



COMMONWEALTH *of* LEARNING



UMS
UNIVERSITI MALAYSIA SABAH

Report of the Baseline Study on Technology-Enabled Learning at Universiti Malaysia Sabah



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COMMONWEALTH *of* LEARNING

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Acronyms

| | |
|-----------|---|
| DePAN 1.0 | Dasar e-pembelajaran Negara – Institusi Pengajian Tinggi (National eLearning Policy for Higher Learning Institutions) |
| DePAN 2.0 | Dasar e-pembelajaran Negara 2015–2025 (National eLearning Policy 2015–2025) |
| ICT | Information and communication technologies |
| KPI | Key performance indicator |
| LMS | Learning management system |
| MCMC | Malaysian Communications and Multimedia Commission |
| MEB | Malaysian Education Blueprint 2015–2025 |
| MEB(HE) | Malaysian Education Blueprint (Higher Education) 2015–2025 |
| MEIPTA | Majlis Ketua-Ketua e-Pembelajaran IPTA Malaysia (Malaysian eLearning Council for Public Universities) |
| MOHE | Malaysian Ministry of Higher Education |
| MOOC | Massive open online course |
| OER | Open educational resources |
| TEL | Technology-enabled learning |
| UMS | Universiti Malaysia Sabah |
| UNEP | Unit for eLearning UMS |

Executive Summary

Report of the Baseline Study on Technology-Enabled Learning at Universiti Malaysia Sabah is the first step undertaken by Universiti Malaysia Sabah (UMS) towards a systematic approach to institutionalising technology-enabled learning (TEL) through research, consultation, capacity building, and monitoring and evaluation, with support from the Commonwealth of Learning (COL). This report analyses and evaluates lecturers' and students' current use of technology for teaching and learning at UMS, together with an assessment of the TEL environment in the institution, based on the *Technology-Enabled Learning Implementation Handbook* (Kirkwood & Price, 2016).

The report's authors obtained TEL-related UMS statistics regarding facilities, students, lecturers, governance and policies. In addition, a TEL survey was administered to 299 lecturers and 979 students to obtain data on their background, access to and use of information and communication technologies (ICT), Internet use, digital skills competency, and perceptions and attitudes about TEL.

The findings forming the baseline are presented in a structure following the guidelines in the *Technology-Enabled Learning Implementation Handbook* (Kirkwood & Price, 2016).

Findings

Introduction and Background to Universiti Malaysia Sabah

- UMS aim to provide excellence in teaching and learning and an enhanced, holistic experience for its 17,000 students.
- TEL development at UMS is strongly influenced by the policies and directives of the Ministry of Higher Education (MOHE) to fulfil the key performance indicators (KPIs) set by the ministry. Prior to 2018, most of the activities conducted to achieve the KPIs were performed on an ad hoc basis, and they lacked an institutional level of holistic eLearning action plans developed through a scholarly approach.
- UMS has improved its TEL organisation and structure and has established a Centre for eLearning to undertake a systematic and scholarly approach to the formulation of a strategic actions plan. The same approach will be used to develop an institutional policy on TEL, with support from COL.
- The keys components of TEL at UMS that need further improvement are the quality of Internet access, as highlighted in the students' comments; and the quantity and quality of training programmes in the use of hardware and software for the development of educational materials, as highlighted in the lecturers' comments.
- An institutional preparedness assessment of UMS places UMS at the third level of preparedness (scoring between 95 and 129), which is described as “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” (Kirkwood and Price, 2016, p. 88).

Background of Lecturers and Students

- The largest proportion (41%) of lecturers are under the age of 41, so they belong to Generation Y, or the first generation of “digital natives”; a quarter of the lecturers have less than five years of teaching experience.
- All students belong to Generation Z, so they have grown up in a highly sophisticated media and computer environment.

Blended Learning at Universiti Malaysia Sabah

- The number of lecturers who have adopted blended learning (see the definition in Chapter 3) is increasing, as can be seen from the usage of UMS’s learning management system (LMS), which is a good approximation for the blended learning activities of lecturers and students. However, there is still a significant number of lecturers who have not used the LMS provided by UMS and who therefore may not have adopted blended learning.

Institutional ICT facilities, and students’ and lecturers’ access to and use of ICT

- Almost all lecturers have access to desktop computers provided by UMS and own a personal smartphone and a laptop.
- Almost all students own a personal smartphone and a laptop. A small percentage of students (0.6%) do not own any digital devices, but their number is much smaller than the number of Thin Client devices provided by UMS at various locations on UMS campuses.
- The current Internet bandwidth at UMS is 3 Gbps, with an average usage level of 65%. Wi-Fi for Internet use is provided in the main buildings except in open areas.
- Lecturers most commonly access the Internet at home and at UMS by using mobile data/wireless and campus networks, respectively. When lecturers are at UMS, they mostly access the Internet from their office and classrooms.
- The majority of students access the Internet at home and in hostels at UMS by using mobile data/wireless and campus networks, respectively. When students are on the UMS campus, they access the Internet primarily from the hostels, library and classrooms.
- Currently, UMS has provided most of the service and facilities that are important for a TEL environment. There are plans to establish other services and facilities that are not presently available at UMS.
- Students and lecturers feel that the quality of most of the digital resources, services and spaces available at UMS are generally acceptable.
- Many of lecturers and students have reservations about Wi-Fi quality and about the software available for them to perform data analysis such as data visualisation, MATLAB, GIS applications, statistical applications and image analysis.

The extent and nature of students’ and lecturers’ Internet use, digital skills competency and training

- Almost all lecturers (98%) and students (94%) use the Internet on a daily basis. Eighty-

nine per cent of lecturers and 98% of students have social media accounts. Around 81% of students spend more than three hours per day on the Internet, and 63% of students spend more than three hours of their daily Internet use on social media.

- However, they do not contribute frequently to their social media accounts and do not actively participate in online discussion forums.
- There is a strong correlation between lecturers' and students' average scores in digital skills competency.
- Quite a number of lecturers and students have very low competency in skills related to multimedia editing, such as multimedia authoring, graphic editing, digital audio and video editing, and webpage design.
- One-third of the 263 written comments from lecturers were related to training (18.6%) and pedagogy (16%).
- Twenty-one per cent of lecturers claimed they had not received training on the use of ICT for teaching and learning, and around 29% said UMS did not provide regular training on the use of new technologies for teaching and learning.

Lecturers' ICT use for teaching and learning

- The majority of the lecturers cannot successfully integrate most ICT tools and skills in their teaching and learning practices.
- About 74% of the lecturers can use the LMS satisfactory or very well.
- The resources most commonly used by lecturers for teaching and learning are presentation notes (e.g., PowerPoint), e-journals, Word files, and images.
- Open-access research papers and open textbooks are among the types of resources not frequently used by lecturers.
- Lecturers rarely use open educational resources (OER) platforms or sources and seldom share as OER the materials they have created.

Perceptions and attitudes of students and lecturers regarding TEL

- Most of the lecturers have positive perceptions of and attitudes towards TEL, viewing it as having strengths and providing opportunities to improve teaching and learning.
- Lecturers' concerns basically revolve around three areas: the possible reduction of face-to-face time with students; pedagogy issues related to TEL; and the effectiveness of communication when using TEL.
- Students have an overall positive perception of the use of TEL, believing it will have positive impacts on their learning.
- Students expressed some concerns about potential threats when using TEL, particularly issues of cyber security and privacy. They want to protect their privacy and keep their academic and social lives separate from social media.
- Key issues that can be addressed to attract more lecturers to the use of TEL are: (1) infrastructure, hardware and software deployment, (2) Internet access and networking in

the university and (3) time and workload adjustments to develop TEL materials.

- Lecturers require training and/or support in instructional design to use TEL — assistance with the learning process in terms of pedagogical approaches, and the tasks and activities designed by lecturers to engage students and promote learning.

Recommendations

- Although UMS has put in place some of the aspects of a TEL system as well as TEL, policies and infrastructure, better TEL governance and a holistic TEL policy cutting across all UMS faculties and departments are required for more successful TEL implementation.
- UMS should involve and engage students as important stakeholders in TEL-related research, consultation, capacity building, and monitoring and evaluation.
- Since a large proportion of the lecturers at UMS are under the age of 40, and hence the generation gap between lecturers and students is not particularly large at this time, awareness and skills-training programmes need to be intensified and enhanced to ensure lecturers keep up with TEL developments and the expectation of students in future generations.
- The Internet bandwidth, Wi-Fi coverage and fibre-optic network in old buildings need to be upgraded and expanded to accommodate the growth in demand that will result from the implementation of TEL at UMS.
- Although they presently depend on proprietary analytical software that requires more overhead costs for UMS, lecturers should be encouraged to use free or open source software. Hence, a dedicated helpdesk or team needs to be established to assist lecturers with “migrating” to open source software by providing technical support, training and incentives.
- It is important for lecturers and course materials to be available online for students, who spend a large proportion of their time on the Internet.
- Lecturers should be trained in how to use TEL for effective communication with students, including to establish meaningful online discussion forums. Lecturers have to lead and moderate online discussion forums in their teaching. More studies need to be conducted to understand the current low involvement of students and lecturers in online discussion forums, as these are important tools for engagement between students and teachers as equal partners in learning and teaching.
- The use of multimedia authoring tools by lecturers and students needs to be improved by (1) providing training to lecturers and students, (2) establishing a dedicated educational e-content or audio-visual production centre and (3) revising the academic programmes at UMS in terms of their delivery and assessment methods, to encourage students to acquire and practice their multimedia skills.
- To increase the effectiveness of training programmes, more and better structured training programmes should be developed to replace loose, ad hoc training sessions during roadshows and seminars. In addition, lecturers’ training records should be monitored so that UMS can take an orderly, logical approach to determining what

training each lecturer needs, depending on their specific skill level.

- Lecturers' competency in using the LMS needs to be improved through more training programmes, workshops and/or other resources. Lecturers should be encouraged to use the LMS as their primary platform so that they are exposed to the pedagogical aspects of TEL that have been integrated in the functionalities of the LMS. In addition, the currently available LMS provided by UMS (i.e., Moodle) needs to be upgraded so that it is more user friendly and relevant in the context of today's social media.
- Lecturers' awareness of OER needs to be improved, and the use of OER should be promoted among UMS lecturers so they can make use of existing OER directly as learning materials for students, or remix and readapt OER to create new learning materials. In addition, to become consumers, lecturers should be encouraged to share their teaching and learning materials as OER, and should be given incentives or recognition for doing so.
- In line with the Higher Education 4.0 Framework Focus 2 – Digital Authentication and Cyber Security, UMS needs to train and retrain employees and students in how to manage privacy and security threats when they are using technology in teaching and learning.
- Strategies and policies need to be developed to take into account the extra workload involved for lecturers when they are applying TEL and creating learning materials during the early stages of adopting TEL in their teaching and learning practices.

Introduction

Report of the Baseline Study on Technology-Enabled Learning at Universiti Malaysia Sabah presents the findings of an institutional survey and review of the current status of technology-enabled learning (TEL) at Universiti Malaysia Sabah (UMS). The information in this report constitutes the most comprehensive dataset ever generated about TEL at UMS. It aims to provide a baseline for the development of institutional policy on TEL and evidence to increase understanding of various aspects of TEL at UMS, which will then be used to enhance the existing strategy and create an action plan for eLearning at UMS. It will also serve as a baseline for an objective assessment of the impact of a systematic and scholarly approach to implementing TEL, which UMS will adopt with support from the Commonwealth of Learning (COL).

The findings represent a descriptive analysis of a very large dataset. It is anticipated that more detailed analysis of the data will be conducted for a number of subsequent scholarly publications. The report is structured as follow:

- **Chapter 1:** Introduction and Background to UMS – A brief introduction to Universiti Malaysia Sabah, and a history of TEL at UMS
- **Chapter 2:** Backgrounds of Lecturers and Students – Basic information about lecturers’ and students’ backgrounds
- **Chapter 3:** Blended Learning at Universiti Malaysia Sabah – The current status of TEL at UMS
- **Chapter 4:** Institutional ICT Facilities, and Students’ and Lecturers’ Access to and Use of ICT – ICT devices, Internet access, and services or facilities for the TEL environment at UMS
- **Chapter 5:** The Extent and Nature of Internet Use, and Students’ and Lecturers’ Competency and Training in Digital Skills
- **Chapter 6:** Lecturers’ and Students’ Use of ICT in Learning and Teaching – Lecturers’ competency at integrating digital tools/skills in teaching and learning, and their use of resources in teaching and learning, including OER and MOOCs
- **Chapter 7:** Students’ and Lecturers’ Perceptions of and Attitudes towards Technology-Enabled Learning – The perceptions and experiences of students and lecturers regarding the usefulness of different technologies for learning and teaching, and the motivators and barriers for lecturers to use TEL

Finally, a concluding chapter provides the key findings and recommendations issuing from this baseline report.

Chapter 1: Introduction and Background to UMS

1.1 Universiti Malaysia Sabah

Universiti Malaysia Sabah (UMS) was established on 24 November 1994 under Section 6(1) of the University and College University Act 1971. UMS is the ninth public university in Malaysia. Currently, it has three campuses in the State of Sabah: the main campus in Kota Kinabalu, UMS-Labuan International Campus in Labuan, and the Faculty of Sustainable Agriculture in Sandakan.

UMS is a comprehensive university. It offers a Science Foundation programme as well as 64 undergraduate programmes in science, engineering, medicine, food science, agriculture, forestry, arts, humanities, business, accounting and economics. In addition, UMS offers postgraduate programmes through its ten faculties, three research institutes, and the five branches of the UMS Centre for External Education throughout the state, which are Kota Kinabalu, Sandakan, Tawau, Keningau and Labuan.

With its vision of being an innovative university of global standing, UMS strives to achieve academic excellence and international recognition through its attention to learning and teaching, research and publication, social services and balance in knowledge specialisation. UMS is committed to education transformation to fulfil the core aspirations outlined in the Malaysia Education Blueprint 2015–2025 (Higher Education) for preparing Malaysia’s youth to thrive in a complex and ever-changing future.

UMS has more than 1,000 academics, about 40% of whom hold a PhD or its equivalent. At present, more than 15,000 students are enrolled at UMS undergraduate programmes, and more than 2,700 postgraduate students are engaged at the master’s and PhD levels. Currently, over 53,000 students have graduated from UMS, from a wide range of countries. In line with its Strategic Plan 2018–2020, UMS aims to enhance excellence in teaching and learning and in holistic student experience (see Key Results Areas 1 and 8, <http://www.ums.edu.my/v5/en/our-strategic-plan>).

1.2 Background of TEL at UMS

Prior to the presentation of the institutional review in the following chapters, it is worthwhile to briefly explore the development of technology-enabled learning (hereafter TEL) at UMS since its establishment in 1994 (see Tan & Abdullah, 2010 for a detailed history). In this context, COL defines TEL as “the use of technology to support students’ learning” (Kirkwood & Price, 2016, p. 2). However, it does not necessarily imply enhancement of learning outcomes.

Prior to 2009, the development of TEL at UMS was driven mainly by a few early lecturers who were enthusiasts, and it was considered a novelty to apply TEL at UMS. The timeline presented in Figure 1.1 shows that the use of TEL at UMS started back in 2000 with the establishment of the Media and Education Technology Unit and the installation of the first LMS in 2001 (Tan & Abdullah, 2010). In 2006, UMS opened the Centre for Academic Development, and in 2009, the eLearning Committee and the eLearning Implementation and Monitoring Committee were formed. The new eLearning Committee was chaired by the Deputy Vice-Chancellor (Academic

and International). The membership of this committee consists of the Director for Strategic and Academic Development, the Chairman of the eLearning Implementation and Monitoring Committee, and the deans of four faculties: Engineering; Computing and Informatics; Business, Economics and Accountancy; and Humanities, Arts and Heritage. The eLearning Implementation and Monitoring Committee has been the main unit driving the eLearning agenda at UMS. It consists of eLearning coordinators representing each of the faculties.

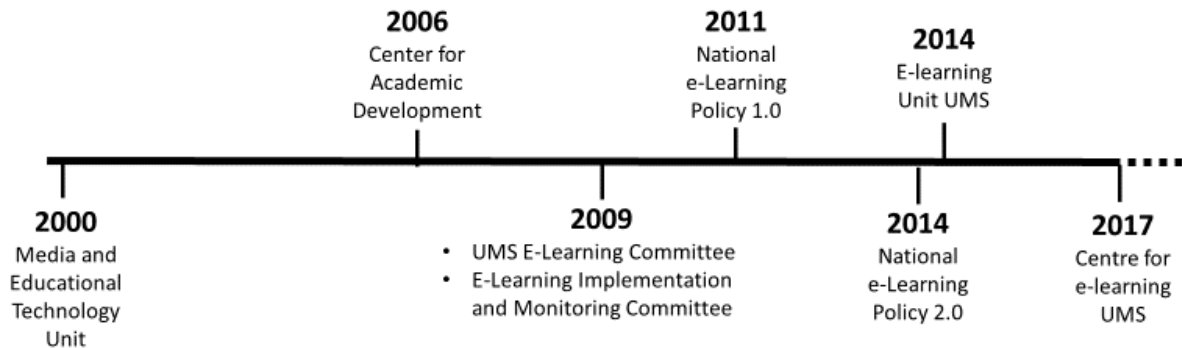


Figure 1.1. Timeline of TEL activities at UMS between 2000 and 2017.

In 2011, the National eLearning Policy 1.0 (2011–2015), hereafter DePAN 1.0 (Ministry of Higher Education Malaysia, 2011), was launched by the Ministry of Higher Education as a directive for higher learning institutions in Malaysia on how to implement technology in teaching and learning. As required by DePAN 1.0, an eLearning Implementation and Monitoring Committee was established within UMS’s Centre for Strategic and Academic Planning. This eLearning team was responsible for organising TEL training via roadshows, seminars and workshops. Most of these events were informal and ad hoc, and the development of staff members’ TEL skills was not systematically monitored. Toward the end of DePAN 1.0, this committee was transformed into the Unit for eLearning UMS (hereafter UNEP).

In 2015, the National eLearning Policy 2.0 (2015–2025), hereafter DePAN 2.0 (Ministry of Higher Education Malaysia, 2015), was introduced and is currently the reference standard that directs TEL development. Within the same year, in response to the policy, the eLearning Unit UMS was established. After the announcement of DePAN 2.0 and the Malaysia Education Blueprint (2015–2025), the Unit for eLearning was given additional responsibility to ensure UMS achieves the three main KPIs monitored by the Ministry of Higher Education: percentage of blended learning courses, number of OER, and number of MOOCs, as outline in DePAN 2.0. In addition to activities aimed at achieving the three KPIs, UNEP was tasked with organising roadshows at faculties to promote eLearning at UMS, ad hoc training, and yearly eLearning seminars. Nevertheless, the management and development of eLearning activities lacked a holistic perspective, and many key areas listed in DePAN 2.0 were not addressed with due diligence. Furthermore, most of the plans and activities were designed and applied on an ad hoc basis and lacked a structured, scholarly approach.

In October 2017, the Unit for eLearning was upgraded to the Centre for eLearning and was given more resources in term of budget and staff to further improve TEL at UMS. The Centre for eLearning was empowered to ensure UMS is on track according to the KPIs listed in DePAN 2.0, which cover six aspects: infrastructure and info-structure; governance; online pedagogy; e-content; professional development; and acculturation. Thus, holistic strategies and

action plans that cut across all the faculties and departments at UMS needed to be formulated. In addition, all faculties and departments needed to be involved in TEL. The first task of the Centre for eLearning was to formulate strategy and action plans and establish policy related to TEL by using more systematic and evidence-based approaches.

1.3 TEL Governance and the Centre for eLearning

The Centre for eLearning was established on 1 October 2017 with the objective of promoting the vision and mission of UMS within the context of TEL. The prevailing TEL ecosystem was assessed by conducting a SWOT analysis on 2 November 2017 among the faculties’ eLearning coordinators. This led to the formulation of the eLearning Strategy and Action Plan 2018–2020 version 1.0. Subsequently, another faculty-wide, open SWOT analysis was conducted to identify perceived weaknesses, strengths, challenges and opportunities relevant to implementing TEL at UMS. Based on the many hundreds of comments received, the eLearning Strategy and Action Plan 2018–2020 version 2.0 was proposed. (For more information, see <http://www.ums.edu.my/pep/>.) This version of the action plan set the direction for smart eLearning at UMS.

On 29 January 2018, UMS and COL signed an agreement that forms the basis for a systematic approach to institutionalising TEL at UMS. COL will provide its expertise in TEL to help UMS take a systematic approach to implementing TEL through research, consultation, capacity building, monitoring and evaluation.

A campus-wide baseline survey of TEL at UMS was conducted from 27 February to 5 March 2018. The survey received responses from 299 academic staff and 979 students. Overall, a total of three surveys were conducted (survey of teachers, survey of students, and a policy review and infrastructure audit) within this period of time.

1.4 The Current Situation of TEL at UMS

In this report, the current situation of TEL at UMS is analysed based on the data collected between November 2017 and March 2018. First, SWOT surveys were carried out. In November 2017, a SWOT analysis was conducted with the university’s eLearning coordinators, who had been coordinating TEL affairs in their respective faculties. These datasets were used to identify the prevailing scenario at UMS, then transformed into the first draft of the Strategy and Action Plan 2018–2020 using the Project Cycle Management approach. After that, in December 2017, all academic staff had the opportunity to engage in discussions about TEL via an online platform. Based on their feedback, together with the feedback from eLearning coordinators, the Strategy and Action Plan 2018–2020 was revised accordingly. As of 7 March 2018, the Centre for eLearning had received 209 instances of feedback about various aspects of TEL, 178 of which were worth exploring (Table 1.1).

Table 1.1. SWOT analysis of TEL at UMS: breakdown of lecturers’ feedback.

| Feedback Category | Count | Percentage |
|----------------------------|-------|------------|
| Pedagogy | 34 | 19.1% |
| Training | 33 | 18.5% |
| Learning management system | 31 | 17.4% |
| Change management | 27 | 15.2% |
| Internet | 13 | 7.3% |

| | | |
|-------------------------------|------------|------|
| Support from management | 12 | 6.8% |
| Hardware and software | 8 | 4.5% |
| Students | 8 | 4.5% |
| Policy | 6 | 3.4% |
| Plagiarism | 4 | 2.2% |
| Copyright | 3 | 1.7% |
| Security | 1 | 0.6% |
| Assistance from support staff | 1 | 0.6% |
| Total | 178 | |

Second, data and statistics from the university’s LMS (Smart2UMS) were extracted in November 2017. The data consist of logs of all lecturers’ and students’ activities on Smart2UMS between June 2014 and November 2017; this comprises approximately 1.2 million entries for lecturers’ activities and close to 33 million for students’ activities (Table 1.2). Each data item can be linked to a unique user (i.e., a student or lecturer). From these data it is possible to examine different aspects of TEL use by lecturers and students in terms of assessment, forum discussions, etc. The data can provide details of whether a student undertook a specific learning activity — for example, viewed a forum post, replied to a post, created a post, etc. Most importantly, the data also provide information about the larger context, such as students’ overall learning patterns, including when, where and what they learn.

Table 1.2. Categorisation of traffic in Smart2UMS, June 2014 to November 2017

| Duration | Total Log Data of Lecturers | Total Log Data of Students |
|----------------|-----------------------------|----------------------------|
| Jun – Dec 2014 | 122,691 | 2,436,151 |
| Jan – Dec 2015 | 296,835 | 7,876,907 |
| Jan – Dec 2016 | 341,820 | 9,971,167 |
| Jan – Nov 2017 | 458,661 | 12,610,241 |
| Total | 1,220,007 | 32,894,466 |

Third, we used tools provided in Kirkwood & Price (2016), specifically the three sets of questionnaires: (1) Questionnaire on Student Use of Technology, (2) Questionnaire on Lecturer Use of Technology for Teaching and Learning and (3) Questionnaire for Survey of Technology-Enabled Learning in Educational Institutions. The nature of the questions is shown in Table 1.3. The surveys were conducted between 23 February and 5 March 2018.

The student questionnaire consisted of 119 multiple-choice questions and one open-ended question. A total of 979 students took the survey, and the completion rate was around 77%. In addition, 388 students gave feedback in response to the open-ended question, of which 232 responses were meaningful (Table 1.4). The lecturer questionnaire consisted of 163 multiple-choice questions and one open-ended question. A total of 299 lecturers took the survey, and the completion rate was around 87%. In addition, 146 lecturers gave feedback in response to the open-ended question, of which 85 responses were meaningful (Table 1.5).

The institutional survey was completed by a senior IT officer who compiled the data from relevant departments at UMS. In addition, the institutional preparedness for TEL score was calculated based on measurement against a total of 37 sub-indices belonging to ten main categories: policy, strategic plan, IT support department, technology, content, documentation,

organisational culture, leadership, human resources and training, and TEL champions (Table 1.6). The overall score for UMS was 123 out of 185, placing the university at the third level of preparedness (scores of 95–129), described as “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’ (Kirkwood and Price, 2016, p. 88).

Finally, the TEL situation of faculties and centres involved in learning and teaching will be accessed through a blended learning audit report covering 2014 to 2016 and information from a number of lecturers involved in TEL. All of the above-mentioned data and information will be used to analyse the current situation at UMS and shape its TEL policy and implementation plan.

Table 1.3. Nature of questions in the student, lecturer and institutional questionnaires

| Students | Lecturers | Institution |
|---|--|---|
| Background Information (10 Q) <ul style="list-style-type: none"> ▪ Gender, age, learning disability ▪ Level, discipline, year of study ▪ Mode of course delivery | Background Information (10 Q) <ul style="list-style-type: none"> ▪ Gender, age, qualification, position ▪ Level, discipline, experience, years of teaching | Background Information (7 Q) <ul style="list-style-type: none"> ▪ Number of students, academic staff and support staff ▪ Level of teaching and status of institution |
| Access to and Use of ICT (64 Q) <ul style="list-style-type: none"> ▪ Provision and access to devices ▪ Internet access and usage ▪ Competency in computer skills ▪ Engagement in social media and online forums ▪ Experience with TEL-related services, resources or space provided by UMS | Access to and Use of ICTs (40 Q) <ul style="list-style-type: none"> ▪ Provision and access to devices ▪ Internet access and usage ▪ Competency in computer skills ▪ Engagement in social media and online forums ▪ Experience with TEL-related services, resources or space provided by UMS | Technology-enabled learning environment (ICT) <ul style="list-style-type: none"> ▪ Number of ICT devices ▪ Network facilities ▪ Access control of online resources ▪ TEL-related services, resources or space provided by UMS ▪ Human resources, training and content provided by UMS ▪ Policy issues for TEL |
| | Using ICT for Teaching and Learning (56 Q) <ul style="list-style-type: none"> ▪ Mode of course delivery ▪ Use and creation of digital content for teaching ▪ Competency in integrating technologies in teaching and learning ▪ Training and development ▪ Policy issues for TEL | |
| | Using ICT for Research and Scholarship (17 Q) <ul style="list-style-type: none"> ▪ Use of online resources in library ▪ Experience with the software and platforms provided by UMS | |
| Perceptions of Use of TEL (45Q) <ul style="list-style-type: none"> ▪ Perceptions of technology use in studying ▪ Preferences for adopting technologies in learning | Perceptions of Use of TEL (40 Q) <ul style="list-style-type: none"> ▪ Perceptions of TEL ▪ Motivators and barriers for lecturers to use TEL | |

Table 1.4. Categories of feedback in the student questionnaire

| Feedback Category | Count |
|----------------------------|-------|
| Internet | 155 |
| Pedagogy | 22 |
| Learning management system | 18 |
| Training | 15 |
| Hardware or software | 9 |
| Facilities | 5 |
| Security | 4 |
| Attendance | 2 |
| Change management | 1 |
| Plagiarism | 1 |

Table 1.5. Categories of feedback in the lecturer questionnaire

| Feedback Category | Count |
|-------------------------------|-------|
| Hardware and software | 18 |
| Training | 16 |
| Change management | 11 |
| Internet | 11 |
| Pedagogy | 8 |
| Policy | 8 |
| Learning management system | 6 |
| Copyright | 2 |
| Support from management | 2 |
| Plagiarism | 1 |
| Students | 1 |
| Assistance from support staff | 1 |

Table 1.6. Scores in institutional preparedness for TEL at UMS

| | | Score | |
|----------------------------------|---|-------|-----|
| 1. Policy | | | |
| 1.1. | There is a well-documented technology-enabled learning policy. | 4 | |
| 1.2. | The vision and mission of the technology-enabled learning policy are aligned with the mission of the organisation. | 4 | |
| 1.3. | The vision and mission of the technology-enabled learning are well understood across the organisation. | 3 | |
| 1.4. | There is a commitment on the part of institutional leaders to use technology to achieve strategic academic goals. | 4 | |
| Category score | | 15 | /20 |
| 2. Strategic Plan | | | |
| 2.1. | There is a strategic plan for the implementation of technology-enabled learning. | 4 | |
| 2.2. | The strategic plan for technology-enabled learning has measurable goals and outcomes. | 4 | |
| 2.3. | The strategic plan for technology-enabled learning is approved by the senior management of the organisation and is supported by adequate financial provisions. | 3 | |
| Category score | | 11 | /15 |
| 3. IT Support Department | | | |
| 3.1. | The organisation has an IT department that handles procurement, installation and maintenance of technologies for teaching and learning. | 4 | |
| 3.2. | There is an ICT policy in place, which is implemented by a high-powered committee in the organisation. | 4 | |
| 3.3. | The head of the IT support department reports to senior management and is responsible for overall functioning of the technology in the organisation. | 5 | |
| 3.4. | The head of the IT support department is well qualified and up to date in order to manage the technological requirements of the organisation. | 4 | |
| Category score | | 17 | /20 |
| 4. Technology | | | |
| 4.1. | There is adequate hardware infrastructure for teaching and learning (e.g. access to computers for students and learners). | 4 | |
| 4.2. | There are adequate applications and software for teaching and learning (e.g. access to appropriate software, intranet, learning management system, etc.). | 4 | |
| 4.3. | There is adequate networking infrastructure in the organisation (e.g. access to adequate bandwidth). | 3 | |
| 4.4. | There are adequate policies and procedures in place to protect privacy and organisational data. | 4 | |
| Category score | | 15 | /20 |
| 5. Content | | | |
| 5.1. | There is support available for the creation of digital multimedia content in the organisation (e.g. production of e-courses, audio and video materials, animation, etc.). | 2 | |
| 5.2. | There are instructional designers in the organisation, or faculty members are trained to organise learning content appropriately. | 2 | |
| 5.3. | Teachers have adequate access to the online systems to develop courses for technology-enabled learning. | 3 | |
| Category score | | 7 | /15 |
| 6. Documentation | | | |
| 6.1. | There is a variety of help available to support teachers and students in using technology effectively. | 3 | |
| 6.2. | Lessons learned in the implementation of technology-enabled learning are stored and shared within the organisation for others to access and learn from. | 2 | |
| 6.3. | The workflow processes and responsibilities to implement technology-enabled learning are well documented in the organisation. | 2 | |
| Category score | | 7 | /15 |
| 7. Organisational culture | | | |
| 7.1. | Faculty and staff members are willing to learn about new technology in the organisation. | 4 | |
| 7.2. | Faculty and staff members support each other easily. | 3 | |
| 7.3. | There is a culture of knowledge creation and sharing in the organisation. | 2 | |

| | | Score | |
|--|--|------------|-------------|
| Category score | | 9 | /15 |
| 8. Leadership | | | |
| 8.1. Leaders in the organisation are involved in the implementation of technology-enabled learning. | | 3 | |
| 8.2. Senior management in the organisation regularly review, monitor and evaluate the progress of technology-enabled learning. | | 3 | |
| 8.3. The top leadership of the organisation is supportive of technology-enabled learning and provides encouragement and motivation to the faculty and staff to achieve the academic goals. | | 3 | |
| Category score | | 9 | /15 |
| 9. Human Resources and Training | | | |
| 9.1. Faculty members are qualified and trained to use technology for teaching and learning. | | 3 | |
| 9.2. Faculty and staff members receive regular training to update them in the use of technology-enabled learning. | | 3 | |
| 9.3. There are adequate staff to support technology-enabled learning. | | 3 | |
| 9.4. The organisation has a structure in place to create teams for content development and delivery of technology-enabled learning. | | 4 | |
| 9.5. Faculty members trust the support received from instructional designers and technology support staff while developing and delivering the courses. | | 3 | |
| 9.6. The IT staff members are highly skilled and trained to provide the needed support. | | 3 | |
| Category score | | 19 | /30 |
| 10. TEL Champions | | | |
| 10.1. There are early adopters of technology-enabled learning in the organisation. | | 4 | |
| 10.2. There are TEL champions in the organisation who support and care about pedagogic innovations. | | 4 | |
| 10.3. There are faculty members who can take leadership roles in developing appropriate policies and a technology-enabled learning strategy for the organisation. | | 4 | |
| 10.4. There are TEL champions to research and disseminate good practices in technology-enabled learning. | | 2 | |
| Category score | | 14 | /20 |
| Overall Score | | 123 | /185 |

Note: 1 = strongly disagree or does not exist; 2 = disagree or only marginally demonstrates existence; 3 = neither agree nor disagree or existence or otherwise is difficult to explain; 4 = agree or it does exist; 5 = strongly agree or it definitely exists and is well established.

Chapter 2: Backgrounds of Lecturers and Students

The strategies of implementing TEL vary among institutions, depending on the context and background of the institution, lecturers and students. The background of UMS was introduced at the beginning of this report. In this chapter, the backgrounds of UMS students and lecturers will be presented.

A breakdown of the UMS population is presented in Table 2.1. There are more than 17,000 students and over 1,000 academic staff members.

Table 2.1. Students and staff at UMS as of 31 March 2018

| Population at UMS | Count |
|---|--------|
| Number of students enrolled | 17,445 |
| Number of faculty and academic staff employed | 1,070 |
| Number of non-teaching and support staff employed | 1,860 |

2.1 Lecturers

As of March 2018, approximately 200 of the total academic staff members had been inactive users of the online system due to maternity leave, sabbatical, exchange programmes, etc. The age distribution of all users is presented in Figure 2.1A. About 46% of the lecturers are under the age of 41, making them members of Generation Y, the first generation of digital natives.

The age distribution of the 299 lecturer respondents (Figure 2.1B) is generally representative of the UMS lecturer population (Figure 2.1A). In term of gender ratio, the proportions of male and female academic staff are almost the same (males 48.2%, females 51.8%). According to the survey results, about a quarter of the academic staff are young lecturers with no more than five years of teaching experience (Figure 2.2). Sixty per cent of the lecturers holds PhDs, and in terms of their positions, 79% are lecturers or senior lecturers, 16% are associate professors, and 5% are professors. Academic staff are primarily involved in undergraduate teaching (83%), with the rest engaged in postgraduate teaching or supervision (17%). As UMS is a comprehensive university, it provides undergraduate programmes across different disciplines. Thus, around one-quarter of the academic staff have a social sciences background, one-quarter engineering and technology, one-quarter natural or agricultural sciences, and the fourth quarter other disciplines (Figure 2.3).

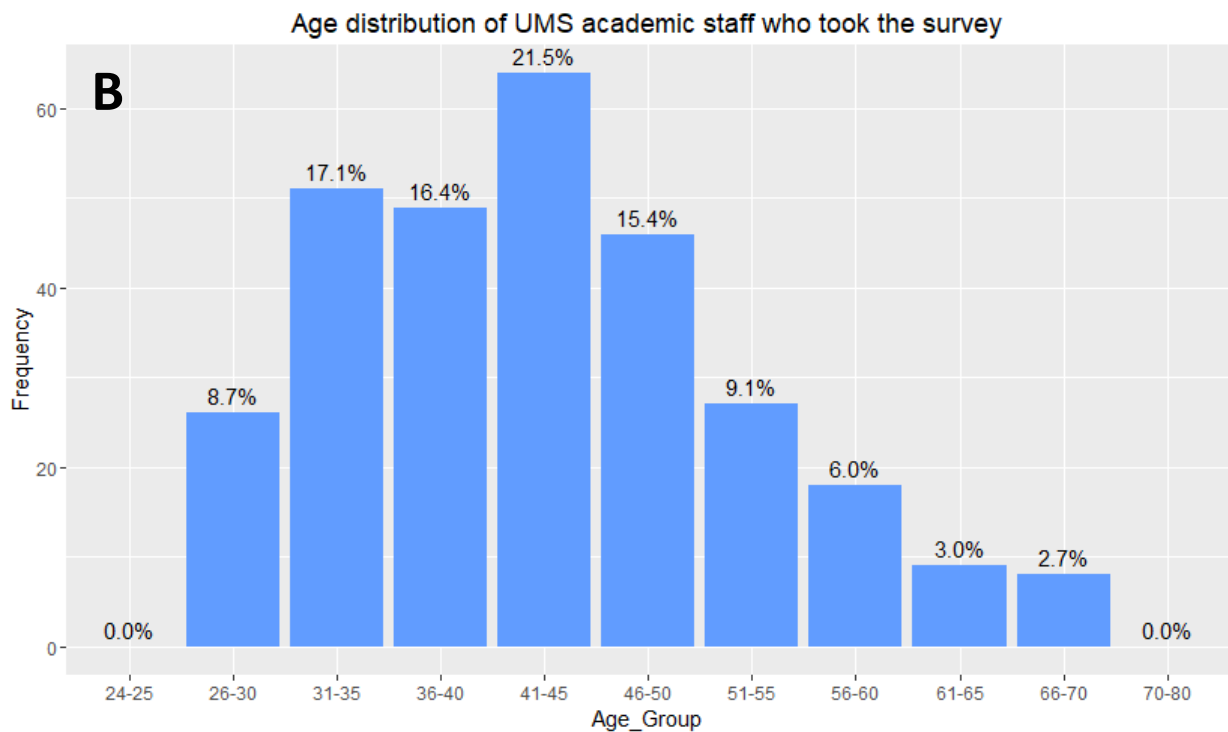
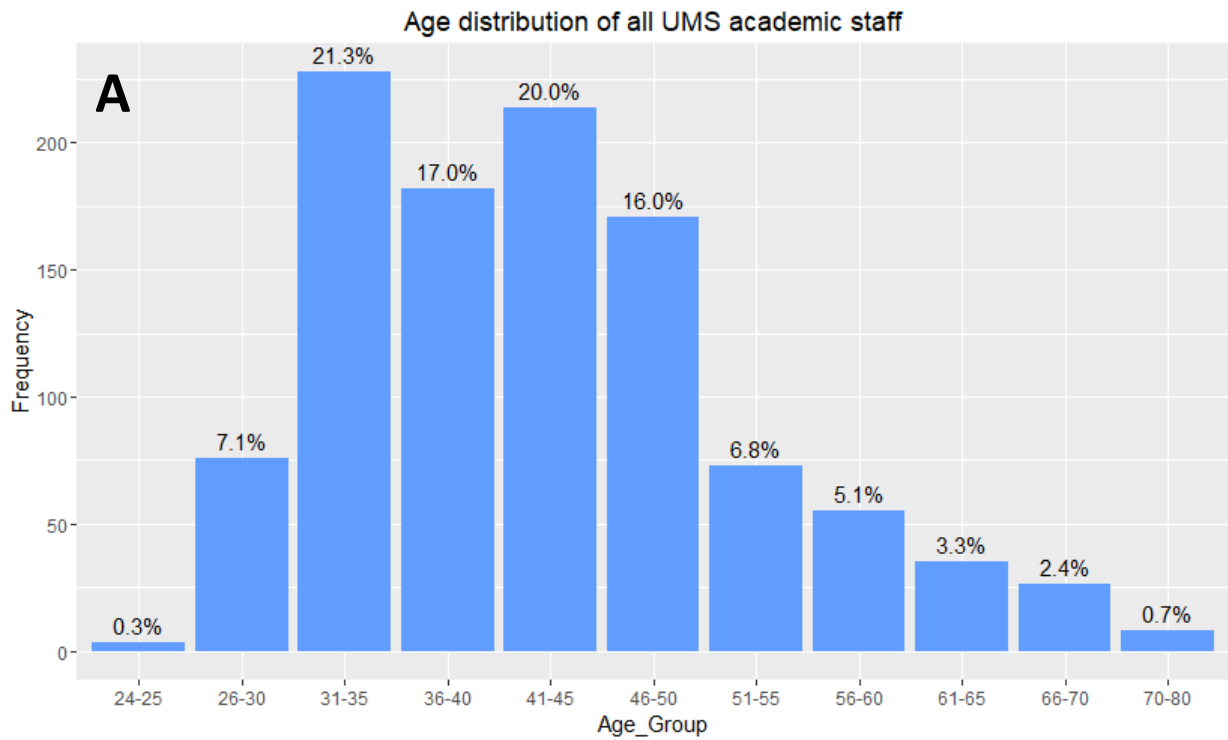


Figure 2.1. Age distribution of UMS academic staff.
 (A) All 1,070 UMS academic staff. (B) The 299 UMS academic staff who took the survey.

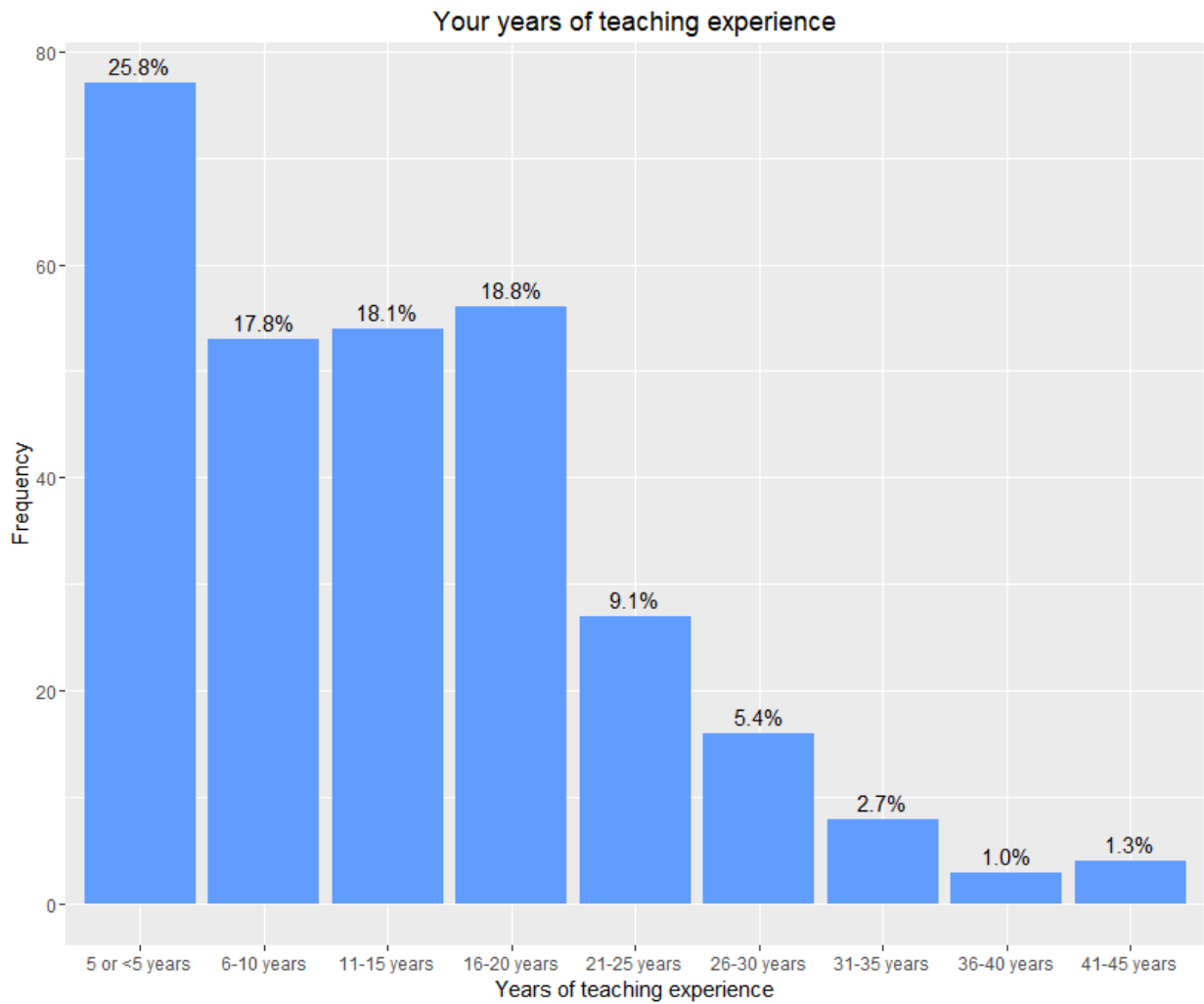


Figure 2.2. Teaching experience of academic staff who took the survey.

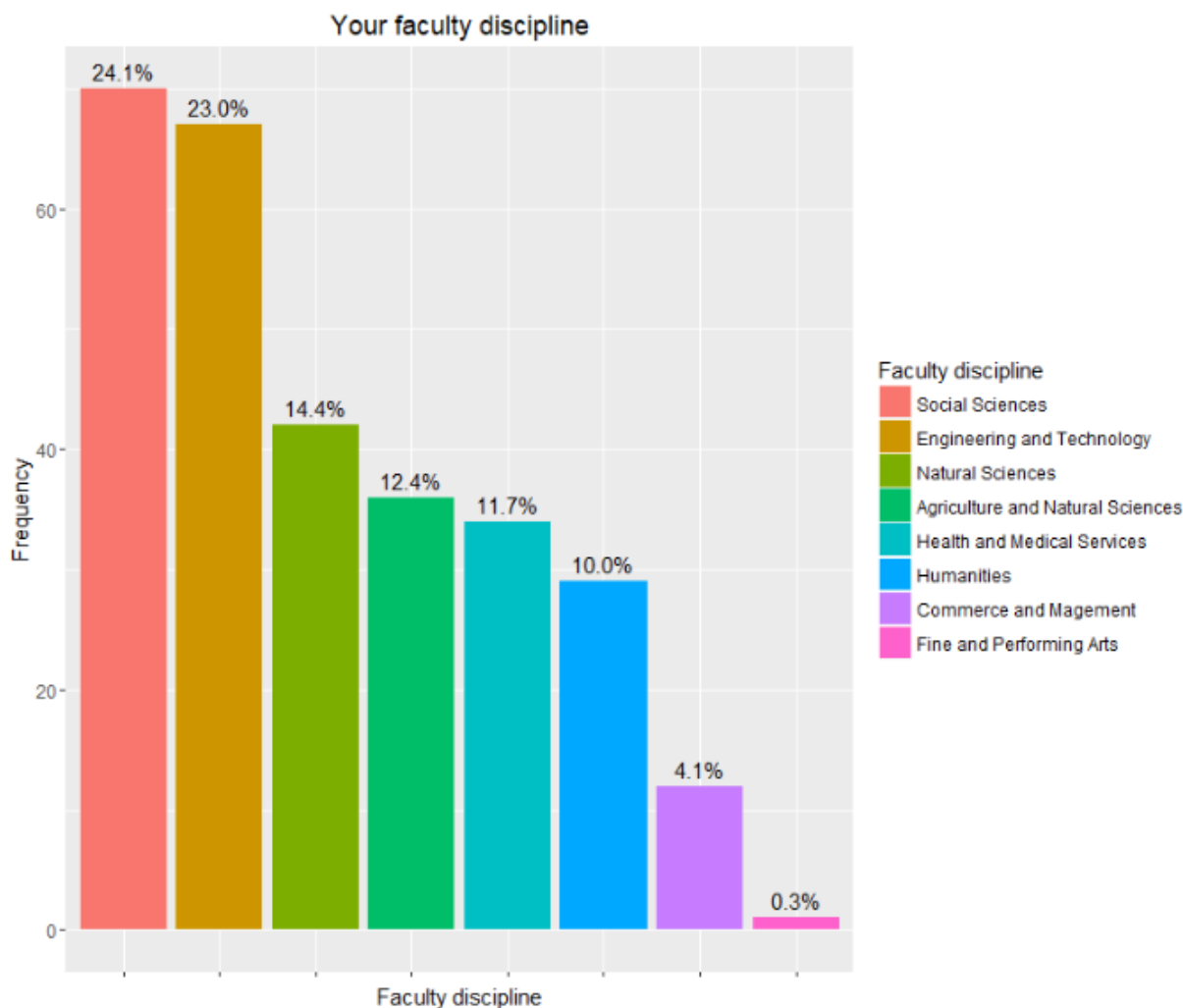


Figure 2.3. Disciplines of academic staff who took the survey.

2.2 Students

The age distribution of the 979 student respondents is depicted in Figure 2.4. About 98.4% of the student are under the age of 26, with a quarter of them being younger than 21. Three-quarters are female students, 94.8% are undergraduates, and the rest are graduate or postgraduate students. These students are part of Generation Z, who are growing up in a highly sophisticated media and computer environment and are more Internet savvy than earlier generations.

In comparing the backgrounds of lecturers and students, one aspect worth discussing is their age distributions. Notably, most of the academic staff at UMS are still young with respect to their academic career and age. On the other hand, almost all students are from Generation Z. Generally speaking, members of Generations Y and Z are digital natives, but Generation Z has used the Internet from a younger age than Generation Y. All are generally comfortable with technology and with interacting on social media. They are digital users, but this does not mean they have the required computer-related skills to learn with ICT. This point is elaborated upon in Chapters 5 and 6.

The degree of difference in age between students and lecturers is not very likely to contribute to

a “generation gap” between the teaching faculty and learners. It is important that lecturers share similar values with their students so they can communicate, collaborate and educate effectively. Students’ expectations must be met by lecturers’ convictions. This will be explored in more detail in Chapter 7.

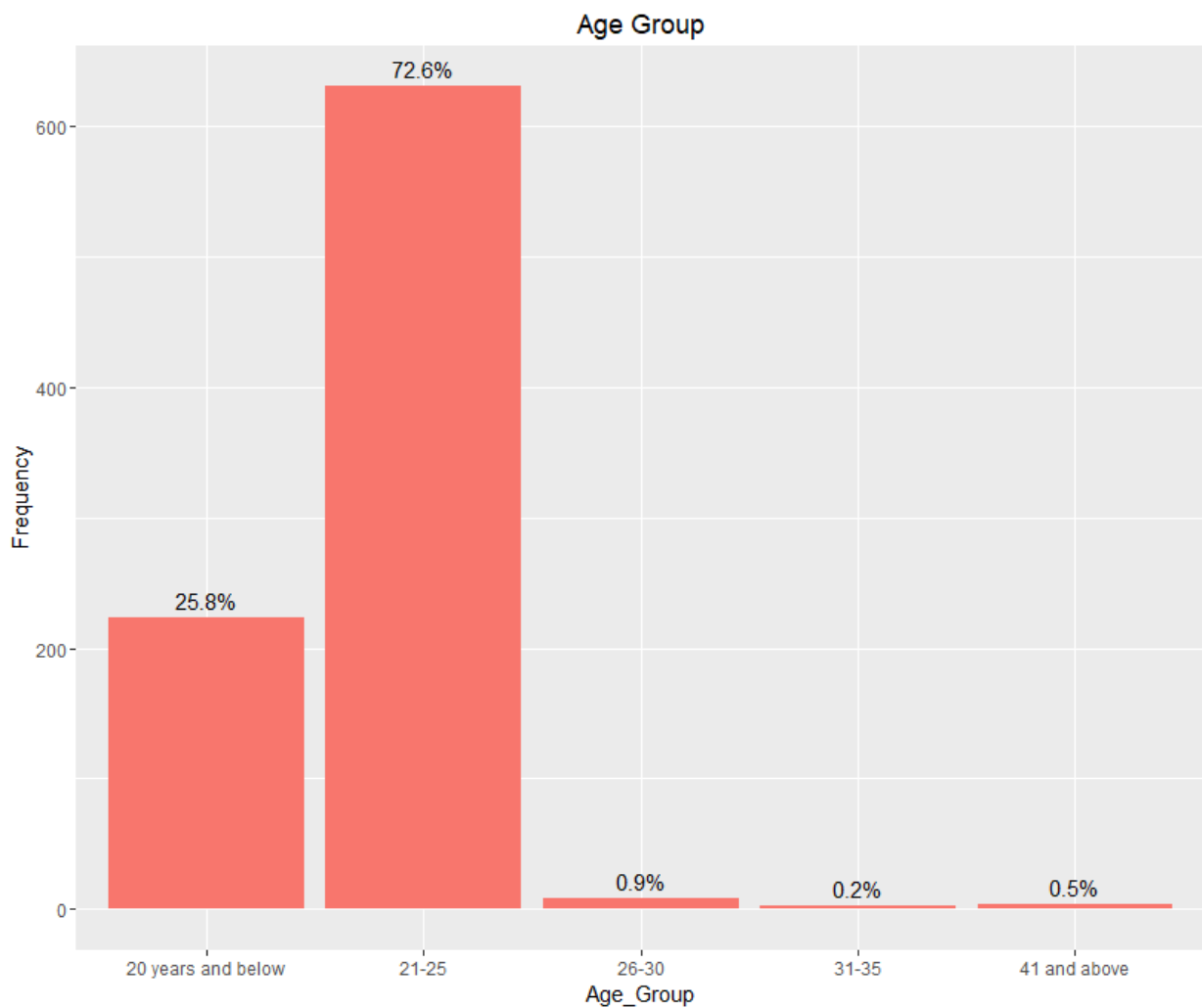


Figure 2.4. Age distribution of the 979 student respondents.

Chapter 3: Blended Learning at UMS

Prior to this baseline report, there have been no documents pertaining to a systematic and holistic investigation of TEL at UMS. However, statistics on the use of blended learning courses and on students' and lecturers' activities on the LMS from June 2014 to December 2017 formed the basis for developing indicators of the current situation of TEL at UMS. In this report, the definition of a “blended” course is based on the definition in DePAN 2.0: a course “that has [a] mix of online and face-to-face mode, where at least 30% of the course is delivered online, but not more than 80%.”

In this context, 30% of the course means 30% of total contact hours, depending on the credit-hours load of the particular course. For the past three years, UMS has adopted the criteria developed by the Malaysian eLearning Council for Public Universities (MEIPTA), which state that for a 3-credit-hours course, a minimum of 13 components must be presented and delivered via an online mode; these can be in the form of course materials, activities and assessments. Commencing January 2018, UMS adopted an updated MEIPTA criterion, which specifically states that at a minimum, the 13 items should consist of one file of course information, seven contents files, three activities files, and two assessments.

According to DePAN 2.0, 50% of the courses at UMS needed to be delivered in a blended mode by the year 2020, and 70% of the courses by 2025. Each year, UMS audits all of its faculties and reports the findings to the Ministry of Higher Education of Malaysia (see Table 3.1). Overall, the number of blended learning courses at UMS has been increasing over the years. Courses in a blended mode had reached 40.5% as of the 2016/17 academic calendar year.

Table 3.1. Percentage of courses in a blended learning mode in two calendar years.

| Faculty/Centre | Percentage of Courses in Blended Learning Mode in Two Calendar Years | | | Number of Recipients of Blended Learning Award in 2017 |
|---|--|---------|---------------|--|
| | 2015/16 | 2016/17 | Overall trend | |
| Faculty of Engineering | 8.3% | 30.5% | + 22.2% | 2 |
| Faculty of Science and Natural Resources | 7.4% | 24.8% | + 17.5% | 10 |
| Faculty of Food Science and Nutrition | 65.2% | 64.5% | – 0.6% | 2 |
| Faculty of Medicine and Health Sciences | 71.4% | 48.3% | – 23.1% | 11 |
| Faculty of Sustainable Agriculture | 27.8% | 38.8% | + 11.0% | 1 |
| Faculty of Computing and Informatics | 44.1% | 64.7% | + 20.6% | 11 |
| Faculty of Humanities, Arts and Heritage | 25.2% | 25.1% | – 0.1% | 7 |
| Faculty of Business, Economics and Accountancy | 22.2% | 52.6% | + 30.5% | 6 |
| Faculty of Psychology and Education | 21.2% | 46.1% | + 24.9% | 3 |
| Labuan Faculty of International Finance | 38.9% | 61.7% | + 22.8% | 7 |
| Centre for the Promotion of Knowledge and Language Learning | 38.8% | 47.1% | + 8.3% | 5 |

However, as pointed out by Kirkwood & Price (2016), such basic statistics as the of number of items uploaded to an online platform do not provide information about the extent to which

students interact with the content, the degree of a lecturer’s engagement with students in online discussions or forums, and whether students receive feedback from lecturers about their online assessments or their assignments submitted online. As shown in Table 1.2, using of the LMS at UMS has increased over the years; the overall usage (i.e. total log count) by lecturers in 2017 had increased 68% from 2015, and usage by students in 2017 had increased 75% from 2015.

In addition, at individual levels, lecturers’ usage is also increasing (Figure 3.1). This trend can be observed in the outliers, which mostly comprise early adopters of blended learning and the remaining lecturers. Nevertheless, it is important to note that there are still around 200 lecturers who are not active on the LMS, though some of them might have been using other platforms. This situation will be improved once lecturers must use the LMS as the primary eLearning platform, and all content and activities created using third-party tools or platforms must be linked back to the UMS LMS by the end of 2018. Hence, the statistics obtained from the LMS as shown in this section should be regarded as the lower bound of the real situation.

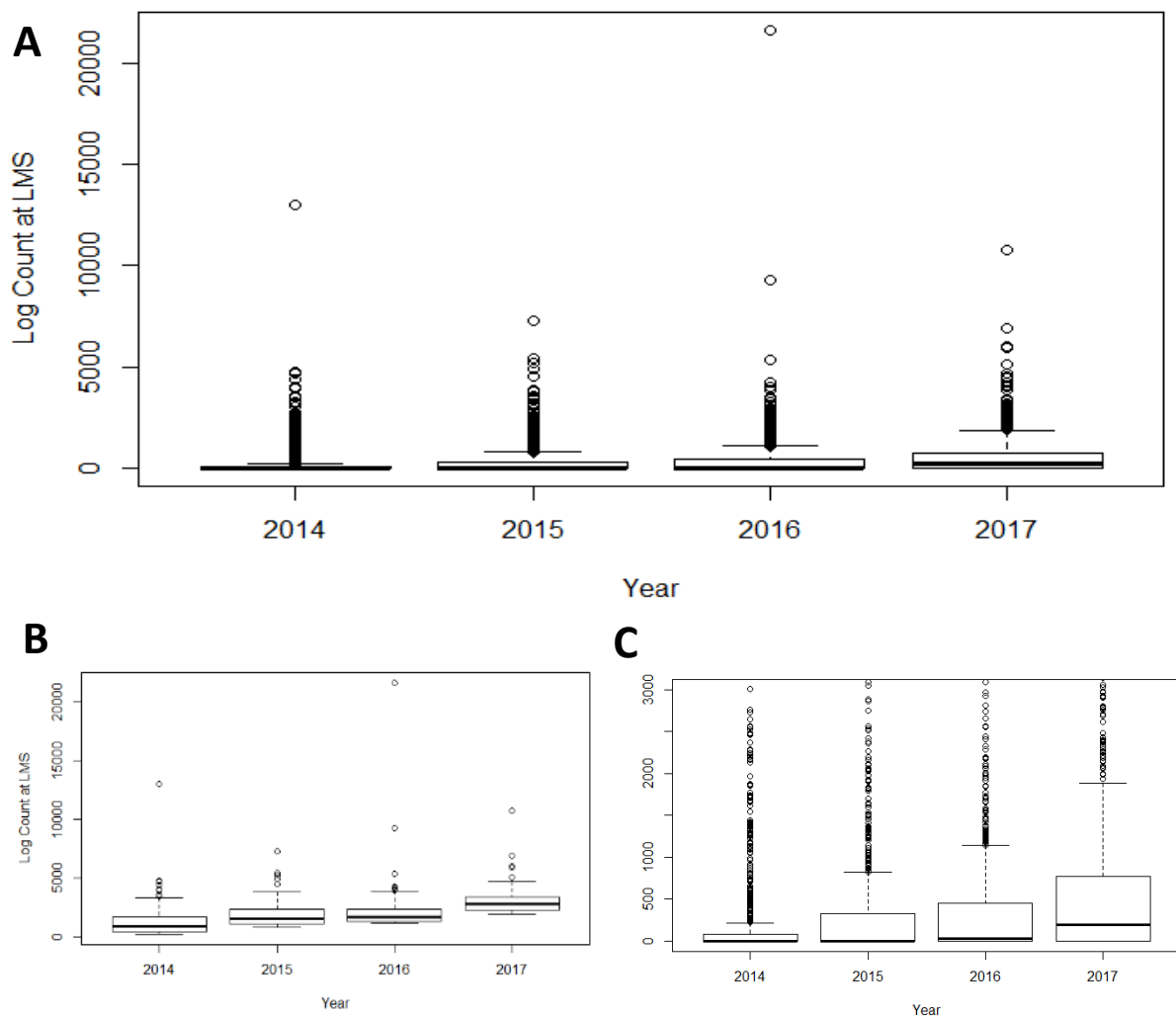


Figure 3.1. Lecturers’ usage of the UMS LMS.

(A) Boxplot showing the log count of lecturers active within the UMS LMS between 2014 and 2017. (B) Boxplot of lecturers who are outliers in (A). (C) Details of lecturers not in the outlier group.

The quantitative data shown in Figure 3.1 are also supported by lecturers’ and students’ statements in the surveys that many of the courses at UMS were conducted in the blended mode (Figure 3.2). Although a large number of courses are being delivered via the blended

mode, a significant proportion of courses are still being taught via the traditional face-to-face classroom method.

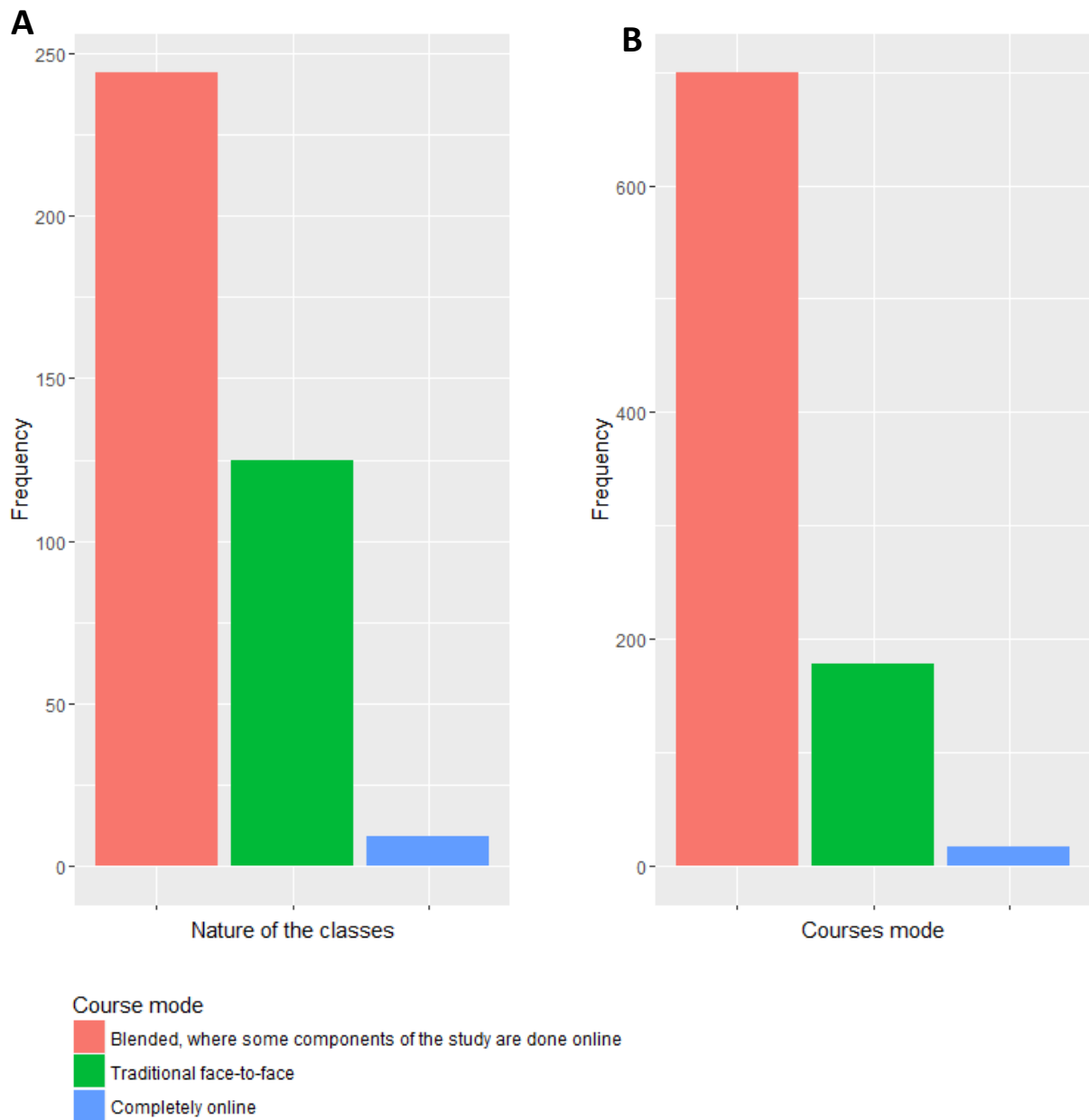


Figure 3.2. Mode of course delivery at UMS.
(A) Mode taught by UMS lecturers. (B) Mode attended by students.

Chapter 4: Institutional ICT Facilities, and Students’ and Lecturers’ Access to and Use of ICT

This chapter will explore the ICT facilities and services provided by UMS, and the students’ and lecturers’ access to and use of these resources. It is essential that UMS provide digital devices, Internet access and other ICT-related services, but their availability alone does not mean that TEL will automatically be implemented. TEL also requires students and lecturers to have digital competencies (see Chapter 5) and a positive attitude towards TEL (see Chapter 7).

4.1 ICT Devices

Table 4.1 shows the types and numbers of computing devices at UMS. The desktops provided by the university are used by lecturers and students (Figure 4.1). However, most of the desktop computers and laptops are provided to staff, whereas the Thin Client devices are provided to students at various common locations at UMS. Thin Client is a lightweight computer for use in a server-based computing environment.

Table 4.1. Types and numbers of computing devices provided by UMS

| Computing Device | Number |
|------------------|--------|
| Desktop computer | 3,307 |
| Tablet | 0 |
| Laptop | 475 |
| Thin Client | 750 |

In addition to the devices provided by UMS, 40% of the lecturers own a desktop, laptop, tablet, or smartphone, and 37% of the lecturers own at least three of these devices (Figure 4.2). Almost all lecturers have access to and own a personal smartphone and laptop. Ninety-six per cent of the students own at least two devices, namely a smartphone and laptop. Overall, almost all lecturers and students have access their own computer devices. Among students, 0.6% do not own any of the devices. However, the estimated number of these students is not especially large, a little over 100, which is less than the number of Thin Clients provided by UMS (Table 4.1). Hence, all students should at the very least have access to a Thin Client provided by UMS at various MegaLab locations on the campuses.

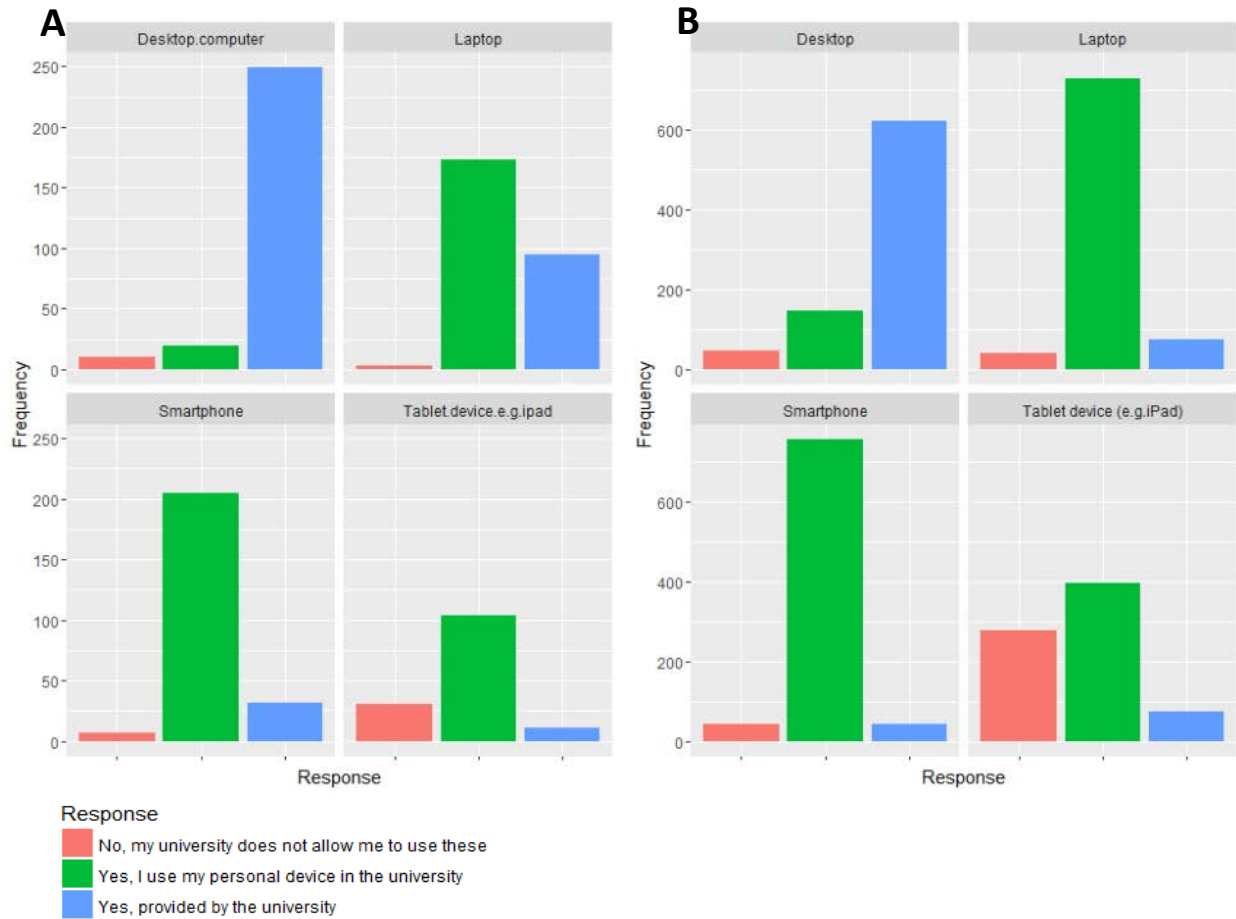


Figure 4.1. User access to devices provided by UMS.
 (A) Lecturers' access. (B) Students' access.

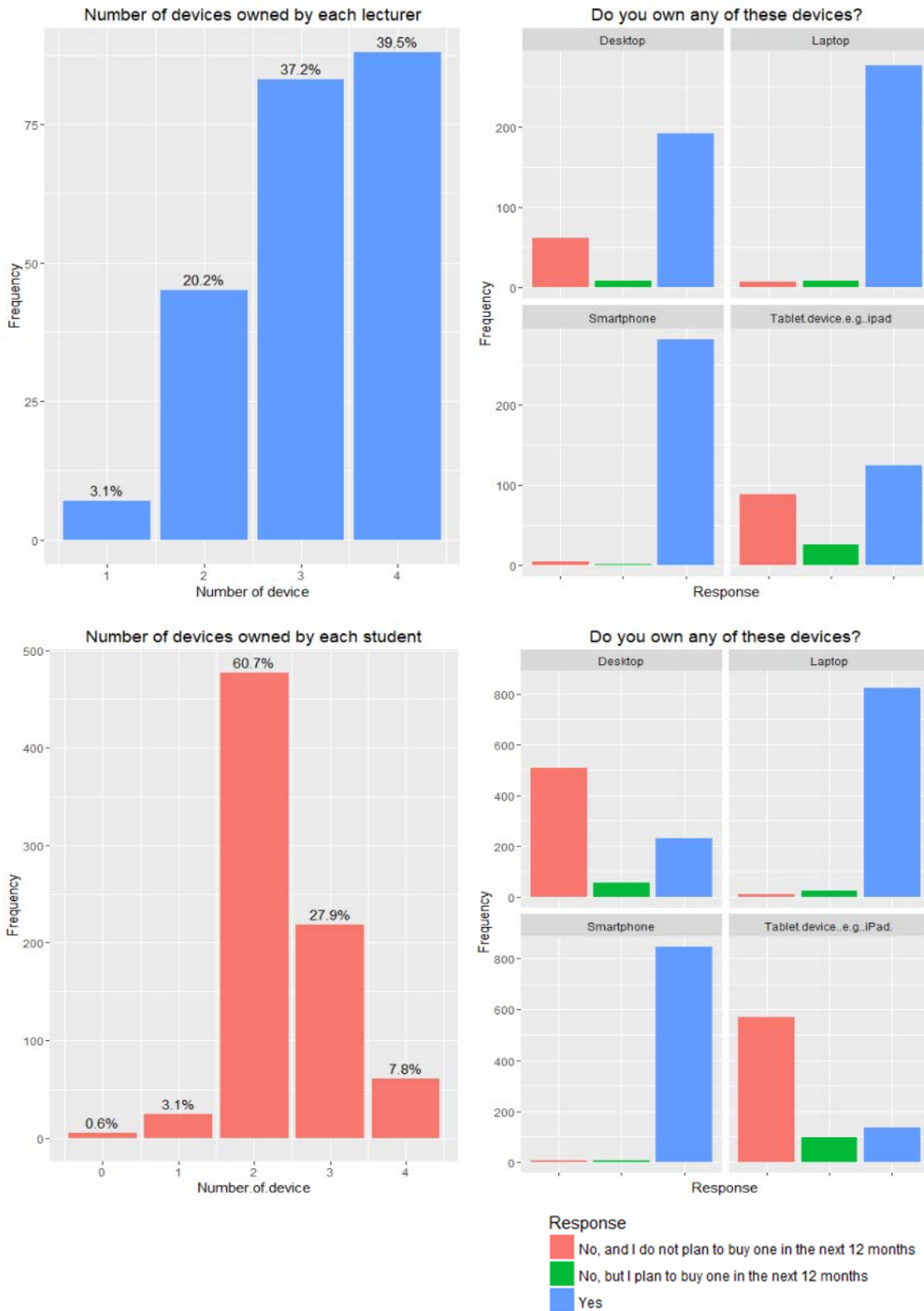


Figure 4.2. Numbers and types of devices owned by lecturers and students.
 Top left: number of devices owned by each lecturer; top right: types of devices owned by each lecturer. Bottom left: number of devices owned by each student; bottom right: types of devices owned by each student.

4.2 Internet Access

The current Internet bandwidth at UMS is 3 Gbps, with an average usage level of 65%. Wi-Fi for the Internet is provided in areas of the main buildings, such as classrooms, lecturers' offices, students' common areas, hostels, the library, lecture halls and laboratories. However, there is no Wi-Fi coverage in open areas such as bus stops.

Students and lecturers differ in the devices they use to access the Internet (Figure 4.3). Most students use a smartphone as their primary device (83%), followed by a laptop (16%). Although a smartphone is also the primary device lecturers use to access the Internet, the proportion is much lower (47%), and their second most commonly used device to access the Internet is a desktop computer (33%), followed by a laptop (19%). According to a report by the Malaysian Communications and Multimedia Commission (2017; hereafter MCMC, 2017), a smartphone is the device most commonly used by Malaysians to access the Internet (89.4%).

Access control measures are in place to restrict users' access to peer-to-peer (P2P) computing or networking, virtual private networks (VPNs) and adult content. However, there are no restrictions on access to social media (e.g. Facebook, Twitter, LinkedIn, Instagram, etc.); video channels (e.g. YouTube, Vimeo, etc.); chat/messaging applications (e.g. WhatsApp, Viber, Skype, GTalk, etc.); audio channels (e.g. iTunes, online MP3 players, etc.); sites for massive downloads of videos, audio files, reference books, etc.; software download sites (e.g. Cnet.com, Sourceforge.net, etc.); and emails.

Lecturers most commonly access the Internet at home and at UMS using mobile data/wireless networks and the campus network, respectively. When lecturers are at UMS, they mostly access the Internet from their offices and classrooms (Figure 4.4). The majority of the students access the Internet at home and at hostels at UMS using mobile data/wireless networks and the campus network, respectively. When students are on a UMS campus, they access the Internet primarily from the hostels, the library and classrooms (Figure 4.5).

Although Internet access has been provided, its quality needs to be improved, as indicated by the comments received from students during the course of the survey. Two-thirds of the 232 comments were related to Wi-Fi connectivity for Internet access (Table 1.4). Conversely, only 9% of lecturers' feedback in the surveys and SWOT analysis was related to the Internet (Tables 1.1 and 1.5). This can be attributed to the fact that academic staff access the Internet via fixed lines or via their own personal Internet connections provided by commercial ISPs. The result is not surprising in light of the locations where students and lecturers access the Internet (Figures 4.4 and 4.5), and the patterns of students' learning times (Figure 4.6). Most students access the Internet at a hostel, especially one of the campus hostels, which currently accommodate more than 5,500 students. These students can access the Internet in classrooms and the library during the day, when they have classes; only at night can they access the Internet from a hostel (see Figure 4.6). This is when they are engaged in most of their independent learning within the UMS LMS. On the other hand, lecturers are most active during their office hours, when they can access the Internet using their desktop through the wired campus network.

The constraints upon students' Internet access will soon be mitigated through Malaysia's MYREN-X initiative. MYREN-X is a Giganet network that will be provided to UMS, providing a computing and storage infrastructure dedicated to learning and research activities, with a bandwidth expanded to 100 Gbps. In addition, UMS's Smart Infra ICT project will receive funding from the Ministry of Communications and Multimedia to improve UMS's fibre-optics

network. Hence, the Internet issues at UMS will be significantly alleviated in due course.

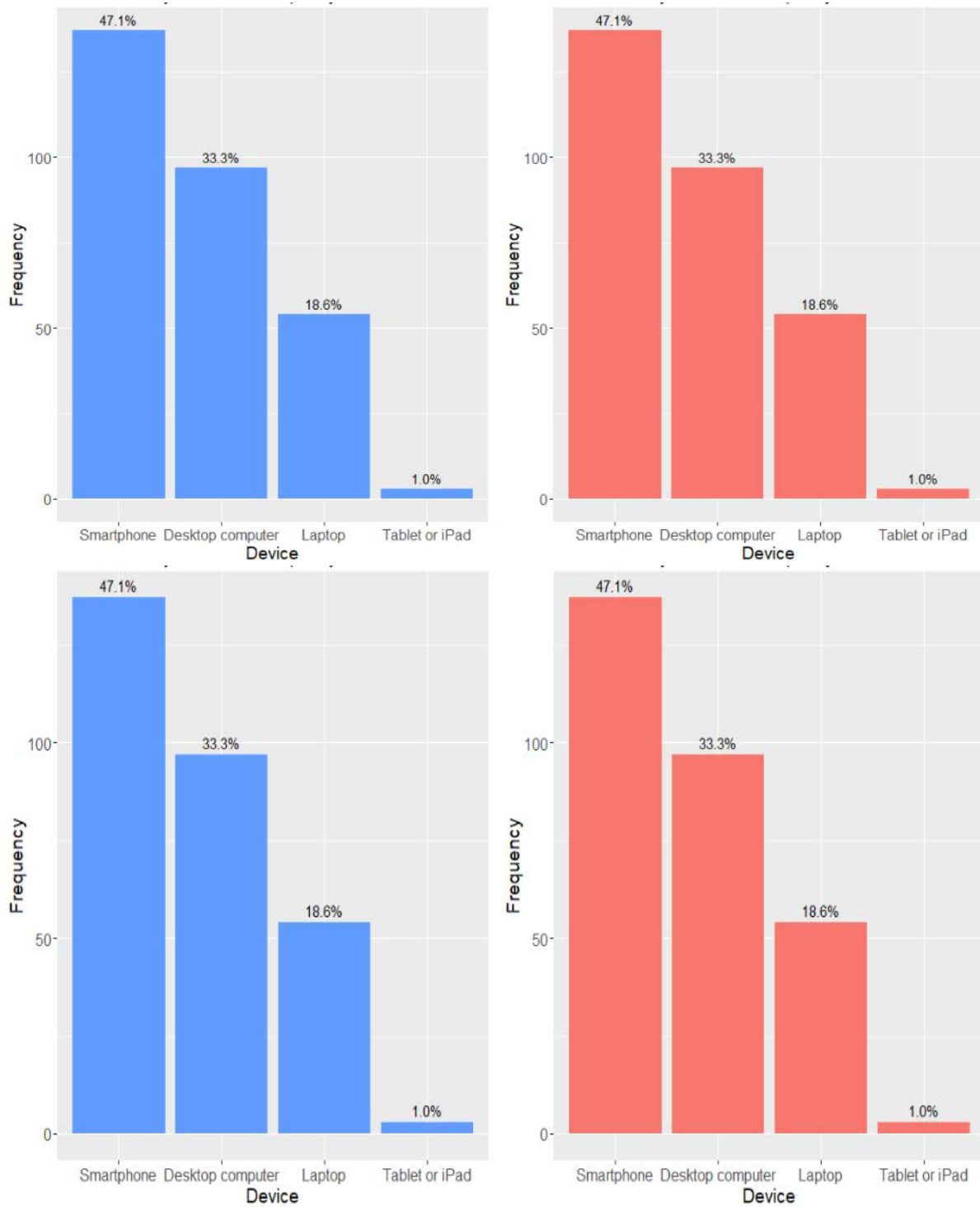


Figure 4.3. Devices most frequently used to access the Internet.
Left: by lecturers; right: by students.

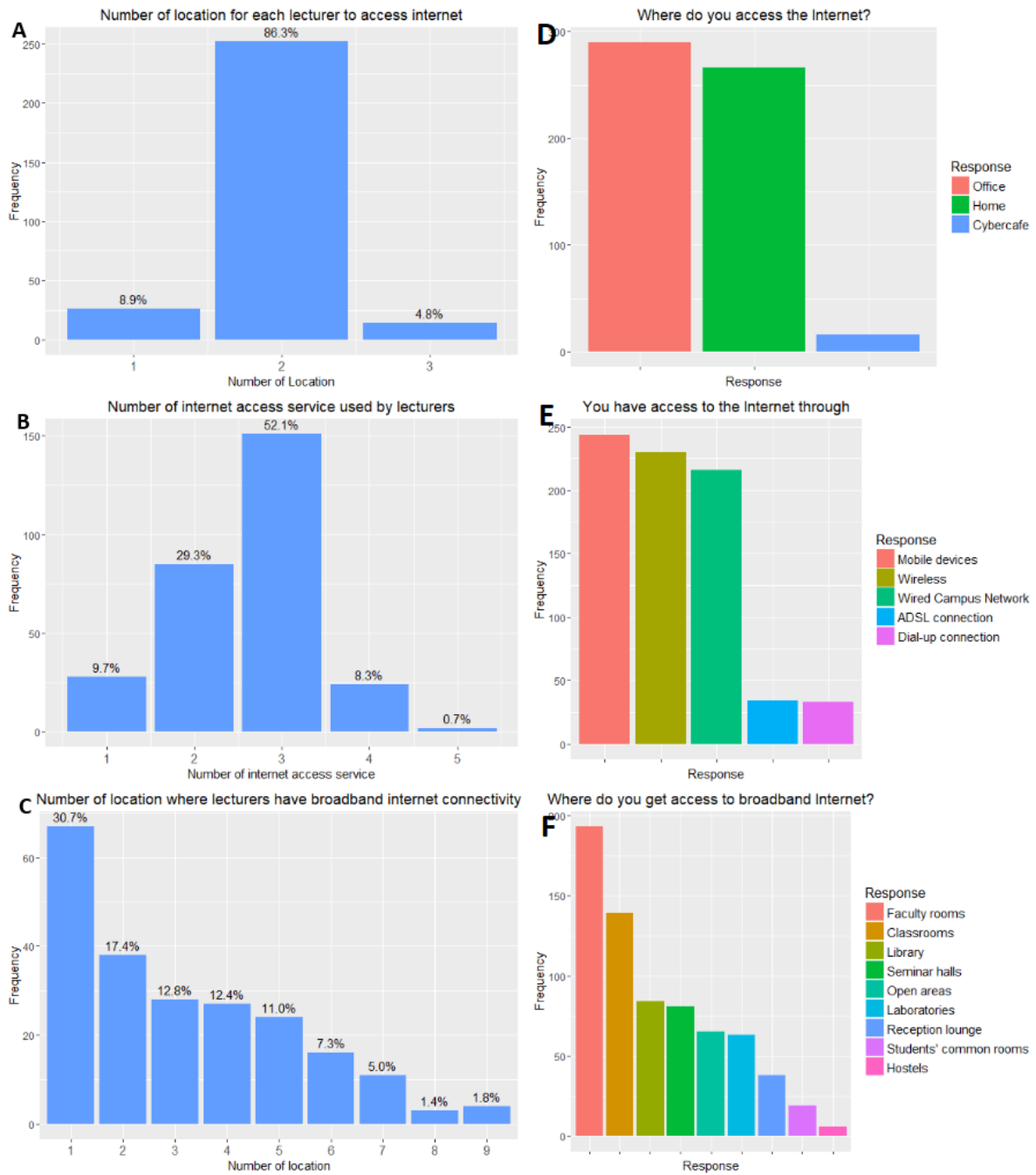


Figure 4.4. Lecturers' access to the Internet.

(A) Number of locations where lecturers access the Internet; (B) nature of locations; (C) number of Internet access services used; (D) types of Internet access services used; (E) number of locations where lecturers have broadband connectivity; (F) nature of locations.

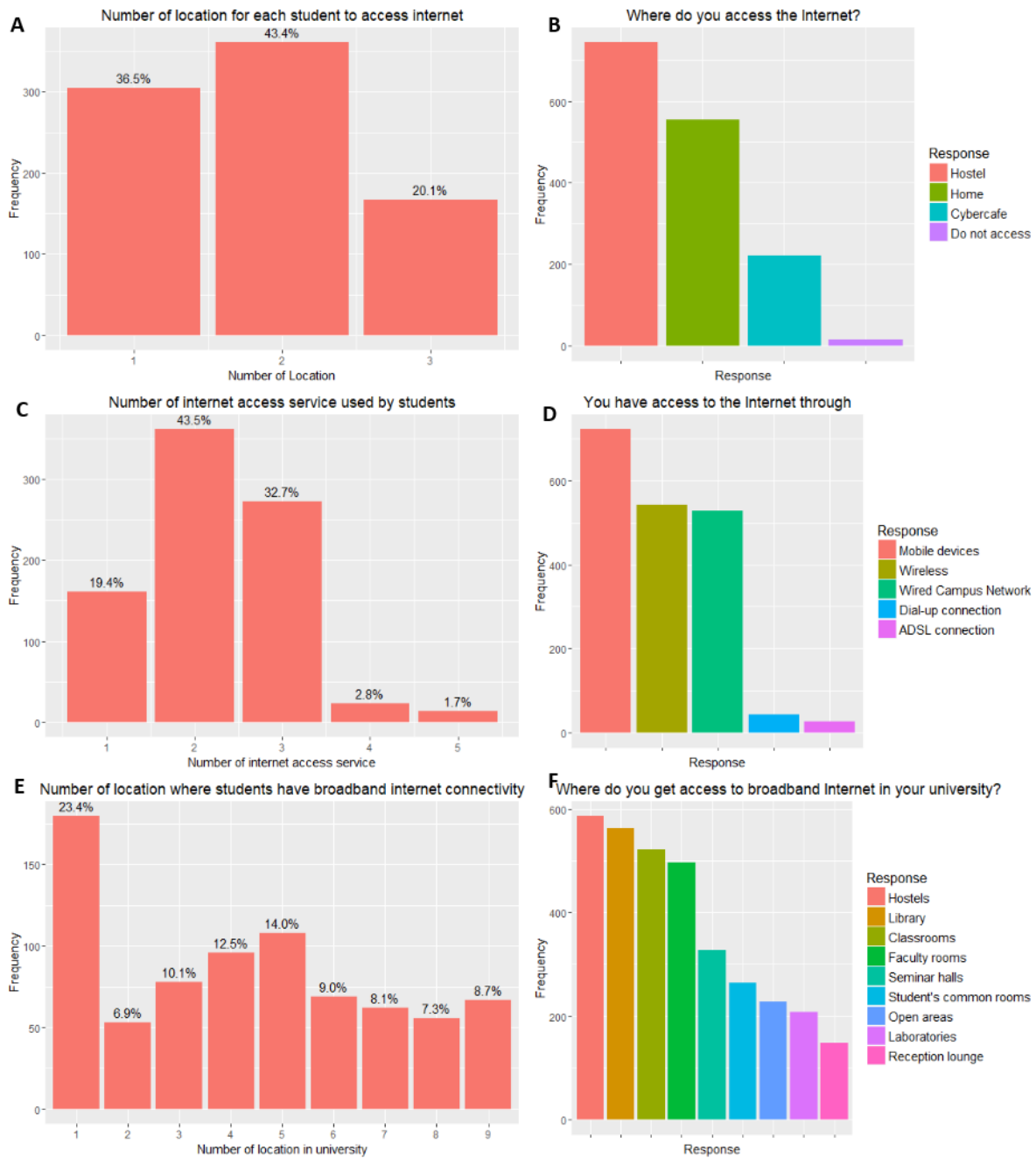


Figure 4.5. Students' Internet access.

(A) Number of locations; (B) nature of locations; (C) number of Internet access services used; (D) nature of Internet access services used; (E) number of locations where students have broadband internet connectivity; (F) nature of locations where students access broadband Internet.

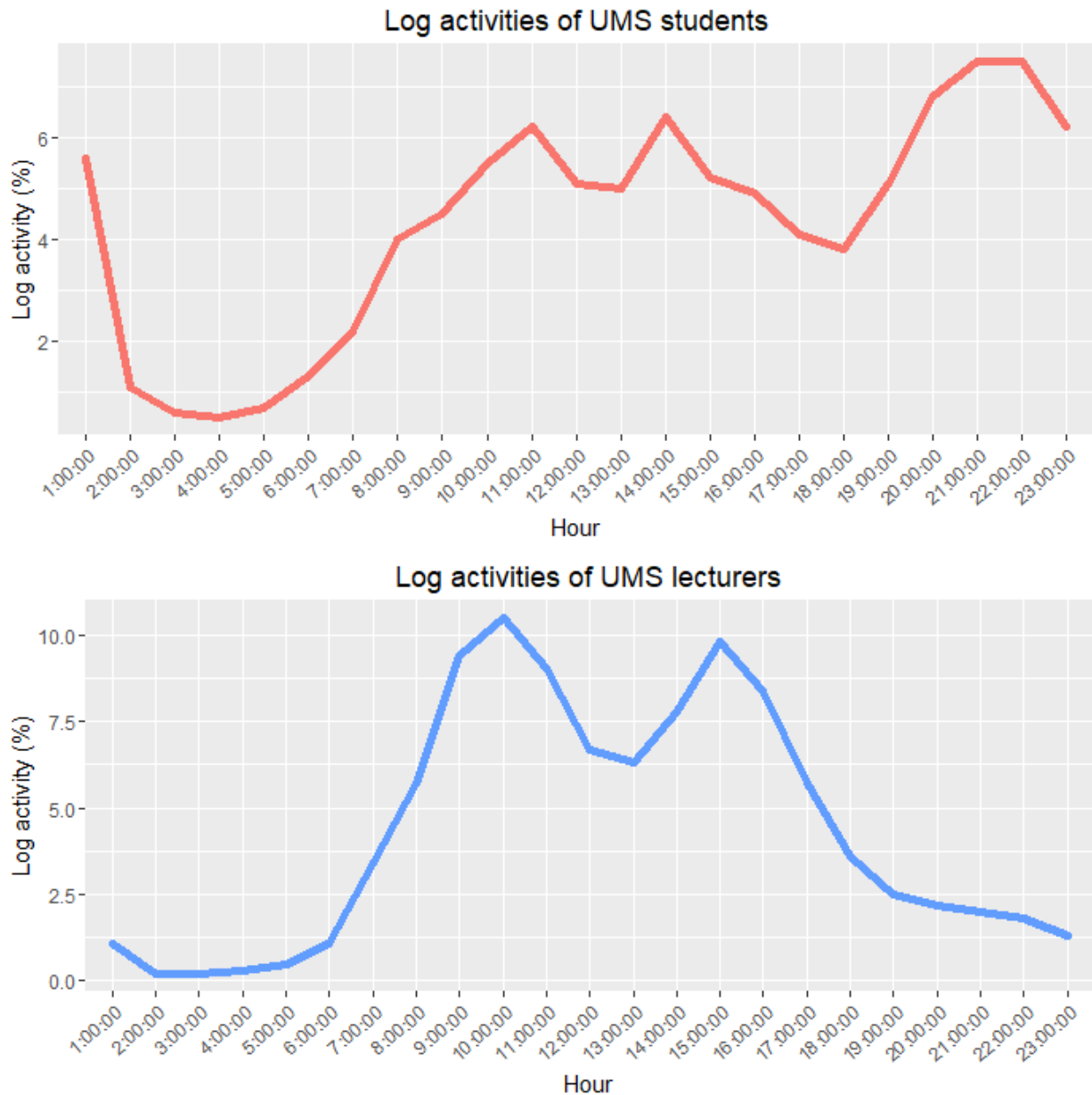


Figure 4.6. Total log activities of students and lecturers in the UMS LMS in 2017.

4.3 Services and Facilities for the TEL Environment

Table 4.2 lists the digital resources, services and spaces that are available for students and lecturers for learning, teaching and research, while Table 4.3 presents the experiences of students and lecturers when using these services and facilities. Most of the essential resources important for establishing a TEL environment are available at UMS. There are also other subscription-based resources, such as e-newspapers, e-theses and e-dissertations, patent databases, and statistical databases. Not yet available are services such as VDI Tech, which provides students with access to the remote lab after office hours, and access to high-specification software using low-end PCs, as well as e-classroom facilities, e-portfolios and data storage for students. However, UMS has a plan for the acquisition of some of these resources and services.

The top two services that have received the highest satisfaction scores from students and lecturers are the LMS and the UMS email service. Students and lecturers also feel that the quality of most of the digital resources, services and spaces at UMS are generally acceptable, with average scores of at least 3. Most of the students are aware of the online library resources (e.g. e-books, e-journals, institutional repository, citation databases, and e-proceedings) provided by the university (87.4%; 11.8% don't know; the rest — 0.8% — said these are not provided) and are generally satisfied with the quality of these resources (average satisfaction score 3.1–3.5). These online resources are important for their learning during their most active learning time, which is at night when they are at home or one of the hostels.

Many lecturers and students have reservations about the software that is available for them to do data analysis, such as data visualisation, MATLAB, GIS applications, statistical applications and image analysis, with average scores of 2.8/2.9 (Table 4.3, Figure 4.7). In addition, UMS funding to support open access publications is at the bottom of the satisfaction list for the services provided by the university (average score of 2.6). Currently, funding support from the university for publication, not limited to open access, is RM 2,000 (approximately USD\$500). However, as already noted in the earlier discussion about Internet access, students rated the network bandwidth speed of Internet downloads and uploads, and the quality of Wi-Fi access, at the bottom of this list (Table 4.3, Figure 4.8).

Table 4.2. Digital resources, services, and spaces currently available and planned.

| Available | Planned |
|--|---|
| Computer labs (for practical and Internet access) | VDI Tech – To provide students with access to the remote lab after office hours and access to high-specification software using low-end PCs |
| Email services (institutional) | e-classroom facilities |
| LMS (e.g. Moodle, etc.) | e-portfolios |
| Network bandwidth/speed of Internet (download and upload) | access to data storage |
| Wi-Fi access | e-newspapers |
| Online or virtual technologies; access to software download and use of free and open source software for teaching and learning | e-theses and e-dissertations |
| Support for maintenance and repair of ICT | patent databases |
| Data visualisation software | statistical databases |
| Citation/reference management software | |
| Institutional repository for sharing research | |
| e-proceedings of conferences | |
| Citation databases | |
| Bibliographic databases | |

Table 4.3. Lecturers' and students' experiences with resources/services/spaces provided by UMS.

The following 19 resources/services/spaces were ranked based on respondents' scores from 1 to 6, where 1 = not available, 2 = poor, 3 = fair, 4 = neutral, 5 = good, 6 = excellent.

| No. | Resources | Average Score (Students) | Average Score (Lecturers) |
|-----|--|--------------------------|---------------------------|
| 1 | LMS (e.g. Moodle, etc.) | 3.9 | 3.6 |
| 2 | email services (institutional) | 3.7 | 4 |
| 3 | e-books | 3.5 | - |
| 4 | e-journals | 3.4 | - |
| 5 | computer labs for practical and Internet access | 3.4 | 3.3 |
| 6 | download and use of free and open source software for teaching and learning | 3.4 | 3.2 |
| 7 | institutional repository for sharing of research | 3.3 | 3.1 |
| 8 | citation databases | 3.3 | - |
| 9 | online or virtual technologies (e.g. network or cloud-based file storage system, web portals, etc.) | 3.3 | 3.3 |
| 10 | citation reference management software | 3.3 | 3.1 |
| 11 | bibliographic databases | 3.3 | - |
| 12 | Plagiarism detection software | 3.2 | 3.3 |
| 13 | Support for maintenance and repair of ICTs | 3.2 | 3 |
| 14 | Data visualisation software | 3.2 | 2.9 |
| 15 | Access to software (e.g. MATLAB, GIS applications, statistical software, qualitative data analysis, graphics software, textual or image analysis programs, etc.) | 3.2 | 2.8 |
| 16 | Network bandwidth speed of Internet downloads and uploads | 3.1 | 3.3 |
| 17 | e-Proceedings of conferences | 3.1 | - |
| 18 | Wi-Fi access | 3.1 | 3.3 |
| 19 | Funds to support open access publications | - | 2.6 |

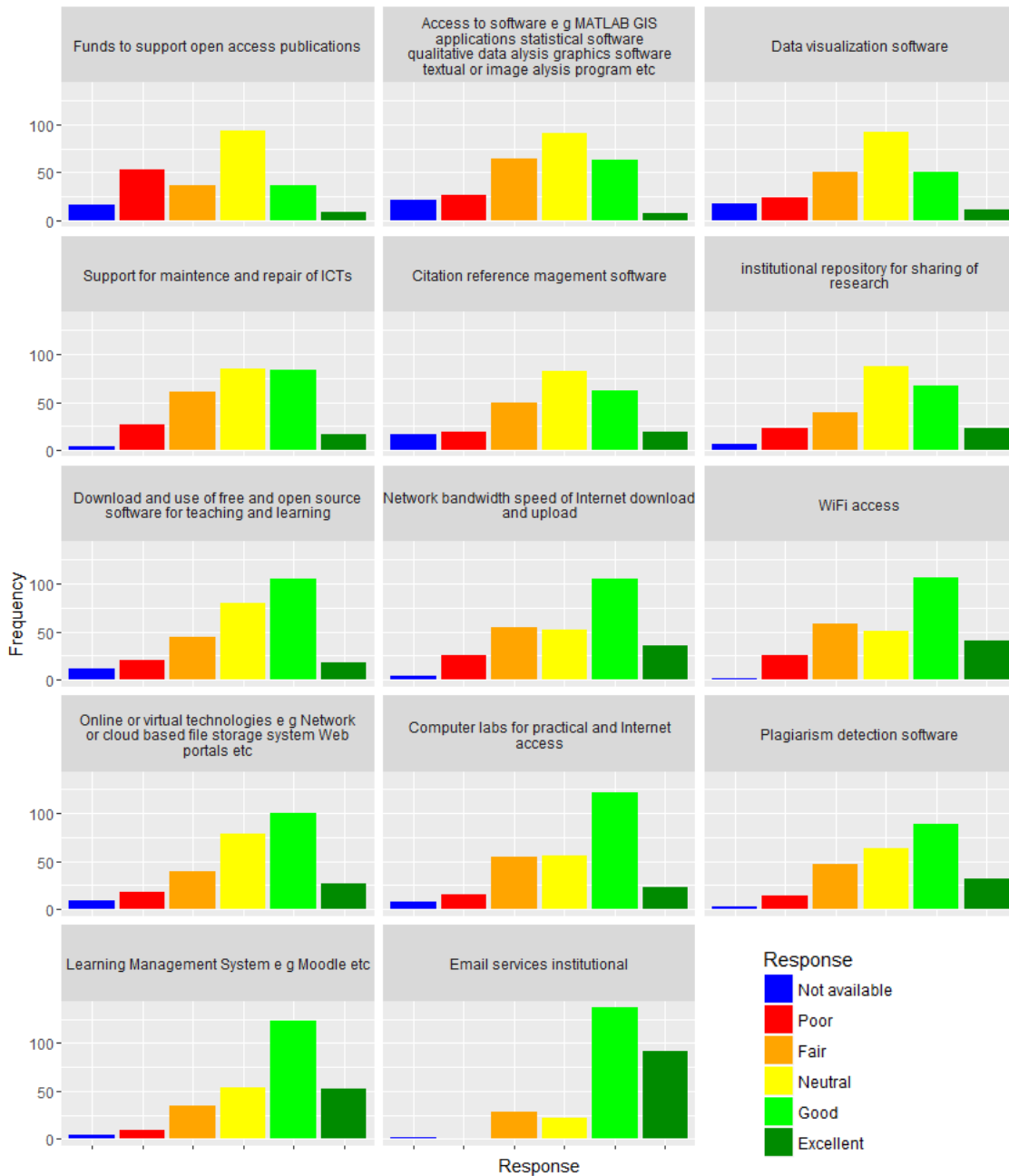


Figure 4.7. Lecturers' experience with the resources, services and spaces provided by UMS, arranged in decreasing order based on average score.

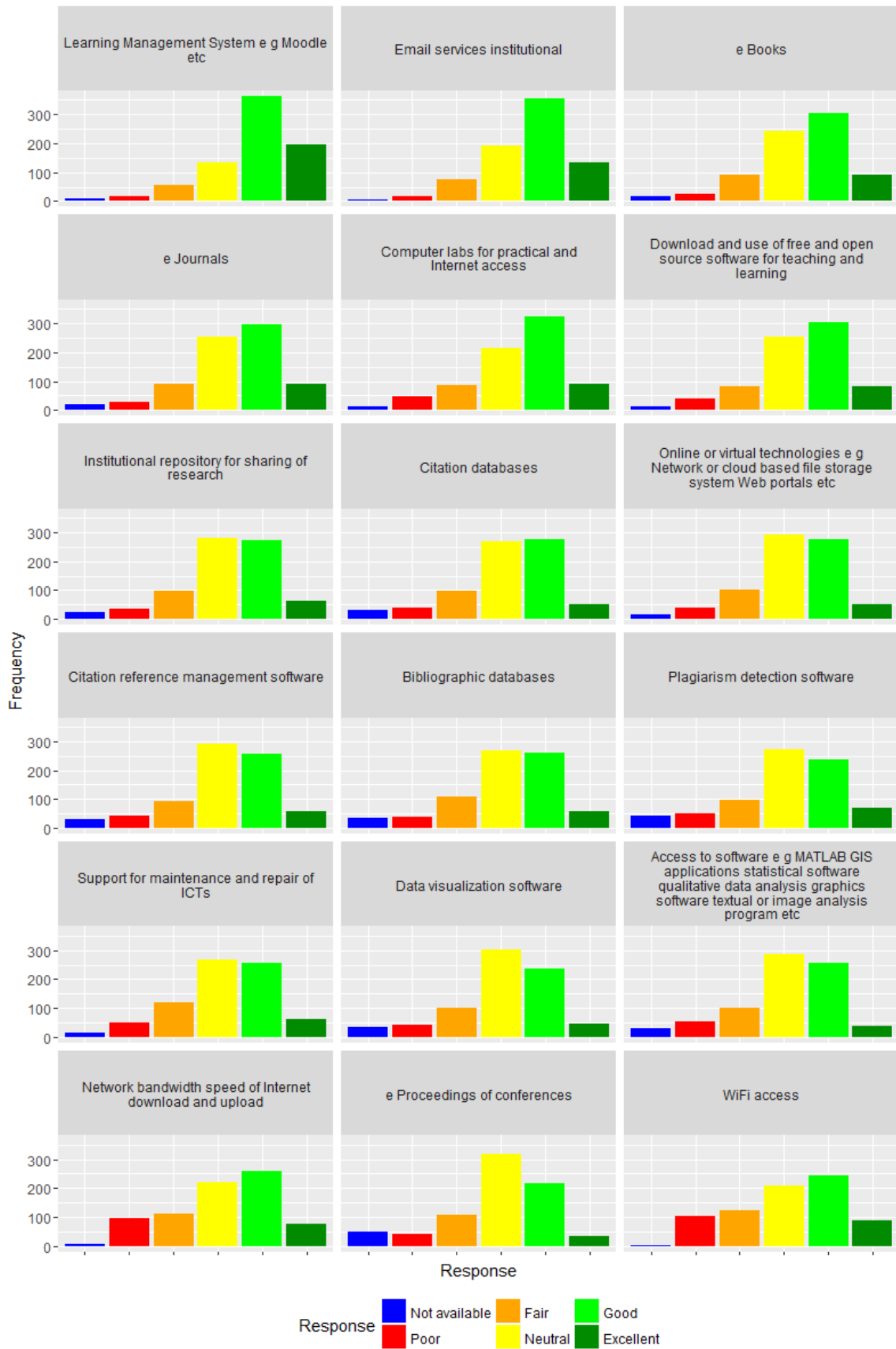


Figure 4.8. Students' experience with the resources, services and spaces provided by UMS, arranged in decreasing order based on average score.

Chapter 5: The Extent and Nature of Internet Use, and Students' and Lecturers' Competency and Training in Digital Skills

As discussed in previous chapters, almost all lecturers and students have the access to devices, either it is own possession or is provided by university, that can be used to access the Internet. This chapter explores the nature of Internet use, and competences of lecturer and student – competences that they have and competences that they should acquire. Teaching and learning at UMS must incorporate 21st Century learning skills in line with Malaysia Education Blueprint 2015-2025 (Higher Education) which include collaboration, digital literacy, critical thinking and problem solving. TEL can improve the collaboration and digital literacy (Tapsir & Puteh, 2018).

5.1 Nature of Internet Use

The MCMC's report on its Internet users survey found that the Internet provides convenience for students and teachers in the course of their learning and teaching. About two-thirds (67.6%) of the surveyed Internet users used the Internet for study purposes, although only 17.1% of the user base was comprised of students (MCMC, 2017). Hence, it is important to understand Internet use among the lecturers and students at UMS. This chapter first will explore the extent and nature of their Internet use, then will assess their competency in digital skills. Finally, it will discuss digital skills training at UMS.

The survey results suggest that 98% of lecturers and 94% of students use the Internet on a daily basis. Hence, almost the entire population at UMS consists of Internet users, compared to overall country data indicating that 23.1% are not Internet users (MCMC, 2017). Around 81% of students spend more than three hours per day on the Internet, and 63% spend more than three hours per day on social media (Figure 5.1). As highlighted by Tapsir and Puteh (2016), the higher education sector is compelled to accommodate the needs of digital natives, 20% of whom are highly dependent upon the Internet and find traditional lectures in the classroom uninteresting.

The Internet has become a pivotal medium in social engagement and leisure activities among Internet users in Malaysia (MCMC, 2017). At UMS, around 89% of lecturers and 98% of students have social media accounts. In addition, 57% of lecturers and 68% of students have more than two social media accounts (Figure 5.2). The most popular social media sites among lecturers are Facebook, research-sharing sites and Google+, whereas among students the favourites are Facebook, Google+ and photo-sharing sites. These patterns are similar to findings in the 2017 MCMC report, with the exception that lecturers use more research-sharing sites than students do.

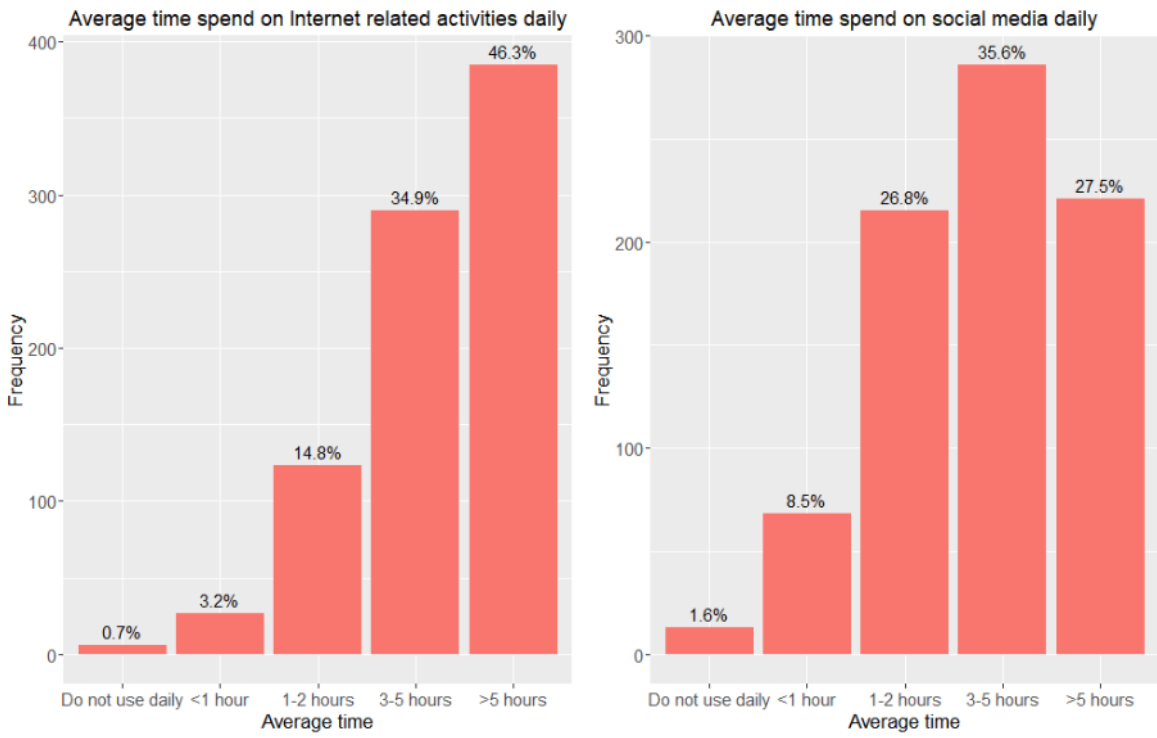


Figure 5.1. Daily time spent by students on the Internet (left) and social media (right).

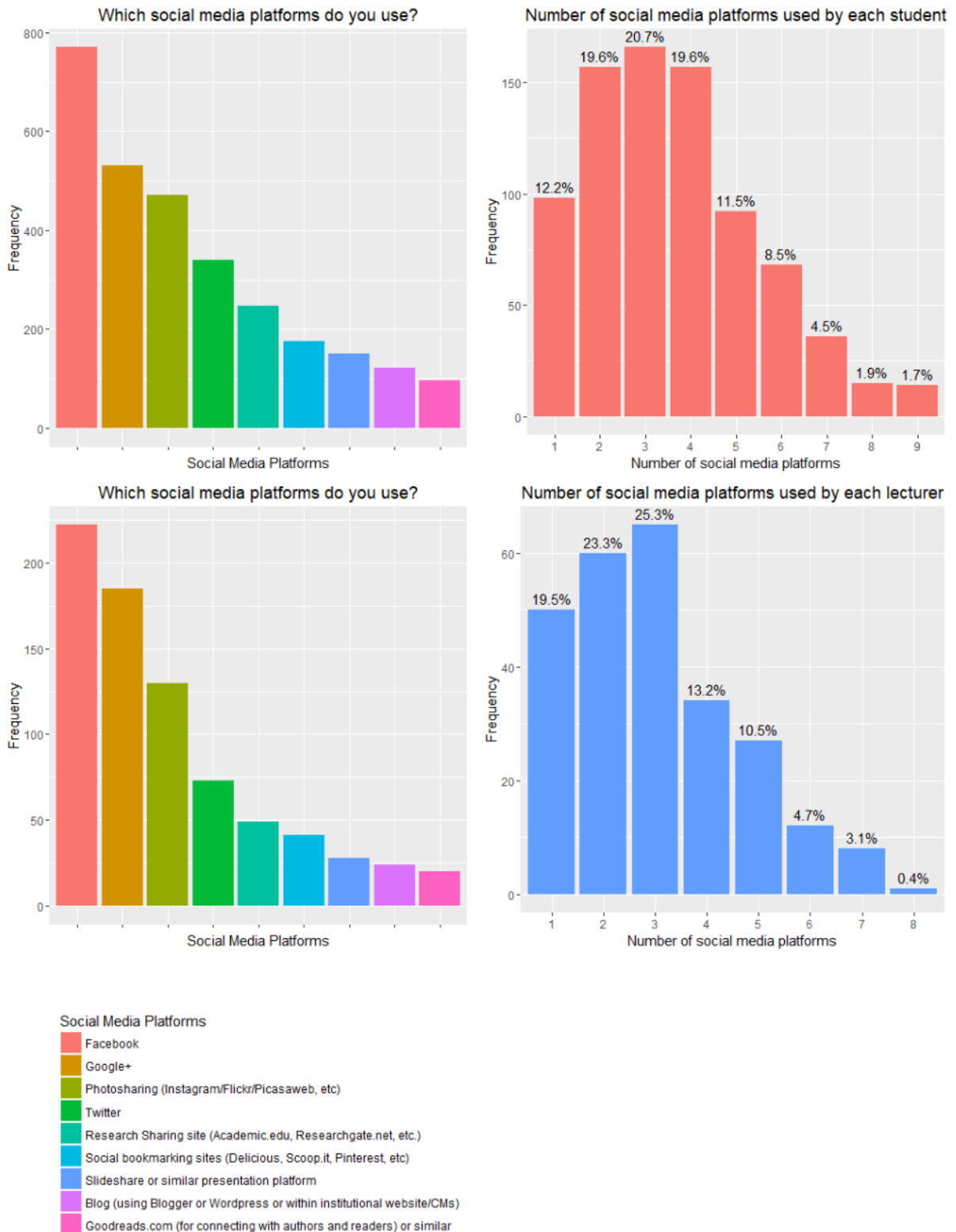


Figure 5.2. Type and number of social media platforms used.
Top, students; bottom, lecturers.

Although both students and lecturers have social media accounts and access the Internet daily — especially students who spend large amounts of time on social media — only 15% of lecturers and 26% of students update their social media status daily (Figure 5.3). More than 50% of the

students and lecturers update their social media less than once a fortnight. In term of participation in online discussion forums or mailing lists, only 54% of lecturers are members of mailing lists or discussion forums, of whom 15% are members of more than five email-based discussion forums and 35% moderate a discussion forum or mailing list. The percentage of students active in discussion forums is lesser than for lecturers. Thirty-eight per cent of students are members of a mailing list or discussion forum; of these, 10% subscribe to more than five email-based discussion forums. However, they are more likely than lecturers to moderate a discussion forum or mailing list (49% versus 35% — see Figure 5.4). Lecturers and students who are members of forums do not post very frequently, nor are they frequent contributors to their social media profiles or online discussion forums. The low involvement of students and lecturers in online discussion forums requires further and more detailed studies, as these forums are important tools for engagement between students and teachers as equal partners in learning and teaching.

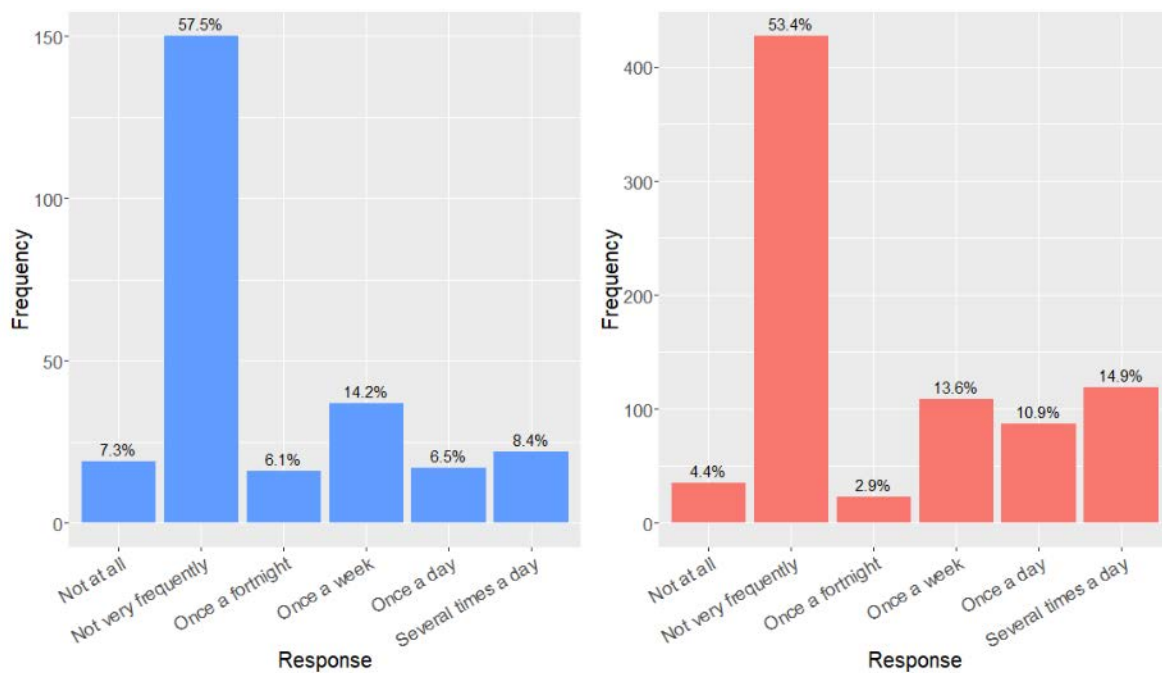


Figure 5.3. Frequency of social media status updates.
Left, lecturers; right, students.

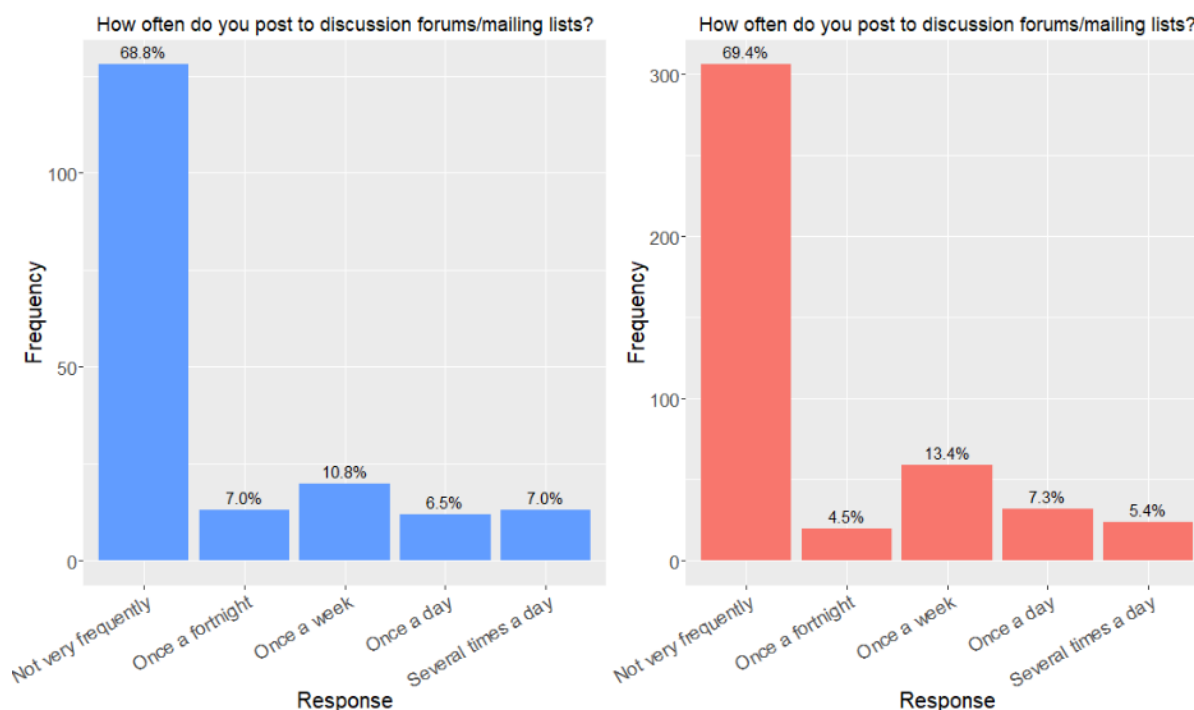


Figure 5.4. Frequency of posting in discussion forums or mailing lists.
Left, lecturers; right, students.

5.2 Digital Skills Competency

As shown in the previous sections, both lecturers and students spend large amounts of time on the Internet as information consumers. Although the Internet is serving as a vital medium for engaging students and lecturers as equal partners in communication and in the teaching and learning processes, it is important to investigate students' and lecturers' competency in computer-related skills.

Overall, there is a strong correlation between lecturers' and students' average scores in digital skills competency (Figure 5.5). The top four areas in which almost all lecturers and students are competent are email, word processing software, presentation software and Internet search engines, (Table 5.1, Figures 5.6, 5.7). It is important to note that quite a number of lecturers and students have very low competency in skills related to multimedia editing, such as multimedia authoring, graphic editing, digital audio and video editing, and webpage design. However, students' skills in these areas are generally higher than lecturers'. In addition, students' skill level in Web 2.0 tools such as wikis, blogs and social networking is much higher than lecturers' (3.4 versus 2.6).

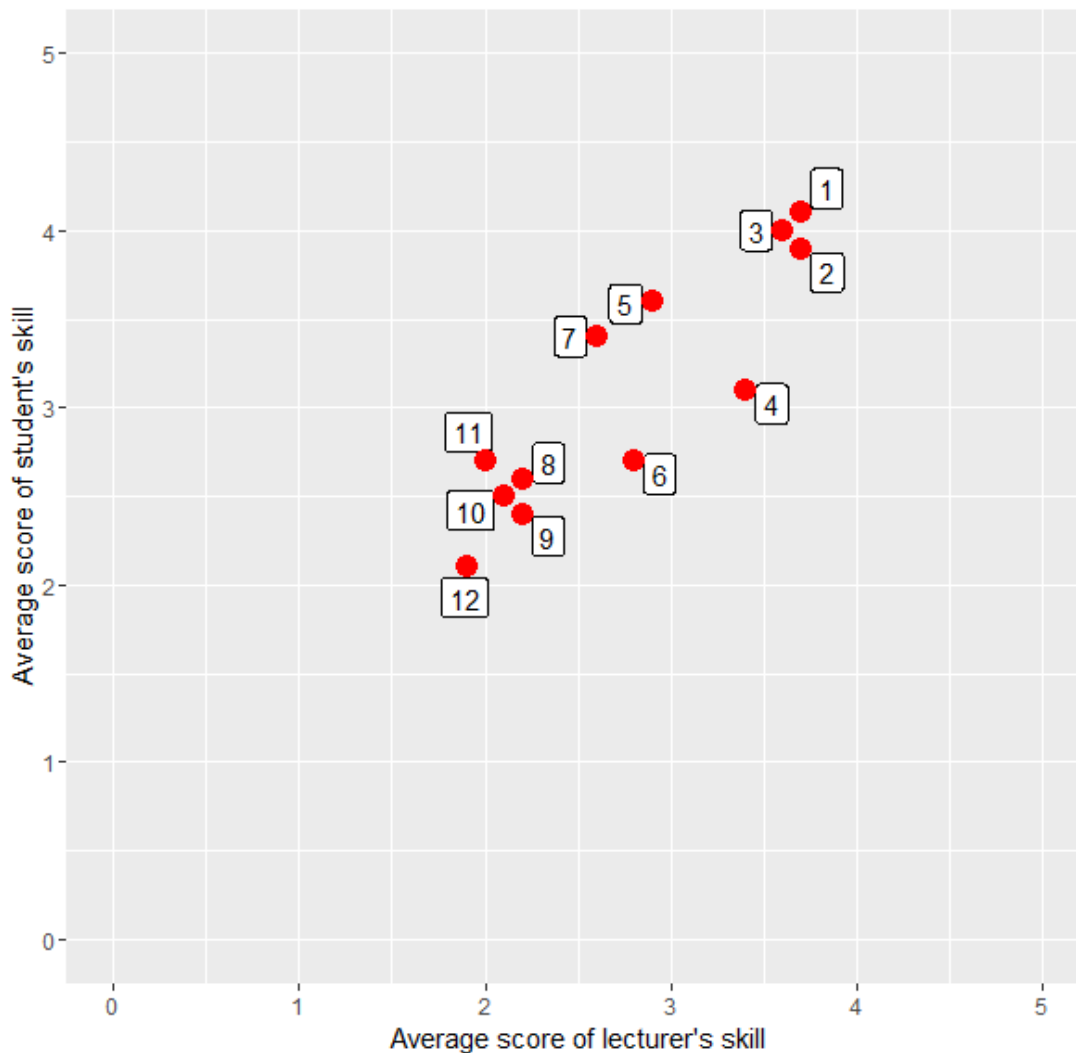


Figure 5.5. Correlation between lecturers' and students' average skills scores.
Labels correspond to the numbered computer-related skills in Table 5.1.

Cornu (2011) indicated that digital-native students prefer learning through graphics and other visual media rather than reading text and are used to learning interactively. Thus, multimedia editing and authoring skills as well as the ability to use Web 2.0 tools are important for lecturers to generate educational content and create interactive learning materials. Furthermore, the development of digital resources requires input from specialists with pedagogic, design and media expertise. Currently, UMS has no dedicated educational e-content or audio-visual production centre.

Students' competency level is as important as lecturers'. Although students are digital natives, they do not necessarily have the skills to employ digital tools strategically to optimise their learning experiences in university; this is especially true for new students. Thus, UMS must take steps to improve lecturer competency in these skills and then to ensure that lecturers take responsibility for helping students acquire the skills. One way to achieve this is to review all academic programmes at UMS in terms of delivery and assessment, to ensure students will be encouraged to acquire and practice the requisite skills.

UMS management, under its Smart Eco-campus initiative and the Ministry for Higher Education's policy, would like to see students make greater use of TEL. DEPAN 2.0 sets two

targets: (1) 100% of students will have the ability to manipulate eLearning content by 2020 and to create eLearning content by 2025; and (2) 60% of students will use eLearning by 2015, 25% will be contributors to eLearning by 2020, and 5% will become innovators in eLearning by 2025. Management at both UMS and the government view TEL not simply as a better delivery mechanism but as an important change in university teaching and learning to prepare students for IR 4.0 — making them future-proof graduates.

Table 5.1. Average scores for lecturers' and students' computer-related skills.

Lecturers chose from five levels of competency: 1 = non-user (NA); 2 = user level (basic); 3 = user level (intermediate); 4 = user level (advanced); and 5 = expert level (trainer).
 Students chose from five levels of competency: 1 = I can't use it; 2 = I can use it to a small extent; 3 = I can use it satisfactorily; 4 = I can use it well; and 5 = I can use it very well.

| No. | Skills | Average Score (Lecturers) | Average Score (Students) |
|-----|---|---------------------------|--------------------------|
| 1 | Email | 3.7 | 4.1 |
| 2 | Word processor (e.g. Word) | 3.7 | 3.9 |
| 3 | Presentations (e.g. PowerPoint) | 3.6 | 4 |
| 4 | Spreadsheets (e.g. Excel) | 3.4 | 3.1 |
| 5 | LMS | 2.9 | 3.6 |
| 6 | Databases | 2.8 | 2.7 |
| 7 | Web 2.0 tools: wikis , blogs, social networking | 2.6 | 3.4 |
| 8 | Multimedia authoring | 2.2 | 2.6 |
| 9 | Graphic editing | 2.2 | 2.4 |
| 10 | Digital audio | 2.1 | 2.5 |
| 11 | Video editing | 2 | 2.7 |
| 12 | Webpage design | 1.9 | 2.1 |
| 13 | Search engines | - | 3.6 |

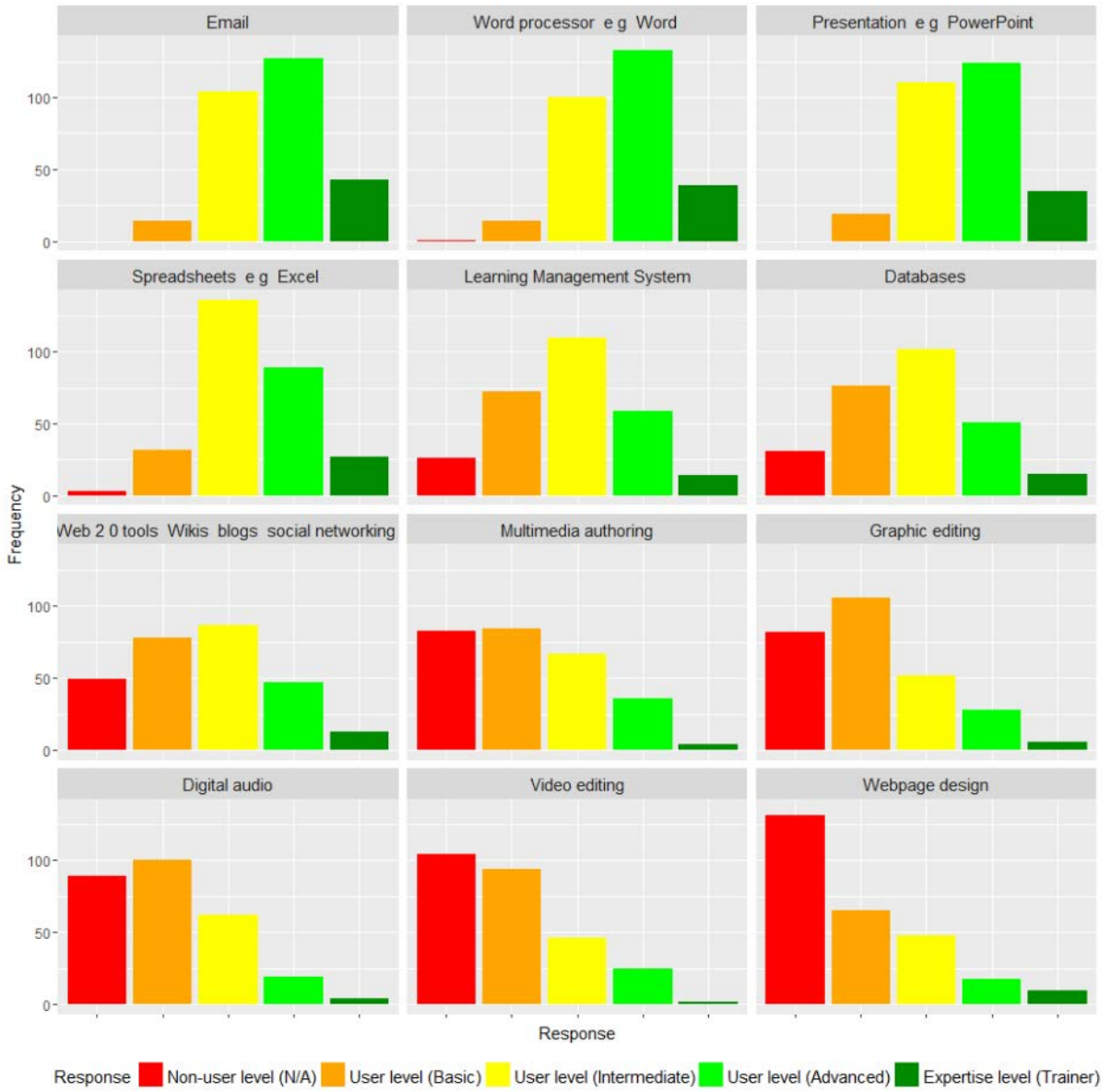


Figure 5.6. Lecturers' skills in 12 computer-related activities, arranged in decreasing order according to average score.



Figure 5.7. Students' skills in 13 computer-related activities, arranged in decreasing order according to average score.

5.3 Training of Students and Lecturers

Pedagogy should always precede technology. Lecturers need training in currently available technology platforms as well as best practices for adopting interactive pedagogical practices. This also means that practices for conducting classes, assessments and learning activities will change within the pedagogical context. Notably, one-third of the 263 written comments from lecturers were related to training (18.6%) and pedagogy (16%). Most of the lecturers at UMS, except those in education, commenced their teaching directly after completion of their PhD programmes, which did not offer any training in pedagogical methods unless the PhD pertained specifically to education and pedagogical methods. These newly appointed lecturers underwent a two-week intensive teaching and learning course, then entered a probationary period during which they had to demonstrate their grasp of teaching and learning practices under the supervision of an appointed mentor. As shown earlier in this report, 25% of lecturers had less

than five years of teaching experience when they took the survey.

However, the need to enhance pedagogical knowledge is not be limited to new lecturers. In fact, veteran lecturers should be retraining as well so they can acquire the new pedagogical approaches afforded by technology. In the survey, 21% of lecturers claimed they had not received training in the use of ICT for teaching and learning, and around 29% said UMS did not provide regular training in the use of new technologies for teaching and learning. The percentage of lecturers with less than 30 years of teaching experience who had not received training is around 20%, compared with about 50% of lecturers with more than 30 years of experience (Figure 5.8). Further analysis showed that length of teaching experience was not associated with competency in two important tools for teaching and learning: (1) the LMS, which yielded an average score of 3.3 on a scale of 1–5, and (2) lecture capture tools, which yielded the lowest average score, 2.5 on a scale of 1–5. The competency in certain skills across the categories is more or less homogenous regardless of length of teaching experience.

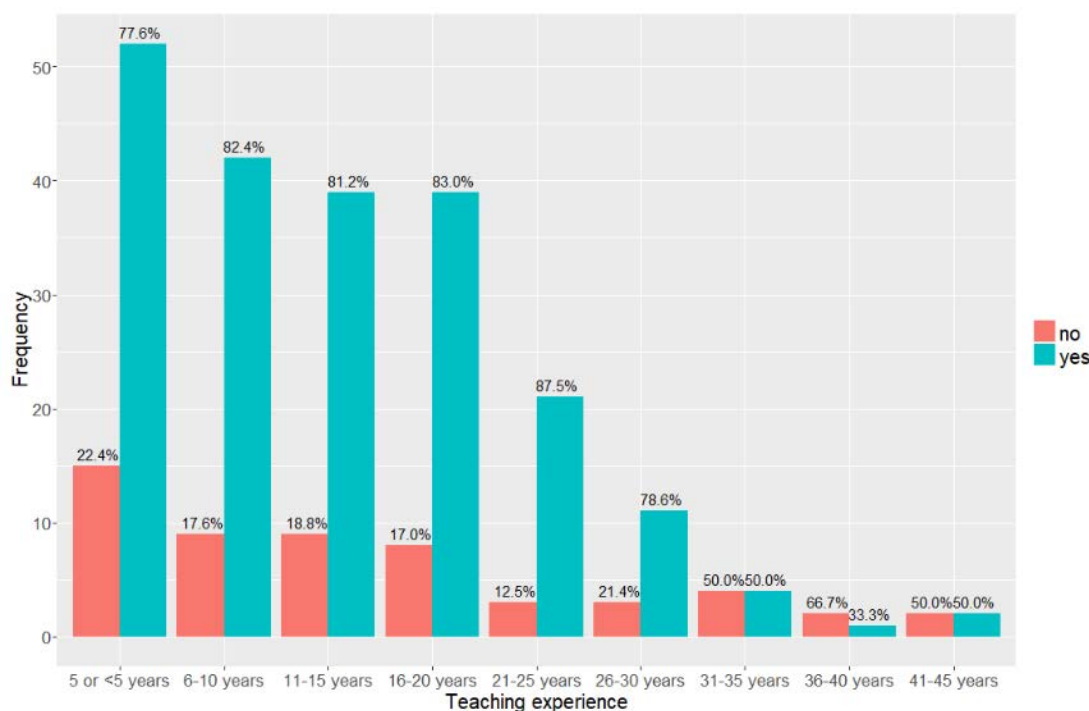


Figure 5.8. Percentage of lecturers who had received training in the use of ICT for teaching and learning, with their years of teaching experience.

Between 2015 and 2017, a total of nine sessions of the two TEL-related courses — Teaching and Learning with Technology and Basic Course on eLearning — were conducted as part of the Individual Development Plan, administered by the UMS human resources department. A total of 27 lecturers completed both of the 12-hour courses, and 176 lecturers completed one of the two. In addition to these formal training courses, around 15 roadshows were organised in each of the faculties and centres at UMS each year to increase lecturers’ awareness of TEL and showcase TEL practices. All training sessions and roadshows were conducted face-to-face. Although numerous TEL-related online courses are available, less than half of the lecturers (43%) participate in online training, of which 32% had attended MOOCs. Most are aware of only one MOOC platform, Malaysia MOOC (Figure 5.9).

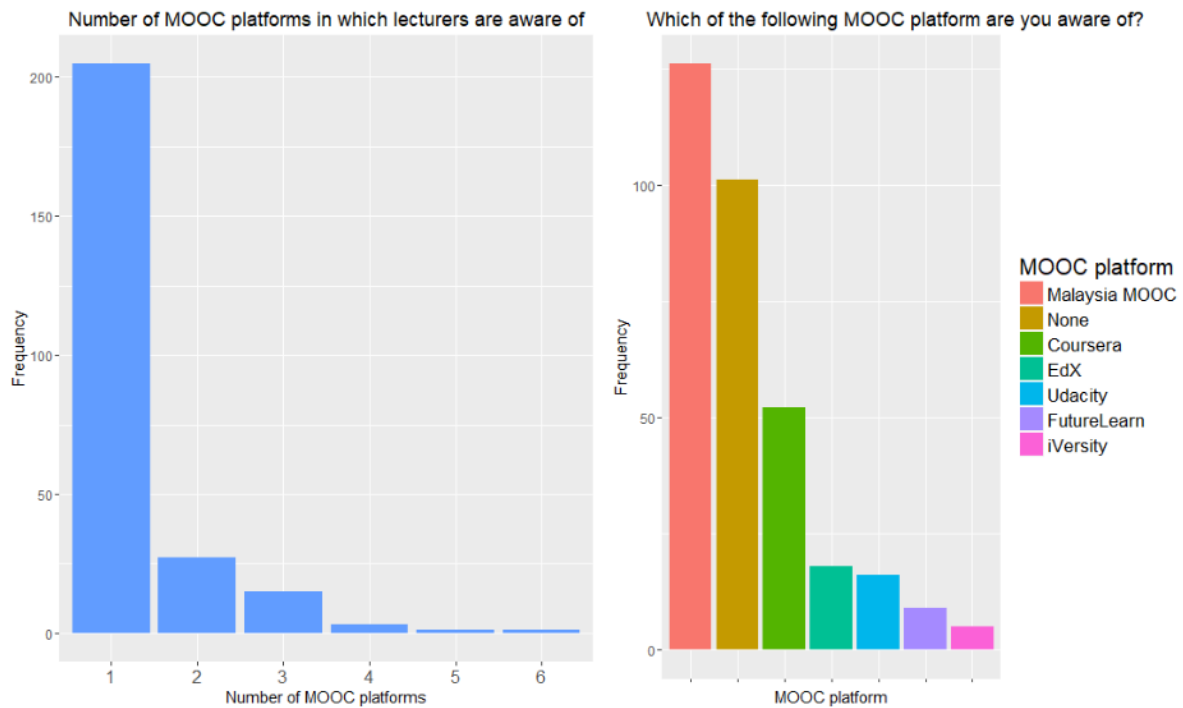


Figure 5.9. Number and names of MOOC platforms lecturers are aware of.

To increase the effectiveness of the training programme, roadshows and seminars in 2018 have used more and better-structured training programmes developed to replace the previous loose, ad hoc offerings. Lecturers are being asked to take courses depending on their level of TEL skills, which is determined using data in the LMS and their past involvement in TEL-related activities. This systematic approach to training provides an orderly, logical method for determining what lecturers should know and their specific skill levels. This is very important for ensuring that no lecturer will be left behind in terms of TEL upskilling and reskilling.

To increase the capacity of the training programmes without increasing overhead, these new courses have been delivered via the blended mode; lecturers were required to complete most of the module online, then had a short face-to-face session. The advantage of this approach is that lecturers have the flexibility to take the courses anytime, anywhere, fitting it around their tight existing workload. Also, as an intangible outcome, lecturers who have taken these blended-mode courses will directly understand what TEL is, which will help them reflect on their current use of TEL and/or their current teaching and learning practices.

Chapter 6: Lecturers’ and Students’ Use of ICT in Learning and Teaching

The Higher Education 4.0 framework emphasises that university modes are becoming more distinct and technology driven (Tapsir & Puteh, 2018). Learning materials are morphing from books and journals in traditional brick-and-mortar universities, to books and journals, blended learning and MOOCs in marginal-change, jukebox universities, to MOOCs in adaptive-change, uberised universities, to user-generated content in radical-change, nano-certification systems. Learning models will increasingly include online lectures, peer teaching, and students as MOOC co-creators.

This chapter focuses on ICT use by lecturers and students in teaching and learning. First, we present the competency of lecturers in integrating digital tools/skills in teaching and learning. Second, we look at the use of subscription-based resources from the UMS library as well as resources from others digital sources or platforms. Third, we investigate the learning materials created by lecturers in term of their types and whether they are shared through an open licence. Fourth, we discuss lecturers’ use of OER. Lastly, we examine students’ use of MOOCs.

6.1 Lecturers’ Competency in Integrating Digital Tools/Skills

The majority of UMS lecturers cannot successfully integrate in their teaching and learning practices most of the tools listed in Table 6.1. Most importantly, about 26% of the lecturers can use the LMS only to a small extent or not at all (Figure 6.2). This suggests that many lecturers do not have much experience in working with the range of tools and facilities that the UMS LMS offers. In addition, less than half of the lecturers can satisfactorily integrate into their learning and teaching practices educational games, simulations, lecture capture tools, and accessibility tools for people with disabilities.

Table 6.1. Lecturers’ average competency scores for integrating digital tools in teaching and learning.

Lecturers indicated their competency level for each skill, from 1–5: 1 = I can’t use it; 2 = I can use it to a small extent; 3 = I can use it satisfactorily; 4 = I can use it well; 5 = I can use it very well.

| No. | Skills | Average Score |
|-----|--|---------------|
| 1 | LMS (e.g. Moodle) | 3.3 |
| 2 | Online video/audio | 3.1 |
| 3 | Online collaboration tools (e.g. Adobe Connect, Google Docs) | 3.1 |
| 4 | e-books, e-textbooks | 3.0 |
| 5 | Social media, blogs, wikis, etc. | 2.8 |
| 6 | Educational games, simulations | 2.5 |
| 7 | Lecture-capture tools | 2.5 |
| 8 | Accessibility tools for people with disabilities | 1.8 |

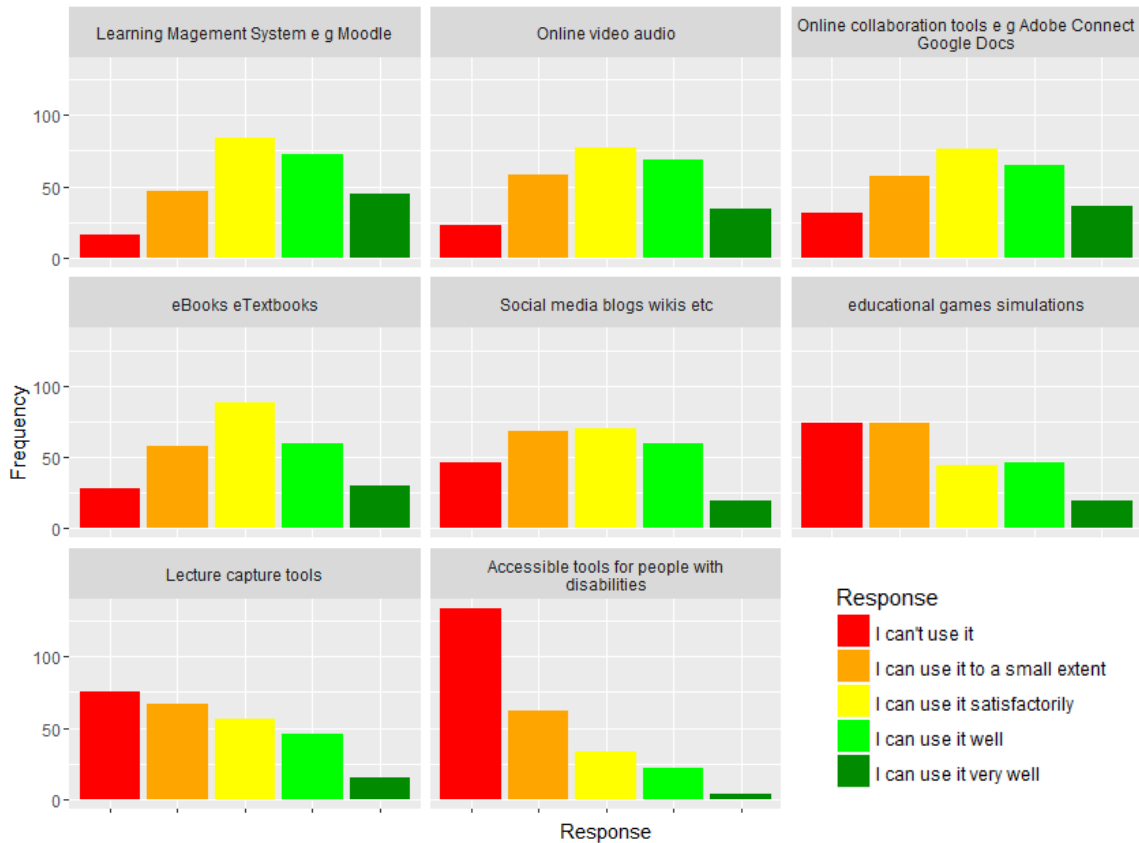


Figure 6.1. Lecturers' competency in integrating digital tools/skills with their teaching and learning, arranged in decreasing order based on average score.

6.2 Use of Resources in Teaching and Learning

Table 6.2 and Figure 6.2 show the lecturers' use of subscription-based resources provided by the UMS library as well as other digital resources or platforms in their teaching and learning. The most common resources used by lecturers are presentation notes (e.g. PowerPoint), e-journals, Word files, and images (average score of 4 on a scale of 1–5 of how often they use and access these for teaching and learning). In contrast, not many lecturers use microblogging/Twitter/Facebook, simulations and 2D/3D animation, social bookmarking, or blogs. Surprisingly, open-access research papers and open textbooks are also among the types of resources not frequently used by lecturers.

Table 6.2. Average scores in the use of subscription-based resources from the UMS library and other digital resources or platforms.

Lecturers chose from five levels of use: 1 = never; 2 = rarely; 3 = sometimes; 4 = often; 5 = always.

| No. | Resources | Average Score |
|-----|--|---------------|
| 1 | Presentations (e.g. PowerPoint), including from online sources | 4.6 |
| 2 | e-journals | 4.2 |
| 3 | Word files, activity sheets, handouts, notes | 4.0 |
| 4 | Images, pictures, photographs, including from the Web | 4.0 |
| 5 | LMS | 3.8 |
| 6 | e-books | 3.7 |
| 7 | Citation databases | 3.5 |
| 8 | Digital films, videos (e.g., YouTube) | 3.4 |
| 9 | Open-access research papers | 3.2 |
| 10 | e-proceedings of conferences | 2.6 |
| 11 | Open textbooks | 2.6 |
| 12 | Audio recordings | 2.4 |
| 13 | Microblogging/Twitter/Facebook, etc. | 2.1 |
| 14 | Simulations and 2D/3D animation | 2.1 |
| 15 | Social bookmarking | 1.9 |
| 16 | Blogs | 1.7 |



Figure 6.2. The use of subscription-based resources from the UMS library as well as other digital resources or platforms, in decreasing order based on average score.

6.3 The Use of OER and MOOCs

In addition to resources provided by UMS via subscription, there are a variety of external open resources that lecturers can utilise for teaching and learning — for example, OER and MOOCs. The use of MOOCs by lecturers was discussed in Chapter 5. Here, we explore their use of OER. Around 64% of the lecturers were aware of OER in their discipline. However, the average score for how often lecturers use the OER platforms or sources listed in Table 6.3 is below 2 (= rarely) on a scale of 1–5, except for the Directory of Open Access Journals and the Directory of Open Access Books, which have scores of 2.3 and 2.0, respectively (Figure 6.3).

Multimedia editing skills are important for a lecturer to create more multimedia learning materials, as expected by students (on this, see Chapters 5 and 7 as well). However, acquiring the skills to produce multimedia materials can be a steep learning curve for most lecturers, and producing these materials is time-consuming. Thus, lecturers' awareness of OER needs to be improved, and OER use should be promoted so that lecturers can make use of existing OER directly as learning materials for students, or remix and readapt OER to create new learning materials.

As lecturers do not frequently use OER, it is not surprising that they seldom share as OER the materials that they create (Figure 6.4). Overall, the learning materials or resources that they share and use the most are those they can create with their existing skills. The most common type of teaching and learning materials that lecturers have created and shared are presentation files, Word files, images/pictures, LMS content, and digital videos.

Table 6.3. Average scores for lecturers' use of OER platforms.

Lecturers chose from five use levels: 1 = never; 2 = rarely; 3 = sometimes; 4 = often; 5 = always.

| No. | Resources | Average Score |
|-----|-----------------------------------|---------------|
| 1 | Directory of Open Access Journals | 2.3 |
| 2 | Director of Open Access Books | 2.0 |
| 3 | OER Commons | 1.8 |
| 4 | WikiEducator | 1.6 |
| 5 | MIT OpenCourseWare | 1.6 |
| 6 | College Open Textbooks | 1.4 |
| 7 | OpenLearn UK | 1.3 |
| 8 | NPTEL India | 1.2 |
| 9 | Saylor Academy | 1.2 |
| 10 | BCCampus Open Textbooks | 1.2 |
| 11 | OpenStax College | 1.2 |
| 12 | MERLOT | 1.2 |



Figure 6.3. Lecturers' use of OER platforms, arranged in decreasing order based on average score.

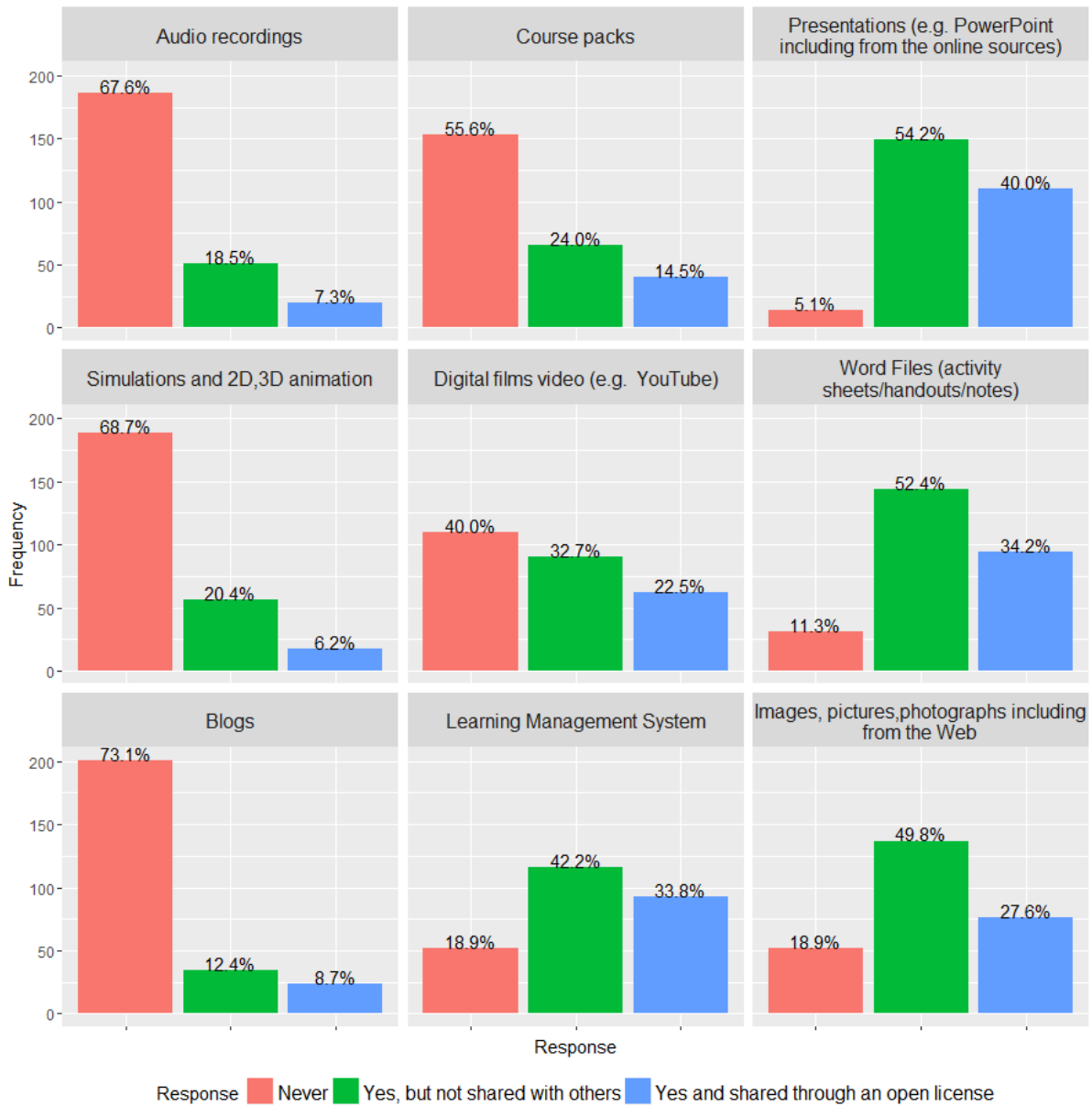


Figure 6.4. Lecturers' creation and sharing of digital content for teaching and learning.

Other useful resources that can be used by lecturers and students are MOOCs. In fact, UMS produces around five MOOCs and 30 OER annually as one of their two main KPIs for eLearning (the other being the percentage of blended learning courses, as mentioned in Chapter 2). To date, a total of 14 UMS MOOCs have been shared via a national MOOC platform at <https://www.openlearning.com/UMSMOOC>, which is provided by OpenLearning, a for-profit educational technology institution based in Australia. In addition, the OER are shared via an institutional OER repository at <http://oer.ums.edu.my/> developed based on DSpace, an open-source repository software package.

The use of MOOCs by lecturers has already been discussed in Chapter 5 (see Figure 5.9). Among students, 64% have taken an online course. Of the 72% of students who had taken a MOOC the previous year, 78% completed the course. Eighteen per cent of students did not know what a MOOC is (Figure 6.5).

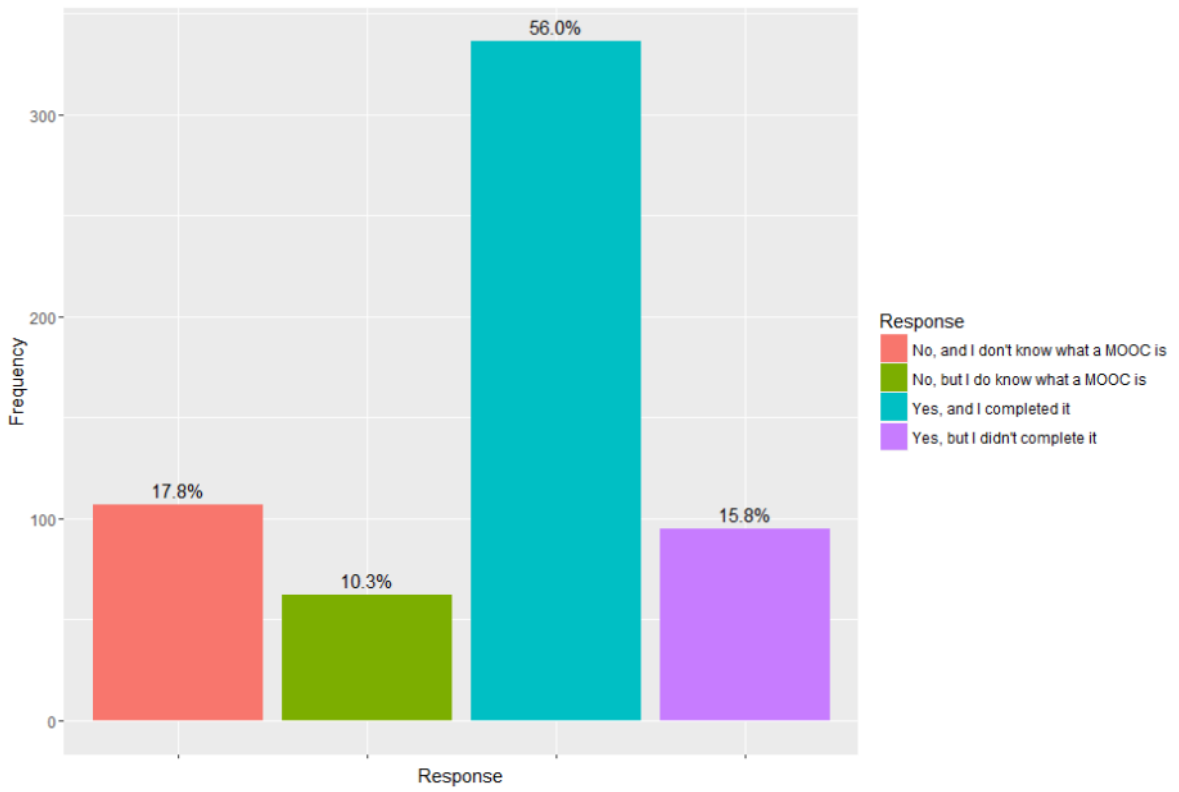


Figure 6.5. Use of MOOCs by students.

Chapter 7: Students' and Lecturers' Perceptions of and Attitudes towards TEL

In this chapter, we explore UMS students' and lecturers' perceptions of and attitudes toward TEL.

Lecturers play a crucial role in TEL because they are on the front line of designing and delivering course modules to students on a daily basis. Hence, lecturers' beliefs about and skills in TEL have an immediate impact on student TEL. Lecturers must understand *why* TEL is needed, then incorporate this knowledge into their beliefs about and philosophy of teaching and learning.

Also important is that the existing academic beliefs and practices of lecturers are being challenged because students are now digital natives who learn in new, different ways (Cornu, 2001). This generation of students has grown up with technology and is used to different kinds of digital tools. In this growing environment, they think and process information in a totally different way from previous generations, including their lecturers.

This situation forces lecturers to adopt TEL. However, if lecturers do not articulate a clear rationale for using TEL, they might use technology as simply another way to deliver information, without making any changes with respect to pedagogical issues. It is also important to recognise the mismatch between students' approach to learning and lecturers' teaching practices (Table 7.1). The following examples highlight the extent of the differences between students' and lecturers' beliefs about face-to-face lectures as well as variations among lecturers.

Students' views

"[S]tudents can easily access to lectures notes, more online classes rather than a lecture in class, because to be truth, 2 hours is like a waste of time, we only focus on the first 30-45 mins and after that our mind is somewhere else." [Student Feedback No. 191]

"The truth is, some students use mobile phones during class because the lecture is delivered in a mundane way. Also, this doesn't mean that students who are focusing during the lecture are actually 'focusing' or understanding it. Consistent uploading of lecture notes and other material few days before the lecture is very much appreciated." [Student Feedback No. 193]

Traditional lecturers' views

"Learning is still most effective the old ways via rigorous reading and writing, not via some fanciful animation and videos." [Lecturer Feedback No. 326]

"Traditional classroom interactions are still the best - We may promote students not to come to class in we're not careful." [Lecturer Feedback No. 95]

Possible TEL practitioner lecturers' views

"Students can learn in a relatively anonymous environment without the embarrassment of failure and/or socio-cultural bias from personal contact." [Lecturer Feedback No. 23]

"It is important to cater the current generation preference on technology and their lack of attention span." [Lecturer Feedback No. 58]

7.1 Lecturers' Perceptions of and Attitudes toward TEL

Analysis of UMS lecturers' perceptions of TEL indicates that most believe TEL has strengths and can provide opportunities to improve teaching and learning (Table 7.2, Figure 7.1). Less than 10% of the lecturers disagree that TEL will provide opportunities to improve teaching and learning. Lecturers' average scores and comments indicate their concerns basically revolve around three factors: possible reduction in face-to-face time with students, pedagogical issues related to TEL, and effectiveness of communication (Table 7.1).

TEL does not imply technologising education; lecturers are still expected to play an important role, and the human relationship between students and teachers and is an essential component of the learning process. Nevertheless, with TEL this relationship has to take new forms, with many of the roles currently filled by lecturers becoming mediated by technology, which requires less face-to-face time. The digital divide between digital natives and traditionally educated lecturers will be exacerbated as machine–human interactions lead to a diminution in the affective domain as defined by traditional face-to-face teaching and learning platforms.

Table 7.1. Examples of feedback from lecturers and students on their beliefs about and perceptions of TEL.

| Lecturer feedback on their thought of impacts of TEL in their students' study | | Student feedback on their thought of TEL in their studies |
|---|--|--|
| Positive impacts | Negative impacts | |
| <p>"Students can learn in a relatively anonymous environment without the embarrassment of failure and/or socio-cultural bias from personal contact" [Lecturer's Feedback No. 23]</p> <p>"Contact with the lecturer - email will do, but online discussions can be more engaging, interactive and collaborative" [Lecturer's Feedback No. 74]</p> <p>"My view may not represent everyone in FKAL, nevertheless, there is somewhat interest among us to incorporate e-learning in teaching in learning. It is important to cater the current generation preference on technology and their lack of attention span." [Lecturer's Feedback No. 58]</p> <p>"Technology-enabled learning is not all about providing or conducting teaching and learning online; and make it easily accessible, however the important thing is the ability of the content provider or the lecturer to engage the <u>students</u> participation into the learning and to ensure the students are able to have an in-depth understanding on the topic ..." [Lecturer's Feedback No. 296]</p> | <p>"Traditional classroom interactions are still the best - We may promote students not to come to class in we 're not careful." [Lecturer's Feedback No. 95]</p> <p>"Preferences and compatibility - some academicians are more comfortable to traditional teaching & learning," [Lecturer's Feedback No. 183]</p> <p>"Lack of relations between the lecturers and the students - too dependence on technology rather than face to face." [Lecturer's Feedback No. 205]</p> <p>"Some courses like mathematics-based courses, teaching & learning using technology may not be suitable because most of the students require more explanation on white-board by the teachers. The students are very hard to learn the mathematics as well as engineering courses independently which involve long steps and complicated of calculations." [Lecturer's Feedback No. 289]</p> <p>"Many students did not response to e-learning activities <u>e.g</u> quizzes and forum. From the quiz that we have, it is difficult to give feedback to the students. As compared to classroom quiz, we can always give feedback and discuss right after the session." [Lecturer's Feedback No. 134]</p> <p>"... overly emphasizing on e-learning activities might decrease the quality of students communication skills and lack of attention span because they will end up spending more time communicating online with the lecturer rather than face to face." [Lecturer's Feedback No. 296]</p> <p>"We should not be an enabler to students who are increasingly less focus. The policy on e-learning is encouraging students to learn by shortcuts. Learning is still most effective the old ways via rigorous reading and writing, not via some fanciful animation and videos. As time progresses, the incidents of copy-and-paste assignments are getting more prevalent. Student's command of English is getting worse because they were not trained in heavy reading and thus, they can barely write." [Lecturer's Feedback No. 326]</p> | <p>"... UMS academician- Personally think that lecturers play important role in promoting and applying TEL in university. Sometimes we are ready and willing to accept and try new thing, but not the lecturers. Whether TEL is effective in T&L is largely depends on lecturers' effort. Students can feel the lecturer's effort in trying anything just to improve our learning experience and we will do the same way. That why it is true to say that student is the mirror of the lecturer. We react differently with different lecturer." [student's Feedback No. 3]</p> <p>"yes, so that students can easily access to lectures notes, more online classes rather than a lecture in class, because to be truth, 2 hours is like a waste of time, we only focus on the first 30-45 mins and after that our mind is somewhere else. But if using online, we get excited because there will be no <u>class</u>, <u>and</u> answered all the online questions happily and we might actually understand what we are doing and might memorize it well. But still, having a <u>2 hour</u> lecture is still fun." [student's Feedback No. 191]</p> <p>"Many lectures solely think that using technology devices in class is actually distracting. However, a lot of top notch universities use technology for effective note-taking (<u>eg.</u> One Note) in class. Some even have own webpage to share notes taken from class which is very useful for students. Instilling knowledge on how beneficial it is the effective use technology must first be <u>adressed</u> among students, lectures and staffs <u>in order to</u> achieve digitalization. The truth is, some students use mobile phones during class because the lecture is delivered in a mundane way. Also, this doesn't mean that students who are focusing during the lecture are <u>actually 'focusing'</u> or understanding it. Consistent uploading of lecture notes and other material few days before the lecture is very much appreciated." [student's Feedback No. 193]</p> |

Table 7.2. Average scores for lecturers' perceptions of TEL in learning and teaching.

Lecturers chose from five possibilities: 1 = strongly disagree; 2 = disagree; 3 = neither agree nor disagree; 4 = agree; 5 = strongly agree.

| No. | Attitude | Average Score |
|-----|--|---------------|
| 1 | TEL increases the flexibility of teaching and learning. | 4.1 |
| 2 | TEL increases access to education and training. | 4.1 |
| 3 | TEL will bring new opportunities for organising teaching and learning. | 4.1 |
| 4 | TEL enables collaborative learning. | 4.0 |
| 5 | TEL increases the quality of teaching and learning because it integrates all forms of media — print, audio, video and animation. | 4.0 |
| 6 | TEL increases my efficiency in teaching. | 4.0 |
| 7 | Universities should adopt more and more TEL for the benefit of their students. | 3.9 |
| 8 | TEL saves time and effort for both teachers and students. | 3.9 |
| 9 | TEL can solve many of our educational problems. | 3.8 |
| 10 | TEL can engage learners more than other forms of learning. | 3.8 |
| 11 | TEL enhances the pedagogic value of a course. | 3.8 |
| 12 | TEL improves communication between students and teachers. | 3.7 |

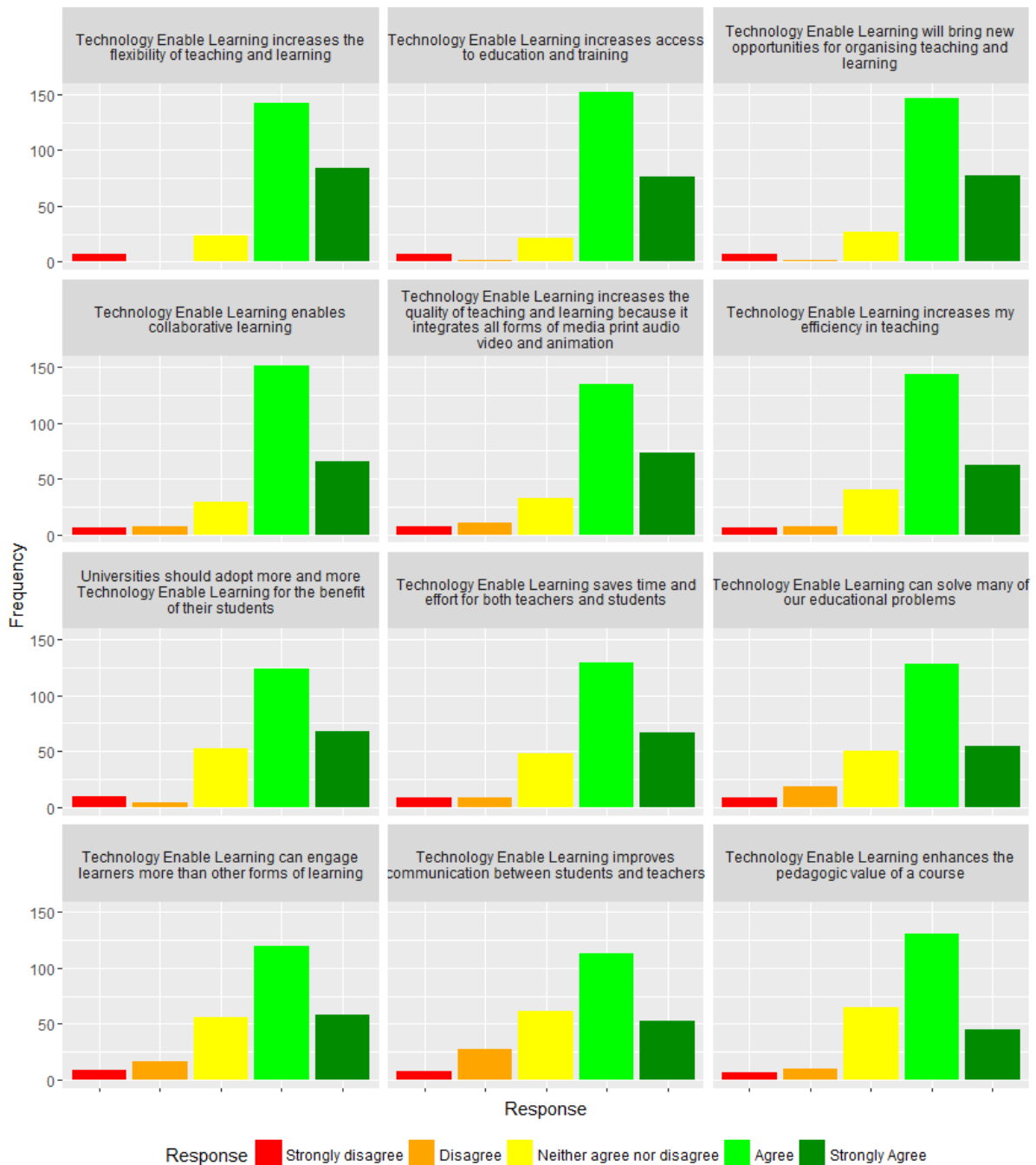


Figure 7.1. Lecturers' perceptions of whether TEL can improve learning and teaching, arranged in decreasing order based on average score.

7.2 Students' Perceptions of and Attitudes towards TEL

Like UMS lecturers, UMS students overall believe that TEL will have a positive impact on their learning (Table 7.3, Figure 7.2). The majority agree that using technology in their studies facilitates learning and helps them to achieve their learning outcomes (e.g. to understand better, to do their work more easily, to get better results, and to be more connected to the university, courses, classes, lecturers and other students). Digital natives have a new vision of time and

space in terms of communication: they can communicate with any person, at any time, in any place (Curno, 2001). The survey results show that they feel more connected through the use of technologies, probably because technologies provide them with additional opportunities to communicate with teachers, support staff and fellow students. Hence, the majority of students agree or strongly agree (67–76%) and very few disagree or strongly disagree (3–7%) with the statements presented in Table 7.3 (average score of 3.6–3.9 on a scale of 1–5); see also Figure 7.2.

Table 7.3. Average scores for students’ attitudes to the potential benefits of TEL.

Students chose from six options: 1 = do not know; 2 = strongly disagree; 3 = disagree; 4 = neither agree nor disagree; 5 = agree; 6 = strongly agree.

| No. | Statement | Average Score |
|-----|--|---------------|
| 1 | Technology makes me feel connected to what is going on at the university. | 3.9 |
| 2 | Technology makes me feel connected to other students. | 3.8 |
| 3 | I wish my teachers at the university would use and integrate more technology in their teaching. | 3.8 |
| 4 | I get more actively involved in courses that use technology. | 3.8 |
| 5 | Technology makes me feel connected to teachers. | 3.8 |
| 6 | When I entered university, I was adequately prepared to use the technology needed in my courses. | 3.7 |
| 7 | The use of tablets and laptops in class improves my engagement with the content and class. | 3.6 |

Students were prepared to use technology when they entered university, they perceive technology as benefiting their studies, and they think that TEL will improve their IT and information skills in general, which will improve their career prospects after university (Table 7.4). On a scale of 1–5, students agree that the use of technology in their studies will improve their career or employment prospects in the long term (average score of 4.1, 85% agree or strongly agree), and will improve their IT information management skills in general (average score of 4.1, 89% agree or strongly agree). Only 3–4% of students disagreed or strongly disagreed with their peers (Figure 7.3).

Table 7.4. Average scores for students’ perceptions about TEL in learning and teaching.

Students chose from five options: 1 = strongly disagree; 2 = disagree; 3 = neither agree nor disagree; 4 = agree; 5 = strongly agree.

| No. | Attitude | Average Score |
|-----|---|---------------|
| 1 | It will improve my IT information management skills in general. | 4.1 |
| 2 | It makes completing work in my subjects more convenient. | 4.1 |
| 3 | It will improve my career or employment prospects in the long term. | 4.1 |
| 4 | It allows me to collaborate with others easily both on and off campus. | 4.0 |
| 5 | It motivates me to explore many topics I may not have encountered before. | 4.0 |
| 6 | It will help me understand the subject material more deeply. | 4.0 |
| 7 | It will help me get better results in my subjects. | 4.0 |

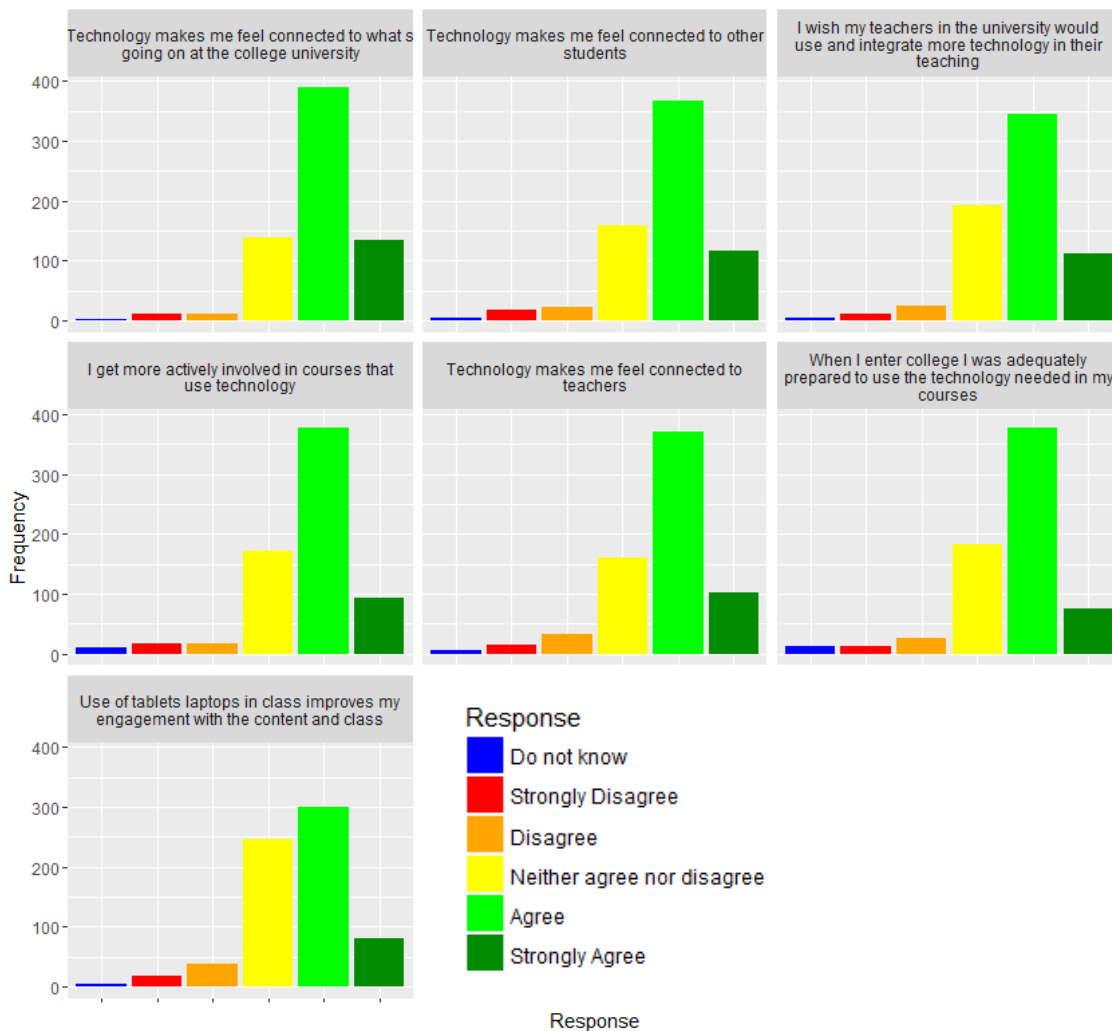


Figure 7.2. Students' views on the potential benefits of TEL, arranged in decreasing order based on average score.

In addition to students having positive perceptions of TEL, they also expressed their concerns about potential threats (Figure 7.4), particularly cyber-security and privacy. They want to protect their privacy and keep their academic life and social life separate from social media (e.g. Facebook, Twitter, etc.). Thus, in line with Higher Education 4.0 Framework Focus 2 – Digital Authentication and Cyber Security, UMS needs to train and retrain employees and students in coping with the threat of cyber-attacks that affect personal data and academic results (Tapsir & Puteh, 2018). Furthermore, students feel that their and their lecturers' concentration may be affected by using technology in the classroom or using technology for multitasking. It is known that digital natives generally cannot concentrate for a long time and tend to perform several tasks at the same time (Cornu, 2011).

Interestingly, most of the students disagree or strongly disagree (51% versus 23% who agree or strongly agree) with the statement: "I am more likely to skip classes when materials from course lectures are available online." Changing the environment in which educational activities can be undertaken increases flexibility for students in terms of where, when and how they study (Cornu, 2011). Technology also increases flexibility for teachers in terms of where and when

they undertake their teaching and assessment activities.

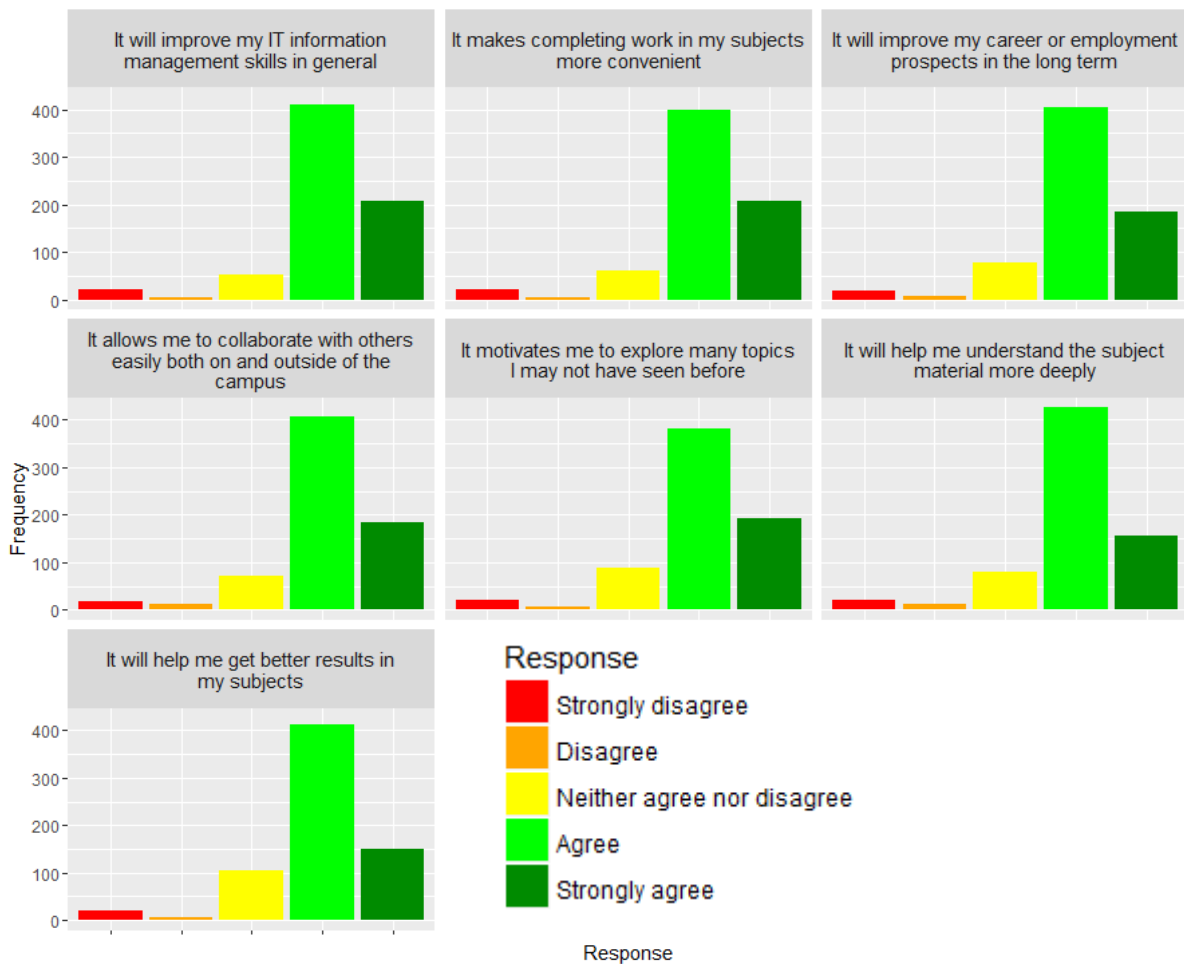


Figure 7.3. Students' perceptions of whether TEL will improve their learning, arranged in decreasing order based on average score.

Table 7.5. Average scores for students' attitudes about potential threats posed by TEL.

Students chose from six options: 1 = do not know; 2 = strongly disagree; 3 = disagree; 4 = neither agree nor disagree; 5 = agree; 6 = strongly agree.

| No. | Statement | Average score |
|-----|---|---------------|
| 1 | I am concerned about cyber-security password protection and hacking. | 4 |
| 2 | When it comes to social media (e.g. Facebook/Twitter/ LinkedIn), I like to keep my academic life and social life separate. | 3.8 |
| 3 | In-class use of mobile devices is distracting to my teacher. | 3.7 |
| 4 | I am concerned that technology advances may increasingly invade my privacy. | 3.6 |
| 5 | Multitasking with my technology devices sometimes prevents me from concentrating on or doing the work that is most important. | 3.6 |
| 6 | Technology interferes with my ability to concentrate and think deeply about subjects I care about. | 3.4 |
| 7 | In-class use of mobile devices is distracting to me. | 3.4 |
| 8 | I am more likely to skip classes when materials from course lectures are available online. | 2.6 |

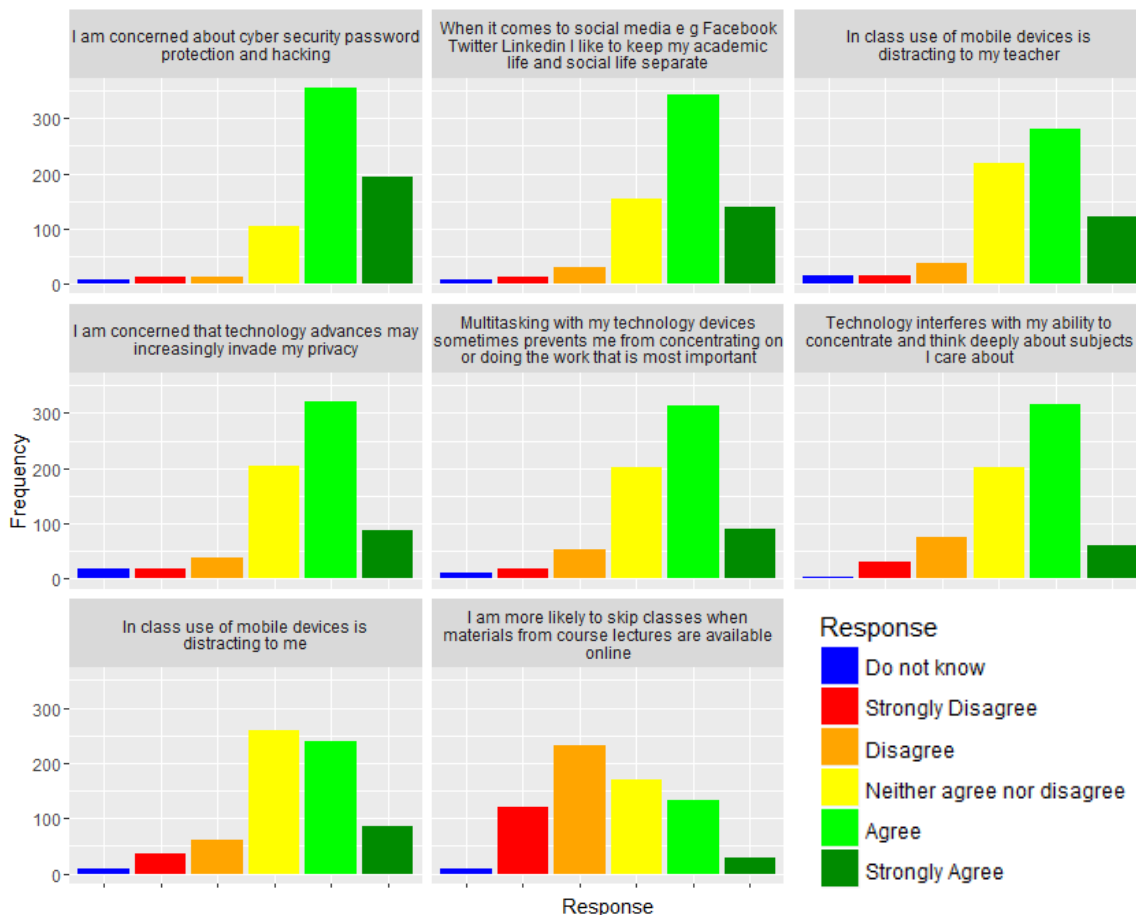


Figure 7.4. Students' attitudes about potential threat posed by TEL, arranged in decreasing order based on average score.

7.3 Students' Perceptions and Experiences of the Usefulness of Different Technologies in Their Learning

The majority of students think that most of the technologies listed in Table 7.6 are useful for their learning. The technologies that students see as less useful are: (1) contributing with other students to the development of a wiki as part of course requirements, (2) using microblogging such as Twitter to share information about class-related activities, (3) designing and building web pages as part of a course, (4) contributing to another blog and (5) keeping their own blog (Table 7.6, Figure 7.5).

TEL increases accessibility for students who would not be able to attend conventional classrooms. Most of them find it very useful to download or access online radio, audio and video recordings of lectures they could not attend and to use these for revision; the average score was 4.0 in a scale of 1–5 (73–75% agree or strongly agree). Only 5–6% disagreed or strongly disagreed with this statement.

Table 7.6. Students' perceptions and experiences of various technologies' usefulness for learning.

Students chose from six options: 1 = do not know; 2 = not at all useful; 3 =useful to limited extent; 4 = neutral; 5 = useful; 6 = very useful.

| No. | Resources | Average Score |
|-----|--|---------------|
| 1 | Use your mobile phone to access web-based university services or information (e.g. enrolment, paying fees) | 4.1 |
| 2 | Use the Web to access university-based services (e.g. enrolment, paying fees) | 4.0 |
| 3 | Create and present multimedia shows as part of your course requirements (e.g. PowerPoint) | 4.0 |
| 4 | Use a social media networking platform (e.g. Facebook) on the Web to communicate/collaborate with other students on the course | 4.0 |
| 5 | Use instant messaging chat (e.g. Skype, Messenger, Hangout, etc.) on the Web to communicate/collaborate with other students in the course | 4.0 |
| 6 | Download or access online audio/video recordings to review the content of lectures you have already attended | 4.0 |
| 7 | Receive alerts about course information (e.g. timetable changes, the release of new learning resources, changes in assessment) via text message on your mobile phone | 4.0 |
| 8 | Download or access online audio/video recordings of supplementary content materials | 4.0 |
| 9 | Download or access online radio/video recordings of lectures you could not attend | 4.0 |
| 10 | Use a personal dashboard on the university intranet to access all your academic information related to courses, grades etc. | 3.9 |
| 11 | Receive alerts about course information (e.g. timetable changes, the release of new learning resources, changes in assessment) via RSS feeds on the Web | 3.9 |
| 12 | Receive pre-class discussion questions from your lecturer via text message on your mobile phone | 3.9 |
| 13 | Create and present audio/video as part of your course requirements | 3.9 |
| 14 | Use the Web to share digital files related to your course (e.g. photos, audio files, movies, digital documents, websites etc.) | 3.9 |
| 15 | Use instant messaging chat (e.g. Skype, Messenger, Hangout, etc.) on the Web to communicate with teachers and administrative staff from the course | 3.9 |
| 16 | Receive grades/marks from your lecturer via text message on your mobile phone | 3.9 |
| 17 | Use an e-portfolio system to record your achievements for future use beyond the course of your studies | 3.8 |

| No. | Resources | Average Score |
|-----|---|---------------|
| 18 | Use web conferencing or video chat to communicate/collaborate with other students in the course | 3.7 |
| 19 | Contribute with other students to the development of a wiki as part of your course requirements | 3.6 |
| 20 | Use microblogging such as Twitter to share information about class-related activities | 3.5 |
| 21 | Design and build web pages as part of your course | 3.5 |
| 22 | Contribute to another blog as part of your course requirements | 3.4 |
| 23 | Keep your own blog as part of your course requirements | 3.3 |

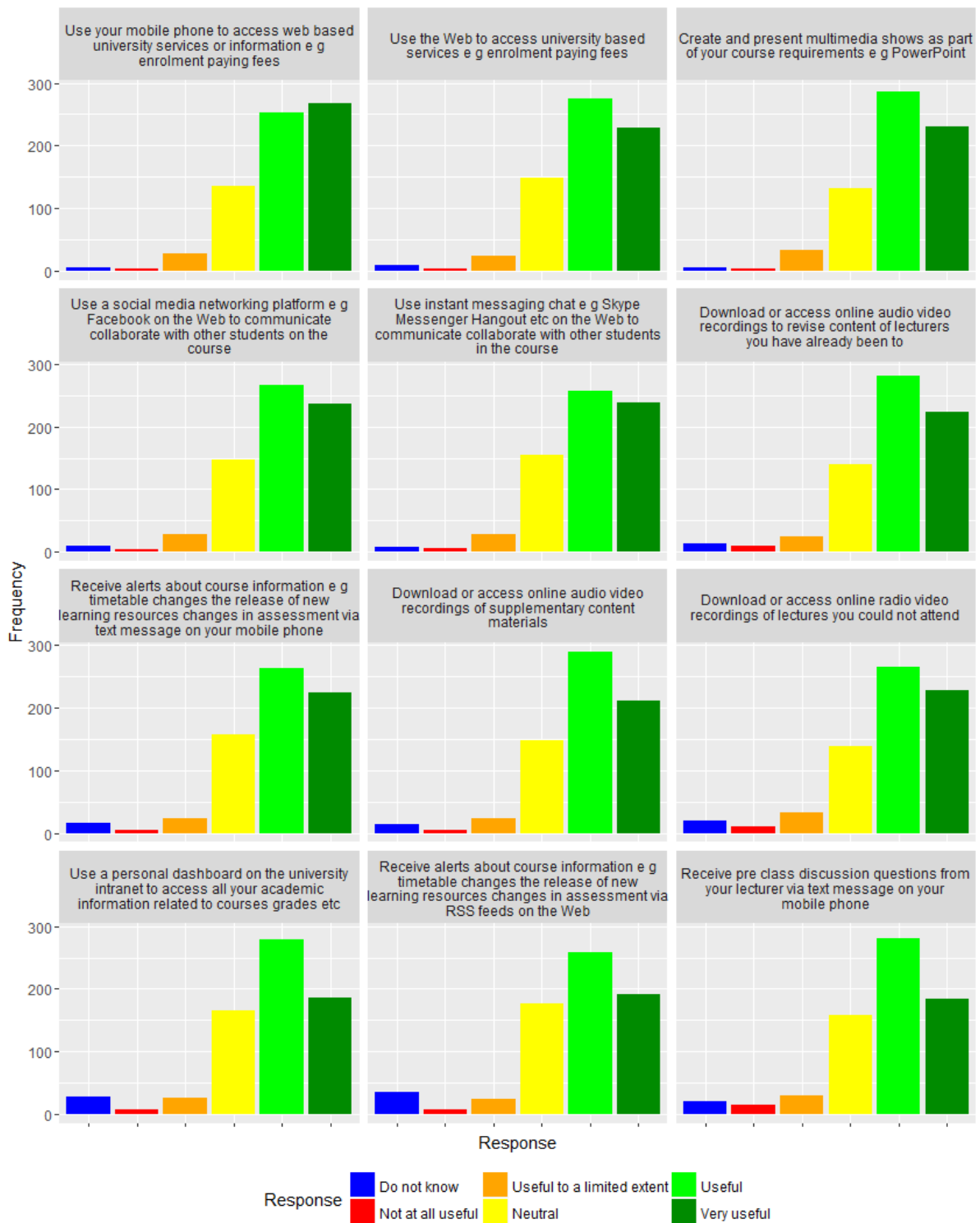


Figure 7.5 Students' perceptions and experiences of the usefulness of various technologies in their study, arranged in decreasing order based on average score. (Continues on next page.)

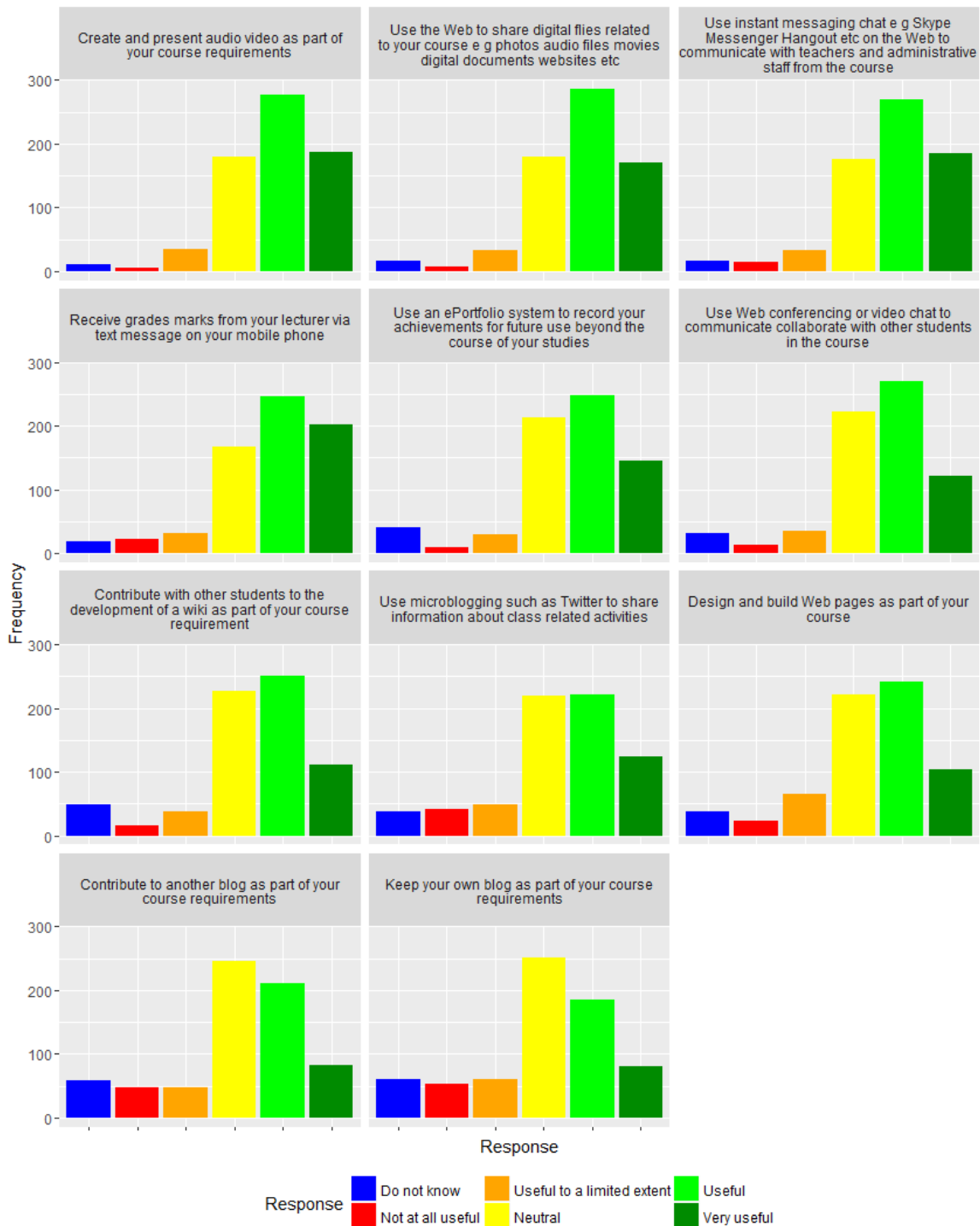


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7.4 Motivators and Barriers for Lecturers to Use TEL

It is important to identify what motivates lecturers to use or prevents them from using TEL. The first three motivators tally with the first three barriers, so these are key issues in bringing more lecturers around to using TEL: (1) infrastructure, hardware and software deployment, (2) Internet access and networking in the university, and (3) time and workload issues in developing

TEL materials (Table 7.7, 7.8, Figure 7.6, 7.7). Internet and ICT facilities are important, as has been discussed in Chapter 3. Strategy and policy are needed to take into account the extra workload incurred by engaging in TEL or creating learning materials in the early stages of adopting TEL in a lecturer’s teaching and learning practices. On the other hand, incentives to use TEL, professional prestige, and credit towards promotion are the least powerful motivators and barriers influencing lecturers’ decision to use TEL.

Currently, UMS recognises the TEL-related scholarship activities of lecturers in its yearly eLearning awards event. However, there is no formal recognition of TEL activities in UMS’s promotions criteria. Nevertheless, on a scale of 1–5, credit towards promotion was not a very important motivator (average score 3.6, ranked number 10 among the 12 motivators), nor was lack of credit towards promotion (average score 3.1, ranked number 15 among the 16 barriers; see Tables 7.7 and 7.8). So far, scholarship activities related to TEL at UMS are not supported by dedicated research funding and are not a prerequisite for promotion.

In addition, there are no special arrangements or policies in place that allow lecturers relief from their existing workload (e.g. teaching, administration, research) to undertake scholarship activities related TEL. Lecturers’ responses indicate that release time or reduction in their existing workload is one of the most important motivators (average score 4.0, ranked number 2 among the 12 motivators), and lack of time to develop e-courses is one of the most important barriers (average score 3.7, ranked number 3 among the 16 barriers).

TEL is simply a collection of tools to facilitate learning. Without the proper prerequisite knowledge in instructional design, lecturers might focus on the question “What can I use this technology or tool for?” rather than “How can I enable my students to achieve the desired or necessary learning outcomes?” or “What forms of participation or practice are enabled for learning?” (Kirkwood, 2014, p. 215).

Table 7.7. Average scores for lecturers’ motivations for using TEL.

Lecturers chose from five possibilities: 1 = very weak motivator; 2 = weak motivator; 3 = average motivator; 4 = strong motivator; 5 = very strong motivator.

| No. | Motivator | Average Score |
|-----|--|---------------|
| 1 | Improved infrastructure hardware and software deployment | 4.0 |
| 2 | Release time reduction in existing workload | 4.0 |
| 3 | Better Internet bandwidth at workplace | 4.0 |
| 4 | Personal interest in using technology | 4.0 |
| 5 | Technical support | 4.0 |
| 6 | Training in TEL | 3.8 |
| 7 | Intellectual challenge | 3.8 |
| 8 | Self-gratification | 3.8 |
| 9 | Professional incentives to use TEL | 3.7 |
| 10 | Credit towards promotion | 3.6 |
| 11 | To be a trendsetter by early adoption of technology in education | 3.6 |
| 12 | Peer recognition, prestige and status | 3.4 |

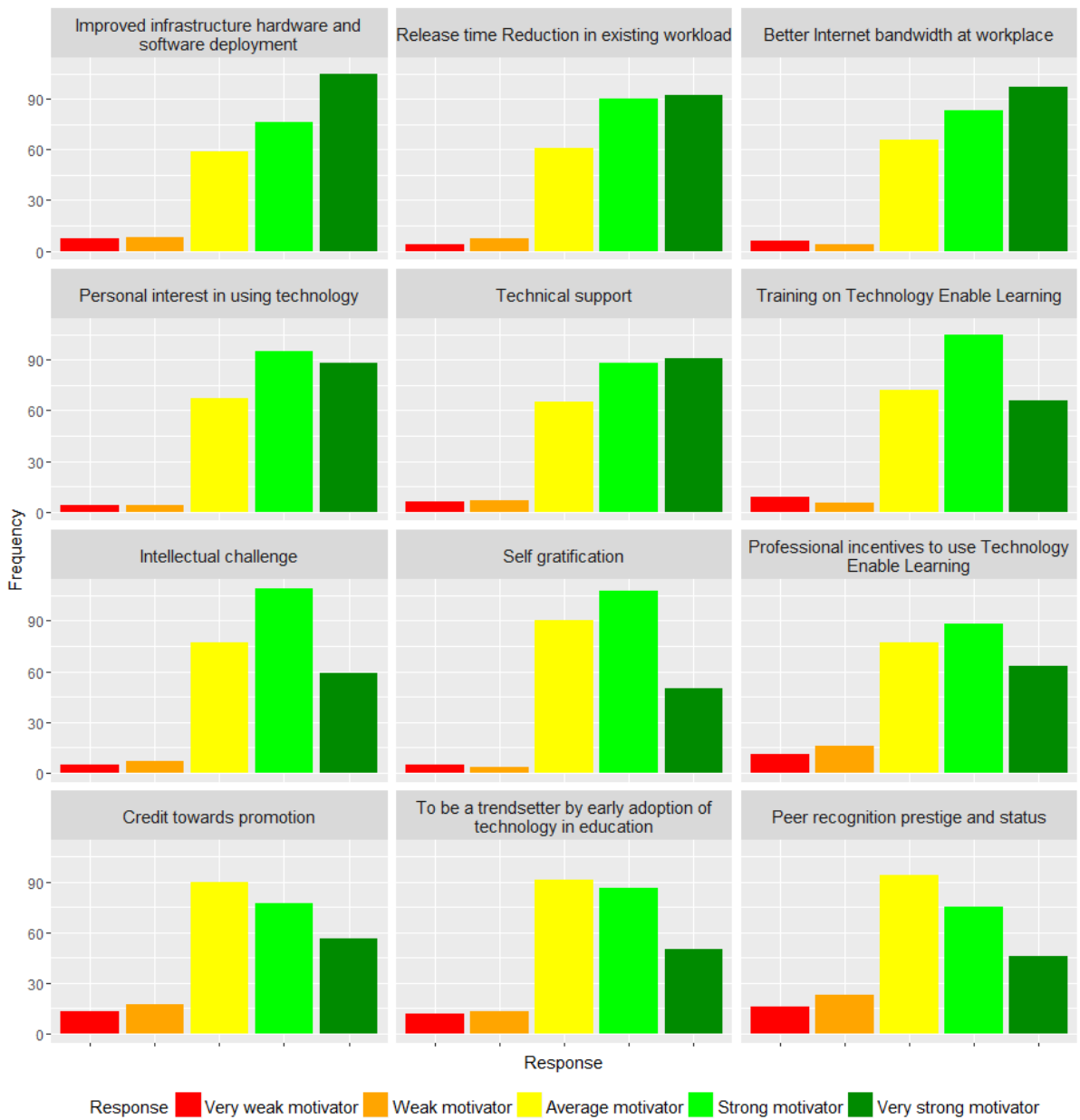


Figure 7.6. Motivators for lecturers to use TEL, arranged in decreasing order based on average score.

As mentioned earlier, students’ learning outcomes and experiences are not necessarily enhanced simply by the use of TEL. Maximising student learning with TEL requires skilful instructional design that takes into account factors such as pedagogy, specific learning tasks, learners’ capacity to focus, and activities created to engage students and promote learning. However, UMS provides little systematic support from instructional designers (ranked number 4 in the list of barriers, with an average score of 3.7; 58% agree or strongly agree, 6% disagree or strongly disagree — see Table 7.8 and Figure 7.8).

Table 7.8. Average scores for barriers to lecturers using TEL.

Lecturers chose from five options: 1 = very weak barrier; 2 = weak barrier; 3 = average barrier; 4 =

| No. | Barriers | Average Score |
|-----|---|---------------|
| 1 | Inadequate availability of hardware and software | 3.8 |
| 2 | Poor Internet access and networking in the university | 3.8 |
| 3 | Lack of time to develop e-courses | 3.7 |
| 4 | Lack of instructional design support for TEL | 3.7 |
| 5 | Lack of technical support in the university | 3.6 |
| 6 | Concern about students' access to technology | 3.6 |
| 7 | Concern about security issues on the Internet | 3.5 |
| 8 | Lack of training in TEL | 3.5 |
| 9 | Concern about faculty workload | 3.5 |
| 10 | Concern about the quality of e-courses | 3.5 |
| 11 | Lack of institutional policy for TEL | 3.3 |
| 12 | No role models to follow | 3.2 |
| 13 | Lack of incentives to use TEL | 3.2 |
| 14 | Lack of professional prestige | 3.1 |
| 15 | Lack of credit towards promotion | 3.1 |
| 16 | Intimidated by technology | 2.9 |

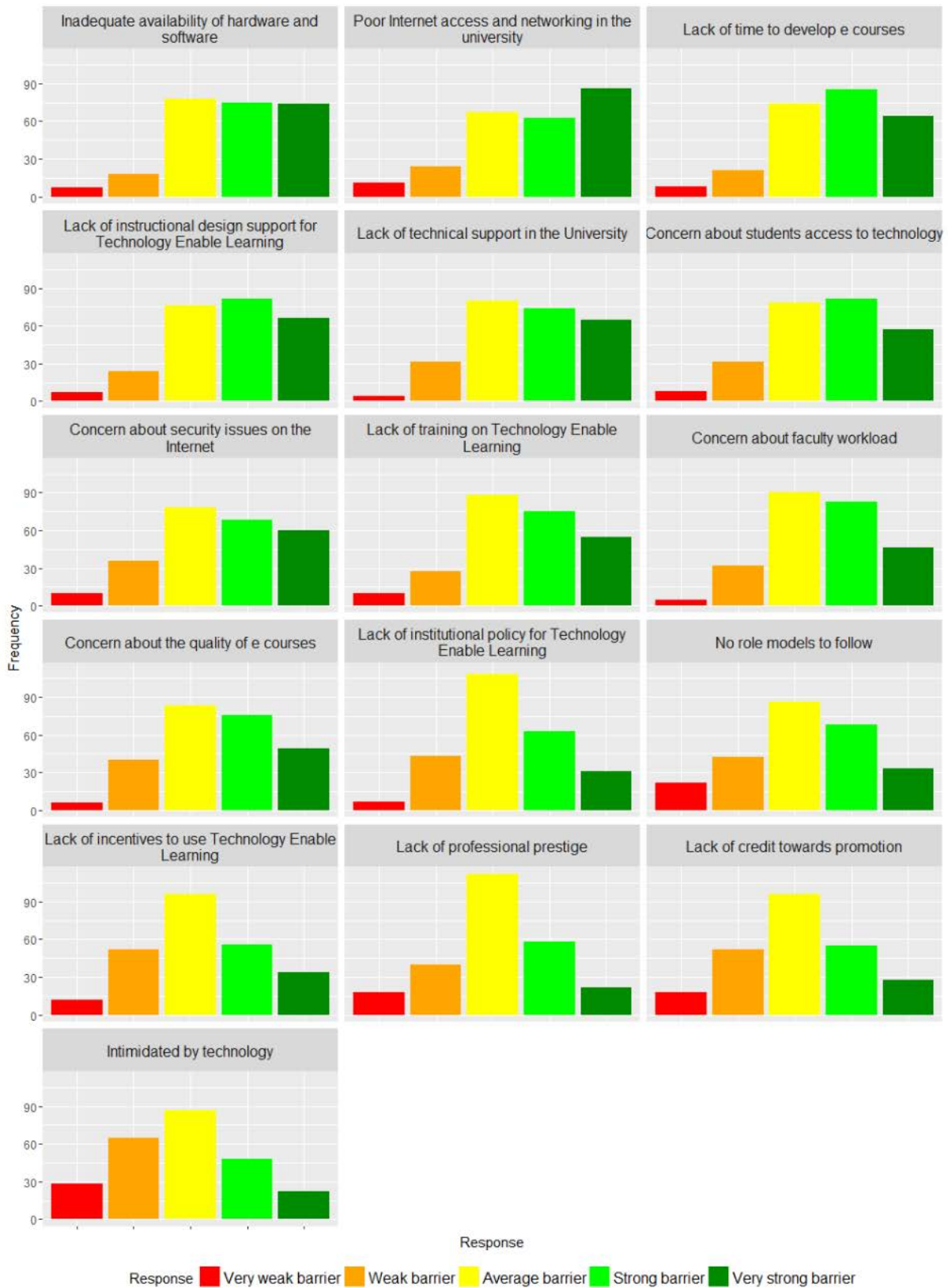


Figure 7.7. Barriers to lecturers using TEL, arranged in decreasing order by average score.

Conclusion and Recommendations

UMS currently hosts a robust ecosystem for implementing TEL. The university has established the basis for developing a TEL policy within the context of the existing regulatory framework of the Malaysian educational blueprint for TEL. This is supported by the university's vision and mission.

The TEL survey highlighted a range of aspects, encompassing strengths that can be relied upon to fortify the ecosystem, and weakness that will need to be addressed with pertinent interventions to enhance the TEL delivery process. A SWOT analysis conducted among academic staff prior to the survey led to the discovery of deeply rooted concepts prevalent in the teaching community and highlighted academic staff's apprehensions about adopting TEL. Prominent among these concerns were doubts related to pedagogical methods that can be adopted in TEL, the perceived lack of training in TEL-based platforms, the structure of the TEL platform itself — which in this case is Moodle based — and issues related to connectivity and bandwidth. A minority of comments were related to copyright, data security and system maintenance. This analysis served as a primer for the subsequent survey on TEL, which delved into a larger audience consisting of both students and teachers.

The implementation of blended learning at UMS has been driven by policies redacted from time to time by the Ministry of Higher Education, with a steady increase in the percentage of courses offered in the blended mode. The quality of these courses can be further enhanced by the implementation of a TEL policy, which will serve as the basis for the development of benchmarks for content quality as well as of content pertinent to the needs of the student community as a whole. The TEL policy will engender a process of acculturation among the minority of UMS lecturers who are yet to adopt the extant TEL platforms at UMS.

UMS has provided the necessary hardware to all lecturers; each lecturer has been assigned a minimum of one desktop, and students have been provided with access to desktop facilities (Thin Clients). UMS has provided Internet access across the campus in designated areas, via either wireless connection or wired networks, although survey respondents submitted several comments about the bandwidth of the Internet connection. The majority of students access the Internet outside of traditional working hours, a trend observed among lecturers as well. Access outside of the campus is done via personal telecommunication accounts, and this involves financial commitments. Social media is a strong driver of TEL. The survey revealed that social messaging platforms such as Facebook, Google+, etc. were the preferred mediums. This may be attributable to their attractive interfaces and ease of use.

Skills enhancement and retooling for lecturers and students is an important aspect of TEL. Current technologies permit the recording of content with easy-to-use platforms such as screen recorders, text-to-speech and speech-to-text interfaces, as well as servers such as GitHub for the execution of teaching and learning materials. The majority of lecturers felt the need for training in emerging technologies. Competency with digital media development tools constitutes a pillar of support for TEL as lecturers and content developers learn to deliver their content in accordance with the expectations of the student community.

UMS is an ideal candidate for the implementation of TEL, as it hosts a sustainable ecosystem with the appropriate policies, infrastructure, competencies, teachers and learners. That being said, several areas need to be improved for TEL implementation to be successful. Foremost

among these is an attitudinal shift among the teaching community, which can be achieved by the delivery of pertinent training in content curation, content development and delivery. The second pivotal factor for TEL implementation will be the enhancement of the existing infrastructure with regard to Internet accessibility and support for the teaching and learning community by subsidising the cost of access via a range of ISPs. Effective TEL is based on two components: content and accessibility. This fact needs to be taken into account when developing the TEL ecosystem at UMS.

Recommendations

- Although UMS has put in place some of the aspects of a TEL system as well as TEL policies and infrastructure, better TEL governance and a holistic TEL policy cutting across all UMS faculties and departments are required for more successful TEL implementation.
- UMS should involve and engage students as important stakeholders in TEL-related research, consultation, capacity building, and monitoring and evaluation.
- Since a large proportion of the lecturers at UMS are under the age of 40, and hence the generation gap between lecturers and students is not particularly large at this time, awareness and skills-training programmes need to be intensified and enhanced to ensure lecturers keep up with TEL developments and the expectation of students in future generations.
- The Internet bandwidth, Wi-Fi coverage and fibre-optic network in old buildings need to be upgraded and expanded to accommodate the growth in demand that will result from the implementation of TEL at UMS.
- Although they presently depend on proprietary analytical software that requires more overhead costs for UMS, lecturers should be encouraged to use free or open source software. Hence, a dedicated helpdesk or team needs to be established to assist lecturers with “migrating” to open source software by providing technical support, training and incentives.
- It is important for lecturers and course materials to be available online for students, who spend a large proportion of their time on the Internet.
- Lecturers should be trained in how to use TEL for effective communication with students, including to establish meaningful online discussion forums. Lecturers have to lead and moderate online discussion forums in their teaching. More studies need to be conducted to understand the current low involvement of students and lecturers in online discussion forums, as these are important tools for engagement between students and teachers as equal partners in learning and teaching.
- The use of multimedia authoring tools by lecturers and students needs to be improved by (1) providing training to lecturers and students, (2) establishing a dedicated educational e-content or audio-visual production centre and (3) revising the academic programmes at UMS in terms of their delivery and assessment methods, to encourage students to acquire and practice their multimedia skills.
- To increase the effectiveness of training programmes, more and better structured training programmes should be developed to replace loose, ad hoc training sessions

during roadshows and seminars. In addition, lecturers' training records should be monitored so that UMS can take an orderly, logical approach to determining what training each lecturer needs, depending on their specific skill level.

- Lecturers' competency in using the LMS needs to be improved through more training programmes, workshops and/or other resources. Lecturers should be encouraged to use the LMS as their primary platform so that they are exposed to the pedagogical aspects of TEL that have been integrated in the functionalities of the LMS. In addition, the currently available LMS provided by UMS (i.e., Moodle) needs to be upgraded so that it is more user friendly and relevant in the context of today's social media.
- Lecturers' awareness of OER needs to be improved, and the use of OER should be promoted among UMS lecturers so they can make use of existing OER directly as learning materials for students, or remix and readapt OER to create new learning materials. In addition, to become consumers, lecturers should be encouraged to share their teaching and learning materials as OER, and should be given incentives or recognition for doing so.
- In line with the Higher Education 4.0 Framework Focus 2 – Digital Authentication and Cyber Security, UMS needs to train and retrain employees and students in how to manage privacy and security threats when they are using technology in teaching and learning.
- Strategies and policies need to be developed to take into account the extra workload involved for lecturers when they are applying TEL and creating learning materials during the early stages of adopting TEL in their teaching and learning practices.

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