



COMMONWEALTH *of* LEARNING

Report of the Baseline Study on Technology-Enabled Learning at Ahsanullah University of Science and Technology



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Foreword

Ahsanullah University of Science and Technology (AUST) has been established with a mission to be a premier centre of excellence in science, engineering, technology and business by creating and transferring knowledge with human values to future generations. After 23 years, AUST is now one of the leading private universities in Bangladesh.

Technology can be a powerful tool for transforming learning. Technology provides teachers and students with access to a variety of educational resources. There has been considerable growth in the adoption of technology within educational institutions in recent years. Technology-enabled learning (TEL) means the use of digital technology to support teaching and students' learning.

The Commonwealth of Learning (COL), headquartered in Canada, came forward to support AUST in the development of a TEL policy and the systematic implementation of TEL. A contribution agreement was signed between COL and AUST on 16 January 2019. COL agreed to provide a systematic approach for implementing TEL through research, consultation, capacity building, monitoring and evaluation to improve the quality of learning outcomes at AUST. It gives me immense pleasure to announce that AUST is the first university in Bangladesh to start implementing TEL in a systematic manner with COL's support. This baseline study has been conducted at AUST with the objective of developing TEL policy and implementing TEL with support from COL. AUST is developing preparedness for TEL. The institution has some of the relevant systems and infrastructure, but these need to be improved for successful TEL implementation.

I would like to thank Mr Kazi Rafiqul Alam, Chairman of the Board of Trustees at AUST, and Professor Dr Kazi Shariful Alam, Pro Vice-Chancellor and Treasurer of AUST, for taking the initiative to implement TEL at AUST. I appreciate the sincere efforts and responsibilities taken by Professor Dr Kazi A. Kalpoma, Head of AUST's Department of Computer Science and Engineering, for TEL implementation at AUST. I would like to express my gratitude to Dr Sanjaya Mishra, COL's Education Specialist: eLearning, and Professor Mostafa Azad Kamal for providing the necessary support to complete this baseline study and report.

I appreciate the unconditional efforts made by all individuals who participated in this survey, conducted this baseline study, analysed the responses and presented the wider picture of TEL at AUST. I also appreciate the contributions of the COL TEL AUST committee members throughout this study. This study certainly will help us with preparing a TEL policy and successfully implementing TEL at AUST.

Professor Dr A.M.M. Safiullah

Vice-Chancellor

Ahsanullah University of Science and Technology

Dhaka, Bangladesh

Preface

Education is the backbone of a nation's prosperity. To strengthen this backbone, Ahsanullah University of Science and Technology (AUST) has the mission to develop human resources in the fields of science, engineering and technology to meet the ever-changing needs of society. It aims to produce quality graduates imbued with ethical values and equipped with knowledge and skills appropriate to a rapidly changing world.

The world is standing on the edge of the fourth industrial revolution, which is based on information technologies. To keep up, AUST has been continuously developing systems to help teachers and students. The Integrated University Management System (IUMS) is one example. Technology provides teachers and students with access to a variety of educational resources that inspire creativity, critical thinking, communication and collaboration. Technology-enabled learning (TEL) is an approach designed to make the system more robust, accessible and interactive.

The Commonwealth of Learning (COL), based in Canada, shares this vision and came forward to support the TEL Implementation Project at AUST. COL will assist AUST in improving the quality of learning outcomes and will also provide a systematic approach to implement TEL at AUST through research, consultation, capacity building, monitoring and evaluation. Adopting TEL at AUST will definitely improve the university's quality of teaching and learning.

A baseline study has been conducted to determine how far the objectives of TEL have been fulfilled at the university in terms of the use of technology by faculty members and students. I would like to thank Mr Kazi Rafiqul Alam, Chairman of the Board of Trustees at AUST, and Professor Dr A.M.M. Safiullah, Vice-Chancellor of AUST, for taking the initiative to implement TEL at AUST. I also thank Professor Dr Kazi A. Kalpoma, Head of AUST's Department of Computer Science and Engineering, for taking responsibility for TEL implementation. I congratulate the COL TEL AUST project team members for their successful completion of the baseline study. I would like to express my gratitude to Dr Sanjaya Mishra, COL's Education Specialist: eLearning, and COL facilitator Professor Mostafa Azad Kamal for supporting TEL implementation at AUST.

I am thankful to all the faculty members who assisted with conducting the survey and preparing this report. This work would not have been possible without their valuable contributions.

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I would like to express my sincere gratitude to all the individuals who provided support to complete this *Report on the Baseline Study of Technology-Enabled Learning at Ahsanullah University of Science and Technology*. I would also like to acknowledge the unconditional support and dedication of the COL TEL AUST committee members throughout this study.

First of all, my special gratitude and thanks to Mr Kazi Rafiqul Alam, Chairman of the Board of Trustees at AUST, for giving me this opportunity to work on TEL implementation at AUST. I sincerely thank Professor Dr A.M.M. Safiullah, Vice-Chancellor of AUST, and Professor Dr Kazi Shariful Alam, Pro Vice-Chancellor and Treasurer of AUST, for taking the initiative to implement TEL at AUST. It would not have been possible for me to carry out this project without their continuous support, invaluable advice and encouragement.

I am thankful to Dr Sanjaya Mishra, COL's Education Specialist: eLearning, for his contribution in planning this study, preparing the survey tools and providing exemplary support in moving this study ahead. I am very grateful to COL facilitator Professor Mostafa Azad Kamal for providing the necessary information to complete the study and report. I would also like to thank Dr Md. Shahriar Mahbub, Associate Professor, CSE, AUST and Mr Mir Tafseer Nayeem, Assistant Professor, CSE, AUST for their support and contribution in conducting this baseline study and completing this report.

I would like to thank all the heads of the departments and the assigned faculty members of various departments for extending their support in monitoring the students taking the survey during this baseline study. I am thankful to all the faculty members and students who co-operated and responded to this survey. Many of them stated that they enjoyed taking the survey and also found it beneficial to them. I am very grateful to the Registrar's Office, the Treasurer's Office and the IT support department for providing the necessary information to complete the institutional survey part of this baseline study. This study wouldn't have been possible without their continuous support and co-operation. The results of the baseline study will be immensely useful for enhancing teaching and learning activities using technology at AUST.

I look forward to a TEL policy that will help integrate the use of information and communication technology in teaching and learning at AUST.

Professor Dr Kazi A. Kalpoma
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Executive Summary

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

AUST was established by the Dhaka Ahsania Mission in 1995. The university offers programmes at all levels of science, technology, business and the social sciences, including pedagogical sciences. This baseline study was conducted to identify the scope for improving the university's teaching and learning practices by integrating technologies.

Objectives

The specific objectives of the study were to: (i) identify the current status of AUST through the lens of TEL preparedness indicators; (ii) examine the teachers' access to, skills with and use of information and communication technologies (ICT) in their teaching learning practices; (iii) identify teachers' perceptions of TEL implementation; (iv) examine learners' access to, skills with and use of ICT; and (v) assess learners' perceptions of using TEL for their learning.

Methodology

Three structured questionnaires, provided by COL, were administered in the form of an online survey: an Institutional Questionnaire, Learner Questionnaire and Teacher Questionnaire. The questionnaires were communicated via Survey Monkey. A total of 276 teachers and 526 learners responded. For data analysis, tabular and graphical methods were used.

Key Findings

- AUST is a renowned private university in Bangladesh with a focus on science, technology, business and the social sciences, including pedagogical sciences. From its inception, AUST has made concerted efforts to ensure quality education for its learners. AUST has already established several state-of-the-art laboratories in different departments. The entire campus has free Wi-Fi access. All faculty members can have an email address within the aust.edu domain. The email service is fully functional and managed by Google.
- As an academic institution, AUST is in a good position for TEL implementation. Its preparedness score is 121, which is within the range of “developing preparedness.”

The teachers are experienced and have good academic standing. Almost 60% of the teachers have master's degrees, while 19.05% have PhDs.

- Most of the teachers (84.36%) are in engineering and technology fields. Most teachers have access to electronic devices, and the majority have smart phones and laptops (around 99% and 97%, respectively); around 75% own desktop computers, and nearly 41% own tablet devices. The majority of teachers (96.70%) have access to the Internet on the university campus, while 95.60% have access at home. The majority of teachers use smart phones (56.04%), followed by laptops (25.64%) and desktop computers (16.85%). The rate of Internet usage at AUST is very high, with 96.31% of faculty using it daily.
- In terms of computer skills, the majority of the surveyed teachers are advanced users and can provide training in word processing, spreadsheets, presentation software and email. Most of the teachers (94.89%) have accounts with social media platforms. Almost all of them (94.34%) have a Facebook profile, while 46.04% have a profile with Google+, 31.7% with photo-sharing sites, 26.04% with SlideShare or a similar presentation platform, 21.13% with Twitter, 12.83% with social bookmarking sites, 7.55% with goodreads.com and 5.66% with blogs. In terms of engagement in mailing lists and discussion forums, 44.03% have subscriptions to discussion forums.
- AUST teachers largely (90.81%) use the face-to-face delivery method, with few (20.96%) using the blended mode. Teachers do not often use digital resources or platforms in their teaching. Their use of blogs, microblogging, social bookmarking, simulations, audio recordings, digital videos and learning management systems (LMSs) is low. In terms of creating and sharing teaching and learning materials, teachers at AUST have limited experience; however, they create teaching and learning resources in significant amounts using image applications, PowerPoint, and Word. Surprisingly, the majority of faculty members have never used digital film/video, audio, simulations, LMS, course packs or blogs to create teaching and learning materials. The teachers are mostly unaware of open educational resources (OER).
- The university is not comfortable with the ICT skills needed for teaching and learning. Most of the teachers (93.33%) have not yet received training in the use of ICT for teaching and learning. AUST does not provide regular training in the use of new technologies for teaching and learning. Most of the teachers (81.92%) haven't yet participated in any online training. The majority of the faculty members (86.47%) have not participated in massive open online courses (MOOCs), and 63.08% of the faculty members were not aware of any of the MOOC platforms listed in the questionnaire.
- The teachers do not know whether AUST policies presently exist.

- Most of the respondents access library resources rarely or sometimes for teaching and learning. The majority of teachers are not happy with the university's support for their research.
- Although teachers use the face-to-face delivery method in their course delivery, they have positive attitudes towards the use of TEL and are highly motivated to integrate TEL into their teaching and learning. Most of the faculties are strongly affected by barriers to the use of TEL. Major barriers to TEL implementation at AUST are: lack of training about TEL; lack of technical support from the university; lack of an institutional TEL policy; and inadequate availability of hardware and software.
- Almost all (99.0%) of the students have their own smartphone, 84.6% have a laptop, 76.4% have a desktop computer and 31.8% have either a tablet or an iPad. They mostly use smartphones. Almost all of the students (98.1%) have an Internet connection at their own home. One-third of the learners (35.9%) use the Internet on the university campus, 21.6% use the Internet at the university labs and 7.8% use it at cybercafés. It was found that around half of the learners spend three to five hours daily on the Internet, while 24.2% spend one to two hours.
- Most of the students can use word processors, PowerPoint, email and search engines. Almost all of the students have a Facebook account. Rates of accounts with Google+, photo-sharing sites, Twitter, social bookmarking sites, research-sharing sites were 66.7, 65.3, 32.2, 30.7, 24.8 and 23.1%, respectively. On average, 41.7% of the students spend one to two hours on social media, 35.6% spend three to five hours, 11.2% spend more than five hours and 10.4% spend less than one hour.
- Around half of the students are members of various IT-based forums, such as mailing lists or discussion forums. The majority use these forums not very frequently. Students are not used to MOOCs. Most of them strongly agree or agree that the technologies they are using at the university will help them with studying, developing skills and preparing themselves for future job markets.
- Learners at AUST are aware of the usefulness of technologies in their studies for accessing academic resources, sharing resources, communicating among their peers, collaborating and other tasks. They prefer to have access to educational resources and course-related information online. They also like to use social media to connect with other students and teachers. They prefer to search for and download videos, texts and audio files from the Internet. However, they are not well aware of copyright restrictions.
- Learners at AUST believe that integrating technologies enhances their level of engagement with their courses. Technology also helps them connect with peers and teachers. Learners are aware of cyber security. They also like to separate their social life from their academic life when engaging in social media.

Recommendations

Based on the findings of the baseline study, it is easy to conclude that some meaningful technological interventions could result in significant changes in the teaching and learning practices at AUST. Teachers could enhance the quality of their courses by improving content creation, content sharing and learner engagement. The following recommendations can be made to improve the TEL environment at AUST:

- A well-structured TEL policy needs to be developed and implemented. The policy-development process should include all relevant stakeholders.
- AUST should have a comprehensive action plan and aligned guidelines for TEL implementation in its teaching and learning processes.
- There is a need to ensure wider access to the Wi-Fi network on the university campus. Bandwidth should be increased so that learners and teachers have easy, uninterrupted access to educational resources, course-related information and various learning forums and social media.
- Teachers should be trained in how to meaningfully integrate technology into their teaching and learning practices.
- Teachers should be trained in the creation of digital content.
- AUST should develop an institutional OER policy.
- AUST should develop an institutional OER repository for storing the educational resources created by its teachers and learners. The repository may be linked with other repositories around the world for better access to OER. The university may also consider creating a referatory for making relevant OER available to learners and teachers.
- The university should consider initiating regular programmes on digital literacy for learners. In addition, C-DELTA could be a good platform for students to test and enhance their digital literacy online.
- A well-structured and user friendly LMS (installed or in the cloud) should be initiated and used for all AUST courses. On the LMS, teachers can share learning content, students can interact with their peers and teachers, and grades and feedback on assignments can be communicated.

Chapter 1: Introduction

1.1. Context

We are living in a technological world. We are also on the edge of the fourth industrial revolution, which is based on technology. Nowadays, technology is an integral part of everyday life. As a developing country, Bangladesh needs to reap the benefits of technological developments, especially in the field of information and communication technologies (ICT) for education and training. A sound and strong higher education system is essential for boosting economic growth and moving Bangladesh towards becoming a developed nation.

Technology-enabled learning (TEL) refers to the use of digital technologies that are applied in any kind of educational system to enhance the quality of teaching and learning. This report is the beginning of a journey to improve the quality of teaching and learning at Ahsanullah University of Science and Technology (AUST). The university aims to: (i) offer courses that integrate ICT for teaching and learning; (ii) enhance student engagement and quality of learning; and (iii) improve the ICT skills of every learner to prepare them for being lifelong learners. After detailed deliberations, AUST signed an agreement with the Commonwealth of Learning (COL) to implement COL's TEL model over a period of two to three years. In the process, COL agreed to support a baseline study and the development of an appropriate policy for TEL, build local capacity for using TEL to develop blended learning courses, and undertake an evaluative research study of changes in students' learning and teachers' pedagogical approaches due to TEL implementation. This baseline study report is part of Phase 1 of TEL implementation at AUST.

Before we discuss the report's details, it is important to set the national context within which activities at AUST are situated.

1.2. The Government's Priorities for Mainstreaming ICT in Education

1.2.1. Digital Bangladesh Vision 2021

“Digital Bangladesh” is an integral part of the government's Vision 2021, which promises a prosperous and equitable middle-income Bangladesh by its golden jubilee of independence. This vision arguably runs parallel to the information society vision advocated by the UN's World Summit on the Information Society. Digital Bangladesh was announced on 12 December 2008, in advance of the Government of Bangladesh's 9th Parliamentary Election, on 29 December 2008. It is interpreted as a long-term vision rather than a target. Digital Bangladesh proposes to mainstream ICT as a pro-poor tool. Indeed, this is probably the first time in the history of Bangladesh that the vision of leveraging ICT for poverty reduction and human development has been proposed, and it received instant support from citizens. The prime minister outlined the four key priorities of Digital Bangladesh: (i) developing human resources for the 21st century; (ii) connecting citizens in ways most meaningful to them; (iii) taking services

to citizens' doorsteps; and (iv) making the private sector and markets more productive and competitive through the use of digital technology. Indeed, the vision of Digital Bangladesh emerged as the world's first development strategy that deliberately attempts to use ICT for reducing poverty and transforming the fates of the ordinary women and men of Bangladesh. Thus, a number of acts, policies and guidelines are in place to guide the nation towards the realization of Digital Bangladesh.

1.2.2. The Master Plan for ICT in Education (2012–2021)

The main objectives of the Master Plan for ICT in Education are to ensure education for all, to improve the standard of education, to produce a skilled workforce, to reduce differences in education standards between urban and rural areas through the use of ICT, and to use ICT in education. The plan addresses four basic obstacles: lack of awareness about how ICT can help improve the education sector; lack of technical capacity to develop policies to effectively integrate ICT in the education system; lack of leadership to implement what has been planned and agreed; and lack of effective co-ordination among the different government agencies. The Master Plan for ICT in Education (MOE, 2013, p. 3) identifies seven objectives:

- Development of teaching-learning environment;
- Teachers' professional and ICT skills development;
- Development of teaching-learning resources;
- Human resource development according to the demand of this age;
- Ensure transparency, skills and accountability in educational management;
- Reaching education services to the doorsteps of citizens; and
- Ensure participation of education related personnel.

While the plan focuses on school education and provides a broader context for ICT use in education, the University Grants Commission of Bangladesh has taken several key initiatives to promote the use of ICT in universities across the country. Some of these are: the Higher Education Management Information System,¹ the UGC Digital Library² and the Bangladesh Research and Education Network (BdREN).³ BdREN has established several virtual classrooms across the country to improve the quality of teaching in areas with a scarcity of qualified teachers. The UGC Digital Library project is largely funded by the World Bank's Higher Education Quality Enhancement Project and provides access to digital peer-reviewed research materials and e-books for member institutions at substantially reduced subscription rates.

¹ <http://ugc-hemis.gov.bd:81/home.html#/>

² <http://udl-ugc.gov.bd/>

³ <https://www.bdren.net.bd/>

1.3. About Ahsanullah University of Science and Technology

1.3.1. History

AUST was founded by the Dhaka Ahsania Mission in 1995. The university offers programmes in science, technology, business and the social sciences, including pedagogical sciences, as permitted by the Ministry of Education, Government of the People's Republic of Bangladesh.

The Dhaka Ahsania Mission is a non-profit volunteer organisation in Bangladesh. The mission was established in 1958 by Khan Bahadur Ahsanullah, an outstanding educationist and social reformer of undivided India. His personal vision of a better society was characterised by a wealth of moral and spiritual values of the highest humanism, which have been universally acclaimed through the ages and manifest in every sphere of life: social, economic and cultural. His remarkable educational reforms include the introduction of the roll number system in public examinations and the creation of equal opportunities for educating all groups of people in society.

1.3.2. Vision and mission

AUST was established with the aim of being a premier centre of excellence in science, engineering, technology and business by creating and transferring knowledge with human values to future generations in such a way that they, in turn, could enhance the quality of life in Bangladesh and beyond.

To achieve its vision, AUST is engaged in developing human resources in its focus areas to meet the ever-changing needs of Bangladeshi society in a highly complex and globalised world. The curricula of the university are designed to produce quality graduates imbued with ethical values and equipped with knowledge and skills appropriate to their professional fields. AUST graduates are taught and trained to accept the various challenges in their job arenas and to contribute meaningfully to society and the country's overall development.

1.4. Objectives of the Study

The study was conducted to:

- review the current status of TEL preparedness at AUST;
- examine teachers' access to, skills with and use of ICT in their teaching and learning practices;
- identify teachers' perceptions about TEL implementation;
- examine learners' access to, skills with and use of ICT for their studies;
- assess learners' perceptions about using technology to learn; and
- develop recommendations for AUST to strengthen integration of ICT in teaching and learning.

1.5. Methodology

1.5.1. Sampling and data collection

For the purpose of the study, COL provided the necessary tools available in the *Technology-Enabled Learning Implementation Handbook* (Kirkwood & Price, 2016). While an institutional review was carried out with AUST staff, surveys were conducted to gather data from students and teachers. Separate structured questionnaires were administered to teachers and students. The study followed random sampling, and the response rates are presented in Table 1.1; the response rate to the teacher survey was 94%, while for the student survey it was only 7%. However, the rates are within the sample size recommended by Krejcie and Morgan (1970).

Table 1.1. Populations and samples of the surveys

Name of the survey	Total population	Number of responses	Recommended sample size	Response rate
Teacher survey	293	276	210	94.19%
Student survey	7,208	526	368	7.29%

1.5.2. Data analysis and chapter summary

Collected data were mainly quantitative in nature. These were entered into Excel spreadsheets, and the necessary tables and graphs were prepared for analysis, which the forthcoming chapters present in detail. Chapter 2 presents the analysis of policy review and infrastructure. Chapter 3 covers teachers' access to and use of ICT for teaching and learning. Chapter 4 includes analyses of the findings from the survey of learners' use of ICT for their studies. Chapter 5 summarises the findings and makes recommendations.

Chapter 2: Policy Review and Infrastructure Analysis

2.1. University Profile

There are 7,208 students and 293 teaching and academic staff supported by 174 non-teaching staff. AUST offers undergraduate, graduate and postgraduate programmes in the fields of science, engineering, business and the social sciences. The university is a science and technology institute, so its main aims are to:

- impart need-based programmes in science, engineering, business and the social sciences;
- offer programmes covering all important fields and disciplines of science, engineering, business and the social sciences, including teacher training;
- develop programmes examining modern trends, needs and progress in science, engineering, business, the social sciences and human resources, carefully observing employment opportunities and market needs both at home and abroad;
- organise programmes in science, engineering, business and the social sciences, including teacher training, for the awarding of degrees, diplomas and certificates of proficiency at all levels; and
- engage in gradual expansion of departments and programmes of learning as per the rules and regulations of the Private University Act, 2010 and in accordance with the country's needs and foreign demands.

2.2. Technology and Services

There are over 700 desktop computers in the university, including 25 laptops. Internet access is available on the campus in the library, faculty rooms, laboratories and seminar halls. The internet bandwidth is currently < 1 Gbps.

2.2.1 Laboratories

AUST has already established several state-of-the-art laboratories in different departments. However, the following labs have ICT-related services:

Table 2.1. Laboratories

Department	Labs
Department of Architecture	Auto CAD Lab.
School of Business	Computer Lab
Department of Civil Engineering	Auto CAD Lab
Department of Computer Science and Engineering	<ol style="list-style-type: none">1. Network and Data Communication Lab2. Web Application and Multimedia Lab3. Data and Knowledge Engineering Lab4. Software Engineering Lab5. Operating System Lab6. Microprocessor and Interfacing Lab7. Mobile Games and Apps Lab8. Digital Electronics and Design Lab

Department of Electrical and Electronic Engineering	1. VLSI Lab 2. Simulation Lab
Department of Textile Engineering	Computer Lab
Department of Mechanical and Production Engineering	Simulation Lab

2.2.2 Wi-Fi access

The entire campus has Wi-Fi access. Fifty access points cover the campus. At the time of this study (January–February 2019), students do not have access, but faculty members enjoy free Wi-Fi access.

2.2.3 Email service

All faculty members can have an email address within the aust.edu domain. The email service is fully functional and managed using Google’s Suite for Education.

2.2.4 Library facilities

The library provides sufficient carrels for individual study and can now accommodate about 200 readers in the reading room at a time. The library has an open shelf system, meaning readers can browse books and journals directly from the shelves. Library employees are also there to help readers.

2.3 Institutional Preparedness for TEL

The institutional survey required the university to rate its TEL preparedness in a number of areas, including: policy; strategic planning; IT support availability; content creation; documentation; leadership and organisational culture; and human resource availability. Table 2.2 presents information regarding institutional preparedness for TEL at AUST. Each criterion was scored from 1 to 5, where: 1 = strongly disagree or does not exist; 2 = disagree or only marginally demonstrates existence; 3 = neither agree nor disagree, 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. As per the score sheet provided with COL’s *TEL Implementation Handbook* (Kirkwood & Price, 2016), the scores for AUST preparedness totalled 121. This is in the 95–129 range, showing that AUST is in the “developing preparedness” category, which implies that AUST has put in place some of the aspects of a TEL system, policy and infrastructure and is in the process of developing a robust system.

Table 2.2. Institutional preparedness scores

Sl. #	Category	Statement	Score
1.	Policy	There is a well-documented TEL policy.	1
		The vision and mission of the TEL policy are aligned with the mission of the organisation.	3
		The vision and mission of the TEL policy are well understood across the organisation.	4
		There is a commitment on the part of institutional leaders to use technology to achieve strategic academic goals.	5
		Category Score	13
2.	Strategic Plan	There is a strategic plan for the implementation of TEL.	3
		The strategic plan for TEL has measurable goals and outcomes.	3
		The strategic plan for TEL is approved by the senior management of the organisation and is supported by adequate financial provisions.	3
		Category Score	9
3.	IT Support Department	The organisation has an IT department that handles the procurement, installation and maintenance of technologies for teaching and learning.	5
		There is an ICT policy in place, which is implemented by a high-powered committee in the organisation.	5
		The head of the IT support department reports to senior management and is responsible for the overall functioning of technology in the organisation.	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	18
4.	Technology	There is adequate hardware infrastructure for teaching and learning (e.g., access to computers for students and learners).	4
		There are adequate applications and software for teaching and learning (e.g., access to appropriate software, intranet, learning management system, etc.).	3
		There is adequate networking infrastructure in the organisation (e.g., access to adequate bandwidth).	4
		There are adequate policies and procedures in place to protect privacy and organisational data.	4
		Category Score	15
5.	Content	There are instructional designers in the organisation, or faculty members are trained to organise learning content appropriately.	1
		There is support available for the creation of digital multimedia content in the organisation (e.g., e-courses, audio and video materials, animation, etc.).	2
		Teachers have adequate access to online systems to develop courses for TEL.	3
		Category Score	6
6.	Documentation	There is a variety of help available to support teachers and students in using technology effectively.	3
		Lessons learned in the implementation of TEL are stored and shared within the organisation for others to access and learn from.	1
		The workflow processes and responsibilities to implement TEL are well documented in the organisation.	4
		Category Score	8

Table 2.2. Institutional preparedness scores (cont.)

Sl. #	Category	Statement	Score
7.	Organisational Culture	Faculty and staff members are willing to learn about new technology in the organisation.	4
		Faculty and staff members support each other easily.	4
		There is a culture of knowledge creation and sharing in the organisation.	4
		Category Score	12
8.	Leadership	Leaders are involved in implementing TEL.	4
		Senior management in the organisation regularly review, monitor and evaluate the progress of TEL.	3
		The top leadership of the organisation is supportive of TEL and provides encouragement and motivation to the faculty and staff to achieve their academic goals.	4
		Category Score	11
9.	Human Resources and Training	Faculty members are qualified and trained to use technology for teaching and learning.	4
		Faculty and staff members receive regular training to update them on using TEL.	2
		There are adequate staff to support TEL.	2
		The organisation has a structure in place to create teams for content development and delivery of TEL.	2
		Faculty members trust the support received from instructional designers and technology support staff while developing and delivering courses.	3
		The IT staff members are highly skilled and trained to provide the needed support.	3
		Category Score	16
10.	TEL Champions	There are early adopters of TEL in the organisation.	3
		There are TEL champions in the organisation who support and care about pedagogic innovations.	3
		There are faculty members who can take leadership roles in developing appropriate policies and a TEL strategy for the organisation.	4
		There are TEL champions to research and disseminate good practices in TEL.	3
		Category Score	13
Total score for all statements			121

Chapter 3: Teachers' Use of Technologies for Teaching and Learning

3.1. Respondents' Profile

Survey questionnaires were sent to all faculty members through mail. Of the 293 faculty members working in the university, 276 responded to the survey. This response rate was almost 94%, which is useful for gaining a general understanding of the faculty's access to technology and their use of technology for teaching and learning.

3.1.1. Gender and age distribution

Among the respondent teachers, 72.1% were male and 27.9% female. The age distribution of the respondents is presented in Figure 1, which shows that the majority were in the 26–30 age group, followed by 36–40. Around 81% of the university's teachers are below 40 years of age.

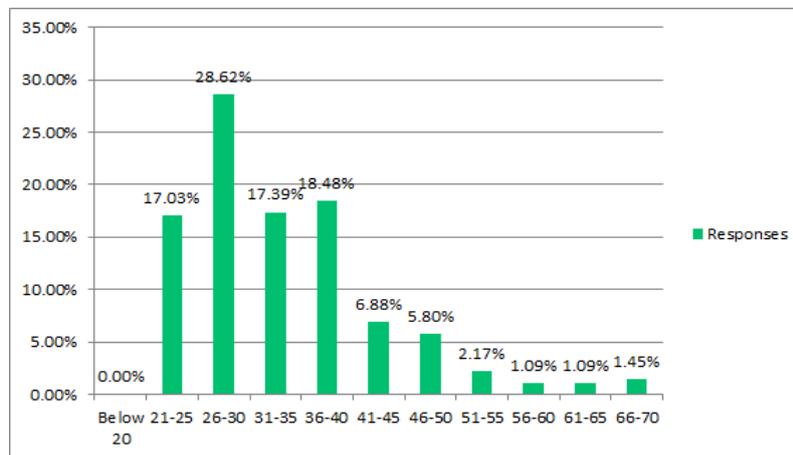


Figure 1. Age distribution of faculty members

3.1.2. Faculty positions and qualifications

Figure 2 shows that the largest proportion of the faculty are assistant professors (44.8%), followed by lecturers (35.02%), associate professors (10.47%), and professors (9.75%).

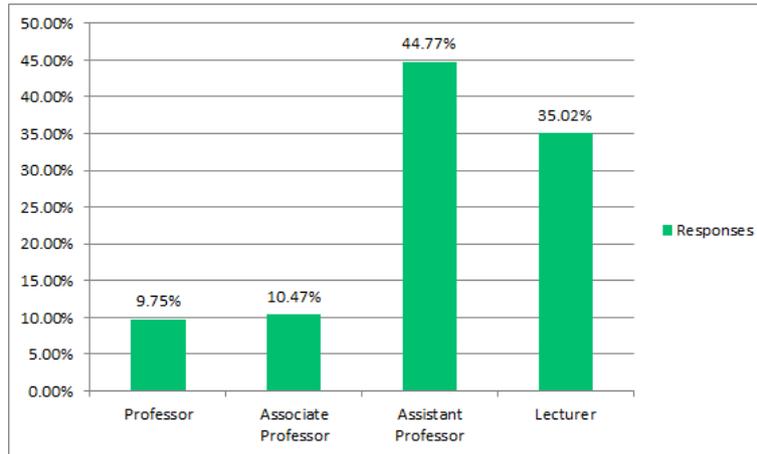


Figure 2. Positions of faculty members

Half (50.55%) of the teachers have master’s degrees (MA, MPhil or MTech), and nearly one-fifth (19.05%) have PhDs. This indicates that a majority of AUST’s teachers were involved in doing research after their graduation (Figure 3).

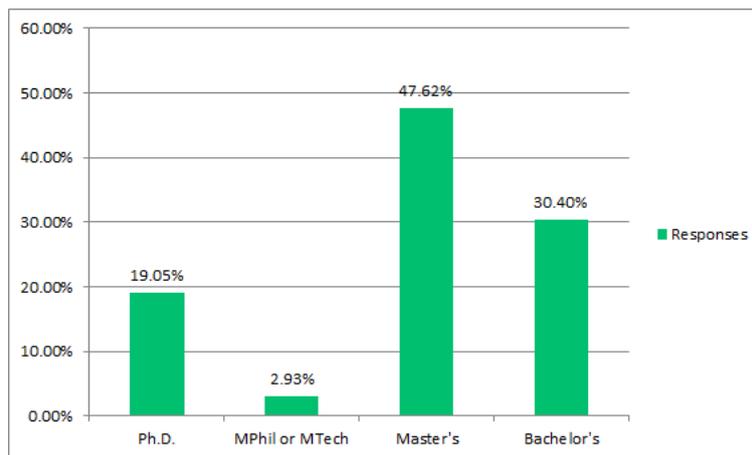


Figure 3. Highest qualification

3.1.3. Teaching level and experience

Figure 4 shows that the majority of faculty members are primarily involved in undergraduate teaching (92.75%), followed by graduate or postgraduate teaching (7.25%). As the university has no doctoral programme, no one is involved in supporting doctoral research.

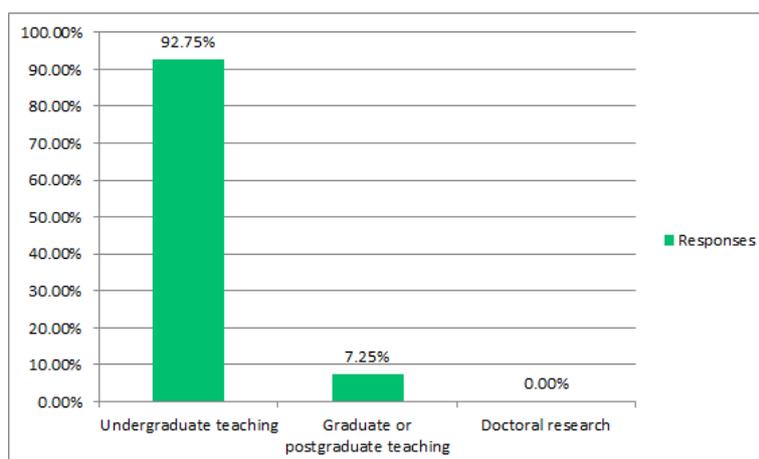


Figure 4. Teaching levels

The majority of the teachers (43.43%) have less than five years of experience, followed by 6–10 years (25.55%) and 11–15 years (20.44%; Figure 5). The mean years of experience of AUST’s teachers is 8.6 years.

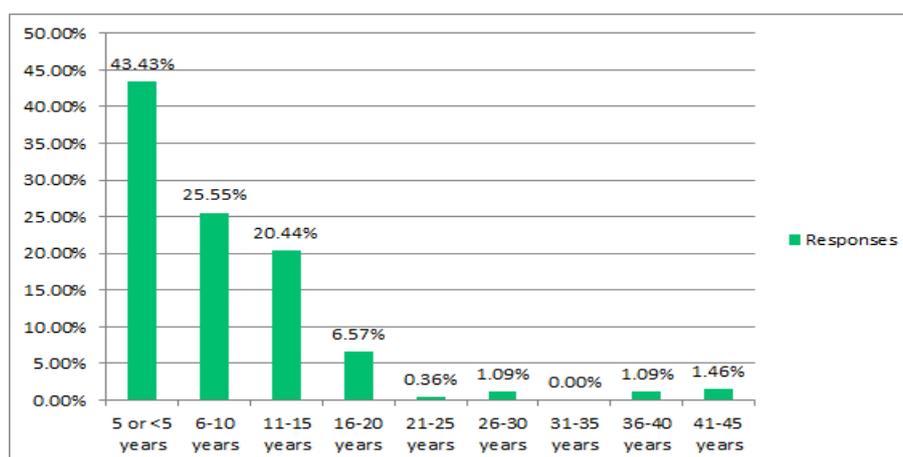


Figure 5. Teaching experience

Most of the respondents (84.36%) came from the engineering and technology field (Table 3.1), which clearly confirms that AUST is a technology-based university.

Table 3.1. Disciplines of the respondents

Discipline	Percentage
Humanities	1.45%
Social Sciences	1.45%
Commerce and Management	6.91%
Health and Medical Services	0.00%
Natural Sciences	5.82%
Engineering and Technology	84.36%
Agriculture and Natural Sciences	0.00%
Fine and Performing Arts	0.00%

3.2. Access to and Use of ICT

3.2.1. Ownership of and access to ICT devices

Most teachers have access to electronic devices, with the majority having smartphones and laptops (around 99% and 97%, respectively). Around 75% own desktop computers, and nearly 41% own tablet devices (Figure 6).

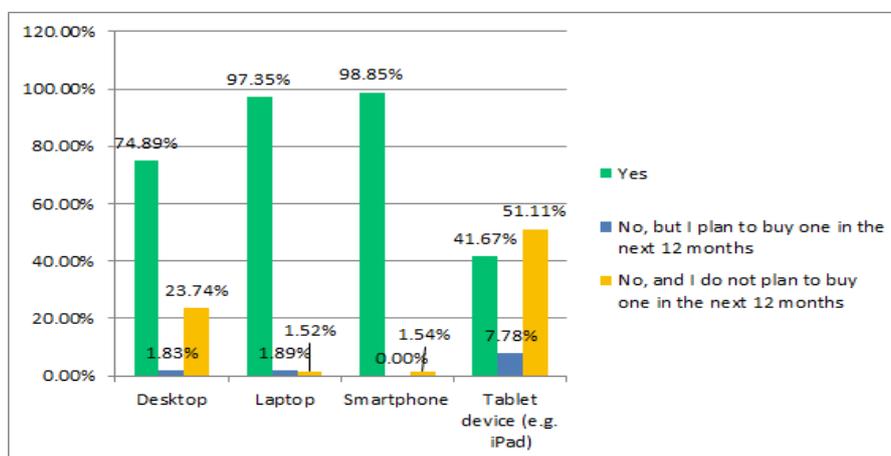


Figure 6. Ownership of devices

Further inquiry revealed that the majority of the devices used by the faculty members, such as laptops, smartphones and tablet devices, are personally owned; desktop computers are provided by AUST to almost 82.41% of the total faculty members (Table 3.2).

Table 3.2. Access to electronic devices

Devices	Provided by the university	Use personal device in the university
Desktop computer	82.41%	9.72%
Laptop	13.12%	86.43%
Smartphone	5.69%	89.10%
Tablet device (e.g., iPad)	1.98%	62.38%

3.2.2. Internet access

Most of the teachers (96.70%) indicated that they have access to the Internet from their office at the university; 95.60% also have access at home. A few (2.9%) use cybercafés (Figure 7).

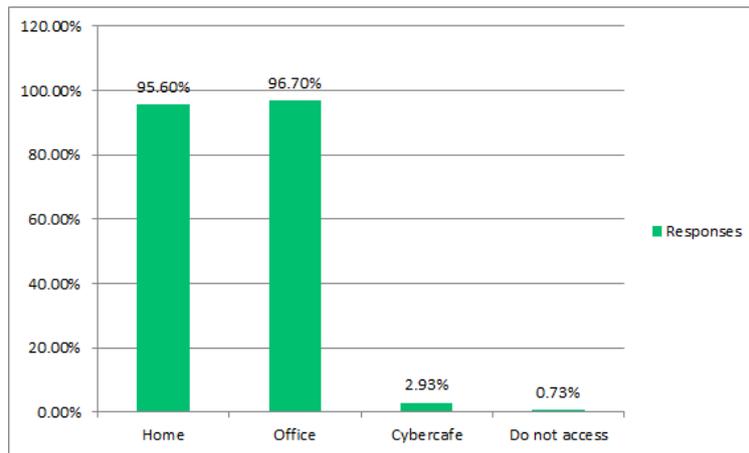


Figure 7. Internet access

The most commonly used medium to access the Internet is Wi-Fi (87.78%), which is provided by the university, followed by mobile devices (80%). Dial-up, ADSL connection and leased line are used by 21.1%, 15.6% and 12.6%, respectively (Figure 8).

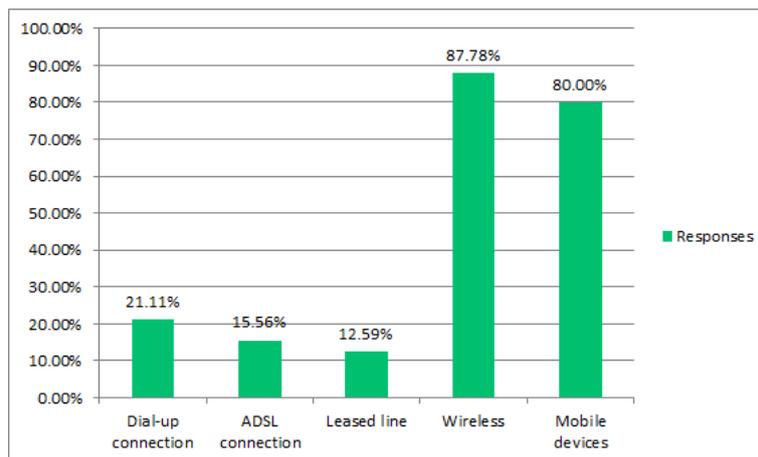


Figure 8. Medium used to access the Internet

Inquiry into what devices faculty members use frequently to access the Internet indicated that the majority of teachers use smartphones (56.04%), followed by laptops (25.64%) and desktop computers (16.85%), with the fewest accessing it through tablets (Figure 9).

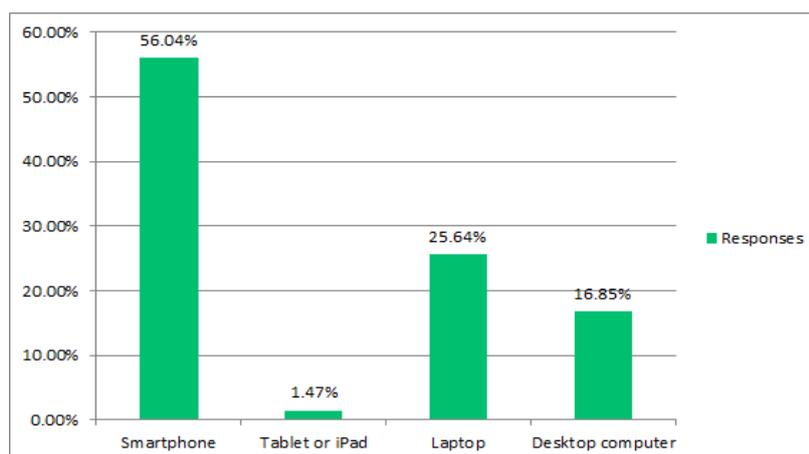


Figure 9. Devices for accessing the Internet

At AUST, faculty mostly accesses the Internet in faculty rooms/offices (98.48%), followed by 22.05% in laboratories, as shown in Table 3.3.

Table 3.3. Places faculty access broadband Internet

Answer choices	Responses
Classrooms	7.60%
Library	9.13%
Hostels	1.14%
Faculty rooms	98.48%
Laboratories	22.05%
Reception lounge	2.28%
Seminar halls	7.22%
Students' common rooms	2.28%
Open areas	4.18%

Faculty members were asked whether the institution has wireless Internet connectivity; 73.33% acknowledged having wireless Internet connectivity on campus, while 26.67% did not. While the 26.6% negative response is quite surprising, the rate of Internet usage at AUST is very high, with 96.31% of faculty using it daily (Figure 10). This is reasonable evidence of faculty being ready to use TEL in their classrooms for teaching if some guidance and support are provided.

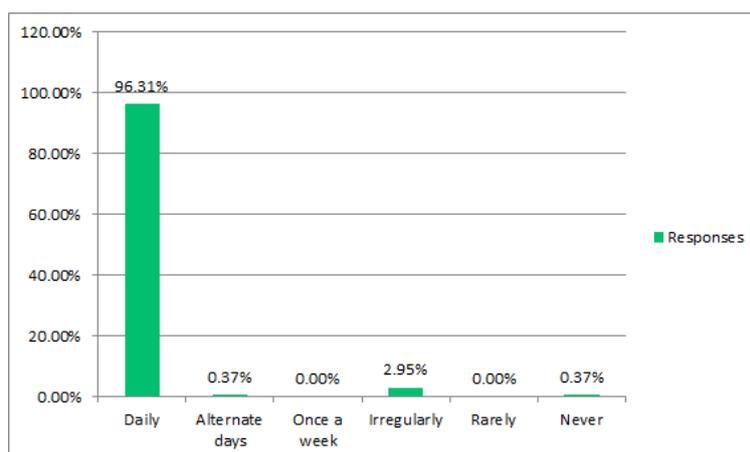


Figure 10. Frequency of Internet use

3.2.3. Computer-related skills

Successful implementation of TEL depends on proficiency in computer-related skills. All the participants were asked to rate their comfort level on a Likert scale, where 1 = non-user, 2 = basic user, 3 = intermediate user, 4 = advanced user, and 5 = expert user. Table 3.4 indicates that the majority of the teachers are advanced users and can provide training in word processing, spreadsheets, presentation software, and email, with a mean of 4.22 for the weighted averages. This is a promising sign in terms of implementing TEL. The number of skilled teachers decreases gradually in the areas of Web 2.0 tools, databases, multimedia authoring, graphic editing, video and audio editing, webpage design and LMS. These are the areas where faculties at AUST require further training to effectively use TEL.

Table 3.4. Proficiency of faculty in computer-related activities

Activity	Expert user	Advanced user	Intermediate user	Basic user	Non-user (N/A)	Weighted average
Word processor (e.g., Word)	20.88%	48.35%	26.01%	4.40%	0.37%	4.33
Spreadsheets (e.g., Excel)	11.68%	43.80%	26.64%	15.69%	2.19%	3.91
Presentation (e.g., PowerPoint)	18.75%	44.85%	28.31%	7.72%	0.37%	4.19
Email	24.91%	50.55%	17.95%	6.23%	0.37%	4.44
Databases	4.98%	18.39%	24.14%	21.46%	31.03%	2.63
Multimedia authoring	4.71%	16.08%	22.75%	24.71%	31.76%	2.53
Graphic editing	2.71%	13.95%	17.05%	15.50%	50.78%	2.16
Digital audio	0.79%	9.06%	13.78%	22.83%	53.54%	1.9
Video editing	1.19%	7.11%	15.42%	20.16%	56.13%	1.84
Webpage design	2.40%	6.40%	9.20%	14.40%	67.60%	1.68
LMS	2.77%	10.28%	13.04%	15.81%	58.10%	1.94

Web 2.0 tools (wikis, blogs, social networking)	7.03%	18.75%	25.00%	19.92%	29.30%	2.73
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3.2.4. Use of social media

Inquiry about social media accounts revealed that 94.89% of faculty members have accounts with social media platforms. Of those with accounts, almost all (94.34%) have a profile with Facebook, 46.04% with Google+, 31.7% with photo-sharing sites, 26.04% with SlideShare or a similar presentation platform, 21.13% with Twitter, 12.83% with social bookmarking sites, 7.55% with goodreads.com and 5.66% with blogs. It is very impressive to note that 60.38% have accounts with research-sharing websites (Table 3.5).

Table 3.5. Social media accounts held by faculty members

Answer choices	Responses
Facebook	94.34%
Twitter	21.13%
Google+	46.04%
Blog (using Blogger or WordPress or within institutional website/CMS)	5.66%
SlideShare or a similar presentation platform	26.04%
Photo-sharing (Instagram/Flickr/Picasa Web, etc.)	31.70%
Research-sharing site (Academic.edu, Researchgate.net, etc.)	60.38%
Social bookmarking sites (Delicious, Scoop.it, Pinterest, etc.)	12.83%
Goodreads.com (for connecting with authors and readers) or similar	7.55%

Frequency of social media status updates

When we asked how frequently faculty updated their social media profiles, the majority (63.16%) update not very frequently, while just 15.41% do so once a week, as shown in Figure 11. However, their social media presence is very high, at 94.89%. In contrast, their social media activity levels are relatively low, so there is a need for further investigation into the potential use of social media in teaching and learning activities.

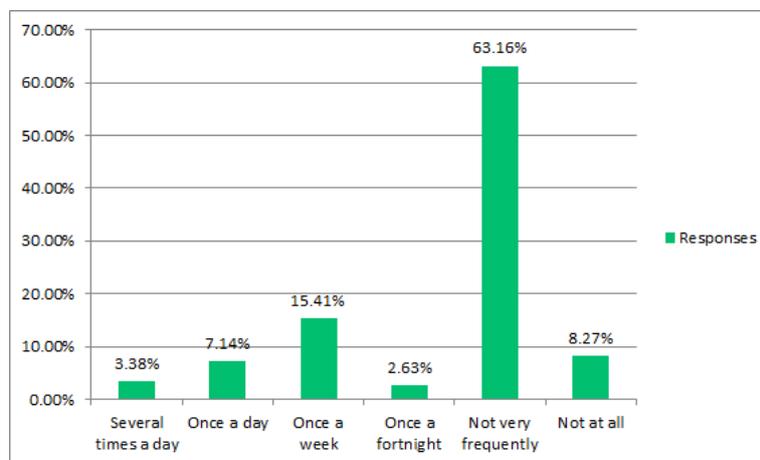


Figure 11. Frequency of status updates on social media

3.2.5. Mailing lists and discussion forums

We asked about teachers' membership in mailing lists and discussion forums: 44.03% of respondents confirmed subscription to discussion forums, while 55.97% are not members of any forum. Of those who are members, 128 subscribe to between one and five email-based discussion forums, and only 15 subscribe to more than five (Table 3.6). It must be noted that 128 teachers did not answer this question, which may have been due to their uncertainty about what mailing lists and discussion forums are. Only 24 respondents indicated they are either a moderator or a manager of a discussion forum (Table 3.6). Those who claimed membership in discussion forums indicated very little engagement in terms of posting to these forums: 134 indicated they do not post very frequently, followed by 16 once a week, nine once a day, two once a fortnight and only one several times a day (Table 3.6). Therefore, it can be safely concluded that the use of mailing lists and discussion forums is very limited amongst the teachers at AUST. In order to move forward, it would be useful to provide training on the use and facilitation of discussion forums for teaching and learning.

Table 3.6. Subscription to email-based discussion forums

Number of discussion forums	Responses	
1–5	90.07%	136
More than 5	9.93%	15
Moderator of email-based discussion forum		
Yes	13.95%	24
No	86.05%	148
Frequency of posting to discussion forums or mailing lists		
Several times a day	0.62%	1
Once a day	5.56%	9
Once a week	9.88%	16
Once a fortnight	1.23%	2
Not very frequently	82.72%	134

3.2.6. Experiences of ICT resources and services provided by AUST

Table 3.7 presents data on teachers' experiences with the resources/services/spaces provided by AUST. Respondents found the resources, services and facilities mostly either "good" or "fair." However, TEL-related resources or facilities are mostly missing or insufficient at the institutional level, pointing to areas for future improvement. Many of the services/facilities, such as LMSs, e-portfolios, etc., are not available at AUST and therefore are not included in these results.

Table 3.7. Experiences of ICT resources and services provided by AUST

Resource/Service	Poor	Fair	Neutral	Good	Excellent	Not available	Total	Weighted average
e-classroom facilities (e.g., computers, projection systems, lecture capture)	41	64	51	86	13	16	271	2.7

Resource/Service	Poor	Fair	Neutral	Good	Excellent	Not available	Total	Weighted average
systems, SMART boards, etc.)								
Computer labs (for practical and Internet access)	35	56	34	98	31	11	265	3
Email services (institutional)	43	58	48	94	22	7	272	2.9
Network bandwidth/speed of Internet (download and upload)	37	57	38	97	24	13	266	2.91
Wi-Fi access	50	64	31	88	18	18	269	2.65
Online or virtual technologies (e.g., network or cloud-based file storage systems, Web portals, etc.)	69	37	34	36	2	83	261	1.53
Access to software (e.g., MATLAB, GIS applications, statistical software, qualitative data analysis, graphics software, textual or image analysis programs, etc.)	70	39	34	57	13	52	265	2.05
Download and use of free and open-source software for teaching and learning	40	53	50	53	16	55	267	2.2
Support for maintenance and repair of ICT	49	80	42	71	10	14	266	2.52

3.3. Use of ICT for Teaching and Learning

In the study, we covered how teachers were currently using ICT in their teaching and learning.

3.3.1. Use and creation of digital content for teaching

We asked about the nature of the teaching used by the faculty members of AUST. The large majority (90.81%) use the traditional face-to-face method, with only 20.96% using the blended mode. It must be noted that no respondents use online as their only mode of teaching. This suggests an ideal situation to promote and strengthen the use of TEL. A substantial effort may be needed to change faculty perceptions about preparing and delivering lectures so that they will shift from traditional face-to-face to online or blended methods. However, it is also important to determine how the term “blended” was perceived by 20% of the respondents. If these teachers are already using some form of web technologies freely available online, such as Google Classroom, then AUST has some champions for using TEL more effectively, which would help institutionalise the current project.

Frequency of using digital resources/platforms in teaching

Faculty members were asked to indicate how often they use digital resources and platforms in their teaching. Frequency was rated on a Likert scale from 1 to 5, with 1 = never, 2 = rarely, 3 = sometimes, 4 = often and 5 = always. Hence, 3 was the natural mid-point. Individual responses are presented in Table 3.8, showing a mean weighted average of 2.59. Inspection of individual weighted average responses indicates that the teachers often use images, Word files, presentations, open textbooks, and research papers. This indicates that the TEL environment needs to be improved by training faculty members on the use of digital resources and platforms that scored below average: blogs, microblogging, social bookmarking, simulations, audio recording, and digital video. Most importantly, use of the LMS was low in comparison to the other resources. Proficiency with an LMS is very important for successful TEL implementation at AUST, so this matter will need to be addressed.

Table 3.8. Use of digital resources/platforms in teaching

Resource	Always	Often	Sometimes	Rarely	Never	Total	Weighted average
Images (pictures, photographs, including from the Web)	28.78%	35.06%	25.83%	7.75%	2.58%	271	3.8
Presentations (e.g., PowerPoint, including from the online sources)	34.20%	29.37%	23.05%	11.52%	1.86%	269	3.83
Word files (activity sheets/handouts/notes)	35.19%	31.11%	24.81%	6.67%	2.22%	270	3.9
Digital films/video (e.g., YouTube)	4.55%	18.56%	31.82%	26.14%	18.94%	264	2.64
Audio recordings	2.29%	5.73%	12.21%	27.48%	52.29%	262	1.78
Simulations and 2D/3D animation	4.96%	11.83%	27.86%	18.32%	37.02%	262	2.29
LMS	3.14%	9.80%	14.51%	21.18%	51.37%	255	1.92
Blogs	1.16%	2.71%	7.75%	18.60%	69.77%	258	1.47
Social bookmarking	0.39%	4.67%	11.67%	19.07%	64.20%	257	1.58
Microblogging (Twitter, Facebook, etc.)	1.56%	5.86%	10.55%	17.58%	64.45%	256	1.63
Open textbooks	24.81%	24.06%	24.06%	13.16%	13.91%	266	3.33
Open access research papers	8.30%	20.75%	34.34%	22.64%	13.96%	265	2.87
Mean weighted average							2.59

Creating and sharing teaching and learning materials

Experience in creating and sharing materials related to teaching and learning is an important indicator of teachers' level of expertise. Members of the faculty at AUST were asked to evaluate themselves on their level of experience and expertise in creating and sharing teaching and learning materials for a number of resources, using a Likert scale where 1 = never, 2 = yes but not shared with others, 3 = yes and shared through an open licence. The mean weighted average of the responses is 1.71 (where 2 is the midpoint), indicating that a significant number of faculty members had created teaching and learning resources using images, PowerPoint and Word, but not all of them had shared the resources with others (Figure 12). It is very important to note that the majority of faculty members had never used digital film/video, audio, simulations, LMS, course packs or blogs to create teaching and learning materials.

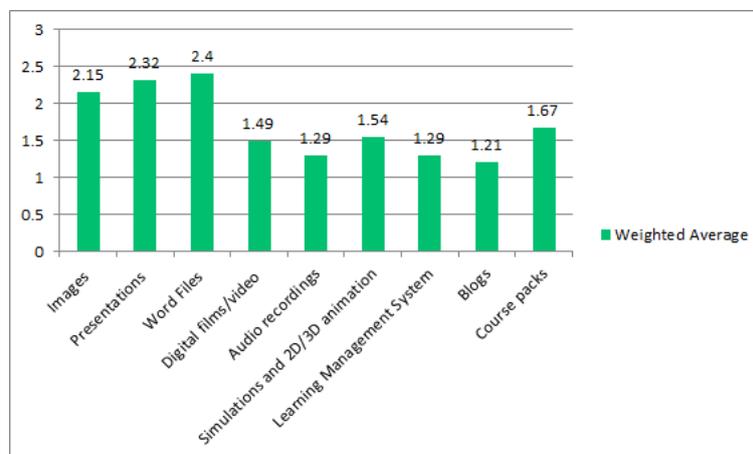


Figure 12. Creating and sharing teaching and learning resources

Frequency of use of OER in teaching and learning

OER — free, accessible resources used in teaching, learning, assessment and research — are very important for TEL implementation. When we inquired about teachers' awareness of OER, nearly 55% indicated they were aware, while 45% were unaware. The frequency of their use of OER in teaching and learning was determined by asking how often they used a series of resources, rated using a Likert scale where 1 = never, 2 = rarely, 3 = sometimes, 4 = often and 5 = always. The mean weighted average of all the responses is 1.55, signifying that the faculty members never or rarely use OER (Table 3.9).

3.3.2. Integration of technologies in teaching and learning

The integration of technology into teaching and learning is crucial for the success of TEL. The Commonwealth regional consultations in OER (Commonwealth of Learning, 2017) pointed out the lack of capacity to integrate TEL into institutions as being a major challenge to implement TEL effectively.

Teachers were asked to rate themselves on a range of relevant skills using a Likert scale, with responses coded as 1 = can't use it, 2 = can use it to a small extent, 3 = can use it satisfactorily, 4 = can use it well and 5 = can use it very well; 3 was the natural midpoint. The responses reveal that faculty members at AUST are not comfortable with the ICT skills needed for teaching and learning. Table 3.10 displays a mean weighted average of 1.36, which implies a need to train faculty members on the use of technologies in teaching and learning.

Table 3.9. Frequency of using OER in teaching and learning

Resource	Always	Often	Sometimes	Rarely	Never	Total	Weighted average
OER Commons	1.71%	4.70%	8.97%	11.11%	73.50%	234	1.5
Saylor Academy	0.87%	3.06%	2.18%	10.04%	83.84%	229	1.27
WikiEducator	2.58%	6.87%	9.87%	11.59%	69.10%	233	1.62
OpenStax College	0.44%	2.20%	2.20%	9.69%	85.46%	227	1.22
BCcampus Open Textbooks	0.44%	2.65%	3.10%	9.73%	84.07%	226	1.26
NPTEL, India	5.60%	13.36%	8.62%	9.48%	62.93%	232	1.89
MIT Open Courseware	5.13%	13.25%	13.68%	11.11%	56.84%	234	1.99
OpenLearn, UK	1.34%	4.91%	3.57%	8.04%	82.14%	224	1.35
College Open Textbooks	1.75%	4.37%	6.99%	8.30%	78.60%	229	1.42
Directory of Open Access Journals	4.74%	15.52%	13.36%	9.91%	56.47%	232	2.02
Directory of Open Access Books	4.35%	11.30%	13.04%	10.00%	61.30%	230	1.87
MERLOT	0.44%	1.31%	3.06%	7.42%	87.77%	229	1.19
Mean weighted average							1.55

Table 3.10. Integration of technologies in teaching and learning

Technology	I can't use it	I can use it to a small extent	I can use it satisfactorily	I can use it well	I can use it very well	Total	Weighted average
LMS (e.g., Moodle)	57.25%	17.65%	10.98%	8.63%	5.49%	255	0.87
Online collaboration tools (e.g., Adobe Connect, Google Docs)	21.09%	19.92%	28.52%	17.97%	12.50%	256	1.81
e-Portfolio	56.69%	18.50%	15.35%	5.91%	3.54%	254	0.81
e-Books/e-Textbooks	14.62%	19.62%	29.62%	21.54%	14.62%	260	2.02
Online video/audio	19.77%	17.44%	23.26%	24.03%	15.50%	258	1.98
Educational games/simulations	37.55%	23.72%	17.79%	12.25%	8.70%	253	1.31
Lecture capture tools	39.68%	18.25%	21.43%	12.30%	8.33%	252	1.31

Accessible tools (for people with disabilities)	71.37%	12.86%	10.37%	3.73%	1.66%	241	0.51
Social media (blogs, wikis, etc.)	24.71%	24.71%	24.31%	17.25%	9.02%	255	1.61
Mean weighted average							1.36

3.3.3. Training and staff development

We asked the teachers at AUST whether they had received training on the use of ICT for teaching and learning. The large majority of respondents (93.33%) had not. The survey results also show that over 88% responded that AUST does not provide regular training in the use of new technologies for teaching and learning.

During the survey, teachers were asked whether they had ever participated in any online training. The survey results reveal that most of the respondents (81.92%) had not participated in any form of online training.

3.3.4. Attendance in MOOCs

Attending massive open online courses (MOOCs) provides insights into how technology can be used in teaching and learning. The majority of the teachers (86.47%) had not attended any MOOCs. Furthermore, 63.08% of the faculty members were not aware of any of the listed MOOC platforms (Table 3.11). Among the faculty members, 24.62% were aware of Coursera, 17.69% of EdX and 11.92% of Udacity. Hence, there is a need to expose the AUST faculty to emerging MOOCs.

Table 3.11. Awareness of MOOC platforms

Answer choices	Responses	Number
Coursera	24.62%	64
Udacity	11.92%	31
EdX	17.69%	46
iVersity	1.15%	3
FutureLearn	7.31%	19
None	63.08%	164

3.3.5. Knowledge of policy issues related to TEL at AUST

The survey collected information on teachers' knowledge of TEL policy-related issues, with possible responses of 0 = do not know, 1 = no and 2 = yes, as presented in Table 3.12. The teachers possessed no knowledge of most of the issues provided, as indicated by the mean weighted average score of 0.52. In ideal circumstances, the responses to these questions should be mostly yes or no; the actual results indicate that the faculties do not know whether policies presently exist or not. Therefore, there is a need to create awareness of policy issues at AUST among the faculty members.

Table 3.12. Knowledge of policy issues related to TEL at AUST

Question	Yes	No	Do not know	Weighted average
Is there a policy for ICT use in teaching and learning in your university/institution?	13.21%	16.23%	70.57%	0.46
Is there a strategy for TEL in your university/institution?	15.85%	18.87%	65.28%	0.54
Is there an ICT policy in your university/institution covering what technologies to use and not use for teaching and learning?	11.15%	16.92%	71.92%	0.45
Is there a privacy and data protection policy in your university/institution?	22.22%	13.79%	63.98%	0.5
Is there a policy on dealing with plagiarism in your university/institution?	14.29%	23.94%	61.78%	0.62
Is there a policy for the use of open-source software in your university/institution?	16.92%	20.77%	62.31%	0.58
Is there a system in place for the use of open-source software in your university/institution?	14.23%	23.46%	62.31%	0.61
Is there a workflow and escalation procedure for the repair and maintenance of ICT in your university/institution?	21.62%	12.36%	66.02%	0.46
Mean weighted average				0.52

3.4. Use of ICT for Research and Scholarship

3.4.1. Access to e-Library resources at AUST

As presented in Figure 13, just over 41% indicated that the library provides access to subscription-based e-resources, followed by almost 34% who said they did not know about these subscriptions and almost 25% who had no access at all to the e-resources. Hence, there is a need to create awareness about the availability of subscription-based e-resources to all faculty members at AUST.

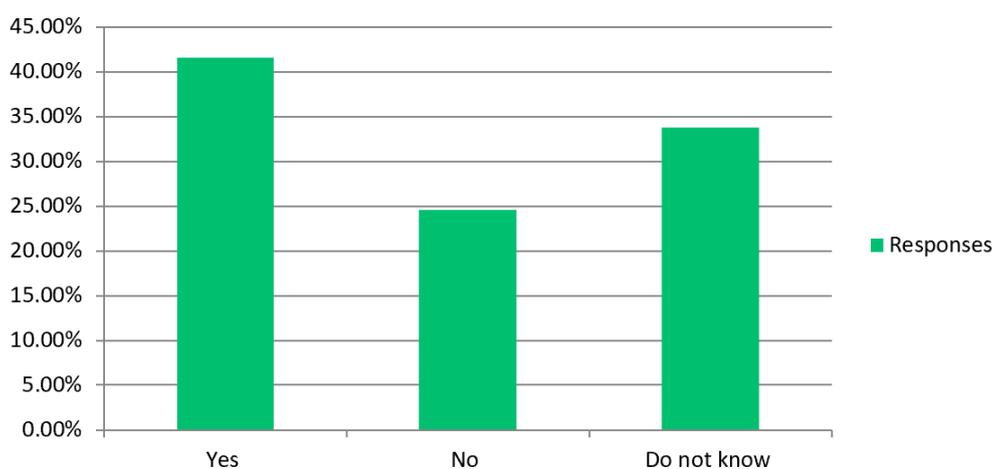


Figure 13. Availability of subscription-based resources at the library

3.4.2. Accessing library resources for teaching and learning

The survey also collected responses on the kinds of resources regularly accessed by faculty members of AUST for teaching and learning, as shown in Table 3.13. Faculty responses were measured on a Likert scale from 1 to 5, where 1 = never, 2 = rarely, 3 = sometimes, 4 = often and 5 = always. The findings revealed that most of the respondents access library resources rarely or sometimes for teaching and learning, which was confirmed by the mean weighted average score of 2.44. It is very important to note that only 142 of the total participants responded to this question, whereas 137 skipped it. The large number of missing values affected the numerical outcomes.

Table 3.13. Frequency of accessing library resources

Resource	Always	Often	Sometimes	Rarely	Never	Total	Weighted average
e-Journals	22.54%	28.87%	28.87%	11.27%	8.45%	142	3.46
e-Books	16.30%	23.70%	24.44%	13.33%	22.22%	135	2.99
Citation databases	9.84%	13.11%	13.93%	14.75%	48.36%	122	2.21
e-Newspapers	17.56%	7.63%	12.98%	16.79%	45.04%	131	2.36
e-Theses and dissertations	11.63%	13.95%	20.16%	13.95%	40.31%	129	2.43
Patent databases	5.65%	7.26%	5.65%	20.97%	60.48%	124	1.77
e-Proceedings of conferences	10.00%	11.54%	21.54%	13.85%	43.08%	130	2.32
Statistical databases	6.25%	14.06%	10.16%	12.50%	57.03%	128	2
Mean weighted average							2.44

3.4.3. Availability of research support

The teachers' experiences with the resources/services/spaces provided by the institute to support research were measured on a Likert scale where 0 = not available, 1 = poor, 2 = fair, 3 = neutral, 4 = good and 5 = excellent. The responses ranged from poor to fair, confirmed by a mean weighted average of 1.23 (Table 3.14). As is typical in developing universities, covering the cost of licensing proprietary software, plagiarism-detection software, data visualisation software and reference management software is a challenge for AUST.

3.5. Perception of the Use of TEL

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

3.5.1. Attitudes toward TEL

Faculty members at AUST were asked to respond to a range of statements to assess their attitudes towards TEL, using a Likert scale with 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, and 5 = strongly agree (Table 3.15). The survey

revealed that teachers have a positive attitude towards the use of TEL, confirmed by a mean weighted average of 4.22. The mean responses for all items were well above average. This suggests that faculty are enthusiastic about using technology in teaching and learning and that a TEL implementation project will succeed.

Table 3.14. Rating of research support resources provided at AUST

Resource	Poor	Fair	Neutral	Good	Excellent	Not available	Weighted average
Access to data storage	19.46%	14.40%	15.18%	12.45%	1.95%	36.58%	1.53
Data visualisation software	21.60%	11.20%	12.40%	8.80%	1.20%	44.80%	1.22
Citation/reference-management software	23.11%	11.16%	12.35%	7.17%	1.20%	45.02%	1.17
Plagiarism-detection software	25.69%	7.11%	9.88%	3.95%	0.79%	52.57%	0.89
Institutional repository for sharing of research	20.87%	14.57%	12.60%	7.48%	2.36%	42.13%	1.3
Funds to support open-access publications	28.02%	11.67%	14.01%	8.56%	0.39%	37.35%	1.3
Mean weighted average							1.23

Table 3.15. Attitudes toward TEL

Statement	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Weighted average
TEL can solve many of our educational problems.	41.70%	47.97%	8.49%	0.74%	1.11%	4.28
TEL will bring new opportunities for organising teaching and learning.	45.93%	48.15%	4.81%	0.37%	0.74%	4.38
TEL saves time and effort for both teachers and students.	45.35%	44.24%	8.92%	1.12%	0.37%	4.33
TEL increases access to education and training.	43.66%	47.76%	7.46%	0.75%	0.37%	4.34
TEL increases my efficiency in teaching.	41.04%	43.28%	13.81%	1.12%	0.75%	4.23
TEL enables collaborative learning.	39.62%	46.42%	12.45%	1.13%	0.38%	4.24
TEL can engage learners more than other forms of learning.	32.45%	43.77%	20.00%	3.02%	0.75%	4.04
TEL increases the quality of teaching and learning because it integrates all forms of media: print, audio, video and animation.	39.55%	49.63%	8.58%	1.87%	0.37%	4.26

Statement	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Weighted average
TEL increases the flexibility of teaching and learning.	36.09%	45.86%	13.91%	3.76%	0.38%	4.14
TEL improves communication between students and teachers.	37.83%	46.44%	11.24%	4.12%	0.37%	4.17
TEL enhances the pedagogic value of a course.	30.30%	43.18%	23.11%	2.65%	0.76%	4
Universities should adopt more and more TEL for the benefit of their students.	46.44%	41.57%	10.49%	0.37%	1.12%	4.32
Mean weighted average						4.22

3.5.2. Motivations for using TEL

Faculty members at AUST were presented with a number of motivators for using TEL and asked to rate them on a Likert scale where 1 = very weak motivator, 2 = weak motivator, 3 = average motivator, 4 = strong motivator and 5 = very strong motivator. The mean weighted average of the responses was 3.92, which is a very encouraging finding, as it shows teachers at AUST are highly motivated to integrate TEL into their teaching and learning (Table 3.16). These factors should therefore receive close attention during the implementation period.

Table 3.16. Motivations for using TEL

Motivator	Very strong motivator	Strong motivator	Average motivator	Weak motivator	Very weak motivator	Weighted average
Personal interest in using technology	38.26%	39.39%	18.94%	2.65%	0.76%	4.12
Intellectual challenge	21.46%	40.23%	33.72%	3.07%	1.53%	3.77
Self-gratification	24.41%	39.76%	30.71%	3.54%	1.57%	3.82
Training on TEL	29.46%	36.82%	25.58%	4.26%	3.88%	3.84
Better Internet bandwidth at workplace	40.61%	34.48%	18.39%	3.45%	3.07%	4.06
Credit towards promotion	28.29%	37.21%	24.42%	4.26%	5.81%	3.78
Professional incentives to use TEL	33.98%	34.36%	21.62%	4.63%	5.41%	3.87
Technical support	36.26%	37.79%	18.70%	4.58%	2.67%	4
Peer recognition, prestige and status	30.35%	34.24%	27.24%	5.06%	3.11%	3.84
Improved infrastructure (hardware and software) deployment	40.93%	32.43%	20.46%	3.86%	2.32%	4.06
Release time/ Reduction in existing workload	40.93%	30.50%	20.46%	4.25%	3.86%	4
To be a trendsetter by early adoption of technology in education	27.63%	36.19%	27.63%	6.61%	1.95%	3.81
Mean weighted average						3.92

3.5.3. Barriers to using TEL

We surveyed faculty on barriers to TEL, using a Likert scale where 1 = very weak barrier, 2 = weak barrier, 3 = average barrier, 4 = strong barrier and 5 = very strong barrier. In general, the survey results indicate that most of the teachers are strongly affected by barriers to the use of TEL, as highlighted by the weighted average mean score of 3.73. Table 3.17 reveals four strong barriers to TEL implementation at AUST: lack of training on TEL, lack of technical support in the university, lack of an institutional policy for TEL, and inadequate availability of hardware and software. However, other barriers are also significant, as indicated by the weighted average scores (>3, as 3 is the natural midpoint), so these will need to be removed if TEL implementation is to succeed.

Table 3.17. Barriers to using TEL

Barrier	Very strong barrier	Strong barrier	Average barrier	Weak barrier	Very weak barrier	Weighted average
Concern about faculty workload	38.20%	29.21%	24.72%	4.12%	3.75%	3.94
Concern about students' access to technology	22.61%	33.72%	26.05%	12.26%	5.36%	3.56
Lack of training on TEL	37.22%	43.23%	15.04%	3.01%	1.50%	4.12
Lack of technical support in the university	42.64%	35.09%	18.49%	2.64%	1.13%	4.15
Lack of institutional policy for TEL	34.10%	39.85%	19.92%	4.21%	1.92%	4
Lack of professional prestige	16.34%	27.24%	35.41%	12.06%	8.95%	3.3
Concern about the quality of e-courses	15.89%	34.11%	36.43%	7.36%	6.20%	3.46
Lack of incentives to use TEL	32.17%	31.40%	26.36%	4.65%	5.43%	3.8
Lack of credit towards promotion	28.57%	25.10%	30.50%	8.88%	6.95%	3.59
Intimidated by technology	13.89%	24.60%	36.90%	12.70%	11.90%	3.16
Concern about security issues on the Internet	20.16%	23.26%	35.66%	12.02%	8.91%	3.34
Inadequate availability of hardware and software	36.72%	38.67%	16.41%	5.08%	3.13%	4.01
Poor Internet access and networking in the university	36.43%	29.84%	20.93%	6.98%	5.81%	3.84
Lack of time to develop e-courses	35.77%	30.00%	22.69%	9.62%	1.92%	3.88
Lack of instructional design support for TEL	35.83%	32.28%	23.62%	5.51%	2.76%	3.93
No role models to follow	26.27%	25.49%	30.98%	11.37%	5.88%	3.55
Mean weighted average						3.73

3.6. Open-Ended Question

In the questionnaire, the last question asked respondents to respond to the statement: "There is a need to develop a technology-enabled learning policy and strategy in your university." Almost 54% of the respondents provided an answer. Here are some of the recommendations and points they raised, which the university could take into consideration.

- “Each and every class should be furnished with online access system/high-speed Internet.”
- “It is suggested to equip USB or HDMI facility in the classroom so that state-of-the-art technological facilities can be used.”
- “TEL is not the future — it is the present. Hope we will build the necessary infrastructure to implement this effectively and efficiently.”
- “I agree with this statement. I feel [the] need to incorporate better hardware support and Wi-Fi support at the classroom to facilitate teaching.”
- “Computer facilities are not sufficient for faculties, lab quality is very much poor to access and use open source to improve teaching quality.”
- “We can get along with the world if we can access technology-enabled learning. Thanks a lot for your kind cooperation.”
- “Technology-enabled learning increases the quality of teaching and learning and also improves communication between students and teachers, so focus should be given to implement the technique on teaching.”
- “I think AUST can take necessary initiative to implement the TEL as a trial basis first. After that, if a positive result is found without any barrier may attempt to implement it finally.”
- “As we sail through the 21st century, technology in the classroom is becoming more and more predominant. Tablets are replacing our textbooks, and we can research just about anything that we want to on our smartphones. Social media has become commonplace, and the way we use technology has completely transformed the way we live or lives.”
- “With the advancement of technology it is obvious that we should also develop ourselves and the students to cope with the upcoming challenges and hence it is quite necessary to introduce technology-enabled learning policies.”
- “Research-based education should be encouraged by arranging seminar, workshop, symposium and as well as funding for research.”
- “I strongly believe that technology-enabled learning will surely help to raise the standard of education. The students will learn more through various illustrative explanations.”
- “The institutional mailing services are really needed to be taken care of. There are lots of hassles associated with this particular service. Including some blended courses with lecture capturing tool may benefit a lot number of students.”
- “Technology-enabled learning is badly needed nowadays for the betterment of both the teachers and students. TEL will definitely improve the quality of overall educational environment.”

- “There are many topics which are hard to teach without visual demonstration. It can be from a simple figure to complex simulation. The classroom should be designed as such there is smooth transition from blackboard to multimedia content.”
- “In my opinion it’s a noble concern for enhancing the technology-enabled learning. I'm sure this kind of feedbacks will come up with a good strategic plan to overcome current drawbacks.”

Chapter 4: Learners' Use of Technologies for Learning

4.1. Learners' Profile

4.1.1. Demographic profile

Almost all of the respondents (513, 97%) were undergraduate students; only seven were graduate or postgraduate students. Most of the learners were aged 21–25, of which 82% were female and 85% male. Overall, 39.77% of the respondents were female and 60.23% were male (Table 4.1).

Table 4.1. Age and education of the respondents

Age	Female	%	Male	%	Total	%
21–25	172	81.9	270	84.9	442	83.7
26–30	3	1.4	2	0.6	5	0.9
Below 20	35	16.7	46	14.5	81	15.3
Level of education						
Graduate or postgraduate	9	4.3	6	1.9	15	2.8
Undergraduate	201	95.7	312	98.1	513	97.2
Total	210	39.77	318	60.23	528	100.0

4.1.2. Subject and year of study

Table 4.2 shows that most the students, both male (91.8%) and female (88.6%), were students of engineering and technology; the remainder were students of commerce and management. Overall, students of engineering and technology accounted for 90.5% of the respondents. Year of education was more or less evenly distributed.

Table 4.2: Subject of study and year of schooling at the university by sex

Subject	Female	%	Male	%	Total	%
Commerce and management	24	11.4	26	8.2	50	9.5
Engineering and technology	186	88.6	292	91.8	478	90.5
Year						
Year 1	51	24.3	68	21.4	119	22.5
Year 2	55	26.2	77	24.2	132	25.0
Year 3	46	21.9	69	21.7	115	21.8
Year 4	58	27.6	104	32.7	162	30.7

4.1.3. Disability

A very small portion of the students (14) identified themselves as having some kind of disability. Among these, four identified as having physical and learning disabilities, five as having one or more learning disabilities, and five as having one or more physical disabilities (Table 4.3).

Table 4.3. Disability status of learners

Type of disability	Female	%	Male	%	Total	%
None	198	94.3	308	96.9	506	95.8
Prefer not to answer	5	2.4	3	0.9	8	1.5
Both physical and learning disabilities	2	1.0	2	0.6	4	0.8
One or more learning disabilities	4	1.9	1	0.3	5	0.9
One or more physical disabilities	1	0.5	4	1.3	5	0.9

4.2. Access to and Use of ICT

4.2.1. Ownership and use of ICT

Access to ICT devices

Almost all (99.0%) of the students have their own smartphone, 84.6% have a laptop computer, 76.4% have a desktop computer and 31.8% have either a tablet or an iPad (Table 4.4). It is important to note the 99% ownership of smartphones. This is something that, along with the high ownership of laptops and access to desktop computers, AUST should leverage to improve the quality of teaching and learning using ICT, including by promoting “bring your own device” initiatives.

Table 4.4. Ownership of ICT devices

Devices	Number	%
Desktop	266	76.4
Laptop	406	84.6
Smartphone	494	99.00
Tablet device (e.g., iPad)	84	31.8

Among those who don’t have a desktop computer, 3.8% plan to buy one in the next 12 months and 10.2% don’t; it is worth noting that students who have a laptop don’t need to buy a desktop computer. Three-quarters (76.5%) indicated they have access to a desktop computer at the university during schooling hours (Table 4.5).

Table 4.5. Ownership of and access to a desktop computer

Own desktop computer	Total	%
No, and I do not plan to buy one in the next 12 months	20	3.8
No, but I plan to buy one in the next 12 months	54	10.2
Yes, own desktop computer	406	76.9
Access to desktop computer at university		
No, my university does not allow me to use these	28	5.3
Yes, I use my personal device in the university	10	1.9
Yes, provided by the university	404	76.5

In terms of how frequently they use various devices (Table 4.6), 74.6% indicated they mostly use a smartphone, 16.3% a laptop and only 8.3% a desktop computer. A smartphone is both easy to carry and easy to use.

Table 4.6. Devices students use most frequently

Device	Number	%
Desktop computer	44	8.3
Laptop	86	16.3
Smartphone	394	74.6
Tablet or iPad	4	0.8
Total	528	100.0

4.2.2. Internet access

Almost all of the student respondents (98.1%) indicated they have an Internet connection at their own home and use it. When asked whether they use it outside their home, more than one-third (35.9%) said they use it at the university, 21.6% also use it at a university laboratory, and 7.8% use it at cybercafés (Table 4.7).

Table 4.7. Places where students access and use the Internet

Access to Internet connection	Number	%
Home	517	98.1
University	189	35.9
Laboratory	114	21.6
Cybercafés	41	7.8
Do not access	3	0.6

Which types of connection do learners use to access the Internet? Mostly (83.3%) they use a wireless connection, followed by 82.6% who use mobile data and 23.3% who use a dial-up connection. Notably, 95.6% of the students have a broadband connection at their home (Table 4.8).

Table 4.8. Type of Internet connections and places of connection

Connection	Total	%
Dial-up connection	123	23.3
ADSL connection	34	6.4
Leased line	13	2.5
Wireless	440	83.3
Mobile devices	436	82.6
Broadband connection location		
Home	505	95.6
Office	4	0.8
Cybercafé	27	5.1
Do not access	17	3.2

When asked about the broadband connection at the university, the majority (61.7%) indicated they have a broadband connection at a laboratory, whereas 15.7, 8.1, 6.8, 4.7

and 4.0% indicated a faculty room, classrooms, library, students' common rooms and seminar halls, respectively (Table 4.9).

Table 4.9. Access to broadband at the university

Places	Number	%
Classrooms	43	8.1
Faculty rooms	83	15.7
Seminar halls	21	4.0
Library	36	6.8
Laboratories	326	61.7
Students' common rooms	25	4.7
Hostels	21	4.0
Reception lounge	5	0.9
Open areas	36	6.8

Most of the students (82.4%) do not have access to a Wi-Fi connection, but 98.1% use the Internet daily (Table 4.10).

Table 4.10. Wi-Fi/wireless Internet connection and its use

Connection	Number	%
No	435	82.4
Yes	86	16.3
Frequency of using Wi-Fi/wireless Internet connection		
Daily	518	98.1
Irregularly	6	1.1
Never	1	0.2
Total	525	99.4

Students' use of the Internet varies from less than one hour to over five hours. About half of them spend three to five hours daily on the Internet, 24.2% use it for one to two hours, and 24.1% use it for more than five hours (Table 4.11).

Table 4.11. Time spent per day on Internet-related activities

Time spent per day	Total	%
< 1 hour	11	2.1
> 5 hours	127	24.1
1–2 hours	128	24.2
3–5 hours	258	48.9
Do not use daily	2	0.4
Total	526	99.6

4.2.3. Computer proficiency and IT skills

To be competitive in today’s world, AUST learners must have advanced ICT skills and be creative in their learning pursuits. The students were asked to self-assess regarding their ICT skills. Table 4.12 shows that most of the students can use word processing software, PowerPoint, email and search engines, as the average ratings for these were 2.47, 2.44, 3.5 and 3.12, respectively. It is important to note that AUST learners have basic ICT skills but lack advanced skills to make learning more engaging and interactive. This could in part be due to lack of ICT integration in the curriculum.

Table 4.12. ICT skills of learners

ICT skill	I can use it satisfactorily	I can use it to a small extent	I can use it very well	I can use it well	I can't use it	Weighted average
Word processor	24.47%	15.87%	21.80%	31.74%	6.1%	2.47
Spreadsheets	23.98%	24.95%	7.80%	20.66%	22.0%	1.66
PowerPoint	21.26%	18.77%	22.41%	31.03%	6.4%	2.44
Email	8.24%	3.64%	59.39%	27.59%	1.1%	3.4
Database	13.97%	22.55%	7.78%	11.58%	41.9%	1.16
Multimedia	13.11%	21.72%	4.51%	12.70%	44.3%	1.04
Graphic editing	9.49%	25.89%	3.56%	5.73%	53.0%	0.76
Digital audio	8.55%	23.42%	5.09%	8.15%	50.9%	0.85
Video editing	18.11%	31.89%	4.33%	9.25%	35.0%	1.13
Webpage design	9.64%	25.10%	2.41%	4.82%	54.7%	0.68
LMS (e.g., Moodle)	10.82%	16.83%	4.21%	5.41%	59.3%	0.72
Web 2.0 tools (wikis, blogs, social networking)	17.03%	15.05%	23.76%	19.41%	23.7%	2.02
Search engines	9.09%	4.64%	57.45%	19.92%	8.7%	3.12

4.2.4. Social media use

AUST learners use social media extensively, and almost all have an account with different social media providers. Table 4.13 shows that Facebook is used by 98.7% of the student respondents. A quarter of them also use research-sharing sites (24.8%). Can the active use of social media be harnessed for educational purposes at AUST?

Table 4.13. Accounts with social media platforms

Platform	Number	%
Face book	521	98.7
Twitter	170	32.2
Google+	352	66.7
Blog (using Blogger or WordPress or within institutional website or content management system)	61	11.6

SlideShare or similar presentation platform	122	23.1
Photo sharing (Instagram/Flicker/Picasa Web, etc.)	345	65.3
Research-sharing site (Academic.edu, Researchgate.net, etc.)	131	24.8
Social bookmarking sites (Delicious, Scoop.It, Pinterest, etc.)	162	30.7
Goodreads.com (for connecting with authors and readers) or similar	78	14.8

Only 3.2% do not update their social media status; of the remaining respondents, 50% don't update frequently, 25.4% update once a week, 10.4% update every day and 7.6% update several times in day. On average, the largest proportion spends one to two hours on social media per day (41.7%), followed by three to five hours (35.6%), more than five hours (11.2%) and less than one hour (10.4%; see Table 4.14).

Table 4.14. Frequency of social media updates and average use

Frequency of update	Total	%
Not at all	17	3.2
Not very frequently	262	49.6
Once a day	55	10.4
Once a fortnight	16	3.0
Once a week	134	25.4
Several times a day	40	7.6
Average time spent on social media per day		
< 1 hour	55	10.4
> 5 hours	59	11.2
1–2 hours	220	41.7
3–5 hours	188	35.6
Do not use daily	3	0.6

4.2.5. Access to online discussion forums

Around half of the students are members of various online mailing lists or discussion forums (58.1%). The majority of them do not use such forums frequently (Table 4.15). In order to improve student–student discussions and student–teacher interactions beyond the classroom, it is important to make use of asynchronous discussion forums in teaching and learning. Since over 50% of the students are already using some form of mailing list and/or discussion forum, this presents a great opportunity for AUST to make use of technology to foster a collaborative and discussion-oriented knowledge-creation environment.

Table 4.15. Membership and use of different IT-based forums

Forum types	No.	%
Mailing list or discussion forum	307	58.1
Email-based forum	291	55.1
Moderated discussion forum or mailing list	237	44.9
Frequency of posting to discussion forums/ mailing lists		
Not very frequently	220	41.7

Once a day	13	2.5
Once a fortnight	8	1.5
Once a week	42	8.0
Several times a day	21	4.0

4.2.6. Experiences with university resources and services

The students rated a number of technological resources and services for learning environments. The ratings were 5 = excellent, 4 = fair, 3 = good, 2 = neutral and 1 = not available. The weighted average score of the majority was about 3.5, so it can be said that the technological resources and services available at the university are quite good. The individual ratings are shown in Table 4.16.

Table 4.16. Students' ratings of technological resources and services at AUST

Resource/Service	Excellent	Good	Neutral	Fair	Poor	Not available	Weighted average
e-Classroom facilities	9.70%	40.11%	21.29%	15.21%	11.22%	2.47%	3.29
Computer labs	21.54%	38.08%	14.42%	15.38%	9.62%	0.96%	3.49
Email services	9.18%	24.41%	15.23%	13.67%	17.77%	19.73%	3.53
Network bandwidth/speed of Internet	9.11%	16.83%	10.89%	12.87%	26.73%	23.56%	3.39
Wi-Fi access	2.51%	6.96%	5.80%	6.38%	34.43%	43.91%	3.68
Online or virtual technologies	3.75%	12.25%	12.25%	11.86%	29.45%	30.43%	3.40
Access to software	14.48%	24.66%	15.66%	16.63%	17.22%	11.35%	3.37
Download and use of free and open-source software for teaching and learning	11.31%	17.54%	12.28%	14.23%	20.86%	23.78%	3.56
Support for maintenance and repair of ICT	5.52%	21.70%	17.36%	19.53%	17.95%	17.95%	3.31
Access to data storage	3.76%	10.30%	15.45%	15.64%	21.58%	33.27%	3.59
Data visualisation software	5.09%	13.44%	15.07%	15.48%	21.38%	29.53%	3.54
Citation/reference-management software	3.24%	8.30%	15.38%	11.74%	22.47%	38.87%	3.75
Plagiarism detection software	2.02%	7.86%	13.10%	12.30%	24.60%	40.12%	3.71
Institutional repository for research sharing	4.28%	11.81%	16.50%	13.03%	21.59%	32.79%	3.63

e-Journals	3.13%	8.02%	12.33%	10.37%	25.24%	40.90%	3.76
e-Books	3.90%	11.70%	9.55%	11.11%	22.61%	41.13%	3.87
Citation databases	1.02%	4.88%	14.23%	10.16%	23.17%	46.54%	3.90
Bibliographic databases	1.80%	5.81%	12.22%	12.02%	23.45%	44.69%	3.85
e-Newspapers	1.38%	7.48%	9.25%	10.04%	26.57%	45.28%	3.83
e-Theses and dissertations	3.39%	7.78%	13.57%	9.58%	22.55%	43.11%	3.89

4.2.7. Experiences with online courses/MOOCs

About 31% of the respondents indicated that they had taken a MOOC. However, over 50% did not know about MOOCs. Only about 10% had completed a MOOC (Table 4.17). When compared to responses from teachers, these data show that learners are more aware of new developments in technological applications for teaching and learning.

Table 4.17. Experience with MOOCs

Experience with MOOCs	Responses	Number
No, and I don't know what a MOOC is	50.31%	163
No, but I do know what a MOOC is	20.68%	67
Yes, but I didn't complete it	19.14%	62
Yes, and I completed it	9.88%	32

4.3. Perceptions of the Use of TEL

4.3.1. Perceptions of the benefits of technologies

The students were asked to give their opinion about the benefits of different technologies for their studies, skill development, career advancement and competitiveness in the job market. Most of the students strongly agreed or agreed that technologies will help them study in university, develop skills and prepare themselves for future job markets. The weighted average was 4.5 or more, a very satisfactory score (Table 4.18). That learners at AUST are predisposed to the use of technology in teaching and learning is an important finding. This also corroborates the nature of Millennials in general and their access to technology in particular.

Table 4.18. Students' perceptions about using technology for learning

Statement	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Weighted average
It will help me get better results in my subjects.	59.27%	38.42%	1.54%	0.58%	0.19%	4.56
It will help me understand the subject material more deeply.	65.64%	31.85%	1.54%	0.77%	0.19%	4.62

It makes completing work in my subjects more convenient.	53.33%	41.37%	4.51%	0.78%	0.00%	4.47
It motivates me to explore many topics I may not have seen before.	62.48%	32.88%	3.48%	0.77%	0.39%	4.56
It allows me to collaborate with others easily, both on and outside of the campus.	49.03%	39.49%	9.53%	1.56%	0.39%	4.35
It will improve my IT/information management skills in general.	59.53%	33.66%	6.23%	0.39%	0.19%	4.52
It will improve my career or employment prospects in the long term.	61.72%	33.20%	4.10%	0.78%	0.20%	4.55

4.3.2. Usefulness of technology for learners

In response to a question regarding the usefulness of various technologies for learners' studies, it is interesting to note that the respondents are aware of the usefulness of technologies in their studies in terms of accessing academic resources, sharing resources, communicating among their peers, collaborating, etc. (Table 4.19). The learners' priorities regarding the use of technologies are diverse, but the top ones are summarised below:

- Creating and presenting multimedia shows as part of course requirements (e.g., PowerPoint) (4.15)
- Downloading or accessing online audio/video recordings of lectures (missed) (4.16)
- Downloading or accessing online audio/video recordings of lecturers (attended) (4.12)
- Using mobile phone to access Web-based university services or information (e.g., enrolment, fee payment) (4.01)
- Using instant messaging/chat (via Skype, Facebook Messenger, Hangout, etc.) to communicate/collaborate with other students in a course (4.05)
- Using social media networking platforms, especially Facebook, to communicate/collaborate with other students in a course (4.05)
- Using the Web to share digital files related to their course (e.g., photos, audio files, movies, digital documents, websites, etc.) (4.09)
- Receiving alerts about course information via text message on a mobile phone (4.14)
- Using the personal dashboard on the university intranet to access all their academic information related to courses, grades, etc. (4.04)

These indicate the preferences of today's learners at AUST and suggest that teachers should consider these while designing their curricula and their teaching and learning activities.

Table 4.19. Usefulness of technologies in learners' studies

Question	Not at all useful	Useful to a limited extent	Neutral	Useful	Very useful	Do not know	Weighted average
Design and build web pages as part of your course?	10.49%	15.15%	10.87%	34.56%	24.27%	4.66%	3.33
Create and present multimedia shows as part of your course requirements (e.g., PowerPoint)?	2.52%	6.40%	5.62%	33.14%	50.00%	2.33%	4.15
Create and present audio/video as part of your course requirements?	5.05%	7.18%	13.59%	36.12%	34.95%	3.11%	3.79
Download or access online audio/video recordings of lectures you could not attend?	4.49%	3.71%	8.01%	22.66%	57.81%	3.32%	4.16
Download or access online audio/video recordings to revise content of lecturers you have already attended?	3.71%	4.88%	7.23%	27.15%	53.71%	3.32%	4.12
Download or access online audio/video recordings of supplementary content materials?	3.50%	4.66%	10.29%	33.40%	44.27%	3.88%	3.99
Use the Web to access university-based services (e.g., enrolment, fee payment)?	4.90%	4.12%	9.02%	32.16%	45.49%	4.31%	3.96
Use your mobile phone to access Web-based university services or information (e.g., enrolment, fee payment)?	4.87%	4.87%	8.38%	33.33%	45.61%	2.92%	4.01
Use instant messaging/chat (e.g., Skype, Messenger, Hangout, etc.) on the Web to communicate/collaborate with other students in the course?	4.86%	6.03%	8.95%	31.13%	47.28%	1.75%	4.05
Use a social media networking platform (e.g., Facebook) on the Web to communicate/	4.09%	5.64%	10.51%	30.54%	47.28%	1.95%	4.05

Question	Not at all useful	Useful to a limited extent	Neutral	Useful	Very useful	Do not know	Weighted average
collaborate with other students in the course?							
Use microblogging (such as Twitter) to share information about class-related activities?	10.55%	9.57%	21.48%	27.54%	19.92%	10.94%	3.04
Keep your own blog as part of your course requirements?	10.52%	7.74%	23.41%	28.77%	18.25%	11.31%	3.03
Use instant messaging/chat (e.g., Skype, Messenger, Hangout, etc.) on the Web to communicate with teachers and administrative staff for the course?	4.90%	5.69%	10.20%	32.94%	43.73%	2.55%	3.97
Contribute to another blog as part of your course requirements?	9.39%	5.09%	22.70%	30.53%	18.20%	14.09%	3.01
Use the Web to share digital files related to your course (e.g., photos, audio files, movies, digital documents, websites, etc.)?	3.38%	4.97%	8.15%	30.22%	50.10%	3.18%	4.09
Use Web-conferencing or video chat to communicate/collaborate with other students in the course?	6.11%	4.93%	12.43%	34.52%	38.66%	3.35%	3.85
Receive alerts about course information (e.g., timetable changes, release of new learning resources, changes in assessment) via RSS feeds on the Web?	4.54%	4.73%	9.07%	25.84%	48.72%	7.10%	3.88
Receive alerts about course information (e.g., timetable changes, release of new learning resources, changes in assessment) via text message on your mobile phone?	4.90%	3.14%	6.86%	27.25%	54.71%	3.14%	4.14
Contribute with other students to the development of a wiki as	5.34%	5.14%	15.61%	35.38%	28.85%	9.68%	3.48

Question	Not at all useful	Useful to a limited extent	Neutral	Useful	Very useful	Do not know	Weighted average
part of your course requirements?							
Receive grades/marks from your lecturer via text message on your mobile phone?	9.07%	4.54%	13.41%	29.39%	40.24%	3.35%	3.77
Receive pre-class discussion questions from your lecturer via text message on your mobile phone?	6.76%	6.36%	8.75%	28.83%	45.53%	3.78%	3.89
Use a personal dashboard on the university intranet to access all your academic information related to courses, grades, etc.?	3.11%	3.69%	9.90%	23.30%	54.17%	5.83%	4.04
Use an e-portfolio system to record your achievements for future use beyond the course of your studies?	4.71%	3.14%	10.00%	26.67%	46.47%	9.02%	3.8

4.3.3. Learners' perceptions about technology use in education

In response to a question regarding their perceptions about technology use in education, the learners placed high emphasis on the following aspects:

- More active engagement happens in the courses where technology is used.
- A feeling of connectedness with other students as well as teachers arises in learners if technology is used.
- They are concerned about cyber security (password protection and hacking).
- In-class use of mobile devices is distracting to the teachers.
- Academic life and social life should be kept separate while one is engaging in social media.
- Teachers in the university should use and integrate more technology in their teaching.
- Technology makes them feel connected to what's going on at the university.

Overall, the learners are very positive about technology use in education. About 60% of the respondents believe that if lectures for their courses were available online, they nonetheless would not skip classes. However, over 70% also think that technology impedes their ability to think deeply about a subject. This is probably because the current use of technology is limited to social activities, which distract from studies.

Learners are typically concerned about privacy and security concerns that may arise from heavy dependence on technology. Interestingly, students at AUST are also concerned

that in-class use of mobile phones may distract teachers. Many of these perceptions can be dispelled by the university if TEL is used appropriately. Teachers can even use mobile phones and tablets in class to make their lectures more interesting and interactive. The majority of respondents (92%) would like to see technologies used for better connectedness with their peer learners and their teachers, for better engagement in their course work (91%) and for greater access to course-related information. Table 4.20 provides details about the respondents' perceptions of using technology in education.

Table 4.20. Learners' perceptions of using technology in education

Statement	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Do not know
I get more actively involved in courses that use technology.	46.14%	45.75%	4.44%	1.35%	1.93%	0.39%
I am more likely to skip classes when materials from course lectures are available online.	7.21%	13.45%	17.74%	46.20%	13.65%	1.75%
When I entered college, I was adequately prepared to use the technology needed in my courses.	26.18%	47.44%	14.17%	7.09%	0.98%	4.13%
Technology makes me feel connected to other students.	46.88%	44.92%	5.86%	1.37%	0.59%	0.39%
Technology makes me feel connected to teachers.	41.70%	44.86%	9.68%	1.58%	1.78%	0.40%
Technology interferes with my ability to concentrate and think deeply about subjects I care about.	28.49%	41.85%	13.56%	10.02%	4.32%	1.77%
I am concerned that technological advances may increasingly invade my privacy.	23.38%	42.44%	20.04%	9.63%	2.36%	2.16%
I am concerned about cyber security (password protection and hacking).	40.00%	43.50%	8.35%	5.24%	0.97%	1.94%
In-class use of mobile devices is distracting to my teacher.	38.55%	41.88%	10.57%	5.28%	2.15%	1.57%
Use of tablets/laptops in class improves my engagement with the content and class.	23.09%	37.57%	20.94%	13.50%	3.52%	1.37%
Multitasking with my technology devices sometimes prevents me from concentrating on or doing the work that is most important.	25.20%	46.68%	16.21%	7.03%	1.95%	2.93%
When it comes to social media (e.g., Facebook, Twitter, LinkedIn), I like to keep my academic life and social life separate.	39.38%	38.60%	11.50%	8.97%	0.97%	0.58%
I wish my teachers in the university would use and integrate more technology in their teaching.	49.03%	40.27%	8.17%	0.58%	0.97%	0.97%
Technology makes me feel connected to what's going on at the college/university.	49.03%	43.00%	5.25%	1.17%	0.78%	0.78%

Statement	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Do not know
In-class use of mobile devices is distracting to me.	30.35%	39.11%	16.54%	8.56%	4.86%	0.58%

4.4. Open-Ended Responses

When students were asked to give their comments on the statement “There is a need to improve the technology-enabled learning environment in your university,” almost 99% of the learners supported the statement. They strongly felt that TEL implementation at the university will enhance their learning; however, the university needs to ensure some facilities are available as soon as possible. The student respondents’ recommendations are presented in Table 4.21.

Table 4.21. Students’ recommendations for improving TEL at AUST

Areas of improvement	Summary of comments
Wi-Fi coverage	<ul style="list-style-type: none"> • Wi-Fi coverage should be available campus-wide • Laboratories and classrooms should be equipped with free Wi-Fi
Access to digital content	<ul style="list-style-type: none"> • Video, audio and other digital content should be available online • Required software and other relevant applications should be available to learners free of cost
Adaptation of LMS	<ul style="list-style-type: none"> • Content, assignments and quizzes should be accessible online through a user-friendly LMS
Online courses	<ul style="list-style-type: none"> • The university should offer some online courses so that learners can improve their lifelong skills • Online courses should be recognised as of equivalent value to face-to-face courses
Smart boards	<ul style="list-style-type: none"> • Classrooms should be equipped with smart boards
On-campus support for TEL	<ul style="list-style-type: none"> • There should be a dedicated support system for troubleshooting technological problems
Live virtual classes	<ul style="list-style-type: none"> • Classes should be live-streamed and accessible from anywhere
IT training	<ul style="list-style-type: none"> • There should be continuous IT training for learners

Chapter 5: Key Findings, Conclusion and Recommendations

5.1. Key Findings

1. AUST is a renowned private university in Bangladesh with a focus on science, technology, business and the social sciences, including pedagogical sciences. From its inception, AUST has made concerted efforts to ensure quality education for its learners. AUST has already established several state-of-the-art laboratories in different departments. The entire campus has free Wi-Fi access. All faculty members can have an email address within the aust.edu domain. The email service is fully functional and managed by Google.
2. As an academic institution, AUST is in a good position for TEL implementation. Its preparedness score is 121, which is within the range of “developing preparedness.” The teachers are experienced and have good academic standing. Almost 60% of the teachers have master’s degrees, while 19.05% have PhDs.
3. Most of the teachers (84.36%) are in engineering and technology fields. Most teachers have access to electronic devices, and the majority have smart phones and laptops (around 99% and 97%, respectively); around 75% own desktop computers, and nearly 41% own tablet devices. The majority of teachers (96.70%) have access to the Internet on the university campus, while 95.60% have access at home. The majority of teachers use smart phones (56.04%), followed by laptops (25.64%) and desktop computers (16.85%). The rate of Internet usage at AUST is very high, with 96.31% of faculty using it daily.
4. In terms of computer skills, the majority of the surveyed teachers are advanced users and can provide training in word processing, spreadsheets, presentation software and email. Most of the teachers (94.89%) have accounts with social media platforms. Almost all of them (94.34%) have a Facebook profile, while 46.04% have a profile with Google+, 31.7% with photo-sharing sites, 26.04% with SlideShare or a similar presentation platform, 21.13% with Twitter, 12.83% with social bookmarking sites, 7.55% with goodreads.com and 5.66% with blogs. In terms of engagement in mailing lists and discussion forums, 44.03% have subscriptions to discussion forums.
5. AUST teachers largely (90.81%) use the face-to-face delivery method, with few (20.96%) using the blended mode. Teachers do not often use digital resources or platforms in their teaching. Their use of blogs, microblogging, social bookmarking, simulations, audio recordings, digital videos and LMSs is low. In terms of creating and sharing teaching and learning materials, teachers at AUST have limited experience; however, they create teaching and learning resources in significant amounts using image applications, PowerPoint, and Word. Surprisingly, the majority of faculty members have never used digital film/video, audio, simulations, LMS, course packs or blogs to create teaching and learning materials. The teachers are mostly unaware of OER. The university is not comfortable with

the ICT skills needed for teaching and learning. Most of the teachers (93.33%) have not yet received training in the use of ICT for teaching and learning. AUST does not provide regular training in the use of new technologies for teaching and learning. Most of the teachers (81.92%) haven't yet participated in any online training. The majority of the faculty members (86.47%) have not participated in massive open online courses (MOOCs), and 63.08% of the faculty members were not aware of any of the MOOC platforms listed in the questionnaire.

6. The teachers do not know whether AUST policies presently exist.
7. Most of the respondents access library resources rarely or sometimes for teaching and learning. The majority of teachers are not happy with the university's support for their research.
8. Although teachers use the face-to-face delivery method in their course delivery, they have positive attitudes towards the use of TEL and are highly motivated to integrate TEL into their teaching and learning. Most of the faculties are strongly affected by barriers to the use of TEL. Major barriers to TEL implementation at AUST are: lack of training about TEL; lack of technical support from the university; lack of an institutional TEL policy; and inadequate availability of hardware and software.
9. Almost all (99.0%) of the students have their own smartphone, 84.6% have a laptop, 76.4% have a desktop computer and 31.8% have either a tablet or an iPad. They mostly use smartphones. Almost all of the students (98.1%) have an Internet connection at their own home. One-third of the learners (35.9%) use the Internet on the university campus, 21.6% use the Internet at the university labs and 7.8% use it at cybercafés. It was found that around half of the learners spend three to five hours daily on the Internet, while 24.2% spend one to two hours.
10. Most of the students can use word processors, PowerPoint, email and search engines. Almost all of the students have a Facebook account. Rates of accounts with Google+, photo-sharing sites, Twitter, social bookmarking sites, research-sharing sites were 66.7, 65.3, 32.2, 30.7, 24.8 and 23.1%, respectively. On average, 41.7% of the students spend one to two hours on social media, 35.6% spend three to five hours, 11.2% spend more than five hours and 10.4% spend less than one hour.
11. Around half of the students are members of various IT-based forums, such as mailing lists or discussion forums. The majority use these forums not very frequently. Students are not used to MOOCs. Most of them strongly agree or agree that the technologies they are using at the university will help them with studying, developing skills and preparing themselves for future job markets.
12. Learners at AUST are aware of the usefulness of technologies in their studies for accessing academic resources, sharing resources, communicating among their peers, collaborating and other tasks. They prefer to have access to educational

resources and course-related information online. They also like to use social media to connect with other students and teachers. They prefer to search for and download videos, texts and audio files from the Internet. However, they are not well aware of copyright restrictions.

13. Learners at AUST believe that integrating technologies enhances their level of engagement with their courses. Technology also helps them connect with peers and teachers. Learners are aware of cyber security. They also like to separate their social life from their academic life when engaging in social media.

5.2. Conclusion and Recommendations

Based on the findings of the baseline study, the university has some facilities that may be sufficient for undergraduates. However, additional technological interventions would make a significant difference in the teaching and learning practices at AUST. Teachers could enhance the quality of their courses through better content creation and sharing and better engagement with learners. With respect to postgraduate research and education, the university needs further development in some areas. This report makes the following recommendations to improve the TEL environment at AUST.

- A well-structured TEL policy needs to be developed and implemented. The policy-development process should include all relevant stakeholders.
- AUST should have a comprehensive action plan and aligned guidelines for TEL implementation in its teaching and learning processes.
- There is a need to ensure wider access to the Wi-Fi network on the university campus. Bandwidth should be increased so that learners and teachers have easy, uninterrupted access to educational resources, course-related information and various learning forums and social media.
- Teachers should be trained in how to meaningfully integrate technology into their teaching and learning practices.
- Teachers should be trained in the creation of digital content.
- AUST should develop an institutional OER policy.
- AUST should develop an institutional OER repository for storing the educational resources created by its teachers and learners. The repository may be linked with other repositories around the world for better access to OER. The university may also consider creating a referatory for making relevant OER available to learners and teachers.
- The university should consider initiating regular programmes on digital literacy for learners. In addition, C-DELTA could be a good platform for students to test and enhance their digital literacy online.

- A well-structured and user friendly LMS (installed or in the cloud) should be initiated and used for all AUST courses. On the LMS, teachers can share learning content, students can interact with their peers and teachers, and grades and feedback on assignments can be communicated.

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