COMMONWEALTH of LEARNING

Report on the Baseline Study of Technology-Enabled Learning at Jaramogi Oginga Odinga University of Science and Technology

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The Commonwealth of Learning (COL) is an intergovernmental organisation 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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Acronyms

BYOD	Bring Your Own Device
COL	Commonwealth of Learning
CUE	Commission for University Education
ICT	Information and Communication Technologies
JOOUST	Jaramogi Oginga Odinga University of Science and Technology
LMS	Learning Management System
MOOC	Massive Open Online Course
ODeL	Open, Distance and eLearning
OER	Open Educational Resources
TEL	Technology-Enabled Learning

Executive Summary

This document reports on the findings of a baseline survey conducted at Jaramogi Oginga Odinga University of Science and Technology (JOOUST) with the objective of establishing technology-enabled learning (TEL) preparedness at the institution and thereafter developing TEL policy and implementing TEL with support from the Commonwealth of Learning. It reports the findings of a self-review of the institutional facilities related to technology and policies, and the preparedness of lecturers and students to use technology for teaching and learning at JOOUST. The following is a summary of the findings and recommendations based on the survey.

Findings

- JOOUST is developing preparedness for TEL. The institution has some of the relevant systems and infrastructure, but these need to be improved for successful TEL implementation to occur. JOOUST has established a centre for eLearning that will offer academic staff and students support in the appropriate use of TEL.
- Both faculty and students are positive about TEL. There is general consensus that TEL increases the quality of learning due to the richness of content that can be integrated in the learning experience.
- The top leadership is quite supportive of this initiative, and the organizational culture provides a conducive environment for the implementation of TEL.

Recommendations

- Given the willingness of faculty and students to learn about and use TEL and the support for TEL from the JOOUST leadership, it is vital that a TEL policy and strategic plan for the use of TEL be developed. The information and communication technologies policy at JOOUST has a few TEL elements but is not comprehensive in this regard.
- The availability of open educational resources (OER) in almost all subject areas has the potential to reduce the cost of educational materials for students. JOOUST needs to join the OER movement by using and producing OER. The institution needs to increase its online visibility by creating and sharing e-content and courses as OER to be used by students both off and on campus. Faculty members need to be sensitised about the use and repurposing of OER and their integration in teaching.
- The proficiency of both students and lecturers is currently limited to applications such as word processors, presentation packages, spreadsheets and emails. The

institution needs to continuously conduct training for both students and lecturers on the use of emerging and advanced technologies in learning to help them become creators of digital content and be prepared for 21st-century skills. There is a need for continuous professional development in TEL to build institutional capacity for this type of learning.

The institution needs to enhance its infrastructure, specifically electronic classrooms, network bandwidth, Wi-Fi access and computer labs. To increase access to devices, JOOUST needs to make ownership of laptops a mandatory requirement for students joining the institution. There is also the need for a set-up to support the creation of digital video and audio content. An institutional video channel would be appropriate for the storage and dissemination of such content.

- There is a need to increase access to and build capacity in the use of relevant software, such as data visualization, MATLAB, GIS applications, statistical applications and image analysis.
- The university has an underutilised learning management system (LMS). Faculty need to be made more aware of the LMS and encouraged to use it.

Chapter One: Introduction and Background

1.1 Introduction

Jaramogi Oginga Odinga University of Science and Technology (JOOUST) is a public university located near Lake Victoria in the western part of Kenya. The university was initially a constituent college of Maseno University, having been established in 2009, and it became a fully fledged university by award of charter in February 2013. The university has an enrolment of over 5,000 students in 10 academic schools.

Through Kenya Vision 2030, the government is encouraging Kenyan universities to introduce eLearning and blended learning as alternative delivery methods to increase accessibility to higher education in Kenya (NESC, 2007). JOOUST has responded to this by spelling out the integration of information and communication technologies (ICT) in 50% of its academic programmes as a strategic objective in its 2016/17 to 2010/21 strategic plan. The university's plan is to strengthen and expand virtual and eLearning programmes and to embark on a deliberate initiative to complement its traditional classroom training with technology-enabled learning (TEL) to improve the quality of learning at JOOUST. This is in tandem with the orientation of the current generation of students, who are digital natives. It is also anticipated that TEL will increase and widen the student base through open, distance and eLearning (ODeL), given the demand for university-level education and in line with Kenya Vision 2030.

The Commission for University Education (CUE) in Kenya has spelled out the ODeL requirement in its standards and guidelines for universities document, which clearly indicates that an ODeL unit should be taught like a face-to-face unit. As JOOUST plans to increase its student base through distance learning, this CUE requirement and the provision of quality education can only be realised through the adoption of technology for the delivery of rich content, and for effective lecturer–student and student–student interactions.

JOOUST signed an agreement with COL to undertake a systematic approach to institutionalising TEL through research, consultation, capacity building, and monitoring and evaluation for a period of two to three years. The activities to be undertaken include conducting a baseline survey to establish the level of preparedness in the institution, the faculty and the students, and developing and adopting a TEL policy and capacity building for faculty in the use of technology for teaching and learning. This document reports on the findings of a baseline survey conducted to assess the TEL preparedness at JOOUST prior to developing a TEL policy.

1.2 Methodology

The baseline survey of TEL at JOOUST consisted of survey instruments administered to faculty and students. There was also one questionnaire that was mainly a self-review of the institutional facilities related to technology and policies. The questionnaires were provided by COL and were completed in both online and hardcopy formats. Research assistants supported students in completing the survey online and administered printed questionnaires to the schools for the faculty. The research assistants transcribed completed hardcopy questionnaires into online forms. After closure of the online forms, the student, faculty and institutional data were sent to the JOOUST research team by COL for analysis and report writing.

The sample size for the baseline study was determined using the small sample formula from the table by Krejcie and Morgan (1970). Their table recommended a sample size of 361 for a population of 6,000 for the student survey. Accordingly, the sample size of 361 was proportionally distributed across the different schools based on student enrolment and gender (Table 1). The survey was restricted to students who were on campus at the time of the research. All the students completed the questionnaire online using their smartphones, laptops or desktop computers in the computer labs. However, the actual number of completed surveys was 426, possibly because there were no restrictions on accessing the form online more than once.

Table 1. Student population and sample size

School	**Population**			**Sample Size**		
	M	F	Total	M	F	Total
School of Business Administration and Economics	740	497	1,237	45	30	75
School of Education	1005	643	1,648	61	39	100
School of Spatial Planning	68	58	126	4	4	8
School of Agriculture and Food Security	683	379	1,062	42	23	65
School of Mathematics and Actuarial Science	258	93	351	15	6	21
School of Biological Sciences	64	48	112	4	3	7
School of Humanities and Social Sciences	36	20	56	2	1	4
School of Health Sciences	337	309	646	20	19	39
School of Informatics and Innovative Systems	403	86	489	25	5	30
School of Engineering and Technology	163	34	197	10	2	12
Total	**3,757**	**2,167**	**5,924**	**229**	**132**	**361**

The recommended sample size for faculty was 113 based on the sample size determination formula/table (Krejcie & Morgan, 1970). Printed questionnaires were administered to 166 members of staff, and 109 questionnaires were returned, yielding a response rate of 65%. Research assistants transcribed the printed questionnaires into online forms.

Chapter Two: The TEL Environment at JOOUST

The institutional questionnaire was completed by three people, each completing the questions relevant to his area. The three were the ICT Director, the Dean of the School of Informatics and Innovative Systems and the Chief Librarian (who completed a smaller portion than the other two). The institutional survey was used to elicit information about the current provision of hardware and software and the digital infrastructure that is available to be used for teaching and learning.

2.1 Hardware and Software at JOOUST

The university has 479 desktop computers and 22 laptops. The desktop computers are available in the computer labs, library and offices. Laptops are assigned to individuals. To mitigate device shortage, JOOUST has adopted a BYOD (bring your own device) policy that allows students and staff to bring their devices to the university and perform work-related tasks using these personal devices. The university recently added a lab using thin-client technology within the Centre for eLearning. This lab hosts two servers serving 50 dumb terminals within two rooms. Three computer labs are available to students for Internet access and practical sessions. Different applications are installed in the computers, depending on the units on offer at any given time. Projectors are fitted in two classrooms, but for those that do not have projectors, faculty can collect one from a central place. One classroom has a smart board.

2.2 Internet Connectivity

Broadband Internet connectivity of 100 mbps is available through two Internet service providers (ISPs) in load balanced mode. One ISP is government supported and the other is private. The Internet is available to students and staff via Wi-Fi and Ethernet and can be accessed from different locations on campus, including classrooms, the library, labs, open areas, seminar halls and faculty rooms. Bandwidth limitations mean access restrictions on some websites and applications (e.g., YouTube, Internet Download Manager).

2.3 Social Media

JOOUST 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 and JOOUST email. The social media accounts are managed by the public relations office at JOOUST. The Centre for eLearning also maintains Facebook and Twitter accounts that are managed by members of staff at the centre.

2.4 Learning Management System

JOOUST has a learning management system that is managed by the Centre for eLearning. The system, named eJOOUST, is customised from Moodle and designed to be used by both distance learners and on-campus students.

2.5 Library Resources

JOOUST's library provides several electronic resources and has a bibliographic database, electronic theses and dissertations, and e-proceedings of conferences. These are available to those with the right login credentials. All academic staff are required to maintain Google Scholar accounts associated with JOOUST and their university email addresses.

JOOUST has a shared repository, a digital service to collect, preserve and distribute digital materials, including those related to the university's legacy and scholarly communication.

2.6 Educational e-Content an Open Educational Resources

JOOUST currently does not have any educational e-content, an audio-visual unit or an institutional video channel. JOOUST does not produce any content available with a Creative Commons licence and is not a member of any OER consortia. With the launching of the e-learning lab and the introduction of blended and distance learning, e-content will be created. A Centre for eLearning has been introduced to coordinate the use of ICT in teaching and learning.

2.7 ICT Policy

JOOUST has an ICT policy that contains some components relating to TEL. These components include teaching and learning using ICT, the infrastructure to be put in place to support networked learning, anti-plagiarism measures, and the key features that an LMS used at JOOUST should have. It also specifies the function of the Centre for eLearning, namely to coordinate and manage the use of ICT in teaching and learning. At present, JOOUST does not have a TEL policy or a strategic plan for the implementation of TEL.

2.8 Support

JOOUST has an ICT directorate that comprises a team of qualified personnel and is responsible for all procurement, installation and maintenance of ICT devices within the university. The institution also has a Centre for eLearning, within the School of Informatics and Innovative Systems. The role of the centre is to provide support to both faculty and students in the use of technology in teaching and learning.

2.9 TEL Preparedness

The institutional survey required the university to rate its TEL preparedness in a number of areas, including policy and strategic planning, support availability, content creation,

leadership and organisational culture, technology availability and human resource availability. Table 2 presents information on institutional preparedness for TEL at JOOUST. In the survey, each item in the institutional preparedness for TEL section was scored with a value ranging 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, and 5 = strongly agree or it definitely exists and is well established.

Table 2. Institutional preparedness for TEL

Areas	Score (1–5)
Policy	
There is a well-documented technology-enabled learning policy.	1
The vision and mission of the technology-enabled learning policy are aligned with the mission of the organisation.	1
The vision and mission of technology-enabled learning 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
Strategic Plan	
There is a strategic plan for the implementation of technology-enabled learning.	1
The strategic plan for technology-enabled learning has measurable goals and outcomes.	1
The strategic plan for technology-enabled learning is approved by the senior management of the organisation and is supported by adequate financial provisions.	1
IT Support Department	
The organisation has an IT department that handles the procurement, installation and maintenance of technologies for teaching and learning.	5
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
Technology	
There is adequate hardware infrastructure for teaching and learning (e.g., access to	3

computers for students and other learners).	
There are adequate applications and software for teaching and learning (e.g., access to appropriate software, intranet, learning management system, etc.).	3
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.	5
Content	
There is support available for the creation of digital multimedia content in the organisation (e.g., production of e-courses, audio and video materials, animation, etc.).	3
There are instructional designers in the organisation, or faculty members are trained to organise learning content appropriately.	2
Teachers have adequate access to the online system to develop courses for technology-enabled learning.	3
Documentation	
There is a variety of support to help teachers and students use technology effectively.	4
Lessons learned in the implementation of technology-enabled learning are stored and shared within the organisation for others to access and learn from.	1
The workflow processes and responsibilities to implement technology-enabled learning are well documented in the organisation.	1
Organisational Culture	
Faculty and staff members are willing to learn about new technology in the organisation.	4
Faculty and staff members support each other easily.	4
There is a culture of knowledge creation and sharing in the organisation.	3
Leadership	
Leaders in the organisation are involved in implementing technology-enabled learning.	4
Senior management in the organisation regularly review, monitor and evaluate the progress of technology-enabled learning.	4
The top leadership of the organisation is supportive of technology-enabled learning and provides encouragement and motivation to the faculty and staff to achieve academic goals.	5

Human Resources and Training	
Faculty members are qualified and trained to use technology for teaching and learning.	2
Faculty and staff members receive regular training to update them in the use of technology-enabled learning.	2
There are adequate staff to support technology-enabled learning.	3
The organisation has a structure in place to create teams for content development and the delivery of technology-enabled learning.	2
Faculty members trust the support received from instructional designers and technology support staff while developing and delivering courses.	3
The IT staff members are highly skilled and trained to provide the needed support.	5
TEL Champions	
There are early adopters of technology-enabled learning in the organisation.	5
There are technology-enabled learning 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 technology-enabled learning strategy for the organisation.	4
There are technology-enabled learning champions to research and disseminate good practices in TEL.	4
Total	**114**

Overall Score for TEL Preparedness

The scores for JOOUST preparedness tallied 114. Based on the score sheet provided in the *TEL Implementation Handbook* (Kirkwood & Price, 2016) this was in the 95–129 range: developing preparedness. This means JOOUST has put in place some of the aspects of a TEL system, including policies and infrastructure, and is in the process of developing a robust system.

Chapter Three: Faculty Survey

The faculty completed printed forms, which were transcribed to online forms. Issues arose over the length of the questionnaire and the field that required an email address, which faculty felt denied them anonymity, as email addresses could be linked to individuals. In spite of these challenges, out of 166 faculty members and staff working at JOOUST, 109 responded, reflecting a positive response rate of 65%.

3.1 Faculty Profile

3.1.1 Gender and Age Distribution

Survey forms were sent to all faculty members. Of those who responded, 80% were male and 20% female, compared with an actual gender distribution of 73% and 27% JOOUST. The age distribution of the participants suggests that the majority of staff members are in the 41–45 age group, followed by 46–50, 51–55, 36–40 and 31–35, as shown in Figure 1.

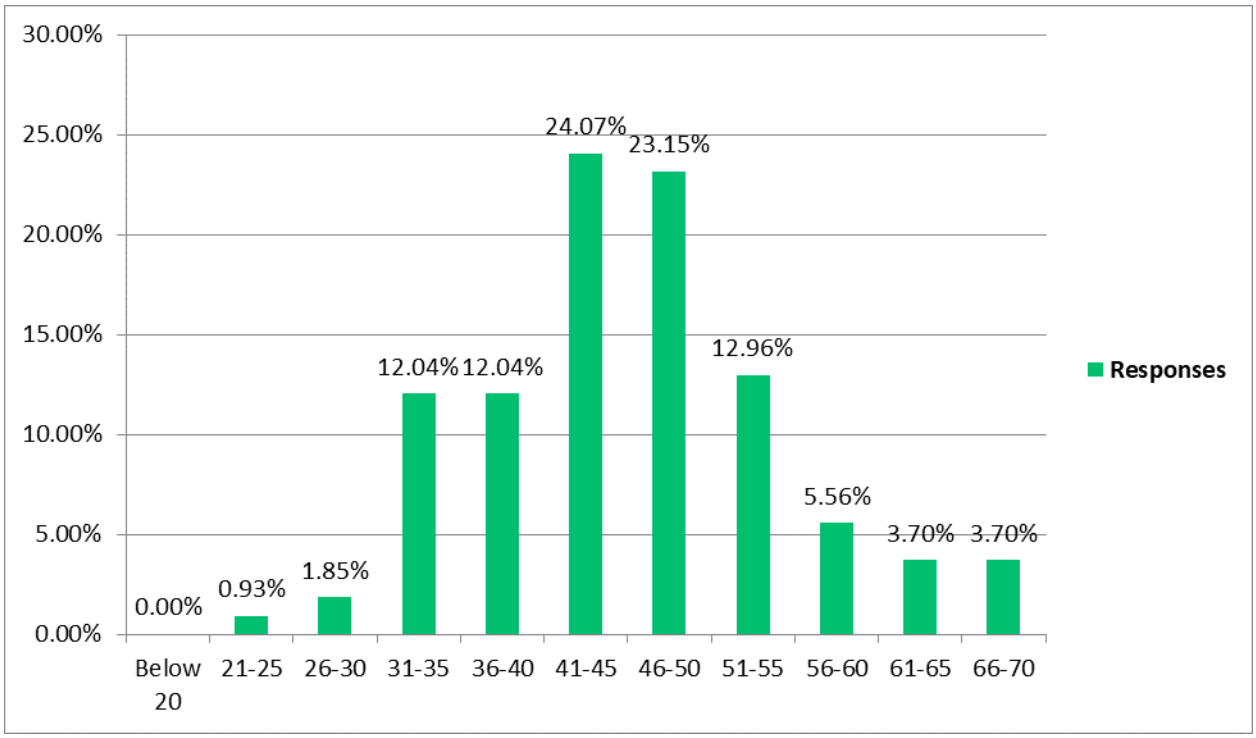

Figure 1. Age distribution of faculty members

3.1.2 Position of Faculty

Figure 2 shows that the majority of the faculty work as lecturers, representing 50% of the population, followed by assistant lecturers or tutorial fellows (24.5%), senior lecturers (18.87%), professors (3.7%) and associate professors (2.83%). The highest qualification held by faculty members is PhD, at 60%, followed by MA (39%) or MPhil (3%).

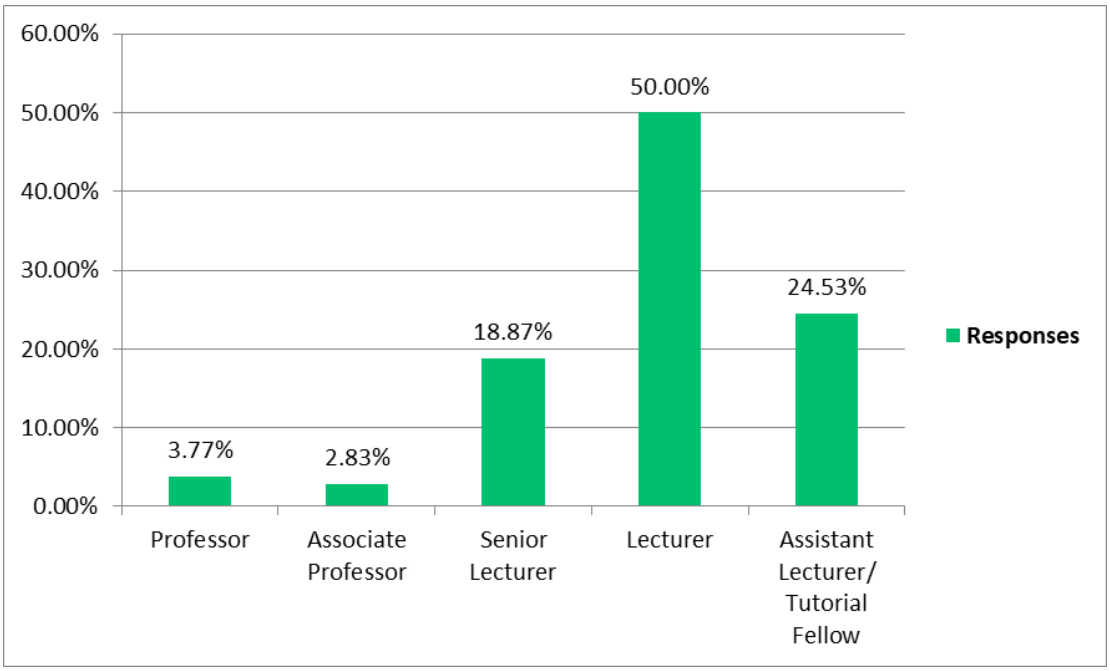

Figure 2. Position of faculty

3.1.3 Teaching Level

The majority of faculty members are primarily involved in undergraduate teaching (53.4%), followed by graduate or postgraduate teaching (34%), with very few in doctoral research represented (12.62%; see Figure 3). About one-third of faculty members (32.4%) have six to ten years of experience, followed by under five years (25%; see Figure 4).

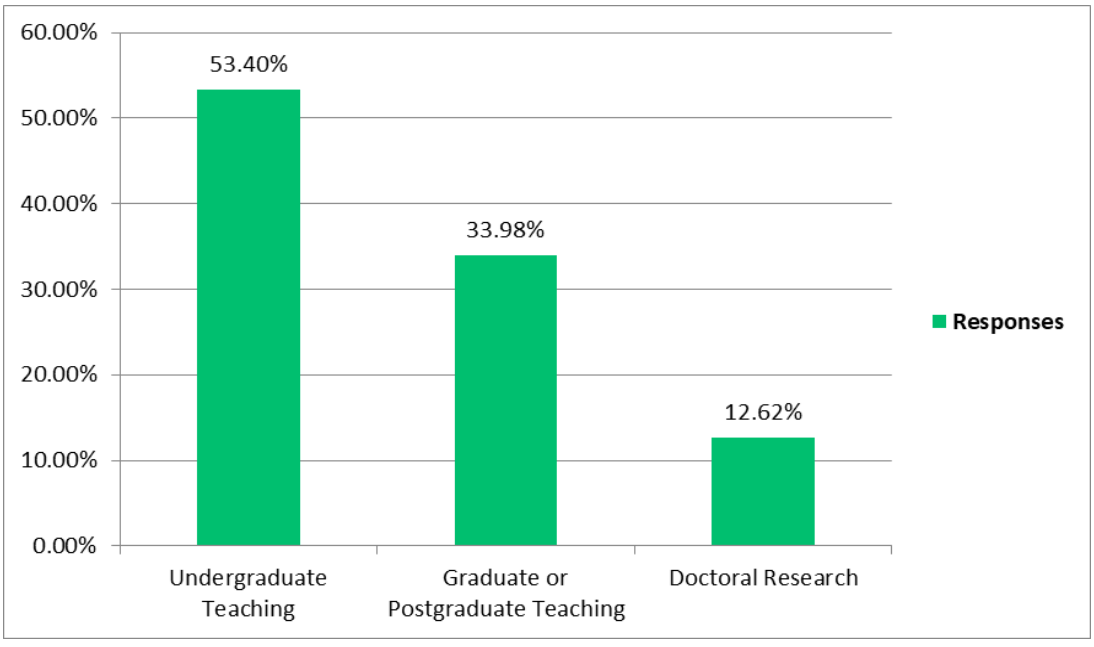

Figure 3. Teaching levels

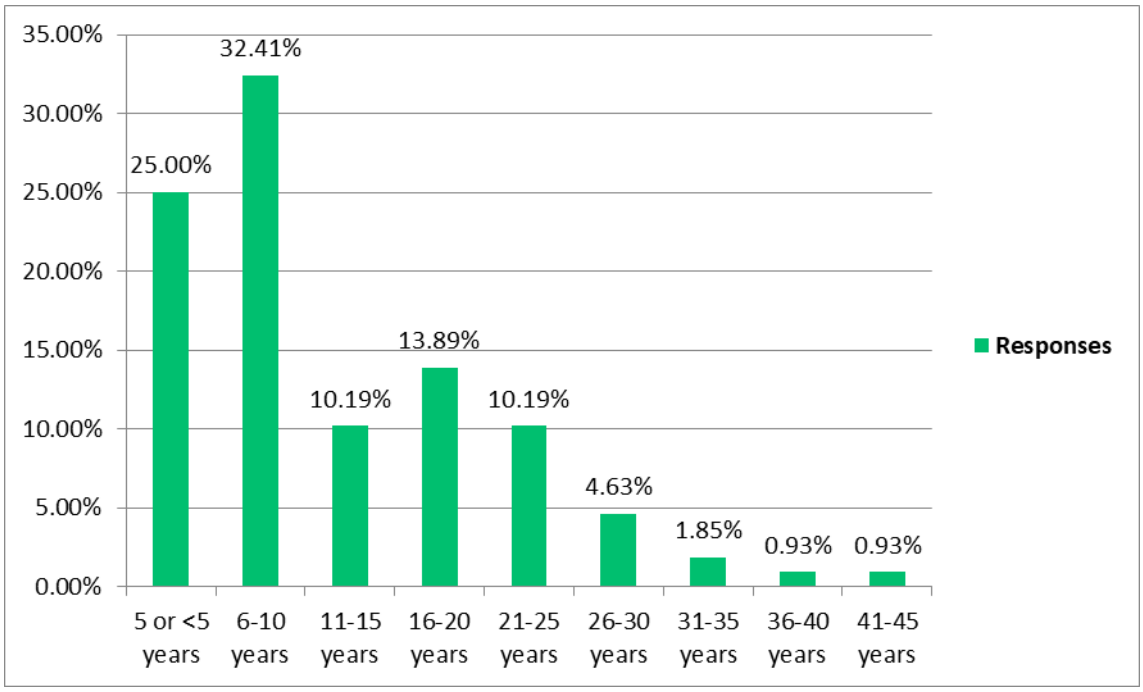

Figure 4. Years of teaching experience

3.1.4 Participation of Schools

When broken down into schools, survey respondents came from all schools of study, with the highest from the School of Humanities and Social Sciences (18.35%; see Table 3).

Table 3. Participation of schools

School	Responses	
School of Humanities and Social Sciences	18.35%	20
School of Health Sciences	12.84%	14
School of Agricultural and Food Sciences	11.93%	13
School of Biological and Physical Sciences	11.93%	13
School of Business and Economics	5.50%	6
School of Mathematics and Actuarial Sciences	9.17%	10
School of Engineering and Technology	5.50%	6
School of Spatial Planning and Natural Resources Management	9.17%	10
School of Education	6.42%	7
School of Informatics and Innovative Systems	9.17%	10

3.2 Access to and Use of ICT

This segment presents results on access to ICT by faculty members. It is further broken down into: ownership and access to ICT devices; Internet access; broadband Internet; proficiency in computer-related skills; social media and discussion forums; TEL resources; use and creation of digital content for teaching; training and staff development.

3.2.1 Ownership and Access to ICT Devices

An inquiry into the devices owned by members of faculty revealed that the majority had laptops and smartphones (90% and 79%, respectively), 60% owned tablet devices and 20% owned desktop computers (Figure 5).

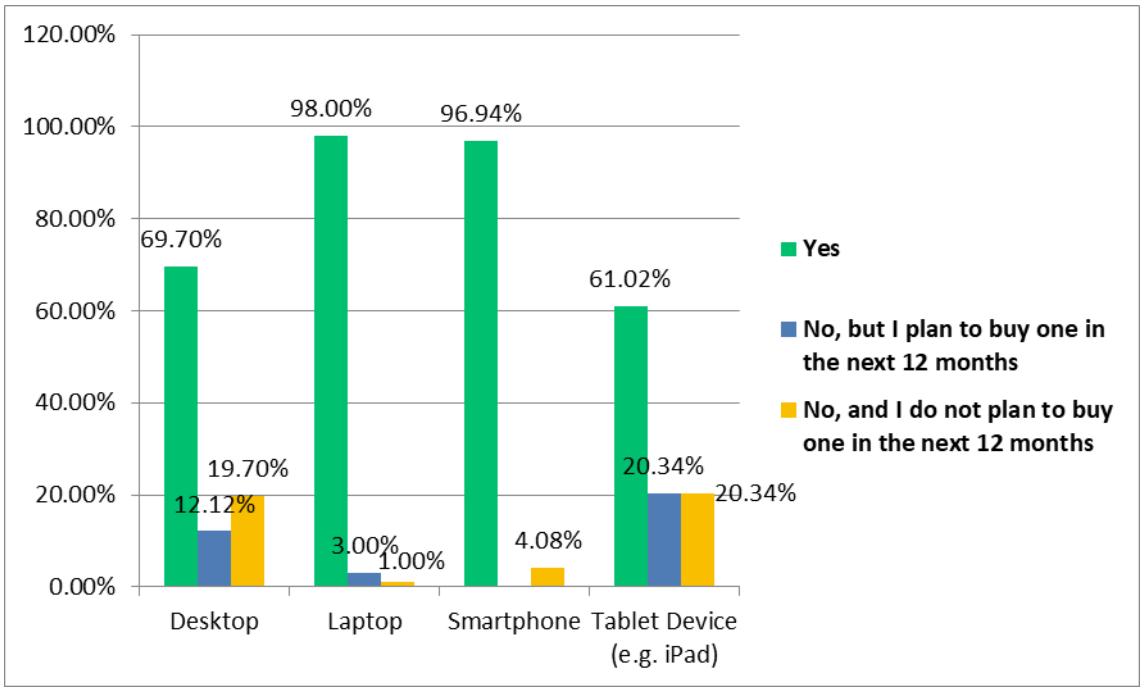

Figure 5. Ownership of devices

Further inquiry revealed that the majority of the devices used by members of faculty are personally owned, except for desktop computers, which are provided by JOOUST (Table 4).

Table 4. Access to devices

	Yes, provided by the university	Yes, I use my personal computing device in the university	Total
Desktop computer	86.21%	16.09%	87
Laptop	27.27%	72.73%	77
Smartphone	23.81%	76.19%	63
Tablet device (e.g., iPad)	22.50%	65.00%	40

3.2.2 Internet Access

Ninety per cent of faculty accessed the Internet from the office, 70% from home and only 30% from cybercafés. Importantly, all faculty members had Internet access (Figure 6).

Smartphones were the most commonly used devices to access the Internet (62%), followed by laptops (26%; Figure 7).

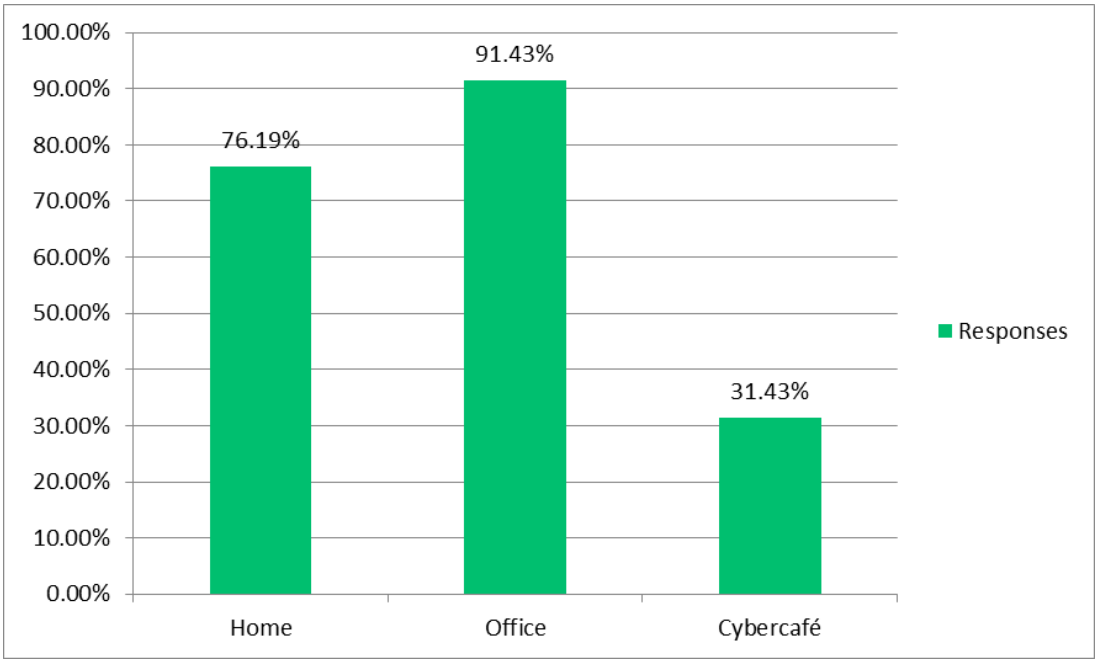

Figure 6. Internet access

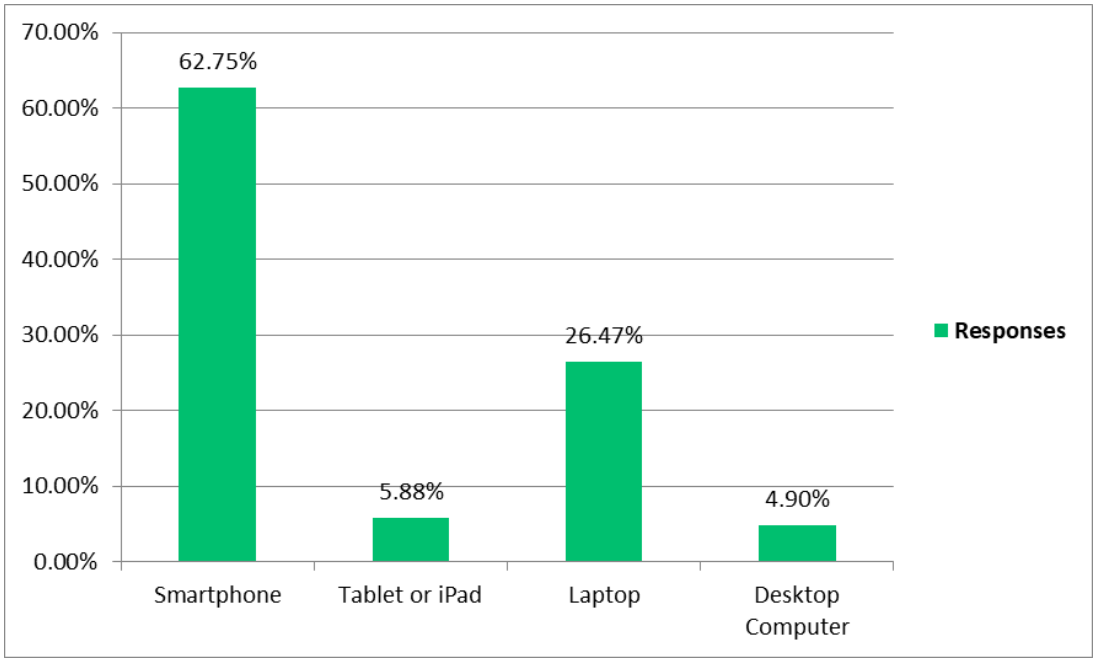

Figure 7. Devices used to access the Internet

3.2.3 Broadband Internet

On the availability of Internet connectivity at JOOUST (Table 5), 82% of respondents noted there was broadband in the university, with only 17% saying there was not. Six failed to respond to this question, possibly because they did not know the meaning of broadband.

An inquiry into where faculty members accessed broadband Internet revealed that 75% used faculty rooms, 52% used the university library, and less than 20% used other places, such as open areas, seminar halls, reception lounges, labs and classrooms (Figure 8).

Table 5. Availability of broadband Internet connectivity

Answer Choice	Responses	
Yes	82.52%	85
No	17.48%	18

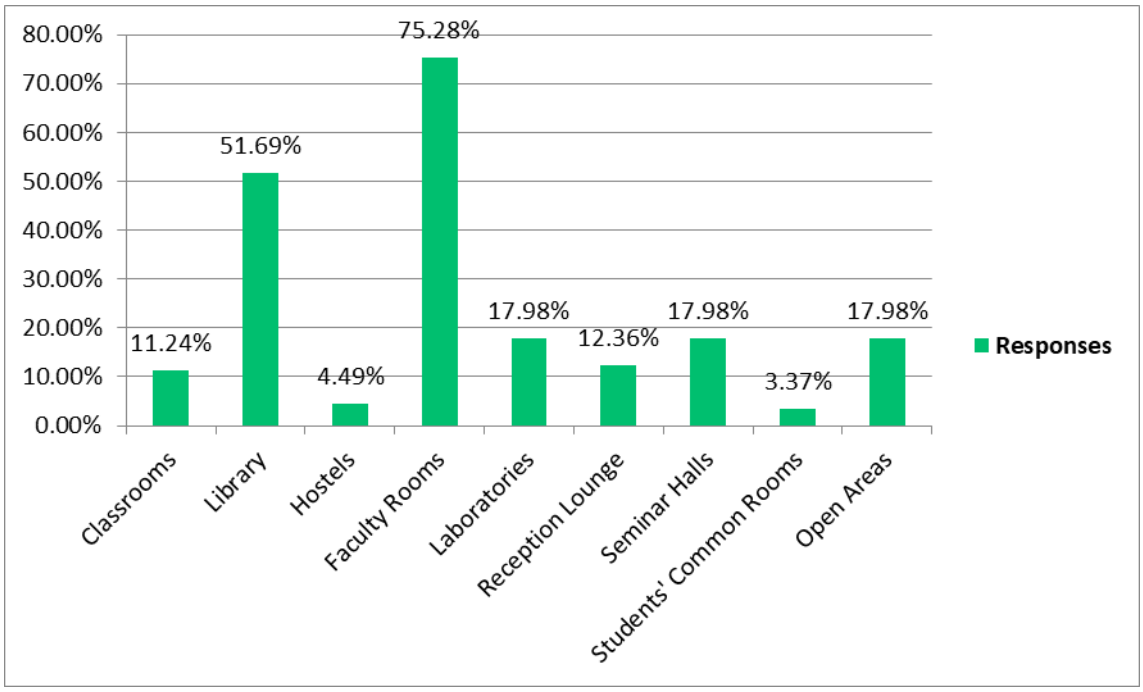

Figure 8. Where faculty access broadband Internet

The faculty were asked whether the institution subscribed to wireless Internet; 67% acknowledged having wireless Internet connectivity on campus while 30% did not. Further inquiry about the frequency of Internet access revealed that 87% accessed the Internet daily, while only 5% and 2% accessed it on alternate days or irregularly, respectively (Figure 9). This is very encouraging for TEL implementation.

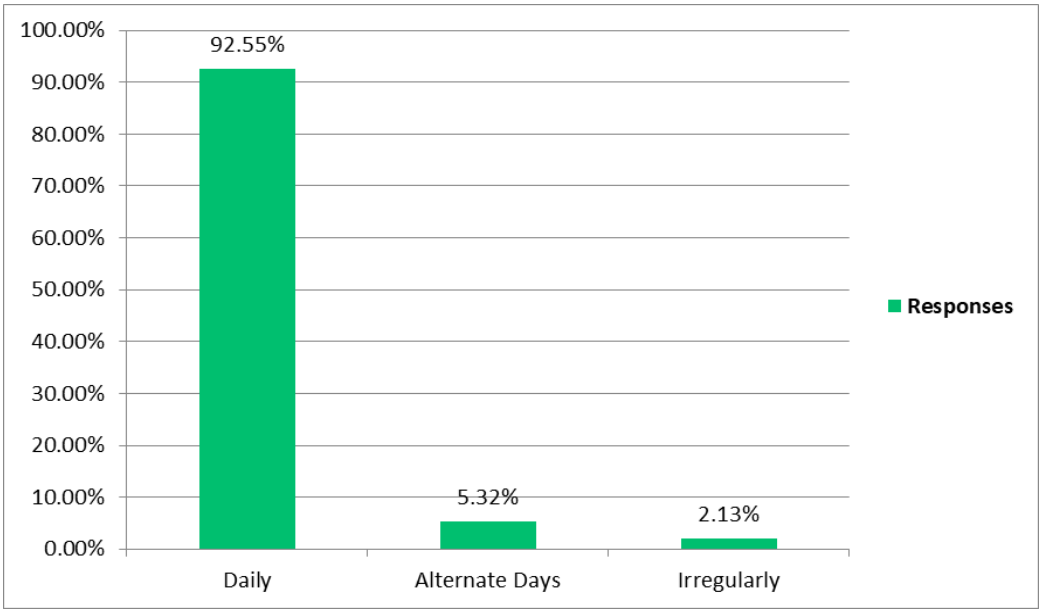

Figure 9. Frequency of Internet use

3.2.4 Proficiency in Computer-Related Skills to Support the Use of ICT

Proficiency in computer-related skills is a key ingredient in achieving successful implementation of TEL. Faculty members were asked to rate their level of comfort with a series of computer-related skills rated on a Likert scale, where 1 = non-user level, 2 = basic user level, 3 = intermediate user level, 4 = advanced user level, and 5 = expert user level. The responses show that the majority of faculty are intermediate-level users with a mean of 3.07, indicating they are comfortable with most computer-related skills. Respondents showed they were advanced users of email, word processing, presentation software and spreadsheets. However, faculty members had only basic proficiency in multimedia authoring, learning management systems, graphic editing, webpage design, digital audio and Web 2.0 tools, meaning teachers' competencies to use advanced ICT tools are poor at JOOUST (Table 6).

3.2.5 Use of Social Media

An inquiry into social media membership revealed that 93% of members had accounts with social media platforms and only 7% did not. Of those with accounts, 80% had profiles with Facebook, 62% with research sharing sites, 62% with Google+, 46% with Twitter, 19% with photo-sharing sites, 19% with SlideShare or similar, 10% with blogs, 8% with goodreads.com and 4% with social bookmarking sites. It is interesting to note that 62% of faculty have accounts on research sharing websites (Table 7).

Table 6. Proficiency of faculty in computer-related activities

	Expert	Advanced user	Intermediate user	Basic user	Non-user (N/A)	Weighted average
Word processor (e.g., Word)	31.43%	42.86%	20.00%	5.71%	0.00%	4.43
Spreadsheets (e.g., Excel)	20.62%	40.21%	20.62%	16.49%	2.06%	4.01
Presentation (e.g., PowerPoint)	36.27%	39.22%	17.65%	6.86%	0.00%	4.44
Email	43.81%	40.00%	8.57%	7.62%	0.00%	4.6
Databases	15.05%	25.81%	26.88%	26.88%	5.38%	3.44
Multimedia authoring	3.26%	14.13%	18.48%	35.87%	28.26%	2.42
Graphic editing	3.33%	10.00%	17.78%	32.22%	36.67%	2.21
Digital audio	3.33%	10.00%	20.00%	34.44%	32.22%	2.28
Video editing	2.20%	9.89%	14.29%	31.87%	41.76%	2.09

Webpage design	4.44%	13.33%	7.78%	24.44%	50.00%	2.11
Learning management system	6.52%	13.04%	10.87%	25.00%	44.57%	2.25
Web 2.0 tools (e.g., wikis, blogs, social networking)	6.25%	20.83%	12.50%	25.00%	35.42%	2.58
Mean weighted average						**3.07**

Table 7. Use of social media

Answer Choices	**Responses**	
Facebook	79.59%	78
Twitter	45.92%	45
Google+	62.24%	61
Blog (using Blogger or WordPress or within institutional website/CMS)	10.20%	10
SlideShare or similar presentation platform	19.39%	19
Photo sharing (Instagram/Flickr/Picasa web, etc.)	19.39%	19
Research sharing (Academic.edu, Researchgate.net, etc.)	62.24%	61
Social bookmarking sites (Delicious, Scoop.it, Pinterest, etc.)	4.08%	4
Goodreads.com (for connecting with authors and readers) or similar	8.16%	8

Frequency of updating social media status

Regarding how frequently faculty updated their social media profiles, the majority (53%) rarely did, while just 14% did so weekly (Figure 10). This means that their social media presence is relatively low so there is a need to further investigate how it can be integrated into learning activities.

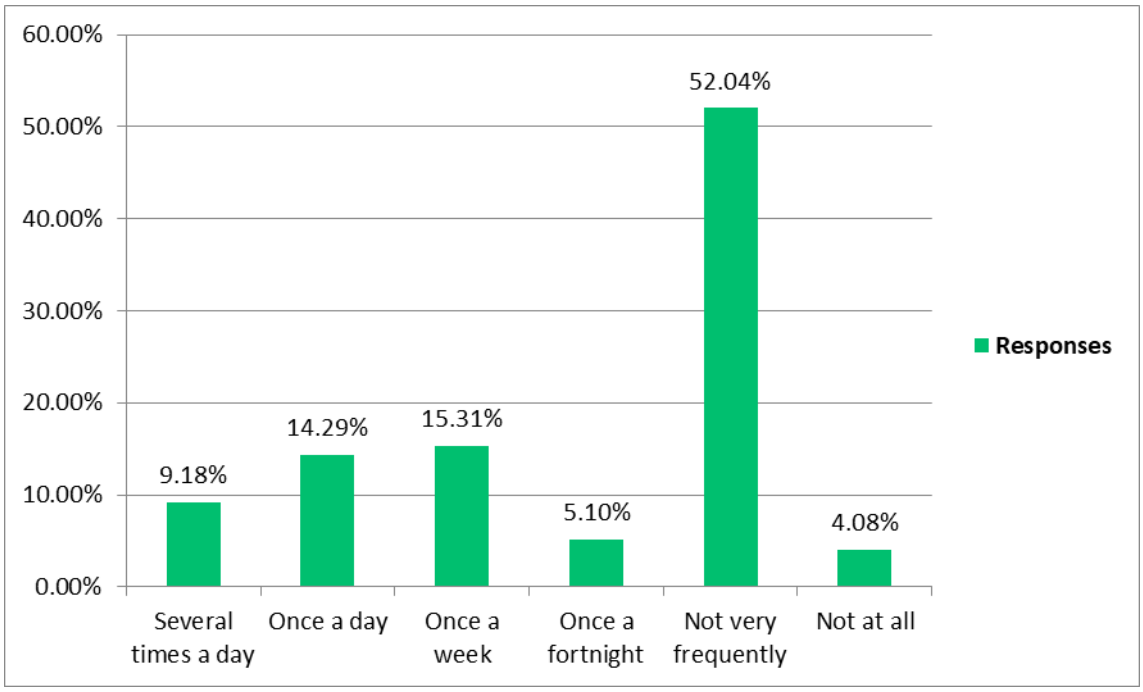

Figure 10. Frequency of updating social media status

3.2.6 Mailing Lists and Discussion Forums

When asked about their membership in mailing lists and discussion forums, 74% confirmed subscription to discussion forums, while 26% were not members of any forum. Of those who were members of forums, 78% subscribed to between one and five email-based discussion forums and only 21% subscribed to more than five. Fifty per cent of faculty do moderate discussion forums while 49% do not.

The faculty were further probed on their frequency of posting to forums; 38% indicated they did not post frequently, followed by 21% who posted several times a day, 19% once a week and 12% daily (Figure 11).

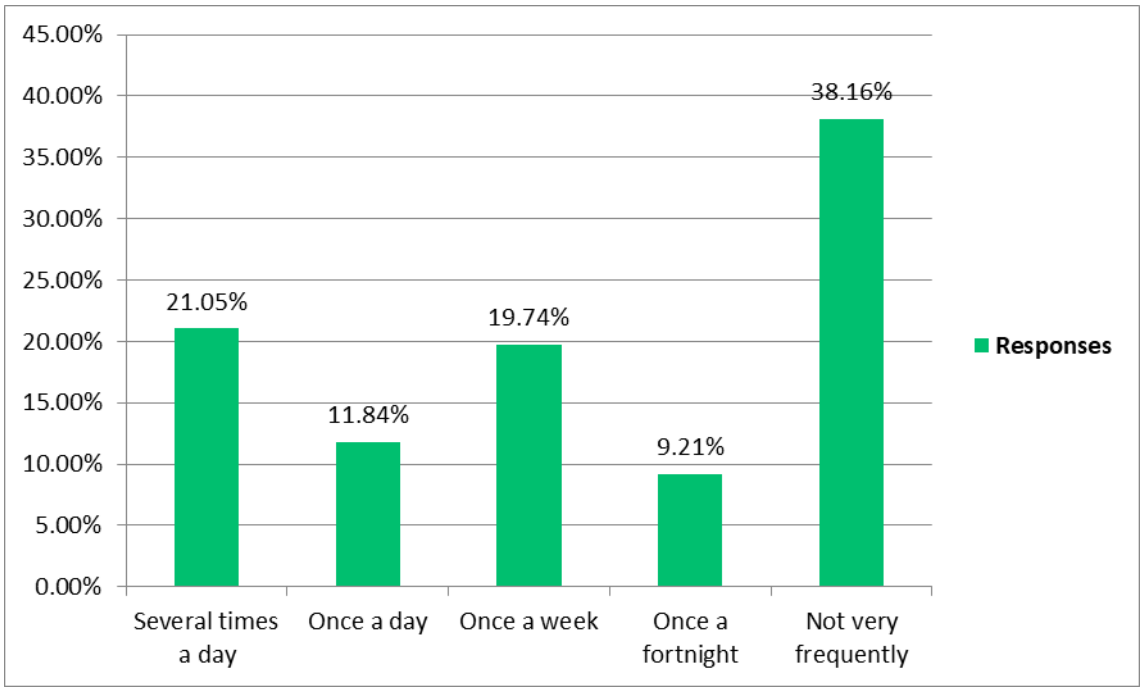

Figure 11. Frequency of posting to discussion forums

3.2.7 Experiences of ICT Resources and Services Provided by JOOUST

Teachers were asked to rate their experiences with a number of resources provided at JOUST on a Likert scale, where 1 = poor, 2 = fair, 3 = neutral, 4 = good, 5 = excellent and 0 = not available. The results displayed in Table 8 indicate that the majority of teachers are very experienced in using the ICT resources provided by JOOUST, as represented by a mean weighted average of 2.5. It is also notable that the least used service is the LMS. Training on the use of the LMS is needed to ensure teachers are comfortable with teaching using technology.

A test of association was further conducted to determine whether some demographic groupings influenced the rating of a few resources, including e-classrooms, computer labs, network bandwidth, Wi-Fi and email services. A significant association was found between age group and the rating of email services and Wi-Fi, where the p-values were .000 and .001, respectively at a confidence level of 95%. The weighted average rating of these two resources increased as the groups' age increased. This could mean that the ICT demands and expectations of junior lecturers are higher than those of senior ones.

Table 8. Faculty rating of experiences with ICT resources provided by JOOUST

	Poor	Fair	Neutral	Good	Excellent	Not available	Total	Weighted average
e-classroom facilities (e.g., computers, projection systems, lecture capture systems, etc.)	20	29	11	24	11	6	101	2.59
Computer labs (for practical and Internet access)	17	18	16	35	10	5	101	2.88
Email services (institutional)	9	24	5	34	22	4	98	3.24
Learning management system (e.g., Moodle)	28	16	12	26	1	15	98	2.09
Network bandwidth/speed of Internet (download and upload)	19	27	11	19	13	5	94	2.63
Wi-Fi access	21	29	8	29	6	2	95	2.62
Online or virtual technologies (e.g., network or cloud-based file storage system, etc.)	21	32	14	12	7	10	96	2.19
Access to software (e.g., MATLAB, GIS applications, statistical software, qualitative data analysis, graphics software, textual or image analysis programs, etc.)	25	25	18	17	5	8	98	2.27
Download and use of free and open-source software for teaching and learning	22	21	18	24	9	4	98	2.64
Support for maintenance and repair of ICT	16	39	12	17	14	2	100	2.68
Mean weighted average								**2.50**

3.3 Use of ICT for Teaching and Learning

This section covers the use of ICT for creating digital content for teaching, the nature of the classes faculty teach, and how often they use digital resources or platforms in their teaching. It also investigates faculty use of ICT to create and share teaching and learning materials, their knowledge of OER, their use of OER platforms for teaching and learning, and how they rate their individual skills for integrating teaching and learning technologies.

3.3.1 Use and Creation of Digital Content for Teaching

Nature of classes taught

The current mode of teaching used by members of faculty is largely (78%) traditional face to face (F2F), with only 2% using the online mode and 31% using the blended mode (Figure 12). This suggests a substantial effort may be needed to change faculty perceptions about delivering course content so they will shift from F2F to online or blended.

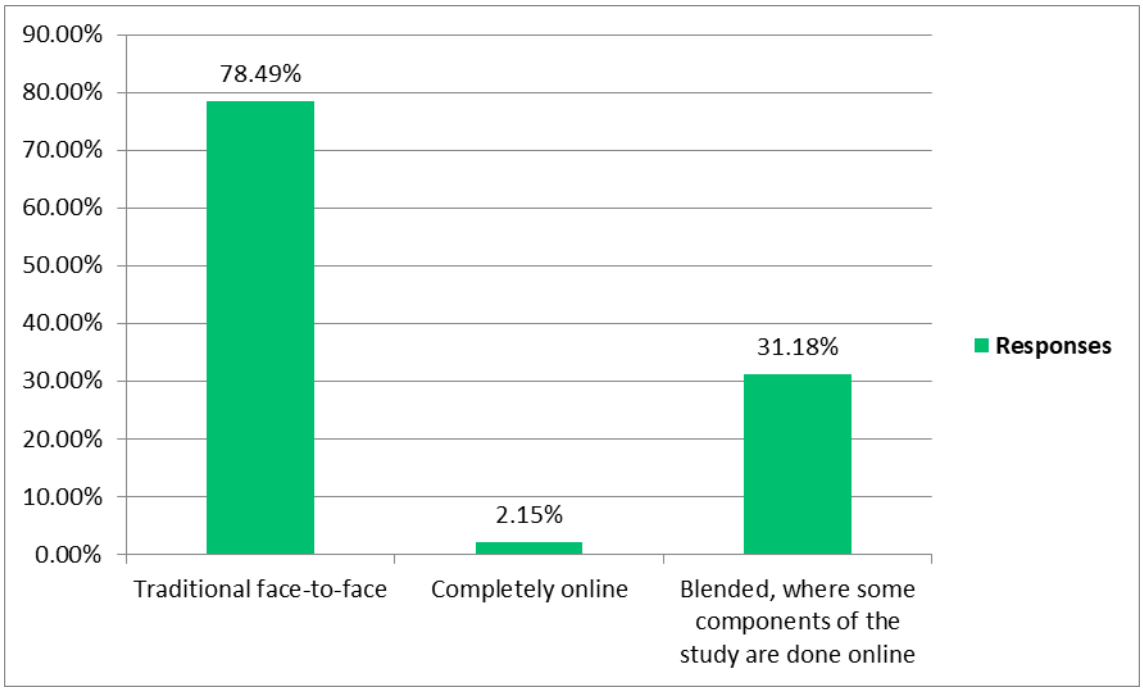

Figure 12. Nature of classes taught

Frequency of use of digital resources/platforms in teaching

Members of faculty were asked to indicate how often they used 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. Table 9 shows that teachers used the following digital resources often: open textbooks, open-access research papers, word files, presentations and images. This indicates that the TEL environment needs to be improved by training faculty on the digital resources and platforms that scored below average: digital films/videos, audio recordings, simulations and 2D/3D animation, LMS, blogs, social bookmarking and micro-blogging.

Table 9. Use of digital resources/platforms in teaching

	Always	Often	Sometimes	Rarely	Never	Total	Weighted average
Images (pictures, photographs, including from the Web)	15.96%	20.21%	44.68%	14.89%	4.26%	94	3.29
Presentations (e.g., PowerPoint, including from online sources)	25.53%	35.11%	23.40%	13.83%	2.13%	94	3.68
Word files (activity sheets/handouts/notes)	40.00%	28.42%	21.05%	8.42%	2.11%	95	3.96
Digital films/video (e.g., YouTube)	6.38%	10.64%	26.60%	35.11%	21.28%	94	2.46
Audio recordings	4.30%	10.75%	20.43%	33.33%	31.18%	93	2.24
Simulations and 2D/3D animation	2.17%	10.87%	16.30%	23.91%	46.74%	92	1.98
Learning management system	3.30%	6.59%	15.38%	30.77%	43.96%	91	1.95
Blogs	3.26%	5.43%	11.96%	26.09%	53.26%	92	1.79
Social bookmarking	2.13%	9.57%	8.51%	25.53%	54.26%	94	1.8
Microblogging (Twitter, Facebook, etc.)	14.13%	8.70%	8.70%	21.74%	46.74%	92	2.22
Open textbooks	17.89%	34.74%	20.00%	13.68%	13.68%	95	3.29
Open-access research papers	23.16%	32.63%	21.05%	12.63%	10.53%	95	3.45

Creating and sharing of teaching and learning materials

Members of faculty were asked to evaluate themselves on their level of experience in creating and sharing teaching and learning materials for a number of resources, and their level of expertise, using a Likert scale where 1 = never, 2 = yes but not shared with others, 3 = yes and shared through an open licence.

The weighted average of the response results (where 2 is the midpoint) indicate that a significant number of faculty members had created teaching and learning resources using PowerPoint and Word but had not shared them (Figure 13). Nonetheless, the majority of faculty had never used digital resources to create teaching and learning materials.

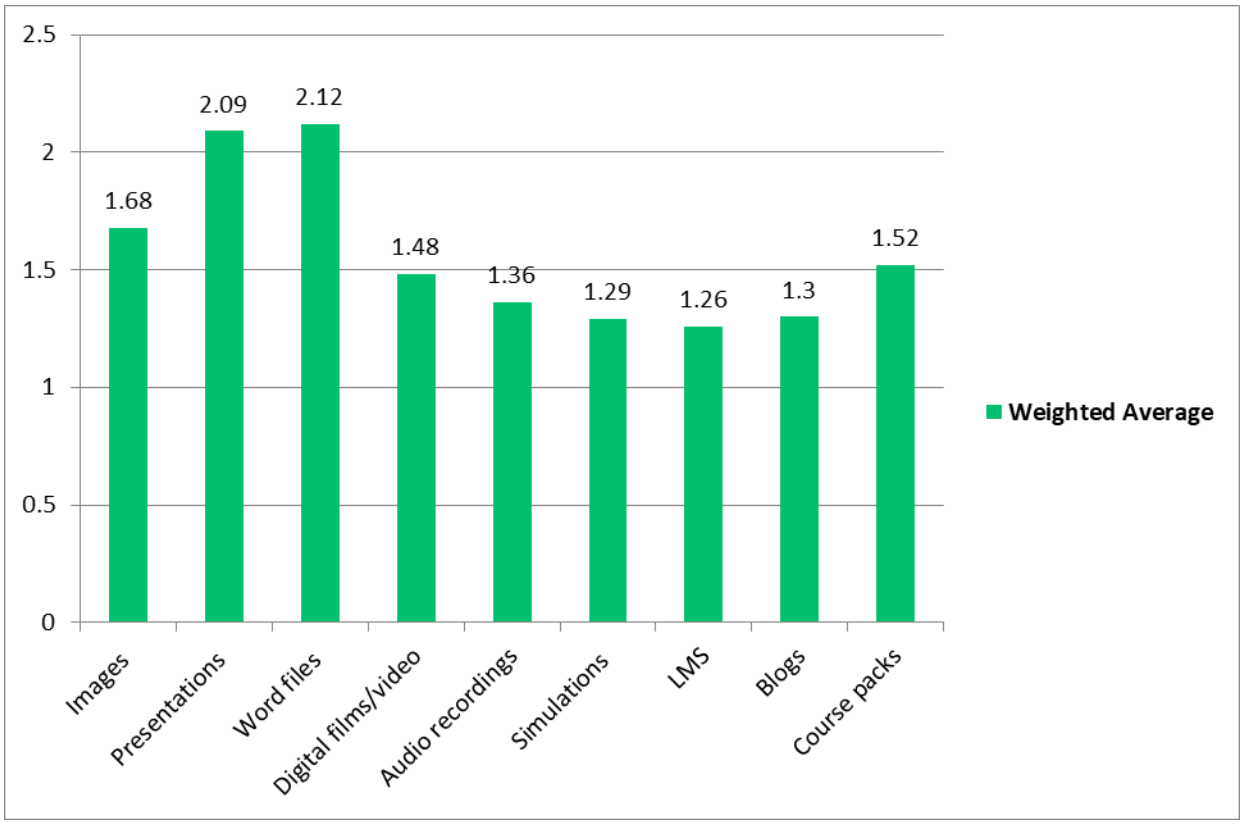

Figure 13. Creation and sharing of teaching and learning materials

3.3.2 Frequency of Use of OER in Teaching and Learning

OER — free, accessible resources used in teaching, learning and assessment as well as for research — are very important for TEL implementation. The determination of their frequency of use is an important indicator of how resourceful JOOUST lecturers will be for their students and for the successful implementation of TEL.

When asked about their awareness of OER, 67% of faculty members indicated they were aware, while 33% were unaware.

Frequency of use of OER in teaching and learning was determined by asking how often members of faculty used a series of resources, rated using a Likert scale where 1 = never, rarely = 2, 3 = sometimes, 4 = often, and 5 = always. The mean weighted average of all the responses was 1.62, indicating that generally, faculty members never or rarely use OER (Table 10).

Table 10. Frequency of using OER in teaching and learning

	Always	Often	Sometimes	Rarely	Never	Weighted average
OER Commons	0.00%	5.32%	15.96%	21.28%	57.45%	1.69
Saylor Academy	1.10%	1.10%	3.30%	23.08%	71.43%	1.37
WikiEducator	0.00%	5.43%	8.70%	20.65%	65.22%	1.54
OpenStax College	1.11%	5.56%	5.56%	15.56%	72.22%	1.48
BCcampus Open Textbooks	1.08%	5.38%	11.83%	18.28%	63.44%	1.62
NPTEL, India	1.12%	3.37%	5.62%	16.85%	73.03%	1.43
MIT Open Courseware	4.40%	6.59%	7.69%	16.48%	64.84%	1.69
OpenLearn, UK	3.26%	4.35%	11.96%	14.13%	66.30%	1.64
CollegeOpenTextbook	2.22%	7.78%	10.00%	18.89%	61.11%	1.71
Directory of Open Access Journals	8.60%	7.53%	15.05%	16.13%	52.69%	2.03
Director of Open Access Books	6.45%	7.53%	10.75%	15.05%	60.22%	1.85
MERLOT	0.00%	1.09%	5.43%	19.57%	73.91%	1.34
Mean weighted average						**1.62**

3.3.3 Integration of Technologies in Teaching and Learning

A probe to determine the integration of ICT in teaching was done using a five-point Likert scale. The responses show that members of faculty are still not comfortable with the ICT skills needed for teaching and learning. Table 11 shows a mean weighted average of 1.52, which implies a need to train and sensitise faculty on the use of technologies in teaching and learning.

Table 11. Integration of technologies in teaching and learning

Technologies	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	Weighted average
Learning management system (e.g., Moodle)	31.91%	36.17%	13.83%	11.70%	6.38%	1.24
Online collaboration tools (e.g., Adobe Connect, Google Docs)	16.84%	31.58%	26.32%	15.79%	9.47%	1.69
e-Portfolio	40.43%	21.28%	22.34%	10.64%	5.32%	1.19
e-Books/e-textbooks	13.54%	16.67%	31.25%	20.83%	17.71%	2.13
Online video/audio	17.20%	20.43%	29.03%	20.43%	12.90%	1.91
Educational games/simulations	29.79%	26.60%	21.28%	15.96%	6.38%	1.43
Lecture capture tools	27.17%	26.09%	23.91%	11.96%	10.87%	1.53
Accessible tools (for people with disabilities)	49.45%	25.27%	16.48%	6.59%	2.20%	0.87
Social media (blogs, wikis, etc.)	26.88%	23.66%	18.28%	15.05%	16.13%	1.7
Mean weighted average						**1.52**

3.3.4 Training and Staff Development

A probe to determine whether faculty received training on the use of ICT for teaching and learning found that 52% confirmed having received training and 48% had not. An additional question to find out whether JOOUST provided regular training on the use of new technologies for teaching and learning showed that 68% of faculty members do not receive regular training, while 31% do. When asked about participation in online training, 48% indicated they had and 51% that they had not. These responses confirm the need for

continuous training and staff development for faculty if TEL implementation is to be successful.

Attendance in MOOCs

Attending MOOCs gives insight into how technology can be used in teaching. A probe to determine the attendance of members in MOOCs revealed that the majority had not attended MOOCs (81%) and only 18% had (Table 12). In addition, 74% of members were not aware of any MOOC platform (Table 13), showing the need for sensitisation on the availability of MOOCs.

A further probe revealed that female faculty members were 3.04 times more likely to participate in MOOCs than their male counterparts. Associate professors were 2.35 times more likely to participate than tutorial fellows. Faculty who had received ICT training were 1.68 times more likely to participate in MOOCs than those who had not. These findings indicate there should be continuous training on the use of ICT.

Table 12. MOOCs attendance

Answer Choices	Responses	
Yes	18.89%	17
No	81.11%	73

Table 13. Awareness of MOOC platforms

Platform	Responses	
Coursera	18.68%	17
Udacity	2.20%	2
EdX	5.49%	5
iVersity	2.20%	2
FutureLearn	7.69%	7
None	74.73%	68

3.4 Knowledge of Policy Issues Related to TEL at JOOUST

When asked about their knowledge of policy issues related to TEL, faculty gave mixed responses (Table 14), with a high percentage indicating they did not know about these issues. There is a need to create awareness of policy issues at JOOUST.

Table 14. Knowledge of policy issues related to TEL at JOOUST

Policy Issues	Yes	No	Do not know
Is there a policy for ICT use in teaching and learning in your university/institution?	60.22%	6.45%	33.33%
Is there a strategy for technology-enabled learning in your university/institution?	54.74%	3.16%	42.11%
Is there an ICT policy in your university/institution that covers what technologies to use and not use for teaching and learning?	52.13%	6.38%	41.49%
Is there a privacy and data protection policy in your university/institution?	43.16%	14.74%	42.11%
Is there a policy on dealing with plagiarism in your university/institution?	70.53%	4.21%	25.26%
Is there a policy for using open-source software in your university/institution?	34.74%	13.68%	51.58%
Is there a system in place for using open-source software in your university/institution?	35.79%	10.53%	53.68%
Is there a workflow and escalation procedure for the repair and maintenance of ICT in your university/institution?	43.16%	10.53%	46.32%

3.5 Use of ICT for Research and Scholarship

3.5.1 Access to e-Library Resources at JOOUST

Faculty members were probed to determine whether the library at JOOUST provided subscription-based e-resources; 87% indicated these were available, 9% said they did not know about such subscriptions, and only 3% had no access at all (Table 15). Hence, there is a need to create awareness about the availability of subscription-based e-resources to all faculty members.

Table 15. Does the library provide subscription-based resources?

Answer Choices	Responses	
Yes	86.90%	73
No	3.57%	3
Do not know	9.52%	8
	Answered	84
	Skipped	25

Access to library resources for teaching and learning

Table 16 shows faculty members' responses about the kinds of library resources they regularly accessed for teaching and learning, measured on a Likert scale where 1 = never, 2 = rarely, 3 = sometimes, 4 = often, and 5 = always. The majority of respondents sometimes accessed e-library resources for teaching and learning; the mean weighted average was 3.14. It is also important to note that most of the respondents accessed e-journals and e-books, whereas patent databases, e-proceedings of conferences, and statistical databases were rarely accessed.

Table 16. Access to library resources

	Always	Often	Sometimes	Rarely	Never	Weighted average
e-Journals	50.62%	29.63%	14.81%	2.47%	2.47%	4.23
e-Books	48.10%	25.32%	17.72%	3.80%	5.06%	4.08
Citation databases	25.33%	24.00%	17.33%	21.33%	12.00%	3.29
e-Newspapers	22.50%	17.50%	16.25%	22.50%	21.25%	2.98
e-Theses and dissertations	26.58%	22.78%	16.46%	17.72%	16.46%	3.25
Patent databases	6.25%	7.50%	20.00%	35.00%	31.25%	2.23
e-Proceedings of conferences	8.75%	12.50%	20.00%	30.00%	28.75%	2.42
Statistical databases	8.75%	21.25%	20.00%	26.25%	23.75%	2.65
Mean weighted average						**3.14**

3.5.2 Availability of Research Support

Resources that support research in a university are not only very important components of learning in this technological era but also facilitate the research process, fact finding and information storage.

Members of faculty were asked to rate their experience with a series of resources and services that support research at JOOUST, on a Likert scale where 0 = not available, 1 = poor, 2 = fair, 3 = neutral, 4 = good, and 5 = excellent. The responses show that the majority of faculty were fair to neutral in their rating, confirmed by a mean weighted average of 2.48 (Table 17).

Table 17. Rating of research support resources provided at JOOUST

	Poor	Fair	Neutral	Good	Excellent	Not available	Weighted average
Access to data storage	13.33%	26.67%	16.67%	24.44%	5.56%	13.33%	2.42
Data visualisation software	19.32%	20.45%	28.41%	14.77%	3.41%	13.64%	2.22
Citation/reference management software	14.61%	26.97%	24.72%	14.61%	7.87%	11.24%	2.4
Plagiarism detection software	11.11%	18.89%	21.11%	25.56%	11.11%	12.22%	2.7
Institutional repository for sharing of research	8.79%	21.98%	20.88%	29.67%	10.99%	7.69%	2.89
Funds to support open-access publications	26.67%	24.44%	21.11%	13.33%	6.67%	7.78%	2.26
Mean weighted average							**2.48**

3.6 Perception of the Use of Technology-Enabled Learning

This section covers how faculty members perceived the potential impact of TEL on teaching–learning, by assessing their attitudes toward a series of propositions, motivators for using TEL, and barriers to using TEL.

3.6.1 Attitudes

Members of faculty were asked to respond to a range of statements to assess their attitudes towards TEL, using a Likert scale with responses coded as 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, and 5 = strongly agree (Table 18).

The survey revealed that members of faculty have a positive attitude towards the use of TEL, confirmed by a mean weighted average of 4.48. This suggests that faculty are prepared to use technology in teaching and learning and that a TEL implementation project will succeed.

Table 18. Rating of attitude statements

Attitude Statements	Strongly agree	Agree	Neither agree/ disagree	Disagree	Strongly agree	Weighted average
Technology-enabled learning can solve many of our educational problems.	60.87%	29.35%	8.70%	0.00%	1.09%	4.49
Technology-enabled learning will bring new opportunities for organising teaching and learning.	63.04%	35.87%	1.09%	0.00%	0.00%	4.62
Technology-enabled learning saves time and effort for both teachers and students.	58.70%	33.70%	5.43%	1.09%	1.09%	4.48
Technology-enabled learning increases access to education and training.	61.54%	32.97%	4.40%	1.10%	0.00%	4.55
Technology-enabled learning increases my efficiency in teaching.	57.61%	36.96%	4.35%	1.09%	0.00%	4.51
Technology-enabled learning enables collaborative learning.	59.34%	37.36%	2.20%	1.10%	0.00%	4.55
Technology-enabled learning can engage learners more than other forms of learning.	46.74%	40.22%	13.04%	0.00%	0.00%	4.34

Technology-enabled learning increases the quality of teaching and learning because it integrates all forms of media: print, audio, video and animation.	55.43%	35.87%	5.43%	3.26%	0.00%	4.43
Technology-enabled learning increases the flexibility of teaching and learning.	55.43%	39.13%	3.26%	1.09%	1.09%	4.47
Technology-enabled learning improves communication between students and teachers.	51.09%	35.87%	9.78%	3.26%	0.00%	4.35
Technology-enabled learning enhances the pedagogic value of a course.	50.55%	38.46%	10.99%	0.00%	0.00%	4.4
Universities should adopt more and more technology-enabled learning for the benefit of their students.	63.74%	34.07%	2.20%	0.00%	0.00%	4.62
Mean weighted average						**4.48**

3.6.2 Motivators

Generating participant enthusiasm for project implementation is key to its development and success. Members of faculty were probed to determine their motivation to use TEL, using a Likert scale for a number of factors, where 1 = very weak motivator, 2 = weak motivator, 3 = average motivator, 4 = strong motivator, and 5 = very strong motivator.

The mean weighted average of the responses was 3.97, implying that faculty members are highly motivated to use TEL for teaching and learning at JOOUST (Table 19).

A critical analysis of the motivation factors shows that personal interest in using technology, training on TEL, improved infrastructure, intellectual challenge, and self-gratification were major motivators, while credit towards promotion, professional incentives to use TEL, peer recognition, prestige and status were less substantial, which is encouraging. It is therefore important to note that all the itemised factors play varying degrees of roles in motivating members of faculty to implement TEL at JOOUST. These should therefore be given closer attention during the implementation period; conversely, a negative ranking may indicate a possible risk factor for TEL implementation.

3.6.3 Barriers

Faculty barriers to TEL were investigated using a Likert scale where 1 = very weak barrier, 2 = weak barrier, 3 = average barrier, 4 = strong barrier, and 5 = very strong barrier. The results revealed, on average, an overall barrier to TEL, with a mean weighted average of 3.44.

Table 20 reveals two strong barriers to TEL implementation at JOOUST: lack of training on TEL, and poor Internet access and networking. These are followed by inadequate hardware and software, plus lack of technical support. Many teachers are also concerned that inadequate student access to technology is a barrier to TEL implementation.

Table 19. Rating of motivators for using TEL

Motivating factors	Very strong	Strong	Average	Weak	Very weak	Weighted average
Personal interest in using technology	69.66%	20.22%	6.74%	2.25%	1.12%	4.55
Intellectual challenge	44.19%	37.21%	12.79%	5.81%	0.00%	4.2
Self-gratification	38.37%	36.05%	16.28%	8.14%	1.16%	4.02
Training on technology-enabled learning	43.82%	35.96%	15.73%	3.37%	1.12%	4.18
Better Internet bandwidth at workplace	41.57%	32.58%	17.98%	4.49%	3.37%	4.04
Credit towards promotion	20.22%	39.33%	23.60%	12.36%	4.49%	3.58
Professional incentives to use technology-enabled learning	29.55%	34.09%	27.27%	6.82%	2.27%	3.82
Technical support	30.00%	38.89%	21.11%	6.67%	3.33%	3.86
Peer recognition, prestige and status	17.98%	28.09%	32.58%	13.48%	7.87%	3.35
Improved infrastructure (hardware and software) deployment	46.07%	33.71%	14.61%	3.37%	2.25%	4.18
Release time or reduction in existing workload	38.89%	31.11%	23.33%	5.56%	1.11%	4.01

To be a trendsetter by early adoption of technology in education	32.58%	32.58%	28.09%	4.49%	2.25%	3.89
Mean weighted average						**3.97**

Table 20. Barriers to the use of TEL

Barriers	**Very strong**	**Strong**	**Average**	**Weak**	**Very weak**	**Weighted average**
Concern about faculty workload	23.60%	28.09%	28.09%	15.73%	4.49%	3.51
Concern about students' access to technology	24.72%	39.33%	16.85%	14.61%	4.49%	3.65
Lack of training on TEL	42.70%	32.58%	14.61%	8.99%	1.12%	4.07
Lack of technical support in the university	25.27%	34.07%	31.87%	7.69%	1.10%	3.75
Lack of institutional policy for TEL	19.10%	25.84%	30.34%	17.98%	6.74%	3.33
Lack of professional prestige	10.00%	21.11%	35.56%	15.56%	17.78%	2.9
Concern about the quality of e-courses	19.10%	30.34%	31.46%	11.24%	7.87%	3.42
Lack of incentives to use TEL	19.32%	21.59%	25.00%	28.41%	5.68%	3.2
Lack of credit towards promotion	15.56%	20.00%	35.56%	16.67%	12.22%	3.1
Intimidated by technology	13.33%	22.22%	21.11%	17.78%	25.56%	2.8
Concern about security issues on the Internet	17.98%	25.84%	28.09%	17.98%	10.11%	3.24
Inadequate availability of hardware and software	36.26%	32.97%	21.98%	4.40%	4.40%	3.92
Poor Internet access and networking in the university	35.63%	35.63%	26.44%	0.00%	2.30%	4.02
Lack of time to develop e-	21.98%	30.77%	27.47%	12.09%	7.69%	3.47

courses						
Lack of instructional design support for TEL	27.47%	28.57%	30.77%	9.89%	3.30%	3.67
No role models to follow	16.67%	15.56%	32.22%	16.67%	18.89%	2.94
Mean weighted average						**3.44**

3.7 Open-Ended Question

The last question asked respondents to comment on the statement: "There is a need to develop a technology-enabled learning policy and strategy in your university." Sixty-seven faculty responded. Here are some of the responses:

"Yes the university needs a fully functional technology enable support with sufficient bandwidth for student and staff."

"This is a long overdue. Efforts in this direction have been initialized but are taking too long to be realised."

"There is strong need to develop and improve technology-enabled learning policy and strategy to improve in quality delivery of the curriculum."

"Technology enabled learning policy as a strategy if adopted in this university will certainly improve efficiency in delivering of learning outcomes as well as promote research work."

"In order for the university to catch up with best practices at the international level, the integration of technology in learning is indispensable."

"The above issue is very important and should be given high priority in development and technological applications to many areas of university functions. More funding in training both staff and students is an important strategy to move the university to high level of technological based institution."

Summary

Lecturers are ready for TEL implementation at JOOUST. This is confirmed by the overwhelming number of those with access to ICT devices, the Internet, and the ICT skills needed for TEL implementation. However, the faculty survey revealed that teachers need training on TEL to build their capacity to use advanced ICT for teaching and learning. Also, the university needs to take appropriate steps towards improving its ICT infrastructure, bandwidth and Internet access.

Chapter Four: Student Survey

Assessing the level of student preparedness for TEL was an important component of this survey, as the results will inform not only the basic training prerequisites to be considered, but also the extent to which students have access to JOOUST's ICT infrastructure.

A sample of 361 out of 5,924 students, reflecting about 6% of the total population stratified according to their schools/faculties, was originally proposed for participation in this survey. Interestingly, the actual number of respondents was 426, comprising 7% of the overall population distributed across the ten schools; with gender also taken into consideration, the sample exceeded what was recommended for achieving useful results.

4.1 Student Profile

4.1.1 Gender and Age Distribution

The gender distribution of the respondents was 63.27% male and 36.73% female (Table 21). This is a fair representation of the population, given that the female students form 36.5% of the total population and the males 63.5%.

In terms of age distribution (Figure 14), the majority of respondents are in the 21–25 age group (79.27%), followed by under 20 (17.97%). Most of the students are digital natives (born after 1985), so there is a need to adopt TEL to meet the demands of this and subsequent generation.

Table 21. Gender of respondents

Answer Choices	Responses	
Male	63.27%	267
Female	36.73%	155

4.1.2 Level and Year of Study

The majority of the students (98.82%) were undergraduates, with only 0.95% graduates or postgraduates (Table 22). The small postgraduate representation was because the student population at the main campus, where the survey was done, comprises mainly government-sponsored undergraduates.

In the undergraduate cluster, 26.36% were year 1 students, 31.35% were in year 2, 33.39% were in year 3 and only 8.79% were in year 4. Eight respondents did not indicate their year of study (Figure 15). It is worth noting that the number of year-4 respondents was

probably so low because the majority of them had finished their studies in May 2018 and were already off campus, awaiting graduation.

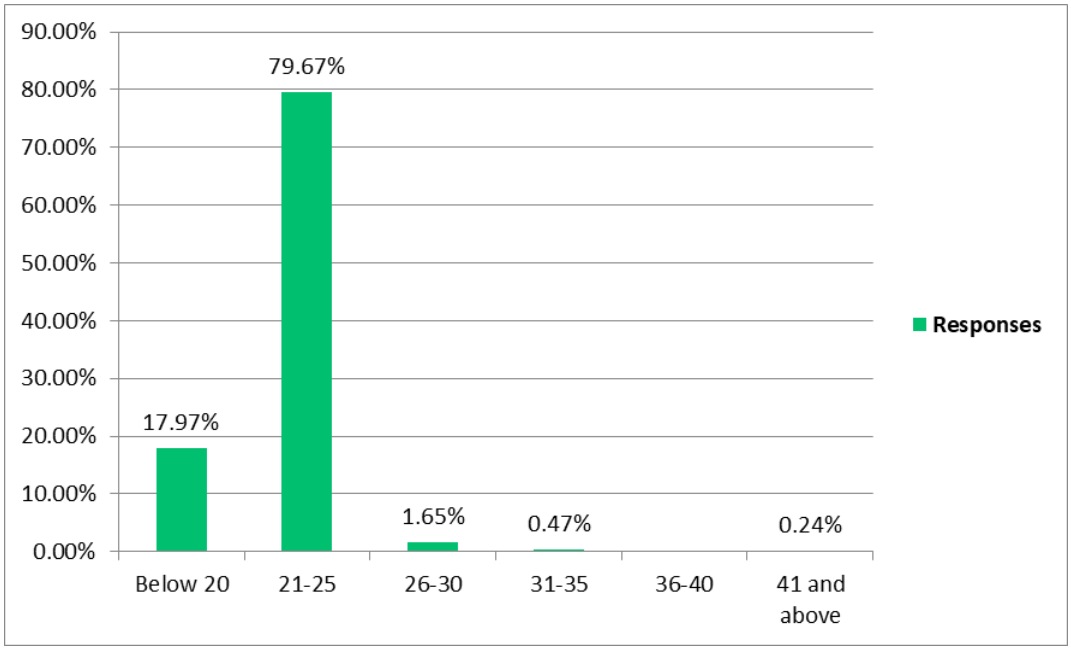

Figure 14. Students' age distribution

Table 22. Level of study

Answer Choices	Responses	
Undergraduate	98.82%	417
Graduate or postgraduate	0.95%	4
Research	0.24%	1

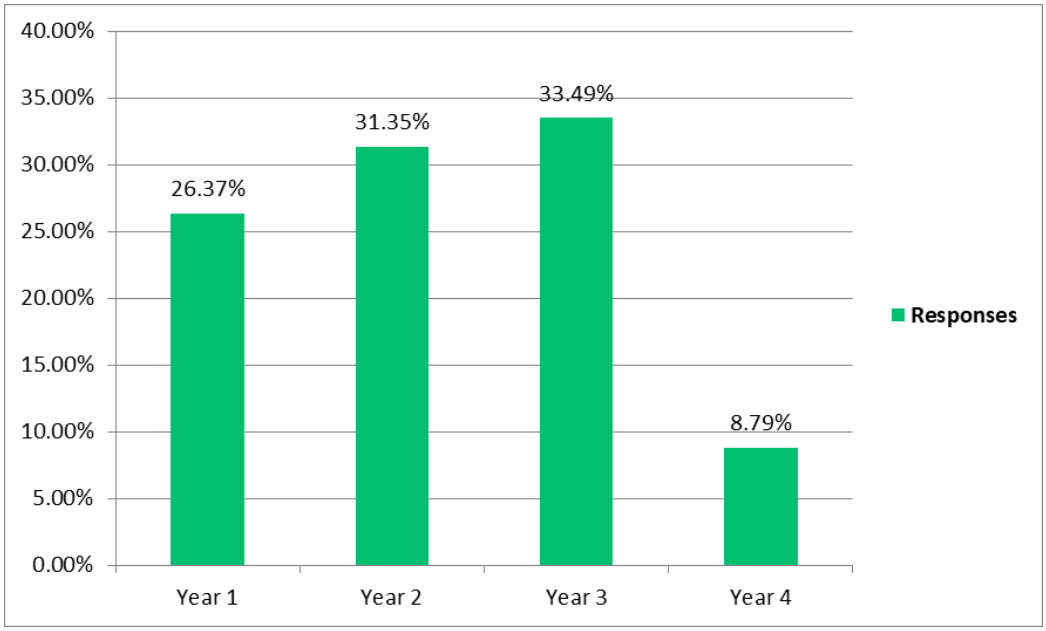

Figure 15. Year of study

4.1.3 Participants' Schools

A probe into the representation of the participating schools or faculties showed that the School of Education, which comprises the largest portion of JOOUST's student population, contributed the highest number of respondents, at 26.70%, followed by the School of Business and Economics (21.08%) and the School of Informatics and Innovative Systems (15.69%; see Table 23).

Table 23. Participants' schools

School	Responses	
School of Agricultural and Food Sciences	7.73%	33
School of Biological and Physical Sciences	3.28%	14
School of Business and Economics	21.08%	90
School of Education	26.70%	114
School of Engineering and Technology	3.04%	13
School of Health Sciences	9.60%	41
School of Humanities and Social Sciences	3.75%	16
School of Informatics and Innovative Systems	15.69%	67
School of Mathematics and Actuarial Sciences	6.56%	28
School of Spatial Planning and Natural Resources Management	2.58%	11

4.1.4 Physical and/or Learning Disabilities

A question eliciting information about student disabilities revealed that only 2.35% of the population identified as having one or more disability that needed adaptive technologies for learning, with 94.59% of the population identifying as not having a disability (Table 24). To ensure fair learning for all, JOOUST needs to acquire adaptive technologies to accommodate students with disabilities.

Table 24. Respondents with physical and/or learning disabilities

Answer Choices	Responses	
No, I do not have a disability.	94.59%	402
Yes, I have one or more physical disabilities that require accessible or adaptive technologies.	2.35%	10
Yes, I have one or more learning disabilities that require accessible or adaptive technologies.	1.18%	5
Yes, I have both physical and learning disabilities that require accessible or adaptive technologies.	0.47%	2
I prefer not to answer.	1.41%	6

4.1.5 Study Mode

Students were asked their mode of study, and the responses showed that most (71.06%) of their courses were delivered using traditional face-to-face teaching, compared to only 0.47% done completely online; 28% indicated that some of their courses were blended, which may be because their teachers sent them resources via email or provided links to online resources (Table 25). However, JOOUST currently offers no formal blended courses.

Table 25. Mode of study

Answer Choices	Responses	
Traditional face-to-face	71.06%	302
Completely online	0.47%	2
Blended, where some components of the study are done online	28.47%	121

4.2 Access to and Use of ICT

This section investigates learners' access to ICT devices both at home and on campus, as well as their access to the Internet, their frequency of Internet use, and the specific devices they use. This segment also identifies learners' level of proficiency with ICT by assessing

their comfort level with computer-related skills and activities, their social media presence, and their participation in mailing lists and discussion forums. Lastly, this section assesses their experiences with resources that support technology-enabled learning and the use of online courses.

4.2.1 Ownership of Devices and Access to ICT

Ownership of devices

Ownership of technological devices is crucial for accessing TEL resources. The survey indicated that the majority of the respondents (90.28%) owned smartphones, followed by 50% owning laptops (Figure 16). Very few respondents had tablets or desktops, but 39% indicated that they planned to purchase laptops in the next 12 months and 22% planned to purchase tablets in the same time frame; 81.58% had no plan to buy a desktop in the next 12 months, and 67.54% had no plan to buy a tablet in the same time frame. Thirteen respondents did not answer the question.

Access to devices at the university

The vast majority (97.69%) of respondents have access to desktops at the university; 86.78% and 79.4% use their personal smartphones and laptops, respectively (Figure 17). These are favourable indicators in terms of access to technology for use in ICT-enabled teaching and learning. A few students (who probably misunderstood the question) indicated that the university did not allow them to use their personal device on campus. The university encourages both students and staff to bring their own devices.

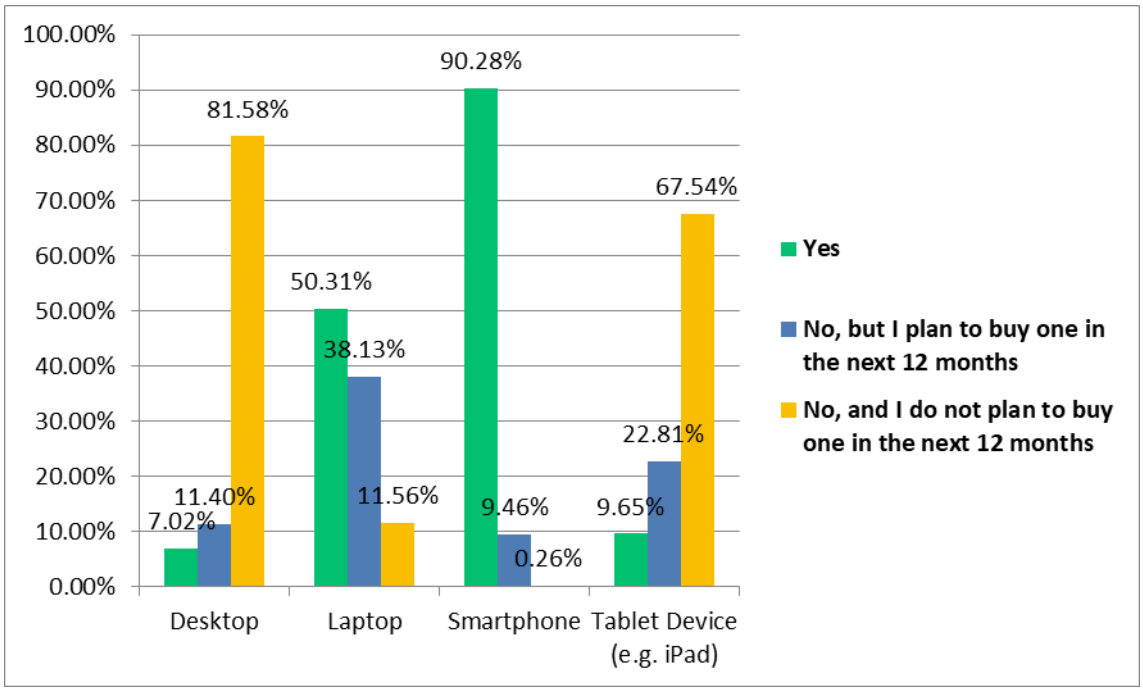

Figure 16. Ownership of devices

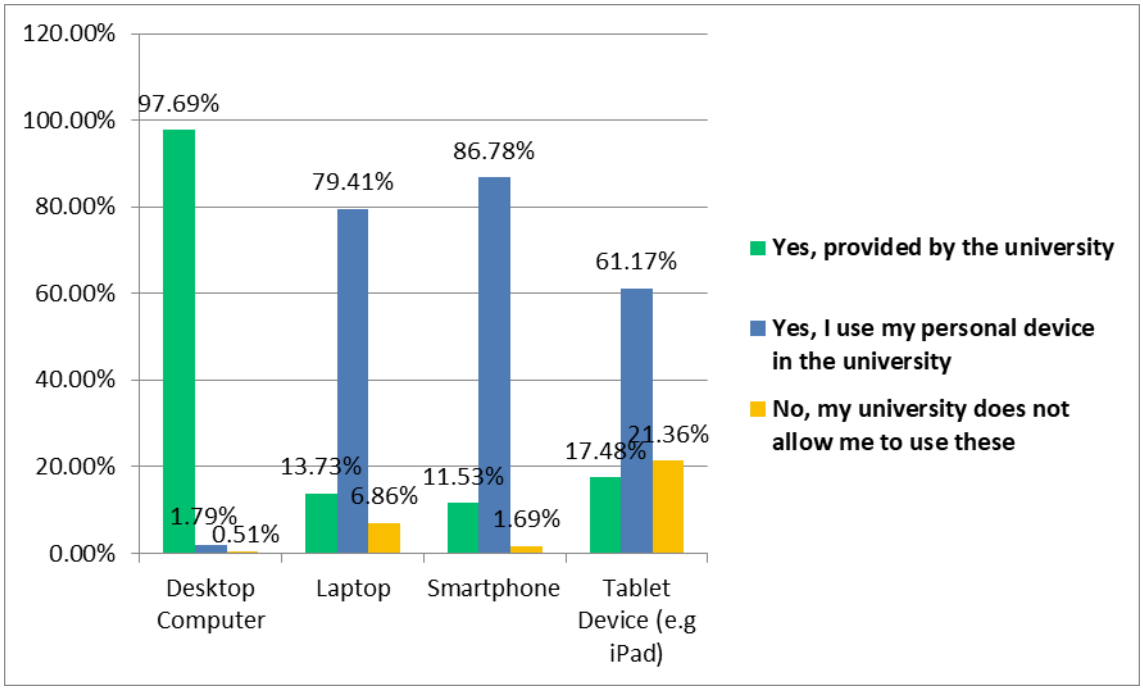

Figure 17. Access to devices at JOOUST

4.2.2 Internet Access

Where Internet is accessed

Internet access is a vital element of TEL, so it is important to determine how comfortable learners are with Internet provision at JOOUST. The majority of respondents (72.91%) access the Internet from cybercafés, while 66.50% access it from their places of residence; 6.16% do not have Internet access (Figure 18). To ensure that learning is convenient for students, it may be necessary to find ways of ensuring they can access the Internet at their places of residence.

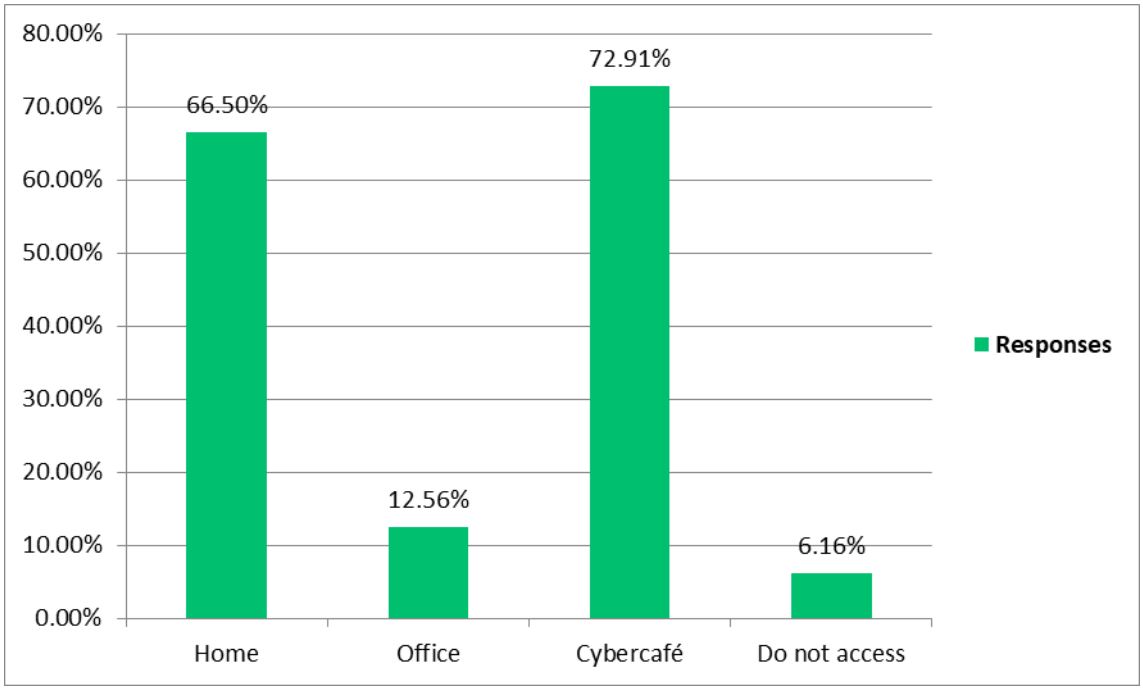

Figure 18. Where Internet is accessed

Media for Internet access

One question asked students to select the various media they use to access the Internet. As Figure 19 shows, the majority use their mobile devices (80%), followed by wireless (75%) and ADSL connection (1%).

Devices used to access the Internet

Students were asked to choose the device they most frequently used to access the Internet. The majority indicated smartphone (87%), followed by desktop computer (5%), then laptop (4%) and lastly tablet and iPad (2%; see Figure 20). An intervention would be necessary to increase Internet access via desktop computers and laptops, as these devices enable students to do more than what they would using handheld mobile devices.

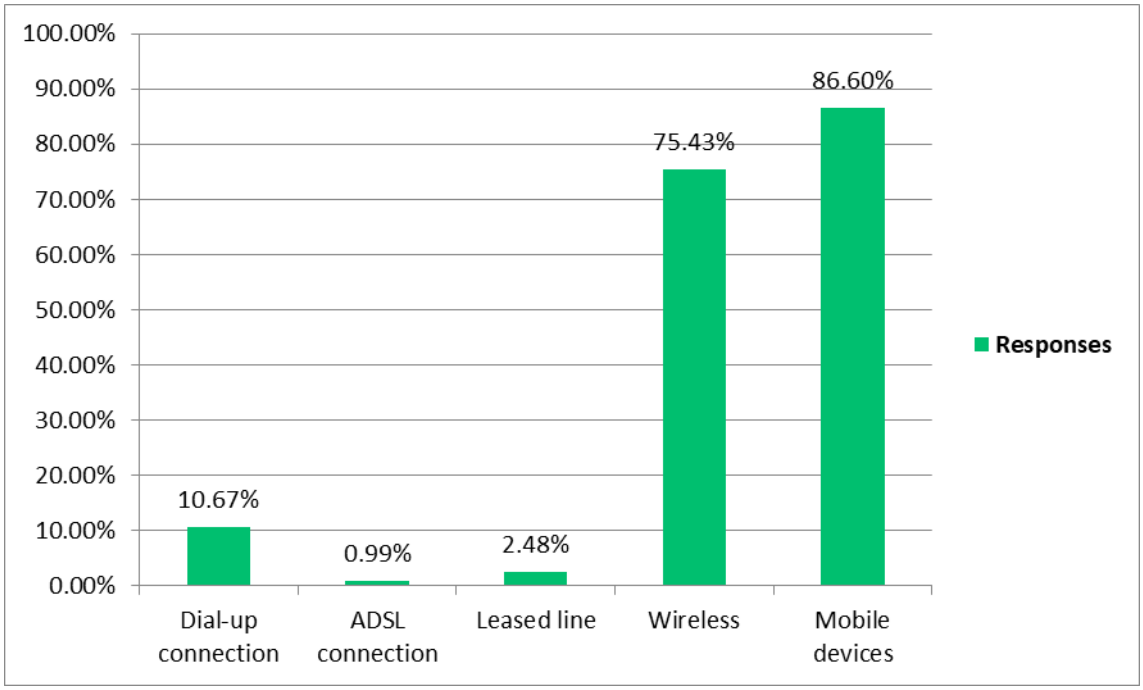

Figure 19. Ways of accessing the Internet

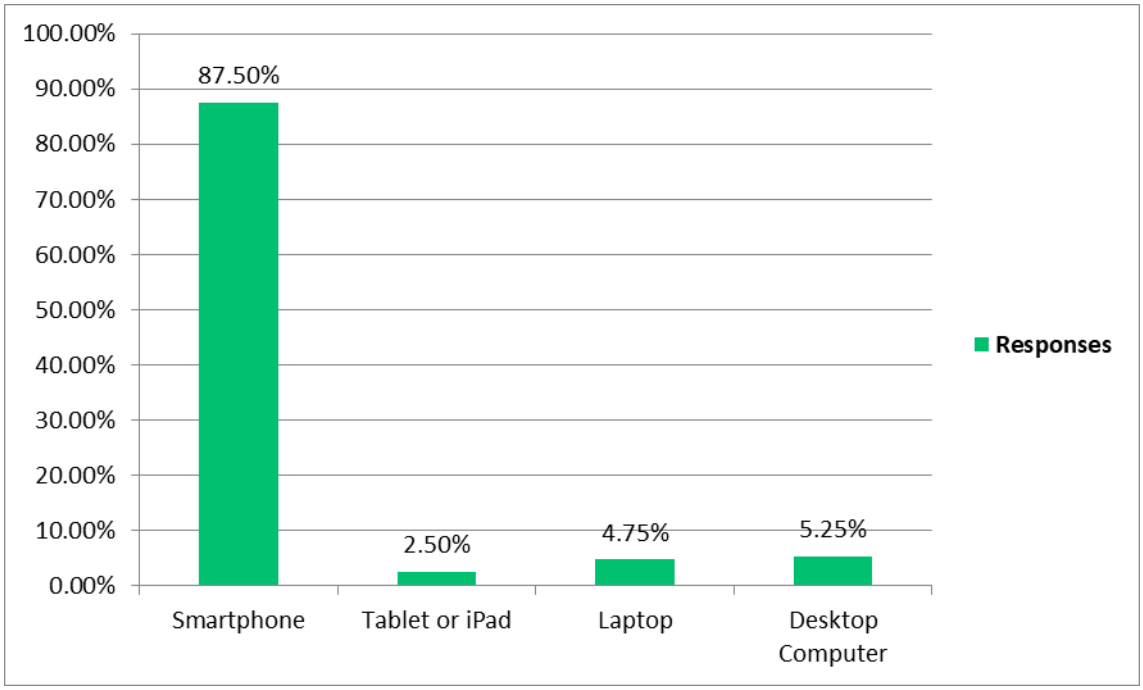

Figure 20. Devices frequently used to access the Internet

Broadband Internet connectivity

High-speed Internet access is essential in the information technology era. Hence, knowing where students access high-speed Internet is vital for strategically positioning the resources that support TEL, to ensure convenience and optimal use.

When learners were asked where they accessed high-speed Internet, the majority (63%) indicated cybercafés, while 31.91% accessed it from their residences; 15% did not have access to high-speed Internet (Figure 21).

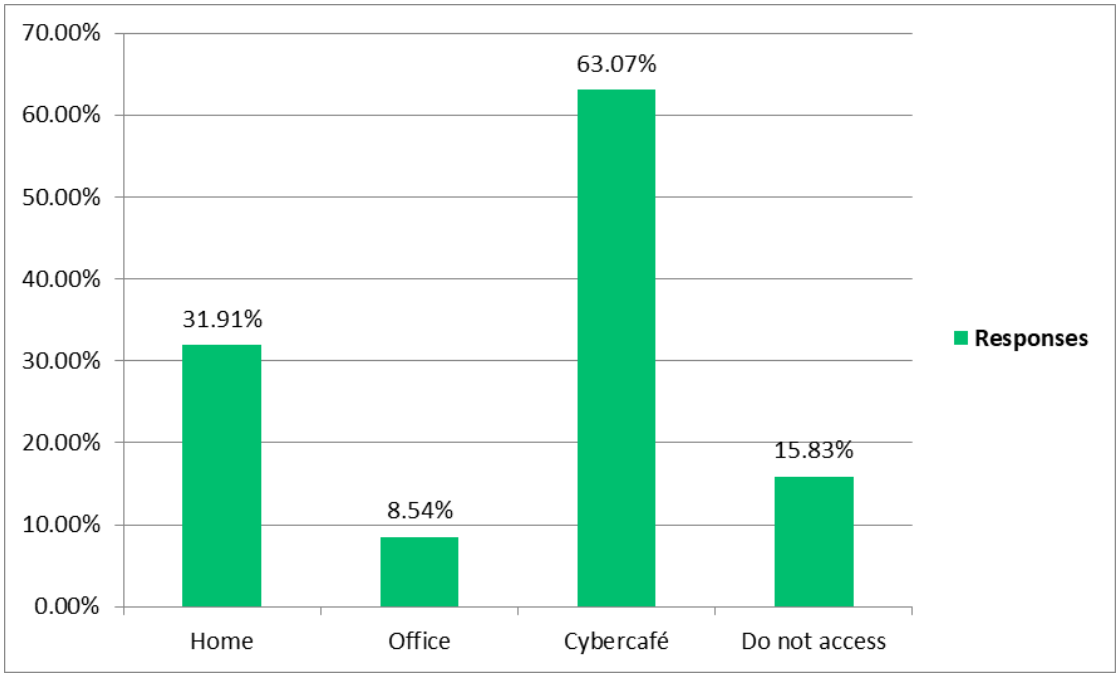

Figure 21. Where students access broadband Internet

Where students access broadband Internet at JOOUST

The highest number of respondents (88.12%) access broadband Internet at JOOUST in the university library, compared with 49.75% in labs and 22.28% in open areas (Figure 22).

Wi-Fi/wireless Internet connectivity at JOOUST

When asked whether they use Wi-Fi to access the Internet while on campus, 91% said yes and 8% said no (Table 26). Notably, 38 students skipped this question. Despite the overwhelmingly positive response, there is still a need to increase the wireless access points on campus so that all learners have access.

Frequency of accessing the Internet

Consistency of Internet access plays a major role in TEL implementation in any learning facility. An assessment of how frequently students use the Internet revealed that the majority do so daily (74.0%), followed by 10% on alternate days (Figure 23).

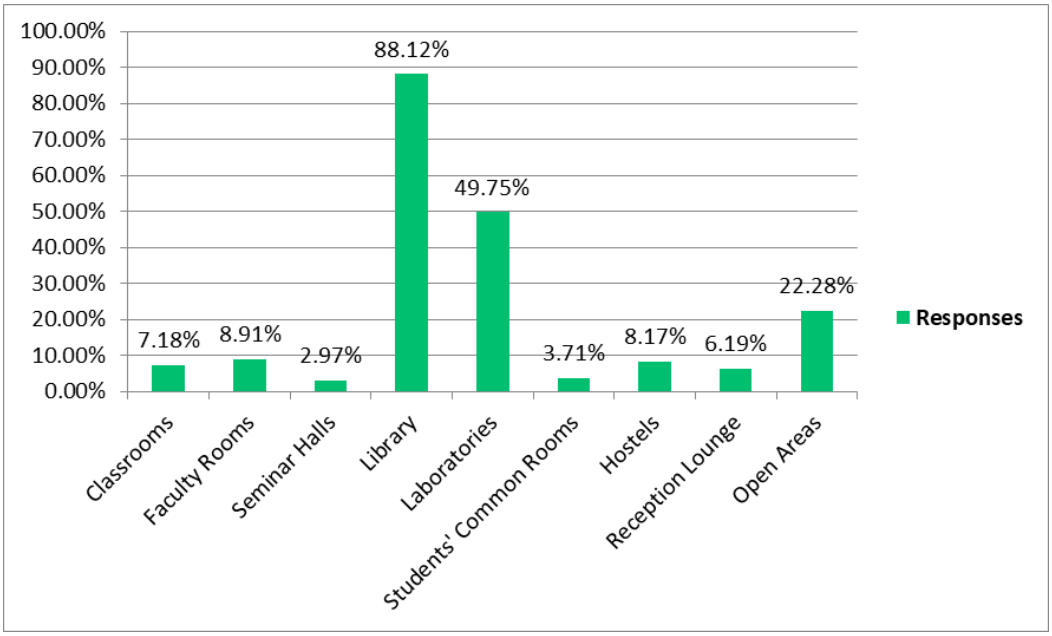

Figure 22. Access to broadband Internet at JOOUST

Table 26. Access to Wi-Fi/wireless connectivity at JOOUST

Answer Choices	Responses	
Yes	91.56%	358
No	8.44%	33
	Answered	391
	Skipped	38

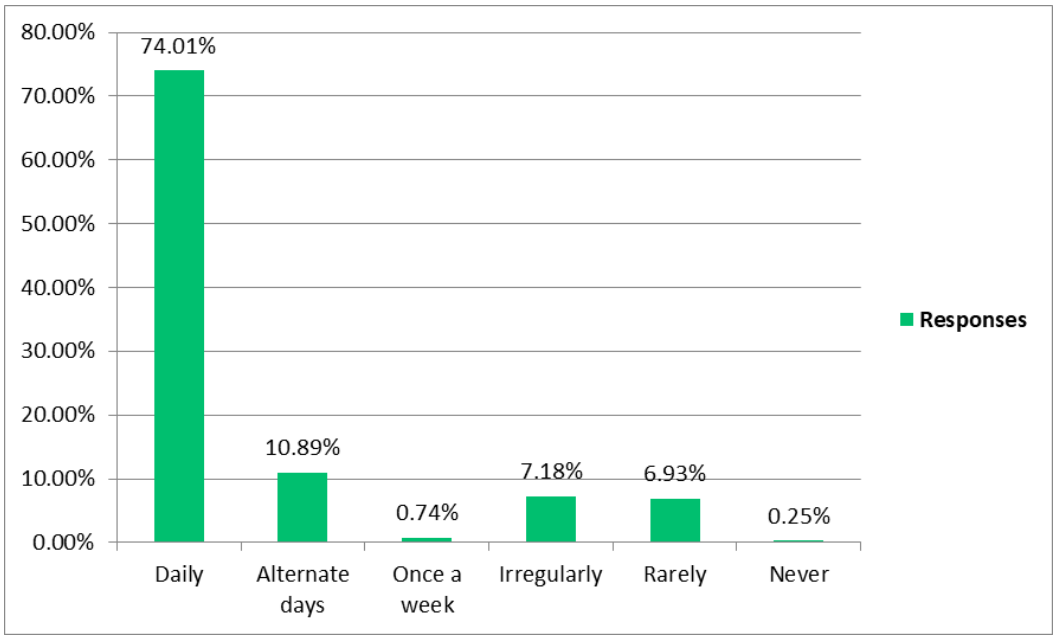

Figure 23. Frequency of Internet use

Time spent on Internet-related activities

Students and lecturers ofen use the Internet for TEL, so it is important to know how much time learners spend on Internet-related activities such as email, browsing and social media.

Students were asked how much time they spent on Internet-related activities; 30.94% indicated one to two hours, 29.46% more than five hours, 28.71% three to five hours, and 5.69% less than one hour, while 5.20% indicated they do not use the Internet daily (Figure 24). On average, students spent three to five hours daily on Internet-related activities.

A test of association based on Pearson chi-square between time spent on Internet-related activities and the year of study showed a strong association between the two, with a p-value of .002 based on a 95% confidence level. A computation of the average time spent on such activities based on the year of study revealed that year 3 students spent the most time on the Internet at 3.5 hours a day, while year 2 spent 2.8 hours and year 1 2.7 hours.

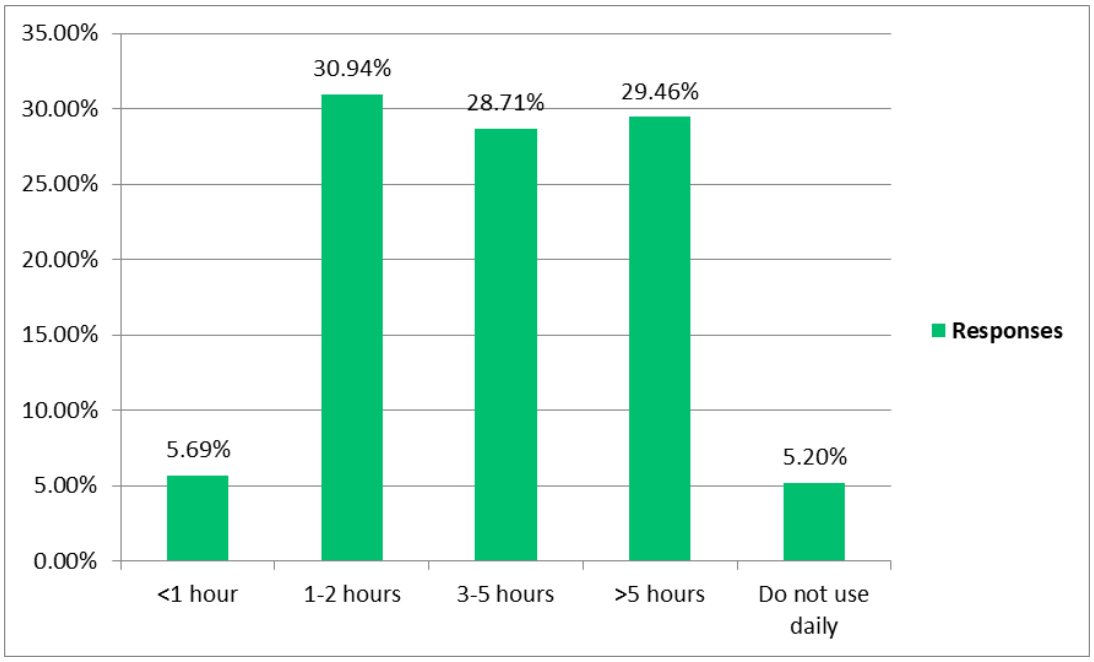

Figure 24. Time spent daily on Internet-related activities

4.2.3 Use of ICT

A probe to determine students' proficiency in computer-related technologies was vital, as it would indicate the level of training needed to successfully implement TEL at JOOUST. Students were asked to rate their level of expertise with various computer-related skills, using a Likert scale where 1 = I can't use it well, 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. Table 27 indicates that the majority of the respondents are expert email users and can comfortably use word processing software, search engines, spreadsheets, and presentation software; a few have graphic editing skills. Twenty-nine respondents did not rate their skills. The number of skilled students diminishes in the areas of multimedia authoring, graphic editing, video editing, learning management system use, and Web tools. Generally, the respondents have intermediate computer skills (mean weighted average = 1.71). This is promising, but effective TEL implementation requires consistent training in low-ranked areas.

Tests of association based on Pearson chi-square were done between selected applications and year of study. The results expressed a strong association between the year of study and proficiency in the use of word processors, presentation packages, email and search engines, with p-values of 0.004, 0.045, 0.038 and 0.004, respectively at a 95% confidence level. This was expected, as some of these applications are taught during the first year of study, and students' skills are expected to improve as they continuously use the applications for assignments. However, there was no association between the year of study and spreadsheet skills, indicating students rarely use spreadsheets in the course of their learning.

Table 27. Proficiency in computer-related skills

	I can't use it	I can use it to a small extent	I can use it satisfac-torily	I can use it well	I can use it very well	Total	Weighted average
Word processor (e.g., Word)	2.75%	20.25%	19.00%	24.75%	33.25%	400	2.66
Spreadsheets (e.g., Excel)	4.33%	31.55%	20.36%	22.90%	20.87%	393	2.24
Presentation (e.g., PowerPoint)	18.14%	28.97%	17.88%	15.11%	19.90%	397	1.9
Email	2.77%	6.05%	12.59%	24.43%	54.16%	397	3.21
Databases	15.42%	34.96%	19.54%	17.99%	12.08%	389	1.76
Multimedia authoring	44.42%	28.05%	13.77%	8.31%	5.45%	385	1.02
Graphic editing	40.00%	30.77%	14.87%	8.97%	5.38%	390	1.09
Digital audio	43.26%	26.17%	14.25%	11.92%	4.40%	386	1.08
Video editing	46.88%	26.04%	13.02%	10.68%	3.39%	384	0.98
Webpage design	29.27%	32.38%	21.24%	9.33%	7.77%	386	1.34
Learning management system	27.89%	31.58%	22.63%	12.37%	5.53%	380	1.36
Web 2.0 tools (wikis, blogs, social networks)	47.52%	19.32%	13.05%	10.44%	9.66%	383	1.15
Search engine	17.01%	11.08%	14.43%	24.23%	33.25%	388	2.46
Mean weighted average							**1.71**

4.2.4 Social Media

To determine their social media presence, students were asked whether they had accounts or profiles with social media websites and platforms; 95.45% said yes, 4% no. Hence, social media presence is definitely high among students and can be incorporated into the TEL environment.

A further question about the social media platforms used by students revealed that 95.05% were on Facebook, followed by Google+ (50.78%), among others, as shown in Table 28. It

is worth noting that fewer learners subscribed to research-sharing websites such as ResearchGate and Academia.edu.

Frequency of updating social media status

The majority (62.57%) of the respondents do not update their social media status frequently, 15.71% do it once a week, 10.99% once a day, 7.07% several times a day and 2.88% once a fortnight. A very small proportion (0.79%) do not update their social media status at all (Figure 25).

When asked how much time they spent daily on social media, 35.08% of the respondents indicated one to two hours, 26.96% three to five hours, and 12.04% more than five hours, while 15.18% said they do not use social media daily (Figure 26).

Table 28. Social media platforms used by students

Answer Choices	Responses	
Facebook	95.05%	365
Twitter	45.83%	176
Google+	50.78%	195
Blog (using Blogger or WordPress or within institutional website/CMS)	7.03%	27
SlideShare or similar presentation platform	7.03%	27
Photo-sharing sites (Instagram/Flickr/Picasa, etc.)	35.94%	138
Research-sharing sites (Academic.edu, Researchgate.net, etc.)	15.36%	59
Social bookmarking sites (Delicious, Scoop.it, Pinterest, etc.)	6.25%	24
Goodreads.com (for connecting with authors and readers) or similar	6.77%	26

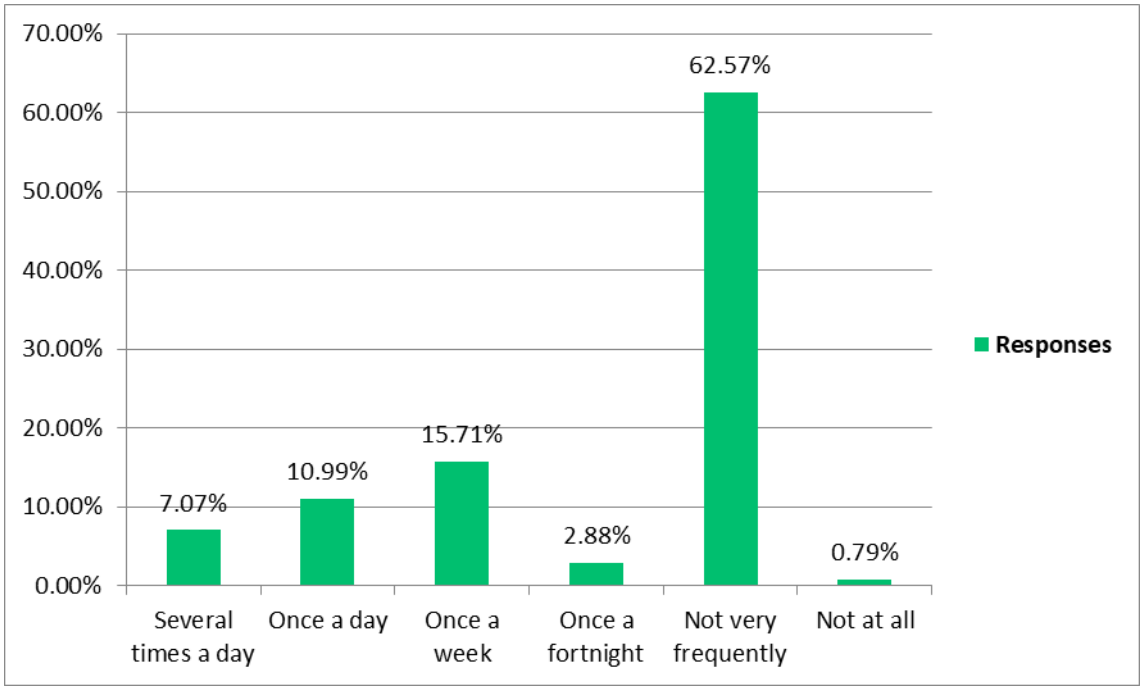

Figure 25. Frequency of updating social media status

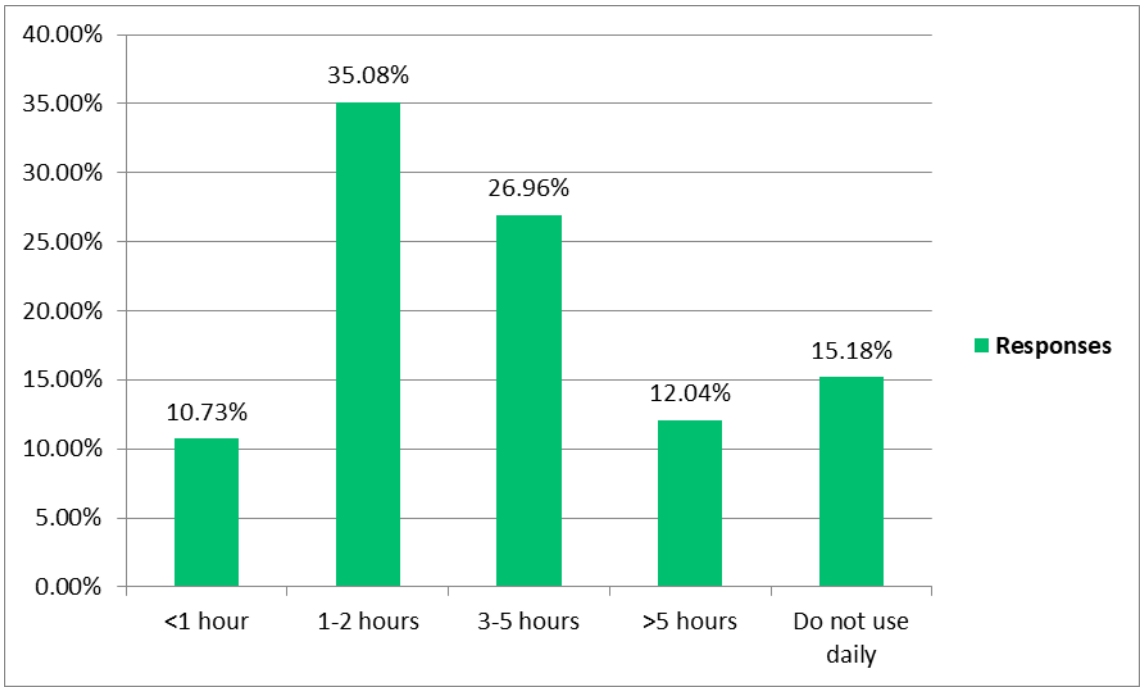

Figure 26. Time spent on social media daily

4.2.5 Mailing Lists and Discussion Forums

When asked whether they subscribe to discussion forums or mailing lists, 72.01% indicated no. When asked the number of mailing lists or discussion forums they subscribed to, 131

respondents answered, with 91.60% subscribing to between one and five email-based discussion forums and 8.40% to more than five. Asked whether they moderated discussion forums, 60% said yes, while 298 skipped the question. There is a need to sensitise students on the use of discussion forums if the Moodle LMS is to be used extensively in teaching and learning at JOOUST.

Students were asked how frequently they posted to discussion forums; the majority (51%) do not post frequently (Table 29). The high number that skipped the question may indicate that students are not aware of the availability and use of discussion forums.

Table 29. Regularity of posting to discussion forums or mailing lists

Answer Choices	Responses	
Several times a day	13.67%	19
Once a day	13.67%	19
Once a week	16.55%	23
Once a fortnight	4.32%	6
Not very frequently	51.80%	72
	Answered	139
	Skipped	290

4.2.6 TEL at JOOUST

Experiences with resources/services/spaces provided by JOOUST

The students were asked to rate their experiences with a number of resources and services provided by JOOUST. This was assessed using a Likert scale where 0 = not available, 1 = poor, 2 = fair, 3 = neutral, 4 = good, and 5 = excellent. The mean of the weighted average was 2.63 (Table 30), indicating that generally, students' experience with resources provided by JOOUST was above average.

A Pearson chi-square test was conducted to determine whether the year of study bore any relation to students' experiences with some of the facilities they often use at the university. There were no such significant relationships in their experiences with e-classrooms, network bandwidth or Wi-Fi. However, there was a significant association between the year of study and the experiences with computer labs, with a p-value of 0.004 at a 95% confidence level. Year 1 students' weighted average on the rating of the computer labs was highest at 3.5, then year 2 at 3.1 and year 3 at 2.8.

Table 30. Experiences with resources/services/spaces provided by JOOUST

	Poor	Fair	Neutral	Good	Excellent	Not available	Total	Weighted average
e-Classroom facilities (e.g., computers, projection systems, lecture capture systems, SMART boards, etc.)	113	92	31	93	45	13	387	2.75
Computer labs (for practical and Internet access)	70	109	40	107	62	2	390	2.97
Email services (institutional)	80	92	69	82	52	7	382	2.88
Learning management system (e.g., Moodle, etc.)	98	93	78	64	27	18	378	2.69
Network bandwidth/speed of Internet (download and upload)	117	92	55	76	38	4	382	2.58
Wi-Fi access	167	63	36	68	52	2	388	2.44
Online or virtual technologies (e.g., Network or cloud-based file storage, Web portals, etc.)	111	100	54	67	28	20	380	2.63
Access to software (e.g., MATLAB, GIS applications, statistical software, qualitative data analysis, graphics software, textual or image analysis programs, etc.)	140	87	52	60	25	18	382	2.47
Download and use of free and open-source software for teaching and learning	104	87	68	70	45	9	383	2.72
Support for	82	106	76	66	38	10	378	2.74

	Poor	Fair	Neutral	Good	Excellent	Not available	Total	Weighted average
maintenance and repair of ICT								
Access to data storage	78	96	74	72	41	12	373	2.83
Data visualisation software	122	94	55	49	30	17	367	2.51
Citation/reference management software	134	80	71	49	17	18	369	2.43
Plagiarism detection software	125	89	65	44	22	25	370	2.52
Institutional repository for sharing of research	98	97	72	51	31	22	371	2.69
e-Journals	91	95	67	78	36	12	379	2.76
e-Books	87	94	64	88	36	7	376	2.77
Citation databases	131	83	67	43	26	22	372	2.51
Bibliographic databases	143	73	67	44	23	23	373	2.46
e-Theses and dissertations	120	85	68	42	25	27	367	2.59
e-Proceedings of conferences	152	73	58	39	23	28	373	2.44
Statistical databases	111	77	74	58	29	27	376	2.73
Mean weighted average								**2.63**

4.2.7 Online Courses

When asked about online courses, 83.99% of the respondents had never taken one, compared to 16.01% who had. A Pearson's chi-square test revealed a relationship between owning a personal computer (desktop or laptop) and taking online courses. Among the 16% who had taken them, 70% owned personal computers. There was no significant association between taking an online course and having access to the Internet.

The learners were further asked whether they had taken a MOOC (Table 31); 279 skipped the question; of those who answered, 51.33% had not and did not know what a MOOC is.

Further inferential analysis was done to assess the factors that influence student participation in MOOCs. A new variable (mooc) was created such that moocs = 1 if a student had participated in a MOOC through an institution and mooc = 0 if otherwise. The effect was assessed with a number of variables, including gender, year of study, device access, Internet access, membership in discussion forums, and social media presence. Binary logistic regression was used; the statistically significant variables included gender and participation in discussion forums:

- Females are 20% less likely to participate in MOOCs than their male counterparts.
- Students who participate in discussion forums are 1.41 times more likely to participate in MOOCs than the reference group. This finding further indicates a need to encourage students to participate in discussion forums, especially those provided on the LMS.

Table 31. MOOC participation through an institution/organisation

Answer Choices	Responses	
No, and I don't know what a MOOC is.	51.33%	77
No, but I do know what a MOOC is.	18.67%	28
Yes, but I didn't complete it.	18.67%	28
Yes, and I completed it.	11.33%	17
	Answered	150
	Skipped	279

4.3 Perceptions of the Use of TEL

Learners were presented with a number of statements to assess their perception of the use of technology in learning. This was rated on a Likert scale where 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, and 5 = strongly agree. Table 32 shows that students have a very positive attitude towards the use of technology in their studies. All except one statement scored average or above average, which was 4.6.

Perceived usefulness of technology in studies

Learners were asked to rate how useful they think a number of technologies are for their studies, regardless of whether they had used them or not. A Likert scale was used where 0 = do not know, 1 = not at all useful, 2 = useful to a limited extent, 3 = neutral, 4 = useful, and 5 = very useful. Most of the technologies scored above average, which was 4.2 (Table

33). A comparison of the learners' perceptions based on their year of study revealed no significant difference among the groups.

Table 32. Perceptions of the use of TEL

	Strongly agree	Agree	Neither agree/ disagree	Disagree	Strongly disagree	Total	Weighted average
It will help me get better results in my subjects.	248	96	7	6	3	360	4.61
It will help me understand the subject material more deeply.	257	89	8	3	2	359	4.66
It makes completing work in my subjects more convenient.	242	103	7	6	2	360	4.6
It motivates me to explore many topics I may not have seen before.	260	90	7	1	2	360	4.68
It allows me to collaborate with others easily, both on and off campus.	242	98	13	3	4	360	4.59
It will improve my IT/information management skills in general.	273	79	4	4	3	363	4.69
It will improve my career or employment prospects in the long term.	264	83	9	3	2	361	4.67

Table 33: Perceived usefulness of technologies in studies

	Not at all useful	Useful to a limited extent	Neutral	Useful	Very useful	Don't know	Total	Weighted average
Design and build Web pages as part of your course requirements?	11	43	36	109	152	9	360	3.89
Create and present multimedia shows as part of your course requirements (e.g., PowerPoint)?	7	31	44	117	153	8	360	3.98
Create and present audio/video as part of your course requirements?	18	22	52	94	154	17	357	3.82
Download or access online radio/video recordings of lectures you could not attend?	8	25	21	81	222	1	358	4.34
Download or access online audio/video recordings to revise content of lectures you have already been to?	6	20	21	82	227	2	358	4.39
Download or access online audio/video recordings of supplementary materials?	5	19	29	91	210	4	358	4.31
Use the Web to access university-based services (e.g., enrolment, fee payment)?	5	14	18	61	247	6	351	4.46
Use your mobile phone to access web-based university services or information (e.g., enrolment, fee payment)?	6	17	14	54	256	7	354	4.46

	Not at all useful	Useful to a limited extent	Neutral	Useful	Very useful	Don't know	Total	Weighted average
Use instant messaging/chat (e.g., Skype, Messenger, Hangout, etc.) on the Web to communicate/collaborate with other students in the course?	7	16	23	85	219	8	358	4.31
Use a social media networking platform (e.g., Facebook) on the Web to communicate/collaborate with other students in the course?	6	18	20	102	202	7	355	4.28
Use microblogging (such as Twitter) to share information about class-related activities?	5	28	24	103	184	8	352	4.16
Keep your own blog as part of your course requirements?	15	25	35	81	177	17	350	3.94
Use instant messaging/chat (e.g., Skype, Messenger, Hangout, etc.) on the Web to communicate with teachers and administrative staff from the course?	10	20	22	90	207	4	353	4.28
Contribute to another blog as part of your course requirements?	18	33	35	92	163	14	355	3.86
Use the Web to share digital flies related to your course (e.g., photos, audio files, movies, digital documents, websites, etc.)?	9	14	23	96	205	4	351	4.32

	Not at all useful	Useful to a limited extent	Neutral	Useful	Very useful	Don't know	Total	Weighted average
Use Web conferencing or video chat to communicate/collaborate with other students in the course?	6	24	29	95	196	6	356	4.22
Receive alerts about course information (e.g., timetable changes, the release of new learning resources, changes in assessment) via RSS feeds on the Web?	9	16	11	68	244	9	357	4.39
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?	4	22	13	65	245	7	356	4.42
Contribute with other students to the development of a wiki as part of your course requirement?	9	21	23	86	206	11	356	4.2
Receive grades/marks from your lecturer via text message on your mobile phone?	10	13	21	66	239	6	355	4.39
Receive pre-class discussion questions from your lecturer via text message on your mobile phone?	8	17	20	69	239	4	357	4.41
Use a personal dashboard on the university intranet to access all your academic information related to courses, grades, etc.?	8	15	24	64	237	7	355	4.37

	Not at all useful	Useful to a limited extent	Neutral	Useful	Very useful	Don't know	Total	Weighted average
Use an e-portfolio system to record your achievements for future use beyond the course of your studies?	7	26	24	74	211	13	355	4.17

Effect of TEL on learners

Students were asked to react to a series of statements about the effects of using TEL. Responses used a Likert scale where 0 = do not know; 1= strongly disagree, 2= agree, 3 = neither agree nor disagree, 4 = agree, and 5= strongly agree (Table 34). The average score for the statement "I am more likely to skip classes when materials from course lectures are available online" is 2.3, indicating learners would not skip classes if materials were available online. Similarly, for the statement "Technology interferes with my ability to concentrate and think deeply about subjects I care about," the score is 2.3, again indicating that the respondents did not agree with this statement. Overall, there were positive responses to statements that indicated student learning would be positively affected by using technology in teaching and learning.

Table 34. Statements on how TEL would affect learners

	Strongly agree	Agree	Neither agree/ disagree	Disagree	Strongly Disagree	Don't know	Total	Weighted average
I get more actively involved in courses that use technology.	195	133	17	8	3	1	357	4.4
I am more likely to skip classes when materials from course lectures are available online.	22	55	40	131	107	3	358	2.3
When I entered college, I was adequately prepared to use the technology needed in my courses.	105	123	32	54	41	2	357	3.5

	Strongly agree	Agree	Neither agree/ disagree	Disagree	Strongly Disagree	Don't know	Total	Weighted average
Technology makes me feel connected to other students.	212	112	14	8	6	0	352	4.5
Technology makes me feel connected to teachers.	192	122	16	12	10	0	352	4.3
Technology interferes with my ability to concentrate and think deeply about subjects I care about.	28	40	47	149	83	6	353	2.3
I am concerned that technological advances may increasingly invade my privacy.	39	83	54	118	58	4	356	2.8
I am concerned about cyber security (password protection and hacking).	170	124	22	28	7	2	353	4.2
In-class use of mobile devices distracts my teacher.	82	124	64	48	26	3	347	3.5
Use of tablets/ laptops in class improves my engagement with the content and class.	85	112	38	85	23	3	346	3.4
Multitasking with my technology devices sometimes prevents me from concentrating on or doing the most important work.	66	119	59	75	31	3	353	3.3

	Strongly agree	Agree	Neither agree/ disagree	Disagree	Strongly Disagree	Don't know	Total	Weighted average
When it comes to social media (e.g., Facebook, Twitter, LinkedIn), I like to keep my academic life and social life separate.	159	98	30	45	17	4	353	3.9
I wish my university teachers would use and integrate more technology in their teaching.	230	95	18	4	8	1	356	4.5
Technology makes me feel connected to what's going on at JOOUST.	239	89	13	7	7	0	355	4.5
In-class use of mobile devices is distracting to me.	61	121	78	59	36	1	356	3.6

4.4 Open-Ended Question

The respondents were asked to comment on the statement: "There is a need to improve the technology-enabled learning in your university." One hundred respondents commented, with 100% agreeing that there was a need to improve the TEL environment at JOOUST. Areas mentioned included network bandwidth, increasing the number of wireless access points and having more devices in the labs. A conceptual content analysis was conducted on the responses, yielding a number of themes in the respondents' perceptions of the effect of an improved TEL environment. Thirty-one responses were weeded out, five because they went off topic after concurring with the statement and the rest because they concurred and mentioned areas that needed improvement, mainly Internet and device access. From the remaining, several themes emerged about their perceptions of what an improved TEL environment would mean for them. Below are the identified themes and some of the relevant responses.

Enhanced academic performance

This was mentioned by 19 respondents, who said learning would be easier and more enjoyable and would occur in a better environment; further, it would be easy to access academic resources and complete assignments, leading to better academic performance.

"Yes there is because when technology is improved the academic performance of the students will rise as they will do consultations online. more so access to wifi and free internet in the library and lecture halls."

"Yeah, there needs to be an improved technology in the university so as to steer up the learning and make some tedious procedures seem simple."

Skills enhancement

Improvement of TEL would help them acquire basic IT skills, which some respondents lacked. This theme emerged 16 times. Respondents felt that if they were encouraged to use TEL, their skills would improve. Some respondents believed that with sufficient devices, this improvement would assist them in their practical units.

> "Yes, there is need to improve the technology-enabled learning environment in our university because it enhances students skills on ICT."
>
> "I wish an improvement could be done as urgent as possible. Very many students lack basic computer knowledge and therefore there should be serious concentration on that."
>
> "Yes. most of the students in jooust are so much behind technologically which hinders them from interacting with other students online and share academic materials and ideas."

Research

Ten respondents linked improved technology with better research and the ability to undertake more research.

> "There is a great need to improve the technology use in our institution, much of the job market and exposure content is now found in the internet. The availability of Wi-fi in the school compound will help most students to do their assignments and research. Also the number of computers and ports available in the library, need to be increased, because it is quite a challenge to get access to internet services especially when having assignments, projects or research to do."
>
> "Improves research in various courses since some books in the library are outdated and hence promote good learning."
>
> "There should increased provision of these services to make us more equipped in the ICT knowledge and also to help us do our academic research."

Access to resources

Improvement of TEL would increase their access to both electronic academic resources and devices for using these resources. Ten respondents indicated this would improve the learning environment.

> "Technology should be improved to help students to get easy access to information on technology and also to help us with our academic research."

> "Yes this should be done as fast as possible to help us access these easily."

The IT component in their courses

A number of courses at the university have an IT component (e.g., Bachelor of Education with IT, Bachelor of Business Administration with IT). For eight respondents, improvements in TEL would help them meet their course objectives (i.e., the IT part of their courses).

> "Yes, there is a need because most of courses done in the university are IT related. Therefore, with IT learning is made simpler."

> "Indeed there is need. If not all, majority of courses offered at the university are done alongside IT and therefore emphasis should be put on the sector of informatics and innovation systems."

> "There is need for improvement as this is the only way we can access IT related products as stipulated in the admissions letter we were given which indicate that we do a course with IT."

Exposure

Nine respondents commented that improvements in TEL would help expose them to technology and keep them abreast of what is being used in the outside world. Among these respondents, one indicated that this exposure would increase his marketability in the job market.

> "Indeed there is. This is due to the fact the number of students in the university is big in response to facilities available and this can try to eradicate congestion, expose students to modern technology and also make learning easier."

> "There is need to improve on Technology so as to help us compete favorably with the rest of the world."

> "Use of technology-enabled learning environment in the university is very useful as majority of learners if not all will be exposed to information technology and as a result be at per with the technologically advanced society."

Summary

Students are very optimistic about TEL implementation at JOOUST, with the majority of them indicating that enhanced digital skills would help them use technology for learning. Like the teachers, they also indicated areas for improvement at JOOUST, including better network access, greater Internet bandwidth, and more training in computer-related skills such as multimedia authoring, graphic editing, digital audio, video editing, webpage design, learning management systems, and Web 2.0 tools. It is significant that most JOOUST learners are digital natives and use technology to a large extent in their day-to-day lives. Using technology for teaching and learning at JOOUST would help them be better learners, prepared for the challenges of the 21st century.

Chapter Five: Conclusions and Recommendations

As revealed by the baseline study, JOOUST needs to improve its TEL infrastructure to accommodate both traditional students and the ODeL mode it is in the process of introducing. The majority of higher education students still study in person at conventional institutions, but a growing proportion do so wholly at a distance, and a "traditional" student experience is increasingly a blend of conventional methods and new technology (Latchem, 2016). JOOUST therefore needs to adopt TEL as an effective and efficient mode of delivering quality education to an expanded student population, both traditional and distance. Moreover, it is important to note that TEL implementation also envisages that teachers at JOOUST will use ICT effectively for teaching their existing courses.

Both students and lecturers have a positive attitude towards TEL. This signals that TEL implementation will be embraced by many. As seen in their comments, both learners and faculty feel TEL is long overdue.

To cater to both on-campus and distance students, JOOUST will have to develop digital resources. The development of digital resources is likely to require input from specialists with pedagogic, design and media expertise, so there is a need to build capacity in these areas. JOOUST especially needs to focus on setting up a digital content creation facility for teachers to use.

For lecturers, the strongest barriers to using TEL are lack of training and poor Internet access and networks. JOOUST needs to conduct training in the use of TEL more frequently, given that it wants to introduce blended learning. Training on proficiency in the use of common applications and the development of media-rich electronic content to enhance teaching and learning is essential. The institution needs to increase Wi-Fi access in faculty rooms and other areas where faculty spend time. A number of lecturers did not know that there was Wi-Fi within the institution. JOOUST also needs to increase the number of e-classrooms.

The university's ICT policy has a few sections that touch on TEL. However, these do not address TEL sufficiently, so the institution needs to develop a comprehensive TEL policy to guide TEL implementation at JOOUST. The policy should be widely circulated to create awareness among teachers and students.

Many of the teaching staff are uninformed about OER and MOOCs. There is a need to create awareness on the availability and use of OER in teaching and learning. OER can be used to reduce the costs associated with instructional materials and to better utilise teacher time. JOOUST also needs to increase its visibility by creating openly licensed course content and course packs that can be shared with the world as OER.

Despite JOOUST having a learning management system, many students and lecturers have no experience in using it. The majority of the students who completed the questionnaire were full-time, on-campus students with little knowledge of the blended mode of study. The majority of the lecturers did not teach any online or blended courses. Lecturers need to be encouraged to use the learning management system for their on-campus students.

Considering the current opportunity to receive support from COL, JOOUST should develop a strategy and timeline for integrating ICT into 50% of its courses, as outlined in its Strategic Plan for 2016/17 to 2020/21.

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