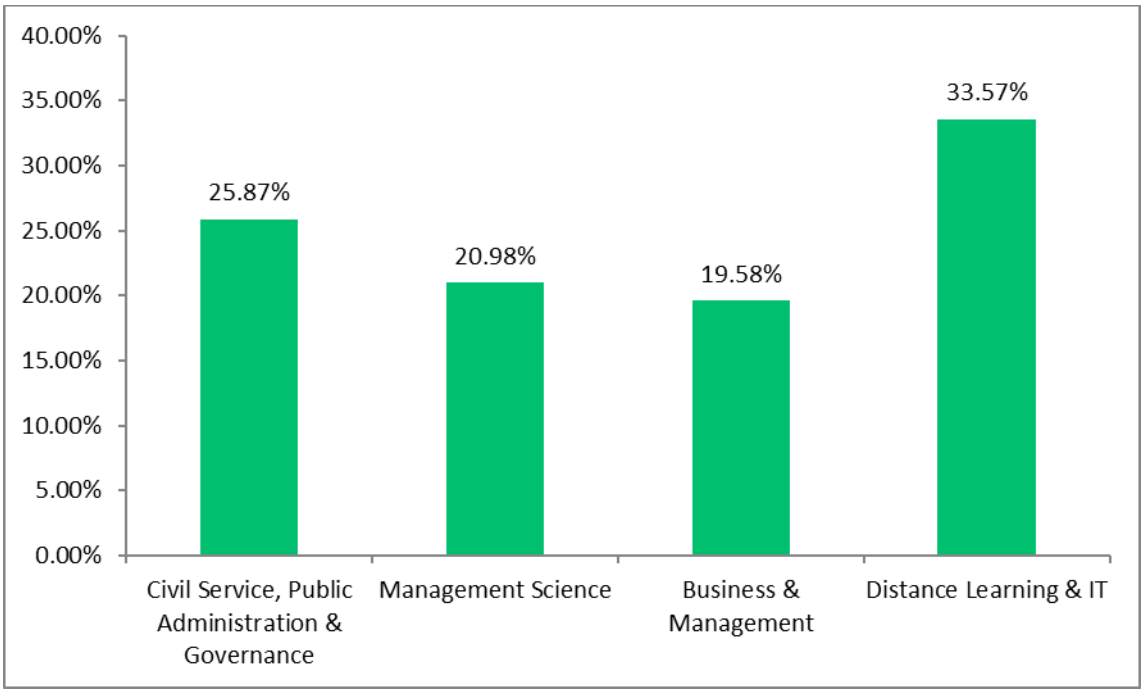

Figure 21: Faculty discipline of student sample

Semester of Study

The distribution of the learners by semester of study indicates that the majority (78.47%) were from Semesters 1 and 2 (Table 26).

Table 26: Semester of Study

Semester of Study	# of Respondents	%
Semester 1	81	54.7
Semester 2	32	21.6
Semester 3	18	12.2
Semester 4	13	8.8
Missing	4	2.7
Total	**148**	**100.0**

Physical Disability

Learners were asked whether they had any physical and/or learning disabilities that required accessible or adaptive technologies for their coursework. Results showed that only one of the respondents had a physical disability or a learning disability or both. While this may seem an insignificant proportion, there is a need for UMI to document the number of disabled students at the admission stage to make provision for special needs as well as gender mainstreaming.

Mode of Course Delivery at UMI

The most common delivery mode for courses at UMI is traditional face-to-face (60.3%), with 6.2% of the respondents indicating that they study courses in an online mode and a significant

33.6% using a blended mode (Figure 23). This shows that some courses in the university already use TEL.

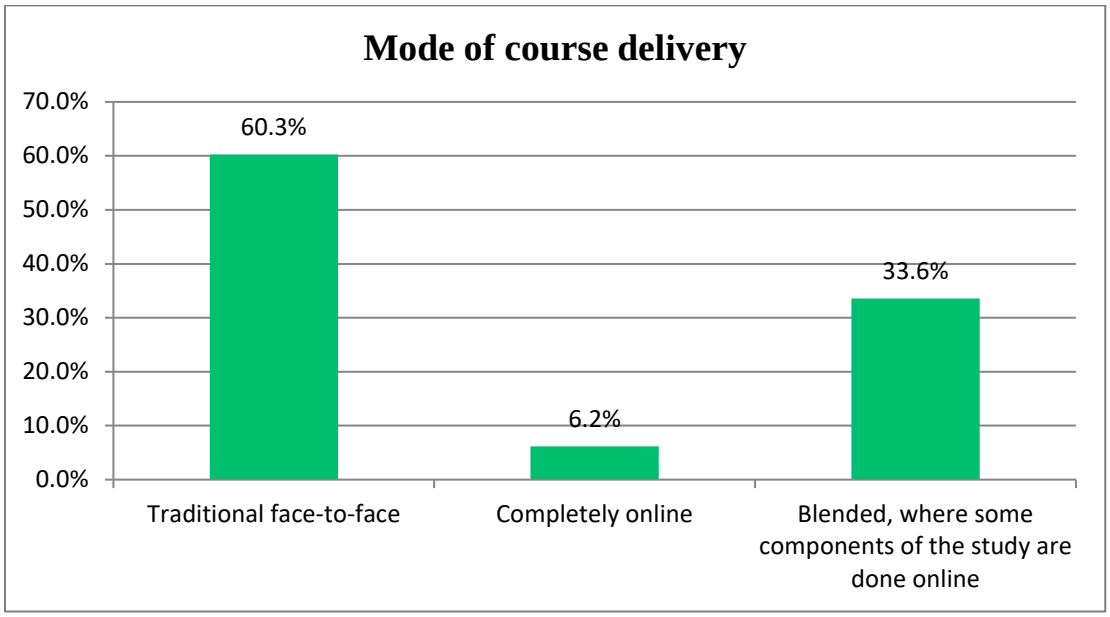

Figure 22: Mode of course delivery at UMI

4.2 Learners' Access to Media and Technology

Ownership of Devices

The findings revealed that 87% of the respondents own laptops, over 99% own smartphones, over 53% own desktops and almost 42% own tablets. Nearly all the respondents who own neither laptops nor smartphones (12% and 0.8%, respectively) were planning to acquire them within 12 months. Some 23% were planning to buy tablets, and a small fraction (4.6%) were planning to acquire desktops (Figure 24).

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 25). A large number of respondents use their own devices on campus: 79% laptops, 84% smartphones and nearly 64% tablets. There were some misconceptions about the institute's policy on using private devices on campus, as quite a few learners indicated that the institute does not allow such use. These results imply that TEL will benefit from the use of personal devices and that UMI should be encouraging this while the students are at the institute.

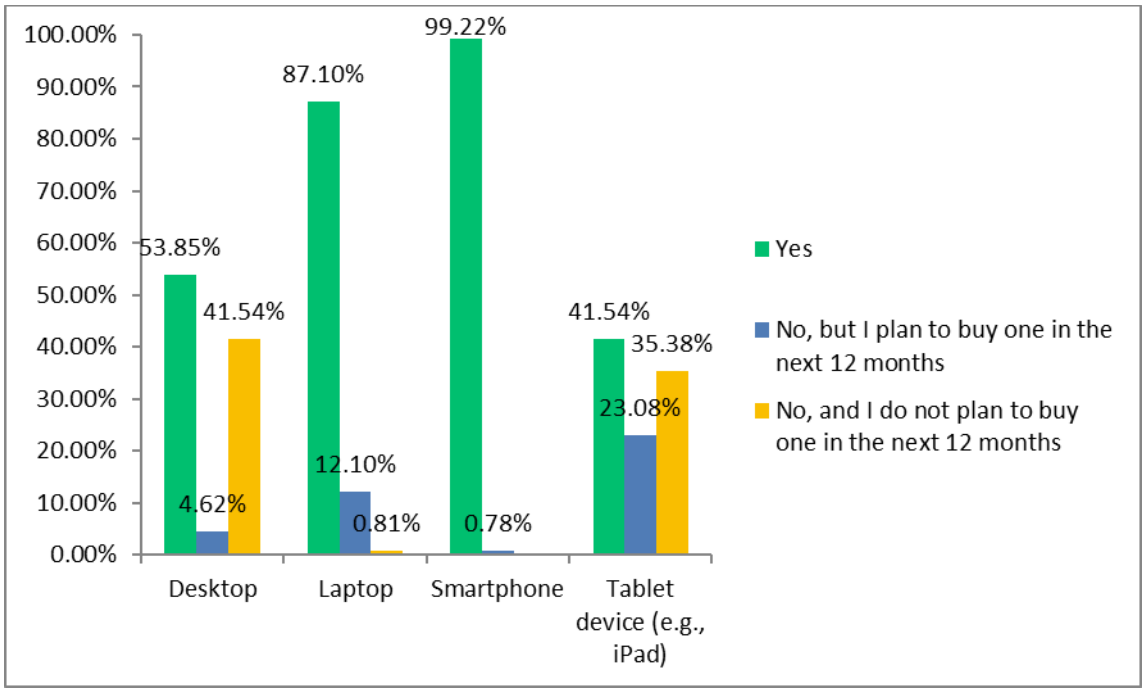

Figure 23: Personal device ownership

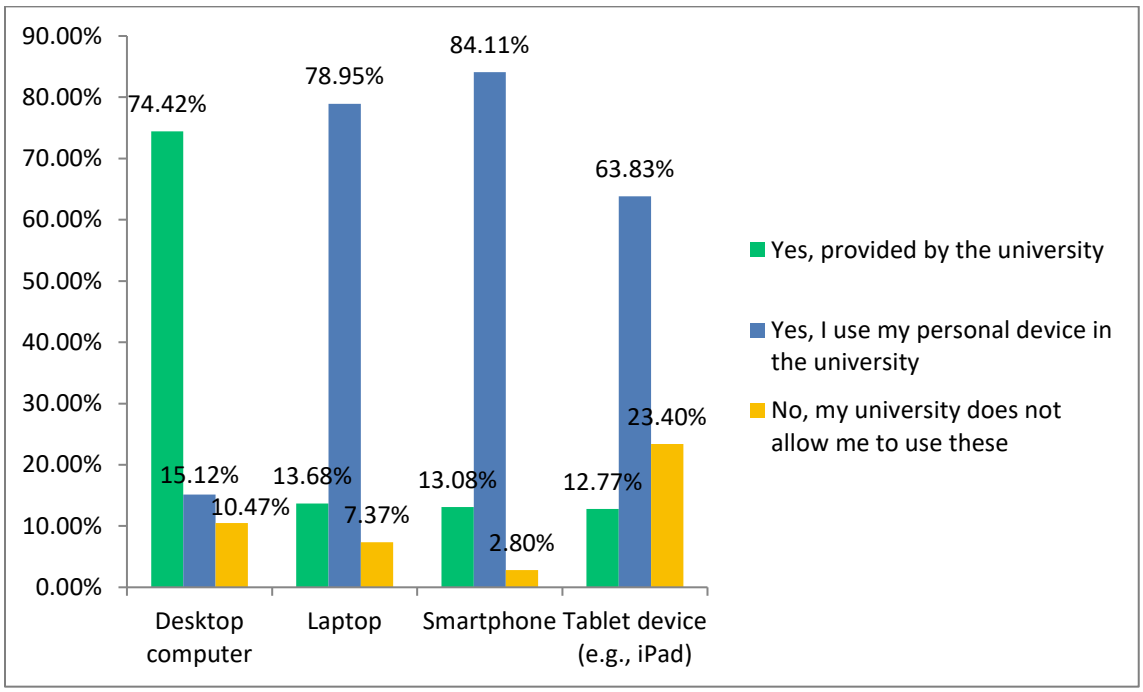

Figure 24: Device access from the institute

Internet Access

The majority of respondents predominantly accessed the Internet from an office (70.5%), followed by from home (64.8%), while a few (18.7%) accessed from cybercafés and 7.2% had no Internet access at all. These results imply that more than 93% of the respondents can access the Internet for learning in their private time (Figure 26), which is very promising. Nearly 90% of respondents accessed the Internet through mobile devices and 67% via wireless technologies (Figure 27). These findings reflect the increasing prominence of wireless use and the pervasiveness of mobile technology in Uganda, which has a tele-density of over 64% (UCC, 2015).

Internet Access Devices

Respondents predominantly accessed the Internet using smartphones (67.4%), followed by laptops (22.5%). Only 5.8% used desktop computers and 4.4% used tablets, indicating that these are not popular Internet access devices (Figure 28). This implies that to be readily utilised by students, the learning content should be smartphone compatible.

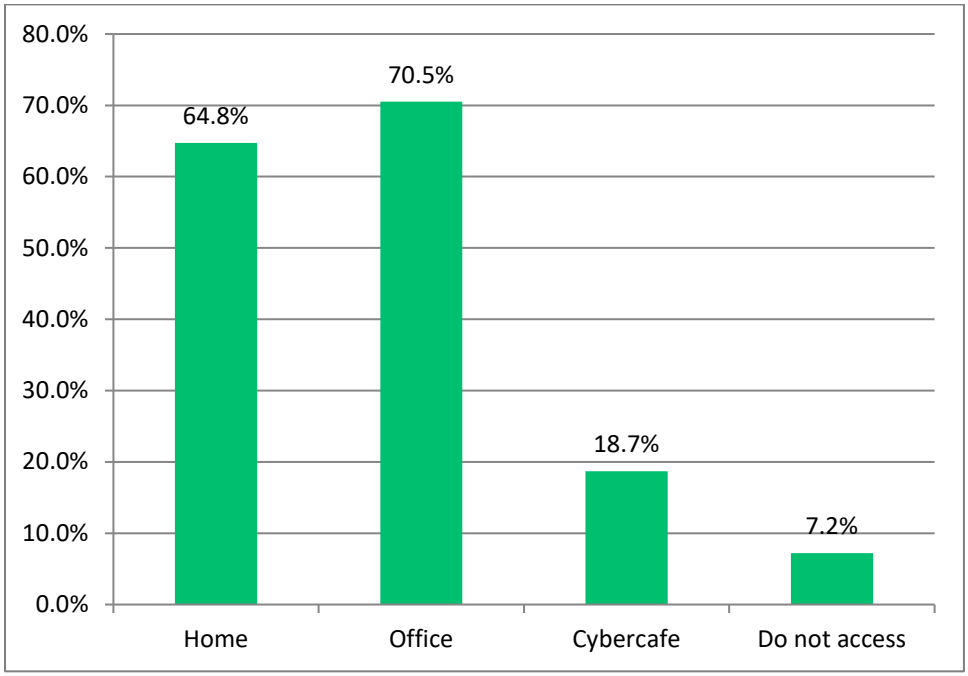

Figure 25: Internet access locations

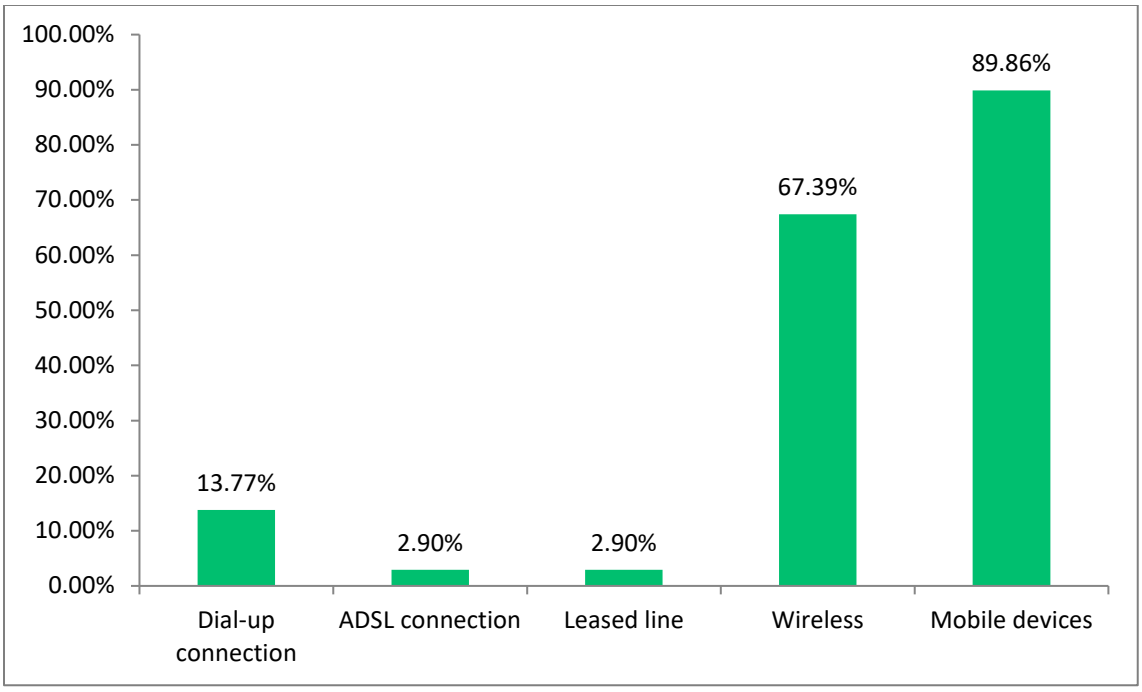

Figure 26: Internet access means

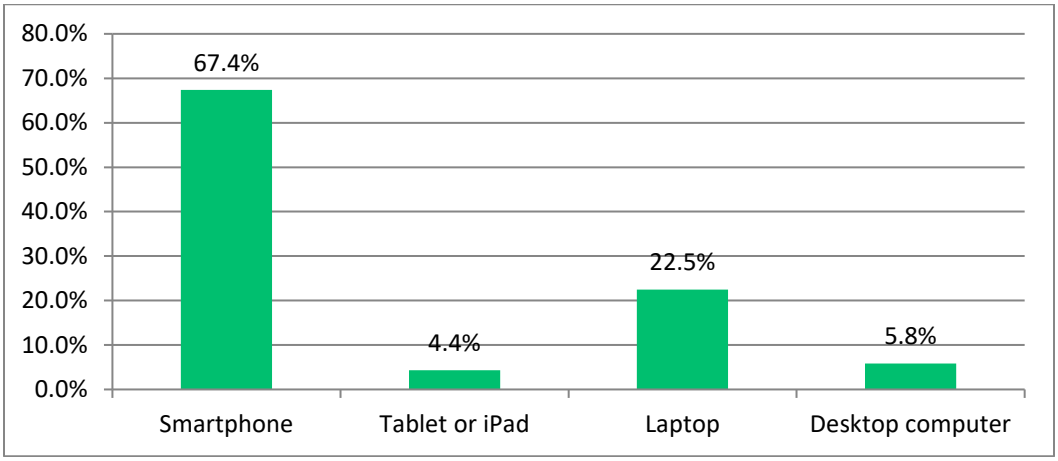

Figure 27: Internet access devices

Broadband Internet

Nearly 64% of the respondents had access to broadband Internet at an office, 27% at home and 10% at cybercafés, while a significant 23% did not have any broadband access (Figure 29). This implies that respondents who had no broadband access could benefit from access while at the institute. In terms of access at the institute, the majority of learners had broadband Internet access via the library (62.5%), followed by 39.8% in classrooms, 25% in laboratories and 20% in open areas. It seemed unclear whether UMI provides broadband access at the institute, as only 60% responded to this question. In addition, there was some confusion about whether UMI offers wireless Internet connectivity, with only 60% of the respondents accessing Wi-Fi on campus. This vagueness about the institute's provision of broadband access needs to be cleared up by

providing the same services in all public places used by students and issuing a clear policy of promoting broadband utilisation for TEL at UMI.

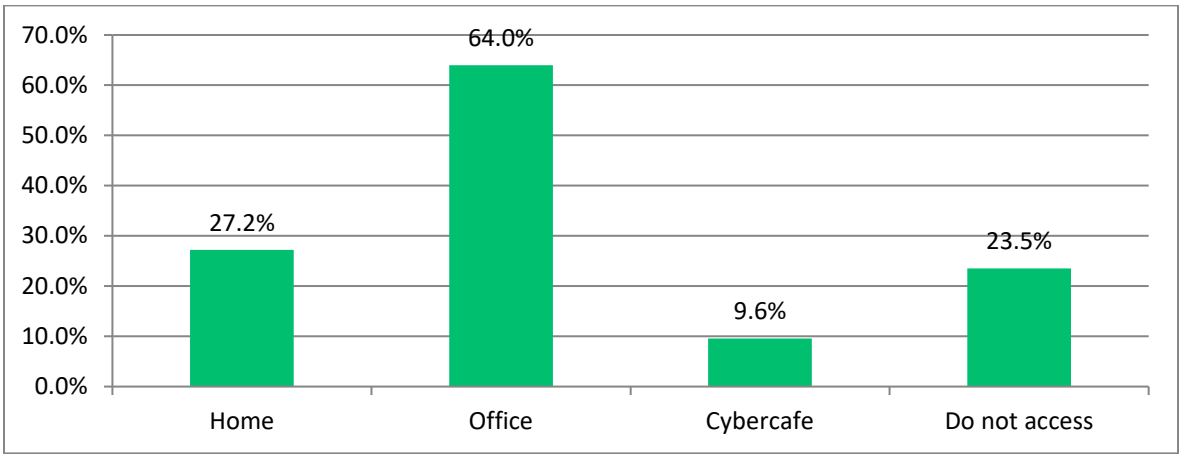

Figure 28: Broadband Internet

Internet Usage Frequency

Nearly 77% of respondents use the Internet daily, 9% on alternate days, 9% rarely and 4% never. This implies that the majority (86%) are frequent Internet users. In terms of how much time, on average, learners spend on Internet-related activities, 35.5% indicated more than five hours, followed by 23.2% one to two hours, and 22.5% three to five hours (Figure 30). This suggests that daily Internet usage is generally good and can be improved by the promotion of TEL when the current challenges are addressed.

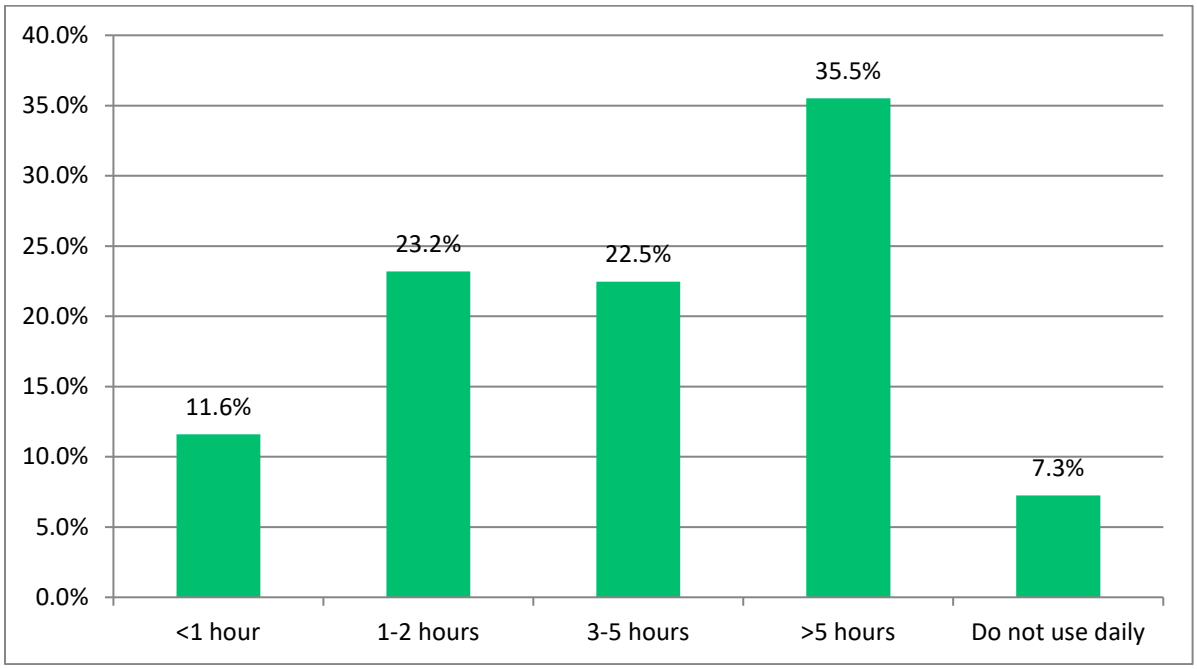

Figure 29: Daily time spent on Internet-related activities

Computer Skills Competence

Learners' competency in using a range of computer skills was evaluated with Likert scale items ranging from 0 to 4 where 0 = can't use it, 1 = use to a small extent, 2 = use satisfactorily, 3 = use well and 4 = use very well (Table 27).

Generally, most of the respondents revealed that they have skills in areas such as word processing, spreadsheets, PowerPoint, email and search engines, which enable them to use a computer satisfactory, as revealed by the mean score of 1.78 and standard deviation of 1.191. However, by and large the respondents lacked skills in graphics editing, digital audio, video editing, webpage design and LMSs, implying that learners need more training to boost their skills in computer-related activities so as to have better experiences of TEL.

Table 27: Competence Levels in Computer Skills

Computer skill	I can't use it (%)	I can use it to a small extent (%)	I can use it satisfactorily (%)	I can use it well (%)	I can use it very well (%)	Mean	Std. Dev.
Word processing	1.5	4.4	14.0	27.5	52.2	3.34	0.978
Spreadsheets	5.2	14.8	25.2	27.4	27.4	2.57	1.188
Presentations (PowerPoint)	5.1	15.2	20.3	23.9	35.5	2.70	1.242
Email	2.2	4.4	10.9	28.3	54.4	3.28	0.974
Databases	14.5	29.0	22.9	18.3	15.3	1.91	1.292
Multimedia authoring	41.5	26.8	12.2	12.2	7.3	1.17	1.291
Graphic editing	45.2	31.5	8.1	11.3	4.0	0.98	1.165
Digital audio	46.0	25.4	14.3	9.5	4.8	1.02	1.193
Video editing	60.0	25.6	7.2	4.0	3.2	0.65	1.002
Webpage design	70.4	20.8	3.2	2.4	3.2	0.47	0.921
Learning management system	42.1	30.2	7.1	16.7	4.0	1.10	1.232
Web 2.0 tools (wikis, blogs, social networks)	40.9	17.3	8.7	18.9	14.2	1.48	1.522
Search engine	15.9	12.9	15.2	20.5	35.6	2.47	1.48
Overall score						**1.78**	**1.191**

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%). Only 8% used photo-sharing platforms such as Instagram. These findings, presented in Table 28, have implications for what social media platforms UMI should consider for use in TEL.

Table 28: Popularity of Social Media Platforms

Social Media Platform Used	# of respondents	%
Facebook	44	29.6
Twitter	25	16.9
Google+	31	21.0
Blog	6	4.1
Slideshare or similar presentation platform	7	4.5
Photo sharing (e.g., Instagram/Flickr/Picasa Web)	12	7.9
Research sharing (e.g., ResearchGate)	11	7.6
Social bookmarking sites	4	2.6
Goodreads.com	3	2.1
Missing	5	3.6
Total	**148**	**100.0**

Social Media Status Update Frequency

There was a range of responses about the frequency with which learners updated their social media accounts. Table 29 indicates that 51.0% did not update their accounts frequently and 4% did not update their profiles at all. Only 8.0% were active on social media several times a day. This implies that it is critical to address the challenges to learners' utilisation of social media.

Table 29: Social Media Status Update Frequency

Social Media Status Update Frequency	# of respondents	%
Several times a day	12	8.1
Once a day	19	12.8
Once a week	16	10.8
Once a fortnight	6	4.1
Not very frequently	75	50.7
Not at all	6	4.1
Missing	14	9.5
Total	**148**	**100.0**

Daily Time Spent on Social Media

There was also a range of responses to the average time learners spent on social media per day (Table 30): 28% spent one to two hours, 20% less than an hour, 19% more than five hours and 14% three to five hours. Overall, learners are active on social media, implying the need to utilise social media to increase content–teacher–learner interactions for improved learning outcomes.

Table 30: Daily Time Spent on Social Media

Amount of Time Spent per Day	# of respondents	%
< 1 hour	30	20.3
1–2 hours	42	28.4
3–5 hours	21	14.2
> 5 hours	28	18.9
Do not use daily	11	7.4
Missing	16	10.8
Total	**148**	**100.0**

Mailing Lists and Discussion Forums

Learners were asked about memberships in mailing lists and discussion forums. Of the 71% who held a membership in a mailing list and/or a discussion forum, 66% had subscribed to between one and five email-based discussion forums and 7% to more. Of these, the biggest percentage (49%) had never moderated a forum, compared to 28% who had. This finding indicates that the majority of the student population is knowledgeable about and actively uses mailing lists and discussion forums; however, faculty need to use it more in coursework distribution and discussion to increase the students' ability to use these methods in their learning.

Frequency of Posting to Discussion Groups/Mailing Lists

Posting to discussion groups/mailing lists is not a popular activity (Figure 31): 48.7% say they infrequently post anything, 18.9% several times a day and 16.2% once a week. Much as learners' have a relatively significant social media presence, the rate of interaction with faculty, content and themselves academically is still weak, so there is a need to integrate mailing and discussion forums with learners' social media accounts to enable TEL.

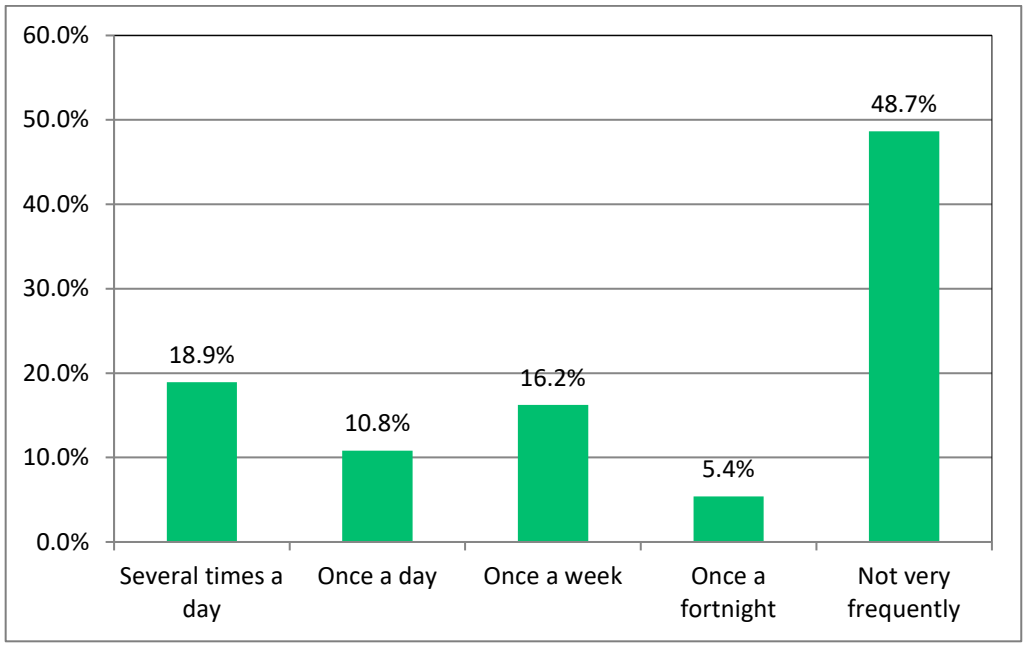

Figure 30: Frequency of posting to discussion forums/mailing lists

4.3 The TEL Environment

In this section, learners were asked to evaluate their experiences with a range of resources, services and spaces. Experiences 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 with the listed services and resources were fair, as confirmed by a mean score of 2.35 and a standard deviation of 1.453 (Table 31). The level of experience ranged from fair to neutral, implying the need for improvement and upgrading of the selected services, as well as increased exposure and training, especially to e-theses and dissertations, patent databases and e-proceedings.

Table 31: Experiences with Selected Digital Resources/Services/Spaces

Digital Resource/ Service/Space	N/A (%)	Poor (%)	Fair (%)	Neutral (%)	Good (%)	Excellent (%)	Mean	Std. Dev.
e-Classroom facilities (e.g., computers, projection systems, lecture capture systems, Smart boards, etc.)	3.2	5.5	18.1	13.4	44.1	15.8	3.37	1.277
Computer labs (for practical and Internet access)	1.8	11.4	19.3	19.3	35.1	13.2	3.14	1.296
Email services (institutional)	7.0	15.7	15.7	12.2	35.7	13.9	2.96	1.53
Learning management system (e.g., Moodle, etc.)	13.0	11.1	14.8	22.2	30.6	8.3	2.71	1.529
e-Portfolio	19.2	24.0	18.3	29.8	6.7	1.9	1.87	1.322
Network bandwidth/speed of Internet (download and upload)	11.9	19.3	24.8	15.6	21.1	7.3	2.37	1.489
Wi-Fi access	8.6	21.4	21.4	15.4	18.8	14.5	2.58	1.566
Online or virtual technologies (e.g., network- or cloud-based file storage system, Web portals, etc.)	12.2	23.4	16.8	23.4	16.8	7.5	2.32	1.49
Access to software (e.g., MATLAB, GIS applications, statistical software, qualitative data analysis, graphics software, textual or image analysis programs, etc.)	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 for teaching and learning	10.3	20.6	16.8	23.4	21.5	7.5	2.48	1.475
Support for maintenance and repair of ICT	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 visualisation 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

Digital Resource/ Service/Space	N/A (%)	Poor (%)	Fair (%)	Neutral (%)	Good (%)	Excellent (%)	Mean	Std. Dev.
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**

Further analysis using factorial ANOVA (three-way between-subjects ANOVA) was conducted to compare the effects of the learners' gender, age group and faculty discipline on the TEL environment (the dependent variable), as shown in Table 32. The TEL environment was normally distributed for the gender, age and faculty discipline groups, as evaluated by the Kolmogorov-Smirnov test. The homogeneity of variance between the variables was calculated based on Levene's test for the equality of error variances. There was no statistically significant interaction between the effects of gender, age group and faculty discipline on the TEL environment at $P > 0.05$ level, F (7, 86) = 1.000, P = .437. Specifically, the results suggest that the gender, age group and faculty discipline of learners do not significantly influence their experiences with the TEL environment.

Table 32: Factorial ANOVA for Gender, Age Group, Faculty Discipline and the TEL Environment

Tests of Between-Subjects Effects					
Source	Type III sum of squares	df	Mean square	F	Sig.
Corrected Model	39.158[a]	34	1.152	1.100	.354
Intercept	399.978	1	399.978	381.980	.000
Gender	5.903	1	5.903	5.637	.020
Age_group	3.404	4	.851	.813	.520
Faculty_discipline	1.950	3	.650	.621	.604
Gender * Age_group	1.388	4	.347	.331	.856
Gender * Faculty_discipline	4.253	3	1.418	1.354	.262
Age_group * @ Faculty_discipline	15.803	12	1.317	1.258	.259
Gender * Age_group * Faculty_discipline	7.330	7	1.047	1.000	.437
Error	90.052	86	1.047		
Total	**899.234**	**121**			
Corrected Total	**129.210**	**120**			

[a] R squared = .303 (adjusted r squared = .028)

Use of Online Courses

Only 28% of learners surveyed had taken an online course at the time of the survey, compared to 57% that had never attended an online course, as indicated in Table 33.

Table 33: Responses on Taking an Online Course

Responses	Frequency	%
Yes	42	28.4
No	85	57.4
Missing	21	14.2
Total	**148**	**100.0**

Responses on Taking a MOOC

When asked whether in the past year they had taken a MOOC through any institution, 32% indicated they did not know what a MOOC was, 12% had not taken a MOOC but knew what it was, 8% had taken a MOOC but did not complete it and 6% had taken and completed a MOOC (Table 34). There is a need to encourage learners to take MOOCs in their areas of study to improve their learning outcomes.

Table 34: Responses on Taking a MOOC

Response	Frequency	%
No, and I don't know what a MOOC is	48	32.4
No, but I do know what a MOOC is	17	11.5
Yes, and I completed it	9	6.1
Yes, but I didn't complete it	13	8.8
Missing	61	41.2
Total	**148**	**100.0**

4.4 Perceptions about the Use of TEL

Perceptions about the use of TEL were evaluated by learners responding to a range of statements on technology, using Likert scale items where 1 = strongly disagree, 2 = disagree, 3 = neither disagree nor agree, 4 = agree and 5 = strongly agree (Table 35).

In general, the majority of the learners highlighted had a strong positive perception about the use of TEL, as shown by a mean score of 4.51 and a standard deviation of 0.620. This is a very encouraging sign, as it means that learners are highly receptive to TEL and accept its potential value.

Additionally, factorial ANOVA was conducted to determine the effects of gender, age group and faculty discipline on learners' perceptions about the use of TEL (the dependent variable). Table 6 presents the results. Learners' perceptions were normally distributed for gender, age group and faculty discipline, as assessed by the Kolmogorov-Smirnov test. There was homogeneity of variance between groups, as assessed by the Welch-Satterthwaite robust test for equality of variances. There were no significant gender, age group or faculty discipline differences in learners' perceptions about the use of TEL at the $p > .05$ level for the conditions [$F(7, 79) = 0.567$, $p = 0.780$]. Therefore, learners did not significantly differ by gender, age group or faculty discipline regarding their perceptions about the use of TEL. Taken together, these results suggest that the gender, age group and faculty discipline of the learner does not really have an effect on how the learner perceives the use of TEL in their studies.

Table 35: Learners' Perceptions about the Use of Technology

Technology Use Perception	Strongly Agree (%)	Agree (%)	Neither Agree Nor Disagree (%)	Disagree (%)	Strongly Disagree (%)	Mean	Std. Dev.
It will help me get better results in my subjects	47.0	40.2	3.4	1.7	7.7	4.48	0.651
It will help me understand the subject material more deeply	43.1	44.0	2.6	1.7	8.6	4.46	0.638
It makes completing work in my subjects more convenient	48.3	39.2	3.3	0.8	8.3	4.52	0.608
It motivates me to explore many topics I may not have seen before	55.8	35.8	0.0	0.8	7.5	4.62	0.537
It allows me to collaborate with others easily, both on and outside of the campus	46.2	43.6	2.6	1.7	6.0	4.46	0.637
It will improve my IT/information management skills in general	54.6	36.4	1.7	0.8	6.6	4.58	0.574
It will improve my career or employment prospects in the long term	46.2	39.5	6.7	1.7	5.9	4.42	0.695
Overall score						**4.51**	0.620

Table 36: Factorial ANOVA on Gender, Age Group, Faculty Discipline and Perceptions about the Use of TEL

Tests of Between-Subjects Effects					
Source	Type III sum of squares	df	Mean square	F	Sig.
Corrected Model	7.804[a]	34	.230	1.101	.356
Intercept	1250.067	1	1250.067	5993.756	.000
Gender	.315	1	.315	1.512	.222
Age_group	1.409	4	.352	1.688	.161
Faculty_discipline	2.311	3	.770	3.693	.015
Gender * Age_group	.882	4	.221	1.057	.383
Gender * Faculty_discipline	.923	3	.308	1.476	.228
Age_group * Faculty_discipline	2.562	12	.213	1.024	.436
Gender * Age_group * Faculty_discipline	.828	7	.118	.567	.780
Error	16.476	79	.209		
Total	**2326.677**	**114**			
Corrected Total	**24.280**	**113**			

[a] R squared = .321 (adjusted R squared = .029)

Learners' Perceptions about the Usefulness of Technologies and Tools

Learners were asked to rate a range of technologies and tools in terms of level of use in their studies, using Likert scale items where 0 = do not know, 1 = not useful, 2 = useful limited extent, 3 = neutral, 4 = useful and 5 = very useful.

On average, the majority of the learners believe that technologies are useful in their studies, as indicated by the mean score of 3.91 and a standard deviation of 1.294 (Table 37). These results are a good sign of students' positive attitudes and willingness to engage in TEL.

Table 37: Learners' Perceptions about the Usefulness of Technologies and Tools

Use of Technology/Tool	Do Not Know (%)	Not at All Useful (%)	Useful to a Limited Extent (%)	Neutral (%)	Useful (%)	Very Useful (%)	Mean	Std. Dev.
Design and build Web pages as part of your course?	7.6	13.6	9.3	13.6	31.4	24.6	3.21	1.611
Create and present multimedia shows as part of your course requirements (e.g., PowerPoint)?	0.9	7.6	6.8	8.5	33.9	42.4	3.94	1.270
Create and present audio/video as part of your course requirements?	1.7	5.1	11.1	18.0	25.6	38.5	3.76	1.304
Download or access online radio/video recordings of lectures you could not attend?	1.7	3.4	10.9	7.6	31.9	44.5	3.98	1.242
Download or access online audio/video recordings to revise content of lectures you have already been to?	1.8	4.4	10.5	2.6	32.5	48.3	4.04	1.272
Download or access online audio/video recordings of supplementary content materials?	2.7	2.7	10.7	6.3	31.3	46.4	4.00	1.280
Use the Web to access university-based services (e.g., enrolment, paying fees)?	1.7	2.6	6.0	7.8	34.5	47.4	4.13	1.138
Use your mobile phone to access web-based university services or information (e.g., enrolment, paying fees)?	3.5	0.9	6.9	5.2	37.1	46.6	4.11	1.193

Use of Technology/Tool	Do Not Know (%)	Not at All Useful (%)	Useful to a Limited Extent (%)	Neutral (%)	Useful (%)	Very Useful (%)	Mean	Std. Dev.
Use instant messaging/chat (e.g., Skype, Messenger, Hangout, etc.) on the Web to communicate/ collaborate with other students in the course?	3.6	1.8	9.8	8.0	29.5	47.3	4.00	1.301
Use a social media networking platform (e.g., Facebook) on the Web to communicate/collaborate with other students in the course?	3.5	4.4	8.9	3.5	30.1	49.6	4.01	1.366
Use microblogging (such as Twitter) to share information about class-related activities?	4.5	4.5	10.7	11.6	33.9	34.8	3.71	1.393
Keep your own blog as part of your course requirements?	5.4	8.1	13.5	22.5	26.1	24.3	3.29	1.455
Use instant messaging/chat (e.g., Skype, Messenger, Hangout, etc.) on the Web to communicate with teachers and administrative staff from the course?	3.6	3.6	8.1	14.4	27.9	42.3	3.86	1.338
Contribute to another blog as part of your course requirements?	7.2	7.2	13.5	10.8	33.3	27.9	3.40	1.545
Use the Web to share digital files related to your course (e.g., photos, audio files, movies, digital documents, websites, etc.)?	4.5	4.5	8.1	8.1	36.9	37.8	3.82	1.376
Use web-conferencing or video chat to communicate/collaborate with other students in the course?	2.7	3.6	6.3	14.4	25.2	47.8	3.99	1.283
Receive alerts about course information (e.g., timetable changes, the release of new learning resources, changes in assessment) via RSS feeds on the Web?	1.8	1.8	3.6	13.4	25.0	54.5	4.21	1.110

Use of Technology/Tool	Do Not Know (%)	Not at All Useful (%)	Useful to a Limited Extent (%)	Neutral (%)	Useful (%)	Very Useful (%)	Mean	Std. Dev.
Receive alerts about course information (e.g., timetable changes, the release of new learning resources, changes in assessment) via text message on your mobile phone?	3.6	1.8	1.8	11.7	30.6	50.5	4.15	1.192
Contribute with other students to the development of a wiki as part of your course requirements?	7.1	5.3	2.7	15.9	30.1	38.9	3.73	1.488
Receive grades/marks from your lecturer via text message on your mobile phone?	1.8	3.6	5.4	7.1	26.8	55.4	4.20	1.192
Receive pre-class discussion questions from your lecturer via text message on your mobile phone?	0.9	3.5	4.4	11.5	31.0	48.7	4.14	1.109
Use a personal dashboard on the university intranet to access all your academic information related to courses, grades, etc.?	0.9	1.8	2.7	11.5	32.7	50.4	4.25	0.987
Use an e-portfolio system to record your achievements for future use beyond the course of your studies?	4.5	3.6	4.5	10.7	34.8	42.0	3.94	1.324
Overall score							**3.91**	**1.294**

Learners' Attitudes towards Technology

Students were asked to respond to statements on their attitudes towards technology, using Likert scale items where 0 = do not know, 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4= agree and 5 = strongly agree. The results are presented in Table 38. Regarding statements framed in positive terms, responses were mostly positive, with learners generally agreeing and mean responses ranging from 1.88 to 3.25. About 59.46% of the learners did not agree that online lectures would make them more likely to skip classes. Learners strongly agreed that technology made them more connected to the university, teachers and other students. The majority of the learners showed concern about privacy and cyber-security issues, and about technology interfering with their concentration on their studies. About 89% of the learners indicated they wished teachers to use and integrate more technology into their teaching.

In general, the majority of the learners had a positive attitude towards technology, which was represented by the mean score of 3.88 and a standard deviation of 1.063.

Table 38: Learners' Attitudes towards Technology

Statement	Strongly Agree (%)	Agree (%)	Neither Agree Nor Disagree (%)	Disagree (%)	Strongly Disagree (%)	Do Not Know (%)	Mean	Std. Dev.
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 entered 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 (password protection and hacking).	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

Statement	Strongly Agree (%)	Agree (%)	Neither Agree Nor Disagree (%)	Disagree (%)	Strongly Disagree (%)	Do Not Know (%)	Mean	Std. Dev.
When it comes to social media (e.g., Facebook, Twitter, LinkedIn), I 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 college/university.	38.4	47.3	4.5	3.6	5.4	0.9	4.29	0.832
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**

Equally, three-way between-subjects ANOVA was undertaken to assess the effects of gender, age group and faculty discipline of the learners on their attitude towards technology (Table 39). The attitude towards technology (dependent variable) was normally distributed for the groups made by arranging the levels of gender, age group and faculty discipline, as assessed by the Shapiro-Wilk test. There was homogeneity of variance between groups, as assessed by the Welch-Satterthwaite robust test for equality of variances. There were no significant relations between the effects of gender, age group and faculty discipline and the attitudes of learners towards technology at $P > 0.05$ level, $F(7, 75) = 1.159$, $P = .337$. This indicates that gender, age group and faculty discipline do not significantly influence learners' attitudes towards technology.

Table 39: Three-way ANOVA for Gender, Age Group and Faculty Discipline on Learners' Attitudes towards Technology

Tests of Between-Subjects Effects					
Source	Type III sum of squares	df	Mean square	F	Sig.
Corrected Model	14.084[a]	34	.414	.951	.553
Intercept	928.306	1	928.306	2131.151	.000
Gender	.164	1	.164	.376	.542
Age_group	1.123	4	.281	.645	.632
Faculty_discipline	3.239	3	1.080	2.478	.068
Gender * Age_group	1.857	4	.464	1.066	.379
Gender * Faculty_discipline	2.153	3	.718	1.648	.186
Age_group *Faculty_discipline	2.391	12	.199	.457	.933
Gender * Age_group * Faculty_discipline	3.533	7	.505	1.159	.337
Error	32.669	75	.436		
Total	**1686.784**	**110**			
Corrected Total	**46.753**	**109**			

[a] R squared = .301 (adjusted R squared = –.016)

4.6 Need to Improve the TEL Environment

Students were asked to respond to the comment: "There is a need to improve the technology-enabled learning in your institute." There was a consensus, with the majority (55%) agreeing about the value and importance of technology for student learning and the need to institute TEL at UMI. The rest (45%) skipped this question, perhaps implying that they do not yet appreciate what TEL is.

4.7 Summary

Access to digital devices is common among UMI students, which is a good sign for integrating TEL in university courses. Over 53% of the students own desktops, 87% own laptops, 99% own smartphones and 42% own tablets; 12% and 23% plan to buy laptops and tablets, respectively, in the next 12 months, with somewhat fewer (4.6%) planning to buy desktops. While delivery of courses at UMI is predominantly traditional face-to-face (60.27%), 39.72% of the respondents also indicated that they study courses using an online/blended mode. Students also have access to desktops at the university. The majority of learners access the Internet from the office (70.50%) or home (64.75%) as well as through mobile devices (90%) and wireless technologies (67%).

These findings reflect the increasing prominence of wireless use and the pervasiveness of mobile technology in Uganda, with ownership of mobile devices now exceeding 90% (UCC, 2015). Learners accessed the Internet using smartphones (67.39%), laptops (22.46%) and desktops (only 5.8%). Nearly 64% of the surveyed learners have access to broadband Internet at the office.

Almost all (96%) use the Internet: 77% use it daily, followed by 9% on alternate days, 9% irregularly and 4% never. In terms of how much time, on average, learners spend on Internet-related activities, 36% indicated more than five hours, followed by 23% one to two hours and 22% three to five hours. Learners were very proficient in word processing, spreadsheets, PowerPoint, email and search engines, with mean responses above average. Learners were not as proficient and need more up-skilling in areas such as graphics editing, digital audio, video editing, webpage design and LMSs.

Nearly 94% 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 were used by 8%. However, 51% did not update their accounts frequently. Only 8% were active on social media several times a day, while a few more spent more than five hours (19%) on social media. The use of mailing lists and discussion forums is high among learners. Of the 71% who held membership in a mailing list or a discussion forum, 66% subscribed to between one and five email-based discussion forums and 7% to more. Of these, the biggest percentage (49%) had never moderated a forum, compared to 28% who had. These findings indicate that learners at UMI are generally familiar with mailing lists and discussion forums. However, if TEL is to be integrated through using an LMS, it is important that learners be encouraged to actively engage in the associated discussion forums.

On the overall quality of their experiences with the university's ICT services and resources, learners were positive, rating all of the services above average except e-theses and dissertations, patent databases and e-proceedings. This draws attention to the services that need improvement and in which learners need more training or exposure, including increased Internet access on the university campus, as well as the need to augment university resources in certain areas, depending upon the availability of funds.

Only 28% of learners surveyed had taken an online course at the time of the survey. When asked whether in the past year they had taken a MOOC through any institution, responses revealed that 32% did not know what a MOOC was, 11% had not taken a MOOC but knew what it was, 9% had taken a MOOC but did not complete it, and 6% had taken and completed a MOOC. Since MOOCs are important developments in higher education, it is relevant for learners to be aware of their effective utilisation. It is up to the institute to develop appropriate policies to integrate and provide credits for the completion of open courses offered by other institutions. Such a practice would help improve the quality of learning outcomes.

Students are positive about the use of TEL in the university and would welcome the integration of TEL in their courses. They also rated a range of technologies and tools as highly useful for their studies. Learners shared concerns over issues such as privacy and cyber security in the use of technology, and technology interfering with their concentration upon their studies. They were also concerned about the in-class use of mobile phones. The students' responses indicated that they are very aware of the power of technology and responded to the survey responsibly.

The majority (55%) agreed about the value and importance of technology for student learning and the need to institute TEL at UMI. The rest (45%) skipped this question, perhaps implying that they do not yet appreciate what TEL is.

Chapter 5: Conclusions and Recommendations

5.1 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 OER) 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 for teaching and learning, 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.
- Their experience of the ICT facilities at UMI is average. This indicates that use of the facilities available at UMI needs to be optimised through faculty training and orientation.
- Only about 30% of the teachers are aware of OER.
- Teachers' contradictory views on policies related to ICT for teaching and 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 for teaching at UMI.

- According to teachers, lack of technical support in the institute, 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

- Almost 100% of UMI students have access to a smartphone; 87% also own a laptop. Overall, the use of ICT is almost universal among learners.
- 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 be due to lack of information about the availability of Wi-Fi on the UMI campus.
- Most students at UMI access the Internet using a smartphone. Over 35% of students use the Internet for over five hours a day. This is predominantly an indication that learners are almost always connected to the Internet during working hours on a normal day.
- 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 (such as audio, video, webpage and Web 2.0 tools) 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. However, they do not update their status very frequently. About 28% of learners spend up to two hours on social media per day.
- 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.

5.2 Recommendations

Based on the above findings, the following recommendations are made to the institute:

- There is a need to institutionalise TEL at UMI by continuous sensitisation, policy development and the inclusion of TEL in UMI's mission and vision statements.
- There is therefore a need to fine tune the wireless connections in and around classroom and office areas to increase Internet access in teaching and learning.
- There is a need for the ICT support department to host and outsource some of these services and to acquire training in how to support modern learning technology equipment.

- There is a need for 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 may start using a blended learning approach to offering courses, integrating the use of a learning management system in each of the courses it offers. Such integration may be piloted in some courses; after evaluation of these pilot projects, the practice of blended learning should be institutionalised.
- UMI may also 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.
- UMI may also start offering MOOCs in some of the areas of its expertise to attract large enrolment and improve organisational visibility.

References

Bower, M., & Sturman, D. (2015). What are the educational affordances of wearable technologies? *Computers and Education, 88,* 344–353.

Jameson, Jill. (2013). E-leadership in higher education: The fifth “age” of educational technology research. *British Journal of Educational Technology*, *44*(6), 889–915.

Kirkwood, A., & Price, L. (2016). *Technology-enabled learning implementation handbook.* Burnaby, Canada: Commonwealth of Learning.

Krejcie, Robert V., & Morgan, Daryle W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement, 30*, 607–610.

UCC. (2015). *Post, broadcasting and telecommunications market and industry report. Third quarter (July–September 2015).* Retrieved from http://www.ucc.co.ug/files/downloads/Q3-Market%20Report%20%20for%20Third%20Quarter%20-%20July-September%202015.pdf