COMMONWEALTH of LEARNING

Report of the Baseline Study on Technology-Enabled Learning at the National University of Samoa

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COMMONWEALTH *of* LEARNING

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.

This report was prepared by Ioana Chan Mow on behalf of the National University of Samoa under the guidance of Dr. Sanjaya Mishra, Education Specialist, eLearning, Commonwealth of Learning, Canada.

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Executive Summary

The baseline study on which this report is based has provided some very valuable information about the technology infrastructure at the National University of Samoa (NUS), as well as the perceived skill levels, attitudes and perceptions towards technology-enabled learning (TEL) of the university's lecturers and students. The following summarises the findings and recommendations:

- NUS is in the early stages of TEL, with some improvements needed in its technology infrastructure and support services.
- In terms of skill levels, staff and students were quite proficient in common applications such as word processors, spreadsheets and email. However, in advanced information and communication technology use for teaching and learning, further capacity building for teachers and orientation for learners are needed to make the environment more creative, engaging and learning centred. Teachers also need more training in the use of open educational resources (OER) and NUS's learning management system (LMS).
- In terms of attitudes towards TEL, staff and students showed very positive attitudes towards the use of technology in teaching and learning. Staff and students obviously knew the value, potential uses and benefits of technology. Responses also showed overwhelming consensus on the need to develop a TEL policy for NUS.

Based on the findings, the study identified several implications and recommendations for the university:

- There is a need to improve the infrastructure at NUS in terms of Internet access, LMS provision and facilities for creating digital resources for teaching and learning.
- There is a need to develop a policy on TEL to guide the development of TEL at NUS.
- There is a need for training staff and students in the use of technology. Continuous capacity building for teachers is important to effectively integrate TEL in courses offered by NUS.
- Enhancing NUS's infrastructure and its staff's and students' skills in TEL has potential benefits for improving the quality of the teaching and learning environment, as well as expanding access to NUS courses through the use of TEL in open and distance learning.
- Creating online courses and making these available with open licences would also help the university be more visible as a knowledge creator and leader, particularly in specialised areas of the university.
- The university administration should focus on the development and implementation of a TEL policy and allocate adequate resources to make it operational.

1. Introduction

In January 2017, the National University of Samoa (NUS) signed a Contribution Agreement with the Commonwealth of Learning (COL) whereby COL will provide support to NUS for undertaking a systematic approach to institutionalising technology-enabled learning (TEL), through research, consultation, capacity building, monitoring and evaluation. TEL is a new initiative introduced by COL as part of its Strategic Plan for 2015–2021. The interventions planned under the TEL initiative aim to enable educational organisations to "adopt policies and strategies for, and devote resources to, technology-enabled learning for innovation and skills." Under the NUS TEL project, the main activities to be implemented are:

1. conducting a baseline study in the institution by undertaking a survey of teachers' and students' ICT use;
2. conducting a policy review and infrastructure audit (PRIA) in the institution;
3. developing and adopting a policy for open and distance learning (ODL) and TEL;
4. developing an implementation plan and budget for ODL and TEL; and
5. conducting capacity building for implementing TEL and ODL.

The overall objective of this collaboration is to implement TEL at NUS to improve student engagement and learning through the effective use of information and communication technologies (ICTs). This report documents the findings of the first two activities — the baseline study of teachers' and students' ICT use, and the NUS infrastructure review and audit.

1.1 The Importance of Technology-Enabled Learning

The Samoa National ICT Strategic Plans of 2003, 2008 and 2012–2017 (Ministry of Communications and Information Technology, 2003, 2008, 2012) all affirm the importance of ICT in education for building capacity at the national level. At the sectoral level, the Education Sector Plan 2013–2018 (Government of Samoa, 2013) states that one of its sub-goals is to "continue roll-out of professional development for ICT integration in curriculum implementation for primary and secondary teachers."

The Ministry of Education, Sports and Culture (MESC) in its ICT plans of 2002–2003 and 2005 (Ministry of Education, Sports and Culture, 2002, 2005) and the ensuing MESC strategic and corporate plans also emphasises ICT development. The 2013–2015 MESC Corporate Plan's Objective 4 prioritises the improvement of information and communication standards. Objective 5 includes the improvement of ICT services for MESC and all schools by: strengthening ICT human resource capacity; utilising appropriate ICT for asset management and the management and maintenance of MESC's website; upgrading data centres and infrastructure; and extending Schoolnet centres to all schools (MESC, 2013). All these improvements in standards, infrastructure and capacity aim to provide a highly competent, up-skilled, ICT-literate workforce and, ultimately better ICT services.

The NUS Corporate Plan 2017–2020 (NUS, 2016) — as part of Pillar 2, Teaching and Learning, under Strategic Objective 3, Activity 2.3.1 — states the need to "develop creative learning spaces and ICT to support and drive pedagogy." Key indicators for this area include:

1. one course delivered by distance and flexible learning from each faculty;

2. digital library/eLearning established and working efficiently;
3. increase in number of students and teachers using virtual classrooms;
4. digitisation of all course notes; and
5. increase in number of staff competent in using virtual classrooms.

Pillar 4, Infrastructure and Resources, covers the following:

1. Strategic Objective 1, Activity 4.1.8: the replacement of traditional boards with interactive smartboards for teaching.
2. Strategic Objective 2: the need to improve the quality of facilities and level of access to state-of-the-art technology for both staff and students. Activities under this objective include:
   - access to scholarly websites; and
   - utilisation of available open educational resources (OER).[1]

From the emphasis placed upon the use of technology for teaching and learning at both national and institutional levels, it is clear that there needs to be a structured approach to ODL and TEL. It must be noted that such initiatives and the use of TEL at NUS are not new; there have been quite a few initiatives in the use of technology at NUS, dating back to the 1990s. These include: wiki-educator workshops; the Asia Pacific Initiative programme, delivering online courses in environment, disaster and waste management; instructional design workshops using a selection of technology tools; and Moodle classrooms (Chan Mow, Kruse, Thomson, Pasiale, & Taupo, 2017). ODL is now a priority both within the education sector and at NUS, with NUS now offering courses via ODL in adult teaching (Certificate Adult Teaching) and education. However, these initiatives have not been structured as part of an overall framework, and they require co-ordination under an ODL policy and implementation plan.

It is fortunate that COL has come forward to provide NUS with its valuable assistance to achieve a structured approach via the TEL project. This structured approach takes the form of: (i) a baseline study on teachers' ICT use; (ii) a baseline study on students' ICT use; (iii) a baseline study on the PRIA at NUS; (iv) the development and adoption of a policy for ODL and TEL; (v) the development of an implementation plan and budget for ODL and TEL; and (vi) capacity building for implementing TEL and ODL. The details of these activities are articulated in the COL TEL handbook (Kirkwood & Price, 2016) which prescribes the theoretical underpinning and methodologies for these activities. The present report focuses on the baseline studies conducted on lecturers and students, and the infrastructure audit.

Together, the objectives of the three baseline studies were to:

1. analyse the access to and use of ICTs by teachers and learners;
2. examine teachers' and learners' perceptions about the use of TEL; and
3. analyse the extent to which teachers use ICTs for research and scholarship.

[1] See http://doer.col.org.

2. Methodology

The baseline investigation of TEL at NUS consisted of three survey instruments:

1. Survey of lecturing staff.
2. Survey of students.
3. Infrastructure audit.

The online questionnaires provided by COL were printed out for data collection. Research assistants recruited from the Faculty of Science administered the staff and student surveys and entered the data into the Survey Monkey online system. Upon completion of data entry, data in Excel format were then generated and made available by COL to the NUS research team for export to SPSS for data analysis.

2.1 The Survey Instruments and the Participants

Questionnaires for the baseline study were taken from the *TEL Implementation Handbook* (Kirkwood & Price, 2016) provided by COL. For staff, surveys were distributed to all of the 169 teaching staff. For the student survey, a stratified sample of 366 students was obtained. The strata were based on the proportions of enrolments in the university's Centre for Samoan Studies and six faculties. The numbers of students from the various strata are presented in Table 1.

Table 1. Stratified Sample for Student Baseline Survey

Faculty/Centre	Returning Student Enrolments	Number of Students in Stratum
Centre for Samoan Studies	101	7
Faculty of Applied Science	1,406	102
Faculty of Arts	502	41
Faculty of Business and Entrepreneurship	1,362	99
Faculty of Education	931	68
Faculty of Medicine	95	9
Faculty of Science	525	40
Total	4,922	366

Participation in the survey was restricted to returning students, as it was felt that since the survey was being implemented early in the semester, new students would not have enough time to become familiar with technology services available within the university. Of the 169 surveys distributed to staff, 108 were returned, yielding a reasonable response rate of 63.9%. Of the 366 surveys distributed to students, 332 were returned, yielding an excellent response rate of 90.7%.

3. Results and Discussion

The results of these three surveys are presented in three sections: (i) the policy review and infrastructure audit at NUS, (ii) the findings of the teacher/lecturer survey, and (iii) the results of the student survey.

3.1 Policy Review and Infrastructure Audit at NUS

3.1.1 About the University

The National University of Samoa[2] was established in 1984 and comprises six faculties (Applied Science, Arts, Business and Entrepreneurship, Education, Medicine, Science) and two main centres (the Oloamanu Professional Development Centre and the Centre for Samoan Studies). The university has three campuses:

1. The main Vaivase campus.
2. The Motootua campus, which houses the Faculty of Medicine.
3. The Mulinuu Ocean campus, which houses the School of Maritime Training and the Marine Research Centre.

There are currently 3,393 students enrolled across these six faculties and two centres. Staff consists of 237 academic and research staff and 150 support and non-academic staff (NUS, 2017). As a public tertiary institution, NUS offers undergraduate and postgraduate programmes across its faculties and centres, with community and professional development courses offered through its professional development and short-term training centre, Oloamanu.

3.1.2 The TEL Environment

An audit of hardware availability recorded 527 computers, 60 tablets and 250 laptops in the university. A fibre-optic backbone connects all the buildings on the main campus. Broadband Internet connectivity is provided 24/7 to all staff and students, with Internet available in the library, the eight computer labs, conference rooms and all staff offices. Internet connectivity is provided through paid services from Digicel Samoa, a private ISP provider, and offers a bandwidth in excess of one gigabit per second as well as unlimited downloads. Despite continuous attempts by NUS management to increase the available bandwidth, Internet access is still quite slow during peak hours, exacerbated by increasing student numbers. Wi-Fi services are also available in certain areas, such as the library, the conference room and the Samoan fale.[3] NUS filters the online content available to students, with restrictions to prevent excessive downloading of content and downloading of any adult or otherwise inappropriate content. NUS has an official Facebook page, thereby ensuring an online presence in social media. There are currently no e-classroom facilities, no facilities for disseminating audio-visual content and no content-sharing platform. There is no institutional video channel, but the School of Journalism has recently instituted a radio broadcasting station.

Open Educational Resources

Although NUS courses use OER such as those provided by COL, NUS currently does not have a formal repository of OER. As part of its ODL initiatives, NUS has assigned funds for the creation of an OER database. OER development is still in its early stages, and there is a need for awareness and recognition of Creative Commons licensing in OER creation and dissemination.

[2] http://www.nus.edu.ws/s/index.php

[3] The Samoan native house is called a fale. The Samoan fale at NUS is its convention centre for hosting university functions.

Online Courses

NUS is in the early stages of designing online courses. However, as mentioned earlier, NUS has participated in online programmes, such as the Asia Pacific Initiative (API) programme put together by a consortium of seven universities in the Asia-Pacific region to offer courses in the areas of environment, disaster, food security and waste management. The Faculty of Medicine has also had courses delivered online through Elluminate and is currently trying to revive this delivery mode (Chan Mow et al., 2017).

Other ICT-related services available at NUS include the following:

1. eight computer labs;
2. the Moodle LMS,[4] available on the NUS intranet;
3. Google sites and Google classrooms;
4. repair and maintenance;
5. plagiarism detection software (Turnitin is used in postgraduate-level programmes);
6. access to data storage on shared drives on the university network through staff and student accounts;
7. free Wi-Fi access in the library and upon request for conferences and workshops;
8. email for all staff and students, with 5Mb storage space;
9. access to software (teachers and students have access to the Microsoft suite, Mozilla Firefox and Google Chrome);
10. EBSCO-hosted online journals;
11. Sage journals; and
12. online databases,[5] such as HINARI, TEEAL, OARE, ARDI and TePuna.[6]

Training in TEL

With the recent focus on ODL, NUS is now offering staff an increasing number of workshops on the use of technology. Workshops on instructional design include the creation of presentations using PowerPoint with features such as animation and narration, as well website design, principles of design, and other related topics. Workshops on technology use include the use of Google sites, Moodle, the Aptus device, file-sharing applications and other subjects. Training workshops are usually offered to faculty members throughout the semester. In 2017 so far, approximately 60 staff have had training in technology skills for ODL.

Policy Issues for TEL

The university has a policy and regulations for the use of ICT in teaching and learning, regarding what technologies can be used. The NUS Corporate Plan contains strategies for TEL. NUS also has policies on plagiarism and for privacy and data protection. However, the university has yet to develop policies for the use of OER and TEL.

[4] http://10.10.1.17/moodle/
[5] http://www.nus.edu.ws/s/index.php/library/online-databases
[6] https://tepuna.on.worldcat.org/discovery

There is a schedule of works for the repair and maintenance of ICT by the university's ICT division, managed and co-ordinated through SpiceWorks[7] software.

3.1.3 Institutional Preparedness for TEL

Policy

NUS currently does not have a TEL policy, and this baseline study is part of the process to develop one. Despite this, there is a keen awareness within the university of the benefits of technology, and there is a definite commitment by institutional leaders to the use of technology to achieve NUS's academic goals (please see the Introduction).

Strategic Plan

NUS currently does not have a separate strategic plan for implementing TEL, and this is one of the proposed activities and outcomes of the present project. Under the TEL implementation project, there will be a workshop for the development of an NUS TEL policy, to be followed by a second workshop to develop capacity building for TEL implementation. However, the university's strategic plan, corporate plan and annual management plan do contain strategies for using TEL to support teaching and learning. As mentioned in the Introduction, the NUS Corporate Plan includes strategies for integrating technology into teaching and learning as well as for improving university's infrastructure. Offering courses by distance to students on Savaii Island in niche areas such as education and continuous professional development is a priority, making the need for TEL even greater.

IT Support Department

NUS has an ICT division, which handles the procurement, installation and maintenance of technologies for teaching and learning. There is an ICT policy, implemented mainly by the ICT division with advice from the NUS ICT Committee. The Director of ICT Services reports to the Vice Chancellor through the Deputy Vice Chancellor of Corporate Services and is responsible for the overall functioning of the organisation's technology. The Director of ICT Services is adequately qualified and up to date to manage NUS's technological requirements.

Technology

There is an adequate hardware infrastructure for teaching and learning insofar as NUS has adequate computers for its computing classes (312 computers in eight computer labs). However, budget constraints mean there is insufficient access to computers for academic support with student assignments and student research. Currently, students can do assignments and research in the library with its 15 computers. There is adequate software for teaching and learning in terms of access to the Microsoft suite, JBuilder, AutoCAD, Moodle, Google sites, etc. However, there are issues with accessing research tools such as SPSS and EndNote due to licensing costs. Protecting organisational data has been an issue in recent times, with virus intrusions despite there being policies and procedures in place to protect privacy and data. Clearly, this area requires attention.

Content

Over the years, COL through its Virtual University for Small states of the Commonwealth (VUSSC) has offered workshops on instructional design using a range of tools, including WikiEducator and Basecamp, particularly regional workshops (boot camps) in content areas such as disaster management, maritime training and fisheries. There is some form of support (increasing in recent times) available at NUS for creating digital multimedia content such as PowerPoint slides with animation and narration, constructing websites and using the Moodle LMS. These workshops are offered in the computing department of the Faculty of Science by lecturers with expertise in instructional design. This training supplements the work of instructional design specialists at the

[7] https://www.spiceworks.com/

Oloamanu Professional Development training centre, who offer workshops on instructional design, focusing on print-based content. There have also been trials in the use of the Aptus — an innovative device invented at COL (www.col.org/Aptus) — to provide offline access to quality OER. These trials, conducted by an NUS team at NUS and selected primary and secondary schools, were highly successful, and NUS is now moving to mainstream the Aptus. Due to issues with procuring the Aptus hardware, NUS has now successfully migrated the contents of the Aptus onto Raspberry pi mini computers. This successful migration means that teachers can load teaching resources onto a Raspberry pi computer and take them to classrooms, providing access to teaching and learning materials without having to be in a computer laboratory. This move will also reduce paper use.

Documentation

A variety of help is available to lecturers and students for using technology effectively. However, there is limited documentation on lessons learnt in the implementation of TEL stored and shared within the university. This is an important recommendation for the way forward. It is the hope that with the establishment of an NUS TEL policy and implementation plan, there will be documentation of lessons learnt, as well as workflows and responsibilities for implementing TEL.

Organisational Culture

In recent times, NUS staff have shown increasing interest in learning new technologies. Faculty and staff support each other as best they can despite resource and funding limitations. There is a culture of knowledge creation and sharing within the university through workshops, seminar series and conferences.

Leadership

NUS leaders are involved in the implementation of TEL by instituting ODL as a focus area, encouraging staff to attend technology workshops and leading the move towards online learning through adapting courseware for online delivery modes. Once TEL is institutionalised, senior management will need to regularly review and monitor progress in the implementation of technology-enabled initiatives. The top leadership of the university is supportive of TEL and has provided encouragement and motivation to faculty and staff to achieve their academic goals. This is manifest in the Vice Chancellor's move to procure affordable bandwidth from the new Tui Samoa submarine cable to ensure adequate bandwidth for the university's technology requirements.

Human Resources and Training

The level of skills and expertise of staff in using technology will be discussed in the section on the findings of the staff survey. Over the years, COL has offered staff at NUS a variety of workshops on instructional design and technology use. As mentioned earlier, there recently have been more workshops for technology up-skilling in staff. Most of the training in TEL has been offered by computing staff in the Faculty of Science as well as ICT staff in the ICT services division. The staff of the computing department and ICT division are highly capable in delivering much-needed technology skills for university staff. With the formalisation of TEL through the establishment of policies and an implementation plan, this should provide a structure within the university to enable the creation of teams for TEL content development and delivery.

TEL Champions

Within the university there are early adopters of TEL across faculties but mostly within the computing department. Some faculty members at NUS are committed to taking the lead in developing appropriate TEL policies and strategies. The computing staff at NUS have led the way in researching and trialling innovations such as the use of the Aptus device (www.col.org/Aptus), Moodle, Raspberry pi computers, Drone applications and Arduino technology.

Overall Score for TEL Preparedness

The overall score for preparedness in TEL, based on a review of the above points as per the score sheet provided in the *TEL Implementation Handbook* (Kirkwood & Price, 2016), is 119. This score was generated by tallying the scores/values allocated to each response to the questions in this part of the survey, and it indicates the following about NUS:

> Score 95–129: Developing preparedness. The institution has put in place some of the aspects of a Technology-Enabled Learning system, policies and infrastructure, and is in the process of developing a robust system.

3.2 Survey of Teachers' Use of Technology for Teaching and Learning

3.2.1 Demographic Information for the Respondents

Lecturers from all three campuses were surveyed, and 106 teachers responded to the survey, of which 45 were male (43%) and 58 were female (57%). Respondents in different age groups were fairly evenly distributed, with the highest percentage in the 46–50 age group (16.98%); figure 1 presents the age-wise distribution of the respondents. The majority of the respondents were lecturers (83.96%). Figure 2 presents the position-wise distribution of the faculty in the sample. In terms of the surveyed teachers' qualifications, nine hold a PhD, 36 hold a master's, 46 hold a bachelor's and 14 hold diplomas. Figure 3 presents the distribution of faculty by their qualification.

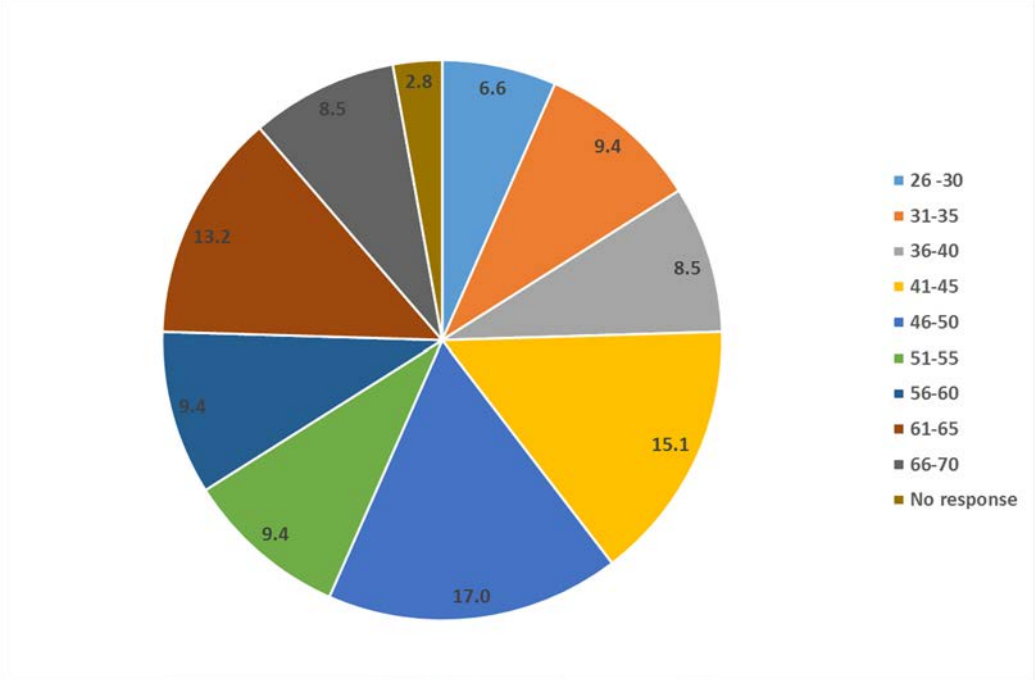

Fig. 1. Age groups of respondents

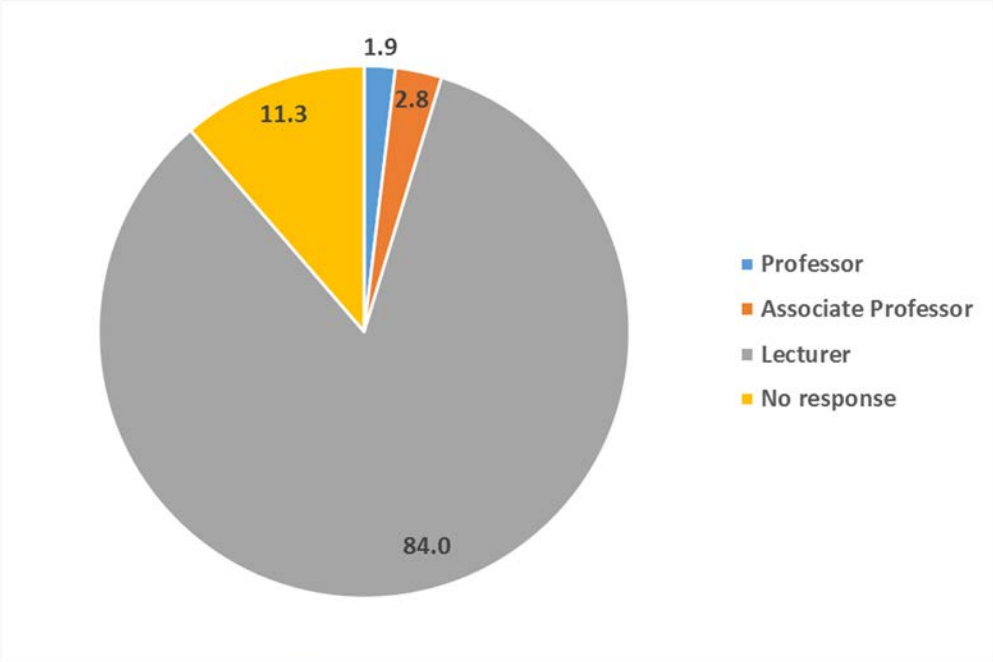

Fig. 2. Distribution of respondents according to position

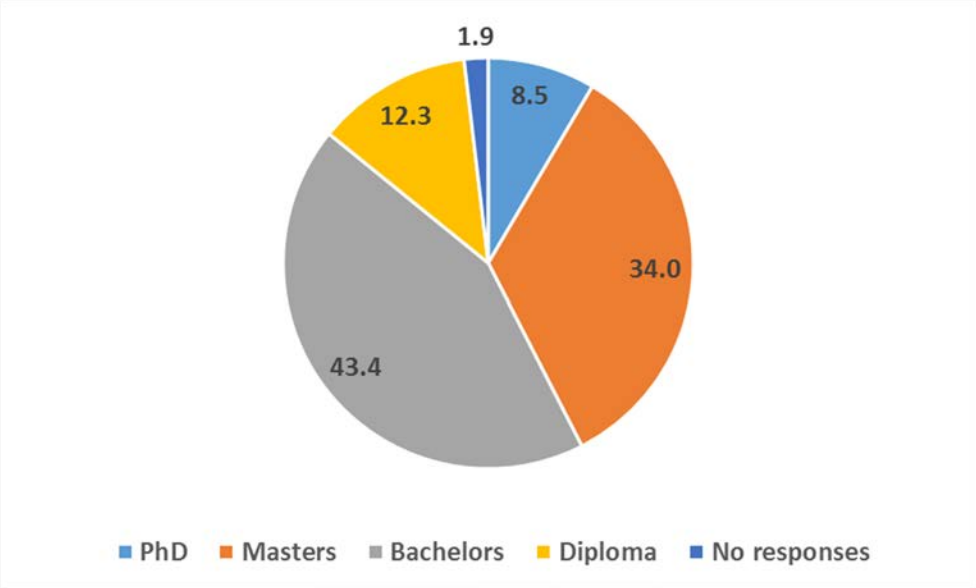

Fig. 3. Distribution of respondents by qualification

The majority of respondents were primarily involved in teaching undergraduates (62.6%), followed by 13% teaching graduates and postgraduates and only two per cent involved with doctoral research.

About 51% of the respondents had less than ten years of teaching experience, whilst ten lecturers in the sample had over 30 years of teaching experience. Table 2 shows the distribution of respondents by discipline, whilst Table 3 shows the distribution by university faculty.

Table 2. Staff Distribution by Discipline

Discipline	Number	%
Humanities	4	3.8
Social Sciences	5	4.7
Commerce and Management	21	19.8
Health and Medical Sciences	10	9.4
Natural Sciences	12	11.3
Engineering and Technology	36	34.0
Agriculture and Natural Resources	2	1.9
Maritime Studies	5	4.7
Missing	11	10.3
Total	106	100

Table 3. Staff Distribution by Faculty

Faculty/Centre	Number	%
Centre for Samoan Studies	4	3.8
Faculty of Applied Sciences	25	23.6
Faculty of Arts	3	2.8
Faculty of Business and Entrepreneurship	21	19.8
Faculty of Education	8	7.5
Faculty of Medicine	3	2.8
Faculty of Science	37	34.9
Missing	5	4.7
Total	106	100

3.2.2 Access to and Use of ICTs

Ownership of Devices

Ownership of technology devices is crucial for accessing valuable resources for TEL. The survey indicated that the majority of the respondents (87%) owned laptops, followed by 52% also owning desktops. Very few respondents had tablets and smartphones, but 36% of the respondents indicated that they planned to purchase smartphones in the next 12 months and 23% planned to purchase tablets in the same time frame (Table 4).

Table 4. Ownership of Devices by Respondents

Devices	Yes	No, I plan to buy one in the next 12 months	No, I do not plan to buy in the next year
Desktop computer	55 (52%)	7 (7%)	22 (21%)
Laptop	87 (82%)	8 (8%)	5 (5%)
Smartphone	7 (7%)	38 (36%)	7 (7%)
Tablet devices (e.g., iPad)	11 (10%)	24 (23%)	8 (8%)

Access to Devices at the University

Practically all of the respondents surveyed have access to desktops at the university, with 63% having access to laptops and 11% to tablets (Table 5). This is a good indicator in terms of access to technology for use in ICT-enabled teaching practices. The use of personal devices in the university was mostly confined to laptops, smartphones and tablets. While NUS currently has no policy banning the use of devices on campus, there seemed to be some misunderstanding about what

the university allows. However, for security reasons, NUS does not allow personal devices to be connected to the university network.

Table 5. Access to Devices at the University

Devices	Yes, provided by the university	Yes, I use my personal devices in the university	No, my university does not allow me to use these
Desktop computer	100 (94%)	2 (2%)	0 (0%)
Laptop	67 (63%)	26 (25%)	2 (2%)
Smartphone	7 (7%)	38 (36%)	7 (7%)
Tablet devices (e.g., iPad)	11 (10%)	24 (23%)	8 (8%)

Access to the Internet

Internet availability is vital for accessing the wealth of online educational resources. Hence, that all respondents have access to the Internet is a positive sign. The majority of teachers access the Internet at the office (64%), with 33% accessing it from home. Very few (3%) use cybercafés (Figure 4). Internet access by teachers is mostly through dialup connections and mobile devices (see Figure 5).

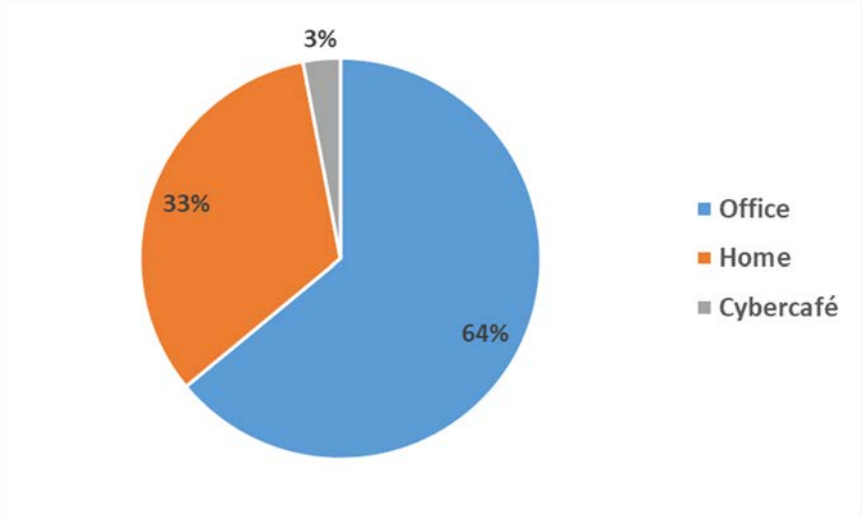

Fig. 4. Access to the Internet

An evaluation of what devices staff use frequently to access the Internet indicated that the majority of teachers use desktop computers (57.7%), followed by smartphones (25.5%) and laptops (15.1%), with the least number accessing it through tablets (Figure 6). There was some misunderstanding in response to the question of whether there was broadband Internet connectivity available on campus, with some indicating no broadband. NUS has broadband Internet connectivity available 24/7 to all NUS academic and teaching staff.

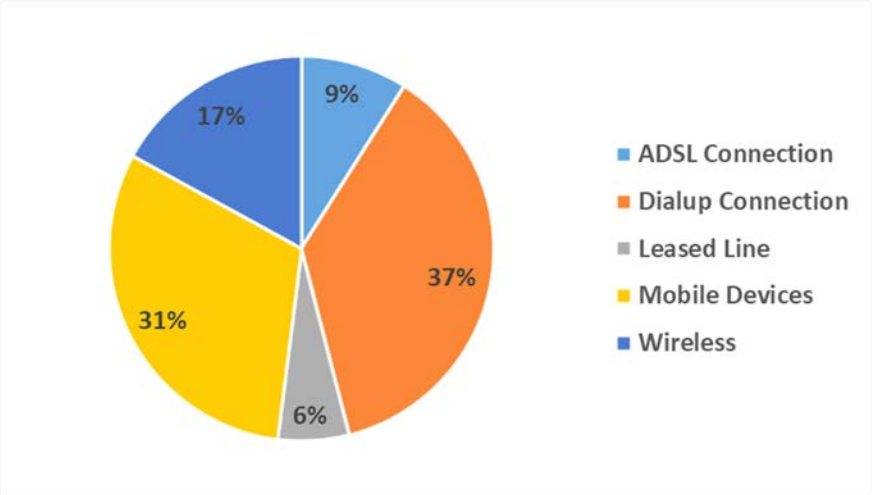

Fig. 5. Internet connection for teachers

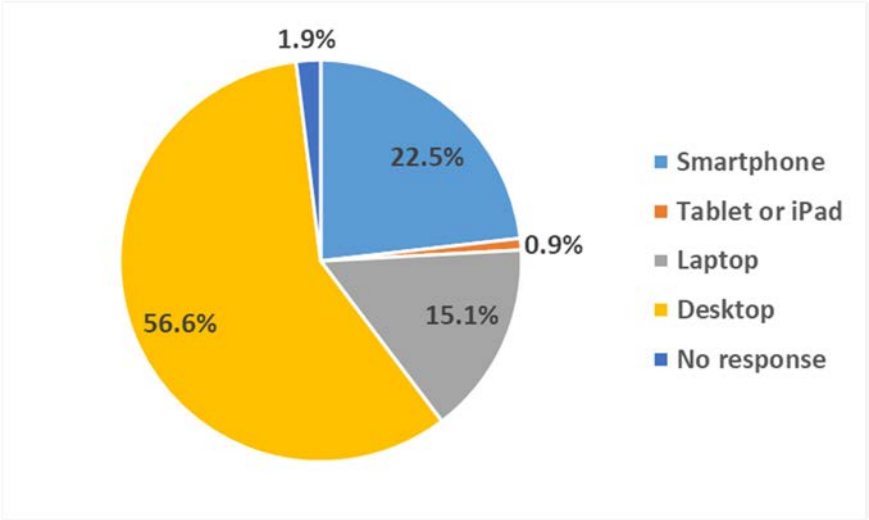

Fig. 6. Device used most frequently to access the Internet

Presence of Wi-Fi/Internet Connectivity on Campus

Respondents showed mixed reactions to whether there was Wi-Fi/Internet access connectivity on campus (43% indicated yes). Responses showed that some were unaware of the presence of Wi-Fi on campus. However, Wi-Fi Internet access is available at the library using purchased cards. Wi-Fi Internet access is also available during special workshops and conferences, set up by the ICT division upon request.

Frequency of Internet Use

A range of responses was received for the frequency of Internet usage, with the majority (about 80%) accessing daily and only about three per cent never having used the Internet (Figure 7). That the majority of teachers are using the Internet daily is a positive sign in terms of moving towards TEL.

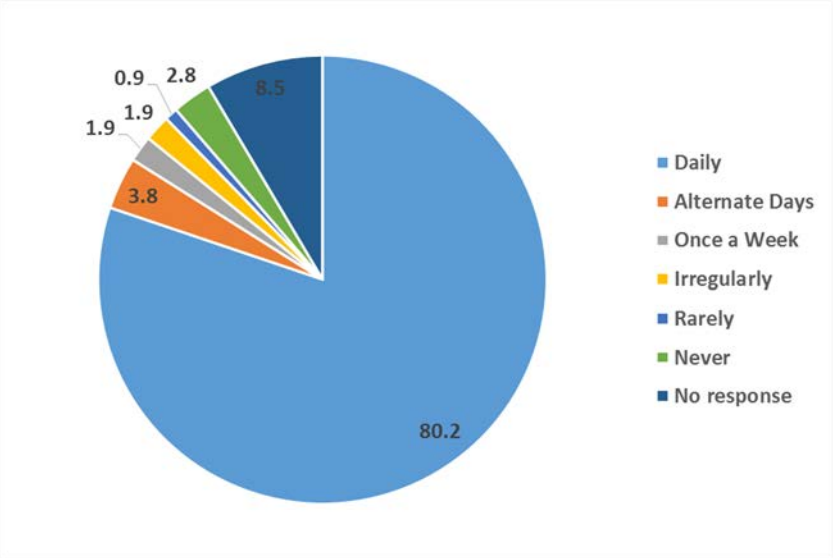

Fig. 7. Frequency of Internet usage

Comfort Level with Using ICTs

Respondents were asked to rate their level of comfort with using various computer-related skills. Table 6 indicates that the majority of the surveyed teachers are expert users and can provide training in word processing, spreadsheets, presentation software and email. This is a promising sign in terms of up-skilling staff in TEL. Furthermore, all of the teachers responded using email, which is another useful tool to communicate and participate in online learning. The number of skilled teachers diminishes and non-users increase in the areas of graphics, video and audio editing, webpage design and LMSs. These are the areas where teachers at NUS require further training to effectively use TEL.

Perceived skill level was coded with 1 for non-user, 2 basic, 3 intermediate, 4 advanced and 5 expert. Hence, the average skill level could be taken as a measure of skill level, with values ranging 1 to 5 and a natural midpoint of 3. One-way ANOVA procedures to determine whether there were any gender differences in the skill levels indicated significant differences in word-processing, email and presentation software, with females' perceived skill levels exceeding males' in these three categories (Table 7). One-way ANOVA procedures to identify any age differences in perceived skill level also indicated differences between age groups with respect to spreadsheets, search engines, multimedia authoring, graphics editing and digital audio, with the younger age groups indicating higher skill levels (Table 8). There were also significant differences between faculties.

Social Media

Social media is perhaps the fastest growing in terms of membership and the most transformative in its potential advantages. Sixty-five per cent of respondents indicated social media use. The distribution of accounts on the various social media platforms is represented in Table 9. Facebook, followed by Google, were the most popular social media sites. It was also interesting to note quite a few subscribing to research sharing sites such as ResearchGate and Academia.edu. These findings are important as there is a need to investigate the potential for using social media in teaching and learning. In terms of frequency of postings to discussion forums, 18% of teachers indicated posting daily. However, the largest proportion of respondents (34.9%) reported posting infrequently (Table 10).

Table 6. Comfort Level of Staff with Using Computer-related Skills

Computer-related Skill	Expert Level (%)	User Level Advanced (%)	User Level Intermediate (%)	User Level Basic (%)	Non-user (%)
Word processing	70	0	21	7	1
Spreadsheets	55	0	25	15	3
Presentation (PowerPoint)	68	0	20	7	3
Email	73	0	17	8	0
Search engines	43	0	25	18	8
Databases	18	0	27	24	21
Multimedia authoring	15	0	18	26	28
Graphics editing	14	0	19	31	26
Digital audio	12	0	13	30	33
Video editing	20	0	10	19	44
Webpage design	18	0	11	25	42
Learning management system	22	0	14	20	39

Table 7. Computer Skills Areas with Significant Gender Differences

Computer Skill	Mean		N	df	F	p
Word processing	Male Female	4.09 4.56	45 57	101	5.119	.026
Presentation (PowerPoint)	Male Female	4.05 4.52	44 56	99	4.421	.038
Email	Male Female	4.19 4.61	43 57	95	4.489	.037

Table 8. Computer Skill Areas with Significant Age Differences

Computer Skill	df	F	p
Spreadsheets	99	2.785	.008
Search engine	95	3.362	.002
Multimedia authoring	89	2.877	.007
Graphics editing	91	2.205	.035
Digital audio	90	2.676	.012

Table 9. Staff Membership in Social Media Platforms

Platform	Frequency	%
Facebook	70	27.0
Twitter	26	10.0
Google	58	23.0
Blog	7	3.0
Slideshare	17	7.0
Photo sharing (Instagram, Flickr)	22	9.0
Research sharing (ResearchGate, etc.)	33	13.0
Social bookmarking (Pinterest)	13	5.0
Goodreads.com	9	4.0

Table 10. Frequency of Staff Posting to Social Media

How often do you post to discussion forums?	Frequency	%
Several times a day	9	8.5
Once a day	9	8.5
Once a week	11	10.4
Once fortnight	9	8.5
Not very frequently	37	34.9
Not at all	16	15.1
Total	91	85.8
Missing	15	14.2
Total	106	100

Mailing Lists and Discussion Forums

Forty-three per cent of respondents indicated that they were subscribed to mailing lists or discussion forums, with 41 subscribed to between one and five forums and 11 claiming subscription to more than five discussion or mailing lists. It must be noted that about 50% of staff did not answer this question, which may have been due to some staff uncertainty about what mailing lists and discussion forums referred to. Moderating discussions is a valuable skill for running bulletin boards and discussion forums in LMSs, and 14% of staff indicated that they had experience in moderating discussion forums and mailing lists. However, there was a range of responses to the question of how often they posted to these discussion groups and mailing lists, with 24.5% indicating infrequent postings (see Table 11).

Table 11. Frequency of Staff Posting to Discussion Forums or Mailing Lists

Frequency of posting to discussion forums or mailing lists	Frequency	%	Cumulative %
Several times a day	6	5.7	12.0
Once a day	4	3.8	20.0
Once a week	10	9.4	40.0
Once a fortnight	4	3.8	48.0
Not very frequently	26	24.5	100.0
Total	50	47.2	
System missing	56	52.8	
	106	100	

The TEL Environment

Teachers were asked to evaluate their experiences with a range of resources/services/spaces (see Table 12). Experiences were rated on a Likert scale where 0 = not available, 1 = poor, 2 = fair, 3 = neutral, 4 = good and 5 = excellent. The possible range of values for responses on individual items was from 0 to 5, with a natural midpoint of 2.5. Hence, comparisons could be made on the quality of their experiences using the average of individual responses; the higher the average response, the better quality the experience. The overall quality of their experiences with the listed services and resources was variable. Of note were above-average responses for e-classrooms, computer labs, email services, network bandwidth/speed of Internet, download and use of free and open source software, and support and maintenance of ICT. This also indicates that in order to achieve a better TEL environment, most of the services need to be upgraded to provide better experiences.

3.2.3 Using ICTs for Teaching and Learning

Use and Creation of Digital Content for Teaching

Modes of teaching currently used by staff are predominantly traditional (80%), with only three per cent using online modes and 17% using hybrid modes. This indicates that there is a considerable amount of work to do towards shifting course content from traditional to hybrid or online modes.

Table 12. Experiences with Selected Resources/Services/Spaces Provided by the University

Resource/Service /Spaces	0 = not available	1 = poor	2 = fair	3 = neutral	4 = good	5 = excellent	Mean	Std dev	N
e-classroom facilities (computers, projectors, systems)	6	13	18	7	38	14	3.04	1.5	96
Computer labs	8	14	16	17	30	9	2.8	1.5	94
Email services	4	4	24	12	28	26	3.4	1.4	98
Learning management systems (e.g., Moodle)	27	18	7	25	10	7	1.9	1.7	94
e-portfolio	27	13	11	25	6	7	1.9	1.6	89
Network bandwidth/speed of Internet, download/upload	13	13	14	21	18	14	2.7	1.6	93
Wi-Fi access	18	14	11	17	13	15	2.4	1.8	88
Online or virtual technologies	17	13	13	20	14	11	2.4	1.7	88
Access to software (e.g., Matlab, statistical, GIS, analysis, graphics)	22	16	17	14	14	10	2.1	1.7	93
Download and use of free and open source software	12	18	16	13	20	17	2.7	1.7	96
Support for maintenance and repair ICTs	7	11	25	23	19	11	2.7	1.7	96

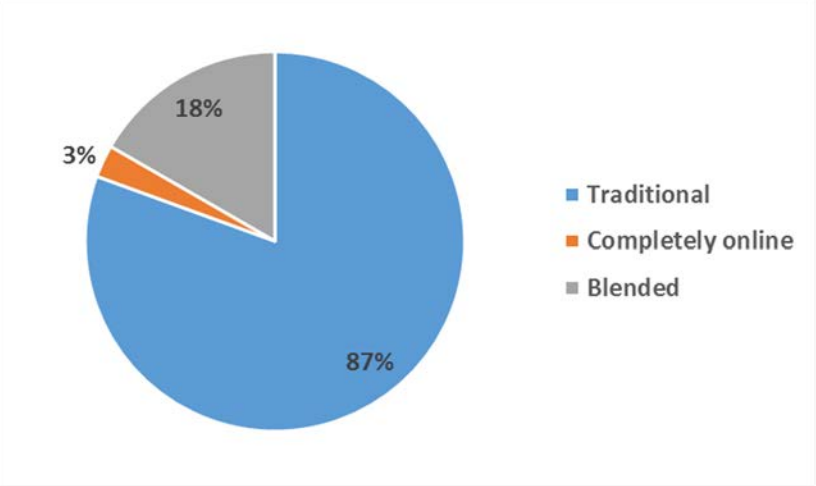

Fig. 8. Nature of classes taught by teachers

Frequency of Use of Digital Resources/Platforms in Teaching

Teachers were asked to indicate their frequency of use of a range of digital resources and platforms in their teaching. Frequency was rated on a Likert scale from 1 to 5, with 1 = never, 2 = rarely, 3 = sometimes, 4 = often and 5 = always. Hence, the possible range of values for responses was from 1 to 5, with 3 as the natural midpoint. Individual responses are presented in Table 13. Inspection of the mean responses indicates an above-average frequency of use or heavy use of digital resources (images, presentations), Word files and open textbooks. One-way ANOVA procedures

to determine any gender differences in the frequency of use indicated significant gender differences in the use of resources such as images, presentations, digital films and audio recordings, with use in these categories by female staff greater than by male staff. This use is also in line with their ICT skills, as indicated in Table 6.

Creation and Sharing of Teaching and Learning Resources

Teachers' experience in creating and sharing teaching and learning resources is an important indicator of their level of experience in a given area. This was assessed using Likert scale questions, with 1 = never, 2 = Yes but not shared with others and 3= Yes and shared under an open licence. The results show (Table 14) that a considerable number of staff had created teaching and learning resources using images (46%), presentations (49%) or Word files (42%) but had not shared them. Staff who had created and also shared resources under an open licence were fewer in number; they used images (30.2%), presentations (31.1%) and Word files (34%). However, in some areas, the majority of the respondents had never used digital technologies for creating and sharing teaching and learning resources: digital films (38.7%), audio recordings (51.9%), simulations (54.7%), blogs (65.1%) and course packs (37.7%).

Awareness of OER

In the provision of access to quality resources, OER are of critical importance. A probe of teachers' awareness about the availability of OER in their discipline showed that 54% of staff were aware (refer Table 15). The large number of missing responses could have been due to the fact that these staff respondents were not sure what the term OER meant. This indicates the need to promote an understanding of OER to move forward with implementing TEL at NUS.

Table 13. Frequency of Use of Digital Resources/Platforms in Teaching

Type of Resource	1 = never	2 = rarely	3 = sometimes	4 = often	5 = always	N	Mean	Std dev
Images	4	4	28	23	34	93	3.9	1.1
Presentations	2	5	16	23	51	97	4.2	1.0
Word files	2	2	7	38	49	98	4.3	0.9
Digital films/video	23	18	26	19	12	98	2.8	1.3
Audio recordings	35	28	17	11	3	94	2.1	1.1
Simulations/animations	40	34	10	7	5	96	2.0	1.1
Learning management systems	48	22	15	4	5	94	1.9	1.2
Blogs	60	21	8	2	1	92	1.5	0.8
Social bookmarking	58	23	6	3	1	91	1.5	0.9
Microblogging (Facebook, Twitter)	56	18	5	7	6	92	1.8	1.2
Open textbooks	12	10	15	33	26	96	3.5	1.3
Open access research papers	26	15	29	15	9	94	2.6	1.3

OER Platforms and Sources

An additional probe evaluated how often teachers used a range of OER platforms. Evaluation was in the form of Likert-type questions, with individual responses coded as 1 = never, 2 = rarely, 3 = sometimes, 4 = often and 5 = always. Hence, individual responses ranged from 1 to 5, with 3 as the natural midpoint. Inspection of the mean response for each OER platform showed that for all the OER platforms, staff use was below the midpoint of 3, indicating below-average use of OER. Another noticeable factor was the large number of staff (all > 50%) who had never used these OER platforms. The results for this probe are shown in Table 16.

Table 14. Teacher Experience in Creating and Sharing Teaching and Learning Resources

Resource	1 = never	2 = Yes but not shared	3 = Yes and shared with an open licence	Missing/No response
Images	14.2	46.2	30.2	9.4
Presentations	10.4	49.1	31.1	9.4
Word files	15.1	41.5	34	9.4
Digital films/video	38.7	25.5	24.5	9.4
Audio recordings	51.9	16	17	15.1
Simulations	54.7	17	17	11.3
Learning management systems	21.7	4.7	7.5	66
Blogs	65.1	8.5	10.4	16
Course packs	37.7	28.3	17	17

Table 15. Awareness of Availability of OER

	Frequency	%
Yes	54	50.9
No	23	21.7
Total	77	72.6
Missing	29	27.4

Skills for Integrating Technology in Teaching and Learning

The skills for integrating technology into teaching and learning are vital for the success of TEL. Teachers were asked to rate themselves on a range of relevant skills using a Likert scale, with responses coded as 1 = I can't use it, 2 = can use it to a small extent, 3 = can use it satisfactorily, 4 = can use it well and 5 = can use it very well. Hence, responses ranged from1 to 5, with 3 as the natural midpoint. The responses in Table 17 show that most of the respondents rated their skill level as very low or can't use at all. The Commonwealth regional consultations in OER (Commonwealth of Learning, 2017) highlighted the lack of capacity to integrate TEL into institutions as being a major challenge. To implement TEL effectively, improving this situation needs to be made an urgent priority.

Table 16. Evaluation of Staff Use of OER platforms

OER Platforms/Sources	1 = never	2 = rarely	3 = sometimes	4 = often	Mean	Std dev
OER Commons	59	12	14	1	1.6	1.0
Saylor Academy	70	7	8	0	1.4	0.8
WikiEducator	42	16	14	7	2.2	1.4
OpenStax College	67	7	7	0	1.4	0.9
BCcampus textbooks	59	8	12	4	1,7	1.1
NPTEL India	70	6	6	0	1.3	0.8
MIT OpenCourseWare	60	10	10	3	1.6	1.0
OpenLearn UK	64	8	11	2	1.5	0.9
College Open Textbook	58	10	13	5	1.7	1.1
Directory of Open Access Journals	59	10	13	4	1.8	1.2
Directory of Open access Books	58	12	12	4	1.8	1.2
MERLOT	67	11	6	2	1.4	0.9
* N = 106						

Training and Staff Development

Forty-four per cent of the respondents reported that they had already received training on the use of ICTs for teaching and learning. Thirty-seven per cent reported that the university provides regular training on the use of technology for teaching and learning. Forty-two per cent indicated that they had participated in online training. Sixteen per cent reported that they had attended massive open online courses (MOOCs). Figure 9 presents the types of MOOCs respondents were aware of. The majority of staff (72%) were not aware of the existence of MOOCs.

Table 17. Evaluation of Teachers' Skills in Integrating Technologies into Teaching

Technologies	0 = can't use it	1 = can use to a small extent	2 = can use satisfactorily	3 = can use well	4 = can use very well	Mean	Std dev
Learning management systems	23	11	16	5	0	1.3	1.2
Online collaboration (Google Docs)	24	13	19	11	0	1.7	1.3
e-portfolio	31	23	13	13	5	1.3	1.2
e-books	17	22	19	14	0	2	1.3
Online video/audio	14	22	15	13	0	1.8	1.4
Educational games	15	21	14	8	0	1.5	1.3
Lecture capture tools	22	20	16	11	0	1.7	1.4
Accessible tools for the disabled	15	15	9	4	0	1	
Using social media (wikis, blogs)	24	24	15	14	15	1.7	

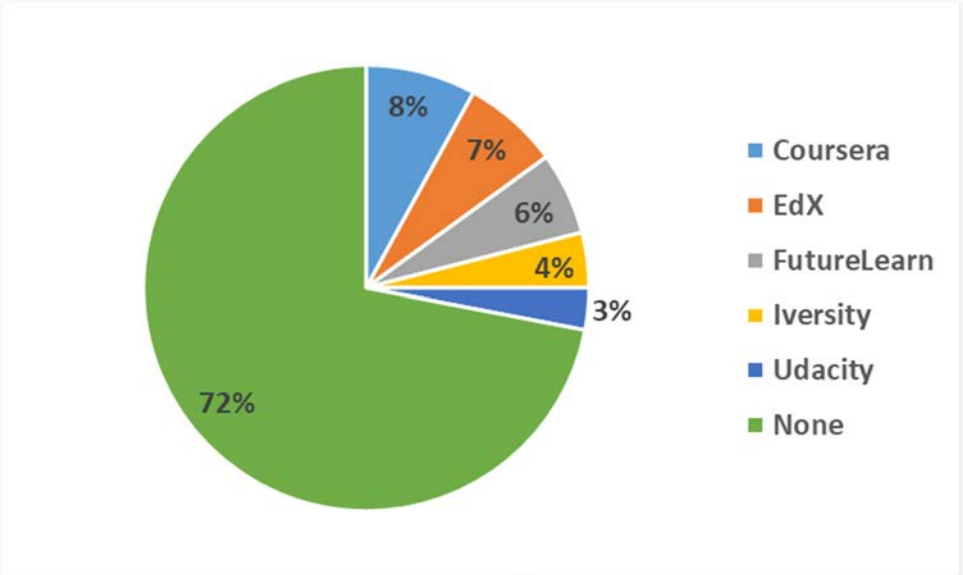

Fig. 9. Awareness of MOOCs

Policy Issues for TEL

Policies that can act as guidelines and structural frameworks to organise and co-ordinate initiatives in TEL are crucial for improving learner engagement and student learning outcomes. There was mixed reaction from staff on the existence of certain university policies, with a range of responses from "yes" to "no" to "don't know." Responses indicated that not all staff were clear about what policies were in place and what had yet to be instituted. Another factor was confusion over terms such as OER, online learning and ICT. NUS has in place policies for plagiarism. It does not have a policy for OER, nor does it have a separate policy for data protection and privacy, although some aspects of these last two are covered in the ICT policy.

3.2.4 Using ICTs for Research and Scholarship

Library Access to Subscription-based Resources

There was a mixed reaction as to whether the library provides subscription-based services, and many staff did not fill out this section of the questionnaire. We found that most of the teachers lacked knowledge about available resources (Table 18). The library actually provides subscription-based services, giving access staff and students access to all library books, and it has an excellent Pacific collection.

Table 18. Does the Library Provide Access to Subscription-based Resources?

	Number	%
Yes	33	31.1
No	7	6.6
Do not know	42	39.6
Total	82	77.4
Missing	24	22.6

Library Resources Used for Teaching and Learning

The frequency with which respondents accessed library resources for teaching and learning was assessed using a Likert scale, with 1 = never, 2 = rarely, 3 = sometimes, 4 = often and 5 = always. Analysis of the mean responses indicated that use of e-books and citation databases was above average (values above 3) but for the remaining digital resources was low (Table 19). There appeared to be some confusion over what these terms actually meant, as the NUS library does not have a patent database, a bibliographic database or citation databases. The findings also suggest that library use by teachers is relatively low, which is a point of concern. However, the large number of missing values also affected the numerical outcomes.

Table.19 Library resources regularly accessed by Staff

Digital Library Resources	1 = never	2 = rarely	3 = sometimes	4 = often	5 = always	Mean	Std dev	N
e-journals	7	3	17	11	8	2.1	0.9	46
e-books	8	2	15	12	9	3.2	1.3	46
Citation databases	14	4	9	14	3	3.3	1.3	44
Bibliographic databases	11	7	12	10	4	2.7	1.4	44
e-newspapers	18	6	8	7	3	2.8	1.3	42
e-theses and dissertations	23	8	3	6	4	2.3	1.4	44
Patent database	22	3	10	6	2	2.1	1.3	43
e-proceedings	16	7	11	6	5	2.1	1.4	45

Availability of Research Support

An assessment of the availability of research support was based on Likert-type items with individual responses ranging from 0 = not available to 5 = excellent, yielding a natural midpoint of 2.5. Results (Table 20) show that with the exception of access to data resources, access to all other categories is below average, indicating low levels of research support in these categories. However, it should be noted that the university does have access to plagiarism detection software (Turnitin), but some teachers seem to lack of awareness of this. As is typical in developing universities, covering the cost of licensing proprietary software has always been a challenge.

Table 20. Availability of Research Support

Resources/ services/ spaces	0 = not available	1 = poor	2 = fair	3 = neutral	4 = good	5 = excellent	Mean response	Std dev	N
Access to data storage	7	17	19	17	22	7	2.6	1.4	89
Data visualisation software	13	22	18	17	14	3	2.1	1.4	87
Citation/reference software	16	24	12	15	19	2	2.0	1.5	88
Plagiarism detection	22	25	16	9	12	3	1.7	1.5	87
Institutional repository for sharing research	15	24	16	13	16	2	2.0	1.5	86
Funds to support open access publication	12	28	16	15	15	1	2.0	1.4	87

3.2.5 Perceptions of the Use of TEL

Technology-enabled learning can solve many of our educational problems and provide valuable support for teaching and learning. Staff perceptions about the use of TEL were assessed by evaluating staff attitudes to a variety of statements, using a Likert scale with responses coded as 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree and 5 = strongly agree. Hence, individual responses ranged from 1 to 5, with 3 as the midpoint. Inspection of the results indicated that the mean responses for all items were well above average, ranging from 4.1 to 4.5 (Table 21). Further analysis using one-way ANOVA procedures to determine any significant differences between staff perceptions based on gender, age or faculty returned no significant results.

The highly positive perceptions of teachers about the usefulness of technology in their teaching are very promising, as they imply a strong willingness to adopt technology. This is consistent with Davis's theory of technology acceptance — the Technology Acceptance Model (Davis, 1989) — wherein users' perception about the usefulness of technology is a key factor in determining their acceptance of it. Within the context of the Technology Acceptance Model, the more positive the perception of usefulness, the more likely users are to employ the technology.

3.2.6 Motivation to Use TEL

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

Calculation of the mean responses to each motivator item indicated that all of the items evaluated were strong motivators, with means for the individual responses all above average, ranging from 4.0 to 4.4 (Table 22). This is a very encouraging finding, as it shows staff are highly motivated to integrate TEL into their teaching. Further analysis using one-way ANOVA procedures revealed significant differences between faculties in how staff perceived items such as self-gratification, credit towards promotion, and professional incentives to use TEL. However, this additional analysis did not reveal any differences by age or by gender.

Table 21. Perceptions/Attitudes of Staff to the Use of TEL

Statements	1 = strongly disagree	2 = disagree	3 = neither disagree nor agree	4 = agree	5 = strongly agree	Mean response (for N = 90)	Std dev
Technology-enabled learning can solve many of our educational problems.	0	6	7	44	33	4.2	0.8
Technology-enabled learning will bring new opportunities for organising teaching and learning.	0	0	5	41	44	4.4	0.6
Technology-enabled learning saves time and effort for both teachers and students.	0	2	8	37	43	4.3	0.7
Technology-enabled learning increases access to education and training.	0	1	3	41	45	4.4	0.6
Technology-enabled learning will increase my efficiency in teaching.	0	2	9	41	38	4.3	0.7
Technology-enabled learning enables collaborative learning.	0	3	5	45	37	4.3	0.7
Technology-enabled learning can engage learners more than other forms of learning.	0	1	21	39	29	4.1	0.8
Technology-enabled learning increases the quality of teaching and learning because it integrates all forms of media: print, audio, video and animation.	0	1	4	43	40	4.4	0.6
Technology-enabled learning increases the flexibility of teaching and learning.	0	0	5	40	45	4.4	0.6
Technology-enabled learning improves communication between students and teachers.	0	2	8	40	40	4.3	0.7
Technology-enabled learning enhances the pedagogic value of a course.	0	3	10	43	33	4.2	0.8
Universities should adopt more and more technology-enabled learning for the benefit of their students.	1	1	4	34	50	4.5	0.7

Table 22. Motivators for Using TEL

Motivator items	1 = very weak	2 = weak	3 = average	4 = strong	5 = very strong	N	Mean	Std dev
Personal interest in using technology	0	3	11	35	39	88	4.3	0.8
Intellectual challenge	0	4	13	38	34	89	4.2	0.8
Self-gratification	2	5	13	37	28	87	4.0	0.9
Training in technology-enabled learning	0	2	10	37	39	88	4.3	0.8
Better Internet bandwidth at workplace	0	2	10	20	47	89	4.4	0.8
Credit towards promotion	0	5	17	28	39	89	4.1	0.9
Professional incentives to use technology-enabled learning		5	12	33	39	89	4.2	0.9
Technical support	0	1	10	34	43	88	4.4	0.7
Peer recognition, prestige and status	0	1	2	15	39	87	4.1	0.8
Improved infrastructure (hardware and software) deployment	0	1	8	35	43	87	4.4	0.7
Release time/ Reduction in existing workload	0	2	14	37	46	89	4.2	0.8
To be a trendsetter by early adoption of technology in education	0	6	16	33	33	88	4.1	0.9

3.2.7 Barriers to the Use of TEL

We conducted a third probe, on barriers to the uptake of TEL by teachers. This was assessed using Likert scale items, with 1 = very weak barrier, 2 = weak barrier, 3 = average barrier, 4 = strong barrier and 5 = very strong barrier. Hence, responses could take values ranging from 1 to 5, with 3 as the natural midpoint. The results of this probe indicated that all of the identified factors were strong barriers to the uptake of TEL, with mean values ranging from 3.4 to 4.1 (Table 23). However, the major concerns were lack of instructional design support and lack of hardware and software, followed by concern about student access to technology and lack of time to develop e-courses. Further analysis using one-way ANOVA procedures revealed significant gender differences in response to two items. Female teachers regarded concerns about student access to technology as a stronger barrier than did male teachers. On the issue of being intimidated by technology, male teachers regarded this as a stronger barrier than did female teachers. One-way ANOVA procedures also showed that there were significant age-based differences in concerns about Internet security issues, with age groups 36–40 and 66–70 regarding this issue as less of a barrier than did the other age groups. There were also significant differences across faculties in ratings for the following items: (i) lack of institutional policy on TEL, (ii) lack of professional prestige, (iii) lack of incentives to use TEL and (iv) lack of credit towards promotion.

Table 23. Barriers to Staff Use of TEL

Barrier Item	1 = very weak barrier	2 = weak barrier	3 = average barrier	4 = strong barrier	5 = very strong barrier	N	Mean	Std dev
Concern about faculty workload	7	1	31	21	20	88	3.4	1.1
Concern about student access to technology	2	6	19	28	35	90	4.0	1.0
Lack of training in technology-enabled learning	3	4	28	26	29	90	3.8	1.0
Lack of technical support in the university	2	3	26	28	30	89	3.9	0.9
Lack of institutional policy on technology-enabled learning	2	9	33	20	26	90	3.7	1.1
Lack of professional prestige	2	12	31	25	20	90	3.5	1.1
Concern about quality of e-courses	1	7	28	29	22	87	3.7	0.9
Lack of incentives to use technology-enabled learning	3	7	24	31	25	90	3.8	1.1
Lack of credit towards promotion	2	11	28	26	23	90	3.6	1.1
Intimidated by technology	8	6	33	25	17	89	3.4	1.2
Concern about issues of security on Internet	1	6	21	31	29	88	3.9	1.0
Inadequate availability of hardware/software	3	1	19	33	35	91	4.1	1.0
Poor Internet access in the university	3	10	19	18	40	90	3.9	1.2
Lack of time to develop e-courses	1	7	18	27	35	88	4.0	1.0
Lack of instructional design support for technology-enabled learning	1	5	18	30	36	90	4.1	0.9
No role models to follow	5	14	24	20	26	89	3.5	1.2

The Need to Develop a TEL Policy for NUS

Teachers were asked to comment on the following statement:

> *"There is a need to develop a technology-enabled learning policy and strategy in your university."*

All of the 47 staff who responded to this open question strongly agreed on the need for a TEL policy. Comments included:

> *"...there is a need to develop and implement one [policy]. The needs of our students are changing rapidly due to technology, in addition in order to ensure the integrity of work submitted by students, therefore access to plagiarism software is a start. There is a need to transform the delivery of education to influence [the] shape and form of the future workforce."*

> *"This should be developed to ensure structures and systems are appropriate, and it will effectively facilitate the tasks and responsibilities. It addresses the development of*

learning opportunities that utilise these systems in ways that enhance the university to achieve a sustainable future in a continuously transforming technological context."

Hence, the responses indicate a strong consensus amongst teachers on the need for a TEL policy.

3.2.8 Summary and Comments

The majority of the respondent teachers (87%) own laptops, followed by 52% who also own desktops. Practically all of the respondents have access to desktops at the university. Some teachers also use their personal devices in the university. All of them have access to the Internet. Most teachers use desktop computers to access the Internet, and mostly access it daily.

In the area of computer skills, the majority of teachers are expert users and can provide training in word processing, spreadsheets, presentation software and email. All of the teachers surveyed use email. However, teachers are not skilled enough or have no experience in areas such as graphics, video and audio editing, webpage design and the use of LMSs. There were significant gender differences in skill levels in word processing, email and presentation software, with female perceived skill levels exceeding male skill levels in these three categories. There were also significant differences in age groups in skill levels for spreadsheets, search engines, multimedia authoring, graphics editing and digital audio, with the younger age groups indicating higher skill levels. The results indicate that male and senior teachers need more training in ICT skills. Sixty-five per cent of respondents indicated they use social media. Facebook, followed by Google+, were the most popular social media sites, with quite a few subscribing to research-sharing sites such as ResearchGate and Academia.edu. Use of mailing lists and discussion forums was not frequent amongst teachers; this is also related to low skills levels in the use of LMSs.

Teachers are largely satisfied with the range of technology services and resources at NSU, such as e-classrooms, computer labs, email services, network bandwidth/speed of Internet, download and use of free and open source software, and support and maintenance of ICTs. Teachers are heavy users of digital resources (images, presentations), Word files and open textbooks. Results also show that female teachers are higher users than male teachers.

Respondents indicated that they have created images (46%), presentations (49%) and Word files (42%) in the past, but they did not share these publicly online. Fewer respondents created and then shared resources using an open licence. The use of advanced ICT skills to create digital films (38.7%), audio recordings (51.9%), simulations (54.7%), blogs (65.1%) and course packs (37.7%) was low.

Although 54% of staff were aware of the availability of OER, their use of different OER platforms was quite low. Over 50% had never used OER platforms. Respondents rated their skills level for integrating ICT in teaching and learning as "very low" or "can't use at all." However, 44% of the respondents reported that they had already received some training in the use of ICTs for teaching and learning. The majority of teachers (72%) were not aware of MOOCs, although some had completed MOOCs. Awareness of institutional policies was low, and questions yielded mixed reactions. Teachers who responded to the survey were very positive about the use of technology in teaching and learning. They were also motivated to use TEL and indicated that recognition and professional incentives would be motivating factors, while they also saw the use of TEL as self-gratifying.

It is important to note from the teacher survey that a systematic approach to integrating TEL in university courses needs to be focused, and teachers need to be provided with specific training to

utilise available or deployed technologies effectively. The positive attitudes of the teachers at NUS need to be exploited to make a difference in the quality of learning for students.

3.3 Survey of Learners' Use of Technology at NUS

3.3.1 Demographic Information for the Respondents

As mentioned in the methodology section, a stratified sample was drawn from the six faculties and from one centre, based on the number of enrolments per faculty/centre. A total of 332 students completed the survey, comprising 65.06% females and 32.23% males (Figure 10). Table 24 presents learners by age group, showing that 56.3% of the sample were aged below 20 and 33.7% were in the 21–25 age bracket, meaning that 91% of the learner participants were 25 or younger. Nearly 82% (81.6%) of the learner participants were from undergraduate programmes, and 11.4% were postgraduate students (Table 25). The distribution of the learners by year of study indicates that the majority of the respondents (73.2%) were from Years 1 and 2 (Table 26). Health and medical sciences accounted for 32.8% of the respondents, followed by 27.7% from commerce and management (Table 27). Table 28 shows the response rate per faculty and distribution of the questionnaire.

Learners were asked whether they had any physical and/or learning disabilities that required accessible or adaptive technologies for their coursework. Results showed that nearly 22% of learners had either a physical disability, a learner disability or both (Table 29). While this is a significant proportion, it is important to revisit these data closely and pay attention to the need for adaptive or accessible courseware to assist these learners with special requirements.

The delivery mode for courses at NUS is predominantly traditional face-to-face (89%), with nine per cent of the respondents indicating that they study courses in an online mode and two per cent using a hybrid mode (Figure 11). This shows that some courses in the university already use TEL.

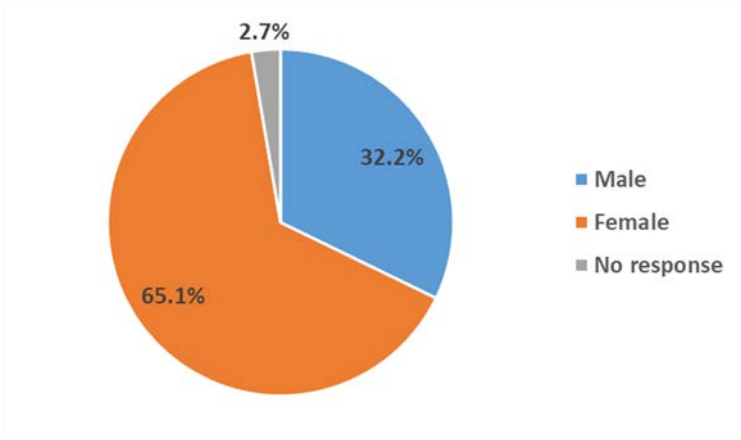

Fig. 10. Gender distribution of student sample

Table 24. Distribution by Age Group

Age Range	Frequency	%
Below 20	187	56.3
21–25	112	33.7
26–30	10	3.0
31–35	12	3.6
36–40	1	0.3
41 and above	6	1.8
No response	4	1.2
Total	332	100.0

Table 25. Level of Study

Level of Study	Frequency	%
Undergraduate	271	81.6
Graduate or postgraduate	38	11.4
Research	2	0.6
No response	21	6.3
Total	332	100

Table 26. Year of Study

Year of Study	Frequency	%
1	108	32.5
2	135	40.7
3	58	17.5
4	18	5.4
5	1	0.3
No response	12	3.6
Total	332	100

Table 27. Major Discipline

Discipline	Frequency	%
Humanities	18	5.4
Social sciences	42	12.7
Commerce and management	92	27.7
Health and medical sciences	109	32.8
Natural sciences	22	6.6
Engineering and technology	21	6.3
Agriculture and natural resources	5	1.5
Fine and performing arts	14	4.2
Maritime studies	1	0.3
Total	324	97.6
Missing	8	2.4

Table 28. Faculty-wise Responses

Faculty/Centre	Number of Students in Stratum	Number of Responses	Percentage of Responses
Centre for Samoan Studies	7	5	71.43
Faculty of Applied Science	102	102	100.00
Faculty of Arts	41	41	100.00
Faculty of Business and Entrepreneurship	99	85	85.86
Faculty of Education	68	50	73.53
Faculty of Medicine	9	9	100.00
Faculty of Science	40	40	100.00
Total	366	332	90.7

Table 29. Learner Disability Profile

Physical Disabilities	Frequency	%
No	231	69.6
Yes, one or more physical disabilities	28	8.4
Yes, one or more learning disabilities	14	4.2
Yes, both physical and learning disabilities	31	9.3
Prefer not to answer	16	4.8
No response	12	3.6
Total	332	100

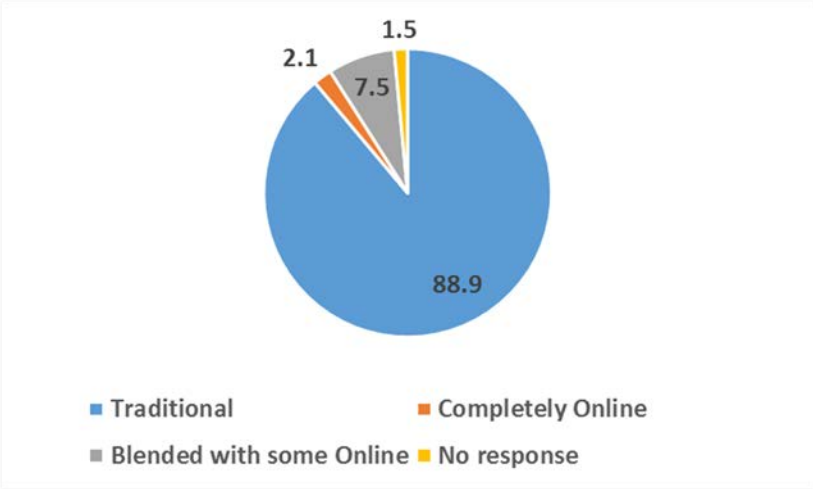

Fig. 11. Mode of course delivery for students

3.3.2 Access to and Use of ICTs

Questions in this section of the survey investigated learners' ownership and access to devices, as well as Internet availability for learners and the frequency of their Internet use.

Ownership of Devices

The findings revealed that almost 20% of students own desktops, almost 68% own laptops, almost 65% own smartphones and over 27% own tablets. Sixteen per cent planned to buy laptops in the next 12 months, which was more than planned to buy tablets or desktops (Table 30). One-way ANOVA procedures did not reveal any significant differences in ownership by gender, age group or level of study.

Table 30. Ownership of Devices

Response	Yes (%)	No, I plan to buy one in the next 12 months (%)	No, I don't plan buy in the next year (%)	Skipped response to this item (%)
Desktop	19.6	14.2	39.5	26.8
Laptop	67.8	16.0	8.1	8.1
Smartphone	64.8	9.9	14.2	11.1
Tablet	27.1	14.8	33.7	24.4

Table 31. Access to Devices at the University

	Yes, provided by university (%)	Yes, use my personal device at university (%)	No, university does not allow me to use these (%)	Skipped response to this item (%)
Desktop	88.6	3.6	3.3	4.5
Laptop	13.0	55.1	7.8	24.1
Smartphone	5.4	55.4	11.7	27.4
Tablet	5.4	34.9	18.7	41

Access to Devices at the University

About 89% of the learners have access to desktops at the university. NUS currently does not provide laptops, smartphones or tablets for student use. A considerable number of learners use their own devices on campus, as seen from the results. There were some misconceptions about university policy on devices, as quite a few indicated that the university does not allow the use of these devices.

Access to the Internet

The majority of learners accessed the Internet from home, followed by from an office, with very few (eight per cent) accessing from cybercafés. This is a promising sign, as it means that learners can access the Internet for their learning after hours, when they are at home (Figure 12). Sixty-nine per cent of learners accessed the Internet through mobile devices and 20% via wireless technologies (Figure 13). These findings reflect the increasing prominence of wireless use and the pervasiveness of mobile technology in Samoa, with ownership of mobile devices now exceeding 90% (PRIF, 2015). Learners accessed the Internet using smartphones (68.22%), desktop computers (15.89%) and laptops (12.77%). Only 3.12% used tablets for accessing the Internet, indicating that tablets are not the preferred device for many (Figure 14).

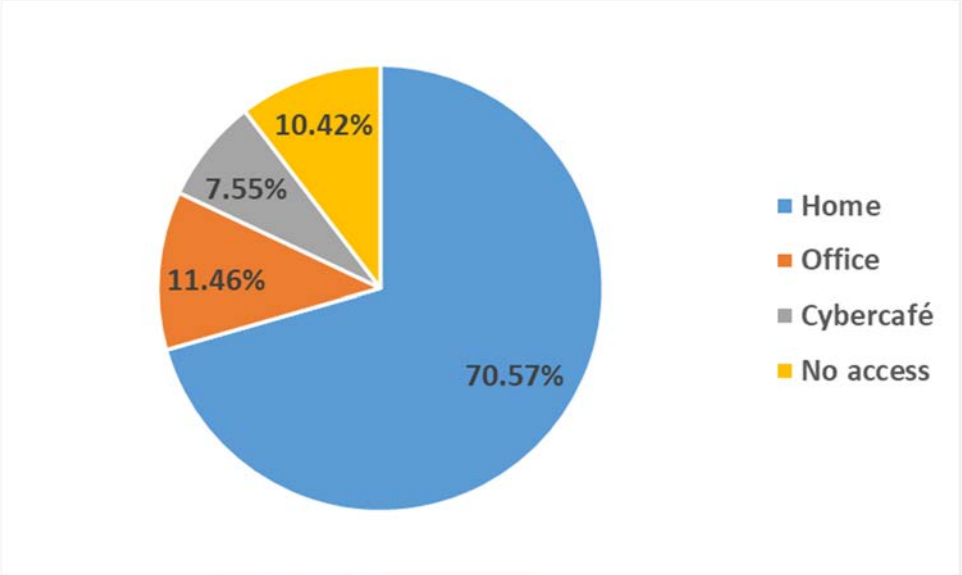

Fig. 12. Students' access to the Internet

Broadband Internet

Nearly 43% (42.8%) of the learners have access to broadband Internet at home, 9.9% at the office and 4.5% at cybercafés, whilst 44.6% do not have access. In terms of access to broadband Internet at the university, the majority of learners access broadband Internet via faculty rooms (78.6%), followed by 21.4% in open areas, 18.4% in classrooms and 13.3% in laboratories. There was some confusion on the issue of whether NUS offers wireless Internet connectivity. NUS does offer paid wireless Internet services at the library. The university also offers wireless Internet at special workshops and conferences, upon request.

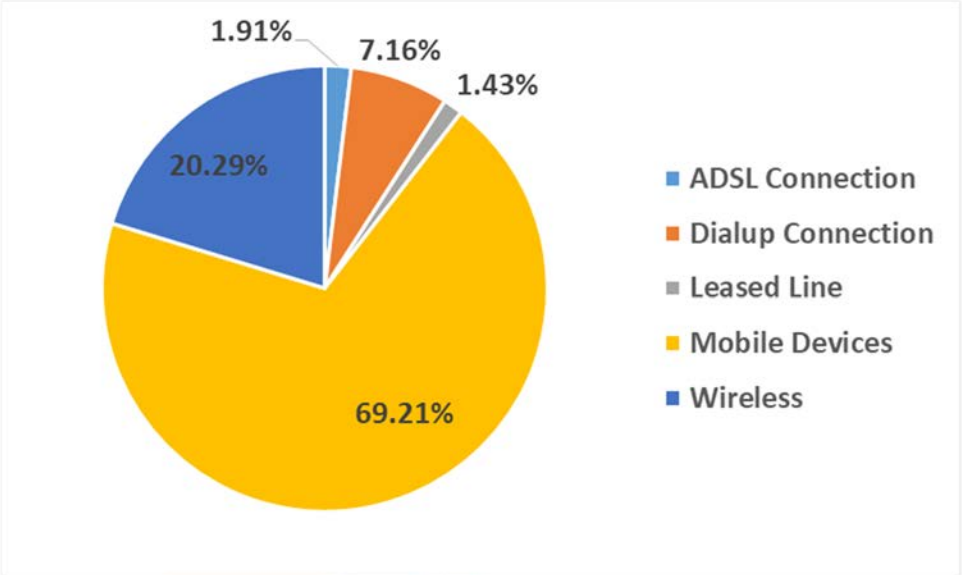

Fig. 13. Technology used to access the Internet

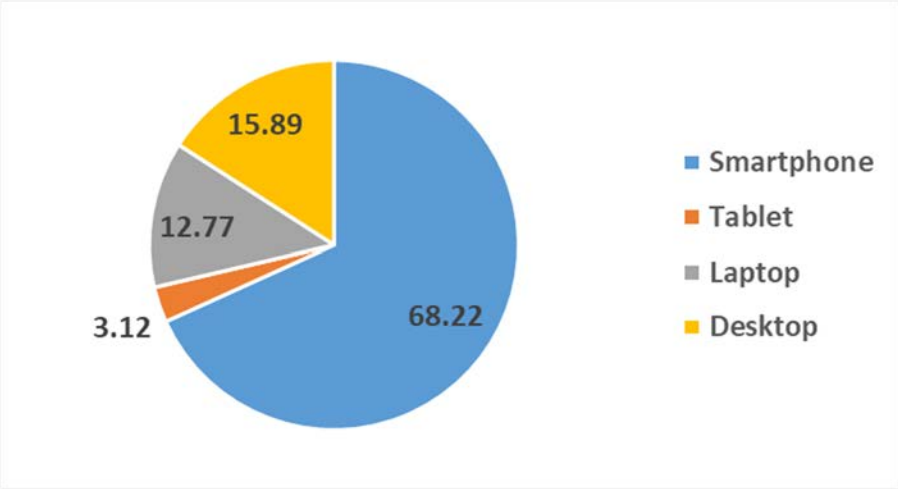

Fig. 14. Device used to access Internet

Frequency of Internet Use

Ninety-six per cent of respondents use the Internet — 40% daily, 24% on alternate days, 16% weekly and seven per cent irregularly (Figure 15). In terms of how much time, on average, learners spend on Internet-related activities, 42.2% indicated one to two hours, followed by 23.8% spending less than one hour and 16.9% spending three to five hours (Table 32).

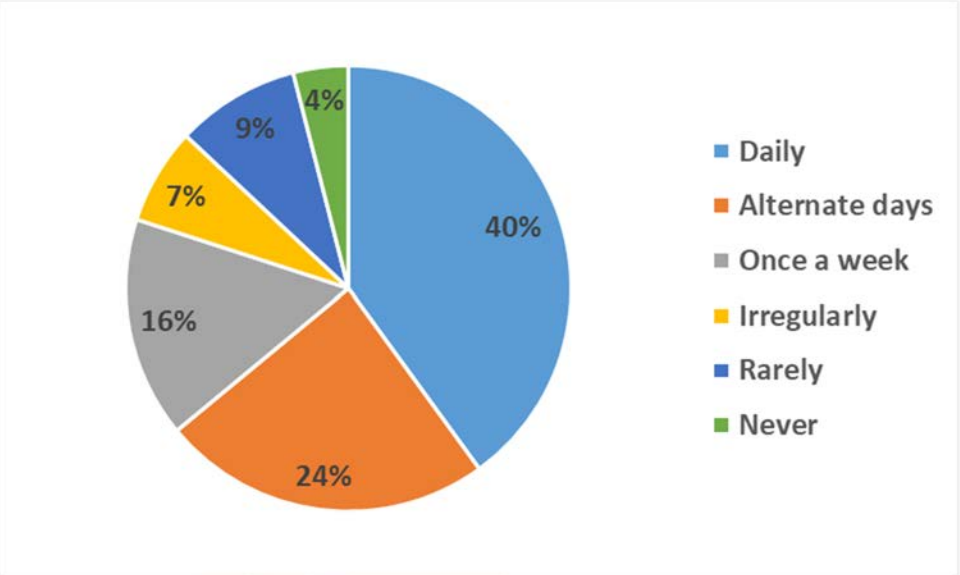

Fig. 15. Frequency of Internet use

Table 32. Time Spent on Internet-related Activities

Time Spent	Frequency	%
Do not use daily	25	7.5
< 1 hour	79	23.8
1–2 hours	140	42.2
3–5 hours	56	16.9
> 5 hours	27	8.1
No response	5	1.5
Total	332	100

Table 33. Competency Level in Using Computer Skills

Computer skills	0 = can't use it (%)	1 = use to small extent (%)	2 = use satisfactorily (%)	3 = use well (%)	4 = use very well (%)	Skipped item (%)	Mean	Std dev
Word processing	2.7	5.7	8.4	27.7	53.6	1.8	3.26	1.0
Spreadsheets	3.3	13.0	21.7	28.6	30.7	2.7	2.7	1.1
Presentations (PowerPoint)	5.4	9.3	11.7	24.1	46.7	2.7	3.0	1.2
Email	15.7	13	13.3	20.8	33.7	3.6	2.5	1.5
Search engines	17.5	23.5	18.1	21.7	16.3	3	1.96	1.4
Databases	22.6	19.3	16.6	22	16.3	3.3	1.9	1.4
Multimedia authoring	29.2	21.7	17.8	17.2	10.5	3.6	1.6	1.3
Graphics editing	26.8	22	17.2	17.2	12.7	4.2	1.7	1.4
Digital audio	33.1	19.3	16.0	16.3	12.3	3	1.5	1.4
Video editing	43.1	19.6	16.9	16.9	7.8	3	1.2	1.2
Webpage design	39.8	21.7	15.4	15.4	4.5	4.2	1.2	1.2
Learning management system	40.7	20.5	13.3	13.3	8.1	4.2	1.2	1.2
Web 2.0 tools	33.7	19.3	12.3	12.3	13.3	3.6	1.6	1.4

Comfort Level with Using Computer Skills

The competency level of learners with using a range of computer skills was evaluated with Likert scale items ranging from 0 to 4, with 0 = can't use it, 1 = use to small extent, 2 = use satisfactorily, 3 = use well and 4 = use very well. Results indicated learners were very proficient in word processing, spreadsheets, PowerPoint and email, with mean responses above the midpoint or average of 2. Learners were not as proficient and need more up-skilling in areas such as graphics editing, digital and audio editing, webpage design and LMSs (Table 33).

Social Media

Nearly 82% (81.6%) of surveyed learners indicated having profiles or accounts on social media platforms. The majority had accounts on Facebook (82.5%), followed by Google+ (42.2%) and photo-sharing platforms such as Instagram (29.2%). These findings, presented in Table 34, have implications for what social media platforms NUS should consider for use in TEL. There was a range of responses to an item seeking information on the frequency with which learners update their social accounts. These results are presented in Table 35 below, which indicates that 28.3% did not update their accounts frequently. Only 14.8% were active on social media several times a day. There was a range of responses to the average time learners spent updating their social media accounts (Table 36); 31.3% spent one to two hours, 24.4% spent less than an hour, and 13.6% spent three to five hours. Very few spent more than five hours (7.2%) on social media.

Table 34. Distribution of Learner Accounts in Various Social Media

Platform	Frequency	%
Facebook	274	82.5
Twitter	31	9.3
Google+	140	42.2
Blog	3	1.2
Slideshare	13	3.9
Photo sharing (e.g., Instagram, Flickr)	97	29.2
Research sharing (e.g., ResearchGate)	17	5.1
Social bookmarking	12	3.6
Goodreads.com	13	3.9

Table 35. Frequency of Updating Social Media Accounts

Response	Frequency	%
Several times a day	49	14.8
Once a day	57	17.2
Once a week	61	18.4
Once a fortnight	10	3.0
Not very frequently	94	28.3
Not at all	19	5.7
No response	42	12.7
Total	332	100

Mailing Lists and Discussion Forums

Learners were asked about memberships in mailing lists and discussion forums. Only 17.5% were members of mailing lists and 22.9% had subscribed to discussion forums. Of these, only 10.5% had any experience with moderating discussions on mailing lists or discussion forums. These findings indicate that learners at NUS are not very familiar with mailing lists and discussion forums. If TEL is to be integrated through using a LMS, it is important that learners at NUS become familiar with online discussions so they can participate and learn.

Table 36. Average Time Spent by Learners on Social Media

Response	Frequency	%
< 1 hour	81	24.4
1–2 hours	104	31.3
3–5 hours	45	13.6
> 5 hours	24	7.2
5	39	11.7
Missing	39	11.7
Total	332	100

3.3.3 The TEL Environment

In this section, learners were asked to evaluate their experiences with a range of resources/services/spaces. Experiences were rated on a Likert scale, where 0 = not available, 1 = poor, 2 = fair, 3 = neutral, 4 = good and 5 = excellent. The natural midpoint was 2.5. Hence, comparisons could be made on the quality of their experiences using the average of individual responses; the higher the average response, the better the quality of the experience. Overall, learners' experiences with the listed services and resources were positive, ranging from 2.4 to 3.4, with all of the services above average except for e-portfolios, online technologies, Wi-Fi access, e-theses and dissertations, patent databases, e-newspapers, e-proceedings and plagiarism software (Table 37). This draws attention to the services which need improvement and in which learners need more training or exposure.

One-way ANOVA procedures revealed significant gender differences in learner comfort level, with male learners indicating higher levels of comfort with LMSs than female learners (N = 315, F = 4.735, p = 0.03). There were also significant differences across age groups in their comfort level with networking skills (N = 313, F = 2.467, p= 0.033), with learners in the age group below 20 showing higher comfort levels and learners in the age group 41 and above showing the lowest comfort level.

Use of Online Courses

Only 8.1% of learners surveyed had taken an online course at the time of the survey. When asked whether in the past year they had taken a MOOC through any institution, responses revealed that 33.4% did not know what a MOOC was, 7.8% had not taken a MOOC but knew what it was, 2.7% had taken a MOOC but did not complete it and 1.8% had taken and completed a MOOC.

3.3.4 Perceptions about the Use of TEL

Perceptions about the use of TEL were evaluated by learners responding to a range of statements on technology, using Likert scale items where 1 = strongly disagree, 2 = disagree, 3 = neither disagree nor agree, 4 = agree and 5 = strongly agree. Hence, individual responses ranges from 1 to 5, with 3 as the midpoint. Results revealed that the perceptions for all statements were above average and highly positive, with mean responses ranging from 4.4 to 4.6 (Table 38). This is a very encouraging sign, as it means that learners are highly receptive to TEL and accept its potential value. Further investigation using one-way ANOVA procedures showed no significant gender or age differences in learner perceptions.

Table 37. Experiences with Selected Digital Resources/Services/Spaces

Resource/Service/Spaces	0 = not available (%)	1 = poor (%)	2 = fair (%)	3 = neutral (%)	4 = good (%)	5 = excel-ent (%)	Mean	Std dev
e-classroom facilities (computers, projectors, other digital systems)	3.3	16	9.3	10.8	43.1	16.3	3.3	1.4
Computer labs	3.0	13.6	9.6	13	38	21.1	3.4	1.4
Email services	5.4	13	11.1	20.8	35.8	11.4	3.1	1.4
Learning management systems (e.g., Moodle)	14.2	17.2	13	21.7	27.4	4.5	2.5	1.5
e-portfolios	13.9	17.5	13	18.7	21.4	5.7	2.4	1.5
Network bandwidth, speed of Internet, download/upload	7.2	24.7	10.2	19.9	19.9	13.3	2.6	1.5
Wi-Fi access	13	25	10.8	19	20.8	9.3	2.4	1.6
Online or virtual technologies	10.5	21.4	10.5	22.6	25.6	5.7	2.4	1.6
Access to software (e.g., Matlab, statistical, GIS, analysis, graphics)	8.7	13.9	14.2	20.2	31	9.3	2.8	1.5
Download and use of free and open source software	5.1	19.9	9.9	19	30.1	14.2	2.9	1.5
Support for maintenance and repair of ICTs	3.6	19	16	22	29.5	8.1	2.8	1.4
Access to data storage	4.5	14.5	15.4	23.8	29.5	10.2	2.9	1.4
Data visualisation software	6.6	17.5	15.4	20.8	30.7	6	2.9	1.4
Citation/Reference management software	5.7	18.4	14.5	20.2	30.4	7.8	2.8	1.4
Plagiarism detection software	14.8	22.3	14.8	18.4	20.5	6.9	2.3	1.6
Institutional repository for sharing of research	9.6	16.3	16.6	21.7	26.2	7.5	2.6	1.5
e-journals	9.3	18.1	15.4	19	27.4	9	2.6	1.5
e-books	9.9	17.8	14.8	22	24.4	8.4	2.6	1.5
Citation databases	11.1	16.9	13.6	23.8	23.5	8.4	2.6	1.5
Bibliographic databases	10.8	17.5	14.2	19.9	27.4	6.9	2.6	1.5
e-newspapers	12.7	20.2	14.8	16.6	26.5	6.3	2.4	1.6
e-theses and Dissertations	15.7	22.3	19	21.1	15.7	3.6	2.1	1.4
Patent database	14.2	23.5	16.6	22.3	17.5	4.2	2.2	1.4
e-proceedings of conferences	14.8	22.3	14.5	22.6	19.6	3.6	2.2	1.4
Statistical databases	13	18	16.9	21.4	21.4	6.2	2.4	1.5

Table 38. Learners' Perceptions about the Use of Technology

Statements	1 = strongly disagree (%)	2 = disagree (%)	3 = neither disagree nor agree (%)	4 = agree (%)	5 = strongly agree (%)	Mean	Std dev
Will help me get results in my subjects	3.9	6	15	19	72	4.6	0.9
Makes completing work more convenient	3.9	9	2.7	21.1	68.4	4.5	0.9
Helps me understand subject material more deeply	2.4	9	3.6	23.8	65.1	4.6	0.8
Motivates me to explore topics not known before	3.3	6	2.5	22.6	70.8	4.6	0.9
Allows me to collaborate with others on and outside campus	2.1	2.7	7.8	27.7	56.6	4.4	0.9
Improves my IT skills in general	2.7	2.1	6.6	31.9	53.3	4.4	0.9
Improves my career employment opportunities	3.0	1.2	4.8	26.2	61.1	4.5	0.9

Learner Perceptions about the Usefulness of Technology

Learners were asked to rate a range of technologies and tools in terms of level of usefulness in their studies, using Likert scale items where 0 = do not know, 1 = not useful, 2 = useful limited extent, 3 = neutral, 4 = useful and 5 = very useful. Results revealed learners rated these technologies as highly useful to their studies, with all mean responses average and ranging from 3.3 to 4.1 (Table 39). These results are a good sign of the positive attitudes of students and their willingness to engage in TEL. The responses also reveal learners' support for the use of mobile learning.

Table 39. Learners' Perceptions about the Usefulness of Technology

Technologies	0 = do not know (%)	1 = not useful (%)	2 = useful limited extent (%)	3 = neutral (%)	4 = useful (%)	5 = very useful (%)	Mean	Std dev
Design and build webpages as part of your course?	9	11	8.1	13.9	26.2	28.3	3.3	1.7
Create and present multimedia shows as part of your course requirements? (e.g., PowerPoint)	2.7	4.8	5.4	7.5	26.2	50	4.1	1.3
Create and present audio/video as part of your course requirements?	3.3	8.1	7.5	11.7	27.4	38.9	3.7	1.4
Download or access online audio/video recordings of lectures you could not attend?	2.7	6.9	6.3	11.7	24.4	25.1	3.7	1.4
Download or access online audio/video recordings to revise the content of lectures you have already been to?	2.4	8.1	5.7	9.9	26.8	44	3.6	1.5
Download or access online audio/video recordings of supplementary content material?	5.4	9.1	5.7	14.2	27.1	34.9	3.9	1.4
Use the Web to access university-based services (e.g., enrolment, pay fees)?	3.6	8.4	5.4	9.3	20.8	48.7	4	1.4
Use your mobile phone to access web-based university services information or services (e.g., enrolment, paying fees)?	2.1	7.2	6	7.8	23.8	49.4	4	1.3
Use instant messaging/chat (e.g., Skype, Messenger, Hangout, etc.) on the Web to communicate/collaborate with other students in the course?	2.1	5.4	8.4	8.1	26.8	46.1	3.9	1.4
Use instant messaging/chat (e.g., Skype, Messenger, Hangout, etc.) on the Web to communicate with teachers and administrative staff from the course?	2.4	5.1	9.3	13.6	21.7	45.2	3.9	1.4
Use social networking platform (e.g., Facebook) on the Web to communicate/collaborate with other students in the course?	3.3	8.1	6.3	14.8	28.5	34.6	3.7	1.4

Technologies	0 = do not know (%)	1 = not useful (%)	2 = useful limited extent (%)	3 = neutral (%)	4 = useful (%)	5 = very useful (%)	Mean	Std dev
Use micro-blogging (such as Twitter) to share information about class-related activities?	5.7	10.8	7.8	18.4	23.2	31	3.4	1.6
Keep your own blog as part of your course requirements?	5.7	8.7	7.5	12.7	24.4	38	3.6	1.6
Contribute to another blog as part of your course requirements?	7.8	9.6	9	17.2	25	28.3	3.3	1.6
Use the Web to share digital files?	2.7	10.8	6.3	11.4	19.9	43.7	3.8	1.5
Use web-conferencing or video chat to communicate/collaborate with other students in the course?	48	12	9	12.7	25.6	33.1	3.5	1.6
Receive alerts about course information (e.g., timetable changes, the release of new learning resources, changes in assessment) via RSS feeds on the Web?	3.3	5.7	5.4	6	27.7	48.8	4	1.4
Receive alerts about course information (e.g., timetable changes, the release of new learning resources, changes in assessment) via text message on your mobile phone?	3	3	6	7.8	25	52.4	4.1	1.3
Contribute with other students to the development of a wiki as part of your course requirements?	8.7	5.1	6.9	14.5	28	33.7	3.5	1.6
Receive grades/marks from your lecturer via text messages on your mobile phone?	3	7.2	3.9	13.9	27.4	41.6	3.9	1.4
Receive pre-class discussion questions from your lecturer via text message on your mobile phone?	5.1	7.8	5.1	10.2	22.3	46.4	3.8	1.5
Use a personal dashboard on the university intranet to access all your academic information related to courses, grades, etc.?	6.3	6.3	6	11.7	28	36.3	3.7	1.5
Use an e-portfolio system to record your achievements for future use beyond the course of studies?	11.1	6	4.2	13.9	25	36.7	3.5	1.6

Learner Attitudes towards Technology

Students were asked to respond to statements on their attitudes towards technology, using Likert scale items with 0 = do not know, 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4= agree and 5 = strongly agree. The results are presented in Table 38. For statements framed in positive terms, responses were highly positive, with learners strongly agreeing and mean responses ranging from 3.76 to 4.1 (Table 40). About 58% of learners did not agree that online lectures would make them more likely to skip classes. Learners highly agreed that technology made them more connected to the university, teachers and other students. The majority of learners showed concern about privacy and cyber-security issues, and about

technology interfering with their concentration on their studies. About 70% of learners indicated they wished teachers to use and integrate more technology into their teaching.

Table 40. Learner Attitudes towards Technology

Statements	0 = don't know (%)	1 = strongly disagree (%)	2 = disagree (%)	3 = neither (%)	4 = agree (%)	5 = strongly agree (%)	Mean	Std dev
I get more actively involved in courses that use technology.	2.1	4.5	3.3	9	40.4	37.7	4	1.2
I am more likely to skip classes when materials from course lectures are available online.	1.5	7.8	50.6	14.2	14.5	7.8	2.6	1.1
When I entered college, I was adequately prepared to use the technology needed in my courses.	1.2	3.6	9	12.3	43.1	27.4	3.8	1.1
Technology makes me feel connected to what's going on at the college/university.	0	3.3	5.7	9.3	41.6	36.7	4.1	1.1
Technology makes me feel connected to other students.	6	3.6	3.6	10.8	42.2	35.8	4.1	1.0
Technology makes me feel connected to teachers.	3	3.6	10.8	13.6	35.5	31.9	3.8	1.1
Technology interferes with my ability to concentrate and think deeply about subjects I care about.	2.7	5.1	13.6	16	33.7	25	3.5	1.3
I am concerned that technology advances may increasingly invade my privacy.	4.5	2.7	9.3	16	34.9	29.5	3.7	1.3
I am concerned about cyber security (password protection and hacking).	2.1	3.9	9.3	11.7	38	31.6	3.8	1.2
In-class use of mobile devices is distracting to me.	2.1	3.6	14.2	13.9	32.2	31	3.7	1.3
In-class use of mobile devices is distracting to my teacher.	1.8	3	13.6	13	38.3	27.4	3.7	1.2
Use of tablets/laptops in class improves my engagement with the content and class.	1.8	5.1	8.1	13.6	39.2	29.2	3.7	1.2
Multitasking with my technology devices sometimes prevents me from concentrating on or doing the work that is most important.	1.2	5.4	7.5	15.7	33.1	34	3.8	1.2
When it comes to social media (e.g., Facebook, Twitter, LinkedIn), I like to keep my academic life and my social life separate.	9	4.8	5.7	13.6	39.5	32.5	3.9	1.1
I wish my teachers in the university would use and integrate more technology in their teaching.	9	6	9	11.1	31.6	38	3.9	1.3

Need to Improve the TEL Environment

Students were asked to respond to the comment: "There is a need to improve the technology-enabled learning environment in your university." There was overwhelming consensus, with practically all participants agreeing about the value and importance of technology for student learning, and the need to institute TEL at the university. Examples of typical responses include:

> *"Yes. It helps improve learning and helps through researcher and helps make assignments make easy to do."*

> *"Yes, we need technology to help us to gain more knowledge and wide understanding."*

> *"Technology is more important nowadays. Everything is technology. It helps to make our work easier and deepen our knowledge about different aspects of life that we are [aware of] but need to use it in a positive way!"*

There was also overwhelming consensus that the technology infrastructure and services at NUS needed significant improvement, with students mentioning "lack of computers," "slow network," "no free Wi-Fi" and the need for "better access to [the] Internet." Typical comments include:

> *"Computers need to be repaired and buy new model. Sometimes the connection is very slow and the university need more computer labs in order for students to use it."*

> *"There is a strong need to improve technology in our university. It is fast when there are few students accessing but when huge number of students connected, it will cause a slow in connection."*

3.3.5 Summary and Comments

Access to digital devices is common amongst NUS students, which is a good sign for integrating TEL in university courses. Almost 20% of students own desktops, 68% of students own laptops, 65% own smartphones and 27.1% own tablets. More students (16%) plan to buy laptops in the next 12 months, with somewhat fewer planning to buy tablets or desktops. While delivery of courses at NUS is predominantly traditional face-to-face (89%), nine per cent of the respondents also indicated that that they study courses using an online mode. Students also have access to desktops at the university. The majority of learners access the Internet from home, 69% through mobile devices and 20% via wireless technologies. These findings reflect the increasing prominence of wireless use and the pervasiveness of mobile technology in Samoa, with ownership of mobile devices now exceeding 90% (PRIF, 2015). Devices used by learners to access the Internet are smartphones (60%), followed by desktops (16%) and laptops (12%). Nearly 43% of the surveyed learners have access to broadband Internet at home. Almost all (96 %) use the Internet, of which 40% use it daily, followed by 24% on alternate days, 16% weekly and seven per cent irregularly. In terms of one-time access to the Internet, 42.2% indicated usage between one and two hours, followed by 23.8% spending less than one hour and 16.9% spending three to five hours.

Learners were very proficient in word processing, spreadsheets, PowerPoint and email, with mean responses above average. Learners were not as proficient and need more up-skilling in areas such as graphics editing, digital and audio editing, webpage design and LMSs. Almost 82% of learners surveyed indicated having profiles on social media platforms. The majority have accounts on Facebook (82.5%), followed by Google+ (42.2%) and photo-sharing platforms (e.g., Instagram) (29.2%). However, 28.3% do not update their accounts frequently. Only 14.8% are active on social media several times a day, whilst very few spend more than five hours (7.2%) on social media. The use of mailing list and discussion forums is low amongst learners. Only 17.5% were members of

mailing lists, and 22.9% had subscribed to discussion forums. Of these, only 10.5% had any experience with moderating discussions on mailing lists or discussion forums. These findings indicate that learners at NUS are not very familiar with mailing lists and discussion forums. The use of a LMS would require that learners be oriented to use discussion forums effectively.

On the overall quality of their experiences with the university's ICT services and resources, learners were positive, rating all of the services above average except e-portfolios, online technologies, Wi-Fi access, e-theses and dissertations, patent databases, e-newspapers, e-proceedings and plagiarism software. These indicate low access to the Internet on the university campus, as well as the need to augment university resources in certain areas, depending upon the availability of funds.

Only 8.1% of learners surveyed had taken an online course at the time of the survey. When asked whether in the past year they had taken a MOOC through any institution, responses revealed that 33.4% did not know what a MOOC was, 7.8% had not taken a MOOC but knew what it was, 2.7% had taken a MOOC but did not complete it, and 1.8% had taken and completed a MOOC. Since MOOCs are important developments in higher education, it is relevant for learners to be aware of their effective utilisation. It is up to the university to develop appropriate policies to integrate and provide credits for the completion of open courses offered by other institutions. Such a practice would help improve the quality of learning outcomes.

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

There was overwhelming consensus amongst practically all participants about the value and importance of technology for student learning and the need to institute TEL at NUS.

4. Conclusion

This baseline study has provided some very valuable information about the technology infrastructure at NUS, as well as the perceived skill levels, attitudes and perceptions towards TEL of both lecturers and students.

4.1 Major Findings

As evident in the survey responses, NUS is in the early stages of TEL implementation, with some improvement needed in its technology infrastructure and support services. In terms of skill levels, staff and students were quite proficient in common applications such as word processing, spreadsheets and email. However, further training and exposure were needed in areas such as graphic design, video editing, animation and MOOCs. Findings also indicated the need for more staff training about integrating technology into their teaching, and more knowledge and awareness in the area of OER. In terms of attitudes towards TEL, staff and students showed very positive views about the use of technology in teaching and learning. Staff and students obviously knew the value, potential uses and benefits of technology. Responses also showed overwhelming consensus on the need to develop a TEL policy for NUS.

4.2 Implications for NUS

The valuable information gathered in this baseline study is vital for informing the development of policies, plans and any future initiatives in TEL at the university. The report indicates the need to allocate resources in the right places to integrate technology in teaching and learning. Based on these results, efforts can be made to attract additional support for enhancing technology use at the university through collaboration with funding agencies. The report will also be helpful for analysing developments in terms of implementing TEL over a period of time, when the survey can be repeated with the same instruments. Such an exercise would help evaluate the effectiveness of TEL implementation in the courses and programmes at NUS. The findings of the survey also have financial implications in terms of identifying the need to improve infrastructure and provide more training for staff and students in the use of technology.

4.3 Recommendations

From the findings of the current study, we put forward the following recommendations:

1. That the TEL infrastructure at NUS be improved to facilitate greater use and integration of technology in teaching and learning by both faculty and students.
2. That a comprehensive policy on TEL be developed to guide TEL implementation at NUS.
3. That capacity building in TEL be a priority area for both staff and students.
4. That pilot courses be started to use TEL and demonstrate its systematic use.

References

Chan Mow, I., Kruse, V. E., Thomson, I., Pasiale, K. T., & Taupo, A. (2017). ICT in education in small island developing states of the Pacific. In R. Cullen & G. Hassall (Eds.), *Achieving sustainable e-government in Pacific Island states*. Cham, Switzerland: Springer International Publishing.

Commonwealth of Learning. (2017). *Regional consultations for 2nd World OER Congress: Background paper*. Burnaby, Canada: Commonwealth of Learning. Retrieved from http://rcoer.col.org/uploads/2/2/8/4/22841180/rcoer_background_paper.pdf

Davis, F. D. (1989). Perceived usefulness, perceived ease of use and user acceptance of Information Technology. *MIS Quarterly*, *13*(3), 319–340.

Government of Samoa. (2013). *Education sector plan 2013–2018, Education Sector Malifa*.

Kirkwood, A., & Price, L. (2016). *Technology-enabled learning implementation handbook*. Burnaby, Canada: Commonwealth of Learning. Retrieved from http://oasis.col.org/handle/11599/2363

Ministry of Communications and Information Technology. (2002). *National ICT Policy 2003–2005*. Apia, Samoa: MCIT.

Ministry of Communications and Information Technology. (2008). *National ICT Policy 2008–2010*. Apia, Samoa: MCIT.

Ministry of Communications and Information Technology. (2012). *National ICT Policy 2012–2017*. Apia, Samoa: MCIT.

Ministry of Education, Sports and Culture. (2002). *MESC Information Technology Plan 2002–2003*. Apia, Samoa: MESC.

Ministry of Education, Sports and Culture. (2005). *MESC Information Technology Plan 2005–2007*. Apia, Samoa: MESC.

Ministry of Education, Sports and Culture. (2012). *MESC Corporate Plan 2012–2015*. Retrieved from http://www.mesc.gov.ws/index.php?option=com_content&view=article&id=57&Itemid=61

NUS. (2016). *NUS Corporate Plan 2017–2018*. Apia, Samoa: National University of Samoa.

NUS. (2017). *NUS Statistical Digest for 2015*. Apia, Samoa: National University of Samoa.

Pacific Region Infrastructure Facility [PRIF]. (2015). *Economic and social impact of ICT in the Pacific*. Retrieved from http://theprif.org/index.php/resources/document-library/121-prif-ict-study-report-2015

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