

Addressing the Digital Divide: A Scan of International Practice of Institutional Approaches to Digital Inclusion and Accessibility

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Contents

Introduction	1
Issues and methods of mitigation	3
Hardware	3
Provision of hardware	3
Clarity of expectations of use of hardware	4
Software	5
Provision of subject-specific software licenses	5
Environment	6
Physical environment.....	6
Digital environment	7
Existing distance and/or digital delivery.....	7
Support.....	7
Digital upskilling.....	8
Support for specific learner groups.....	8
Personalised student support	9
Conclusion	9
Appendix 1: Institutional practice reviewed	11
Appendix 2: Glossary	12
Appendix 3: Useful resources.....	15

Introduction

The COVID-19 pandemic resulted in a mass transition from in-person delivery of learning and teaching at universities to digital delivery. In supporting this effective transition, higher education (HE) institutions and sectors across the globe began to focus on digital exclusion, commonly referred to as the 'digital divide'. The digital divide is commonly used to describe the differing levels of accessibility of technology or technological infrastructure for specific communities. Prior to March 2020, institutional digital priorities were tailored to providing a complementary service to in-person delivery. The move to 'digital first' delivery resulted in an emphasis on supporting an accessible, holistic, digital student learning experience.

The benefits and potential of an effective digital learning and teaching portfolio are clear, and institutional and sectoral staff have developed creative and innovative uses of digital technology which serve to enhance the student learner journey. The continued application of innovative digital approaches to learning and teaching, including the use of videos, live-streamed and recorded lectures, digitally-accessible resources, digital performance spaces, and the development of digital laboratories, remote-controlled laboratory techniques and digital simulation, will serve to enhance the student learner journey moving forward. It is unlikely that national or international HE sectors will return to a wholly or even predominantly in-person learning and teaching provision in the near future.

COVID-19 and the transition to an emergency digital provision has undoubtedly emphasised the positives that can be derived from the use of digital approaches to learning and teaching. The benefits of digital provision include: increased flexibility in provision of learning and teaching; personalised or individualised learning; and greater flexibility of the geographic location of student communities. However, the large-scale transition to digital provision has also highlighted the need to ensure that it supports greater inclusion and accessibility of university studies, rather than the creation of further obstacles for under-represented student communities. The ability to access digital learning and the technologies that support learning is not equitably distributed among different student communities. Limited access to reliable internet, a personal computer/laptop, appropriate software and subject-specific resources, or to accessible software or technologies to support additional learning support needs, creates additional and unnecessary barriers for students undertaking HE studies.

In recent years, global organisations and legislative bodies have been developing initiatives and championing the creation of legislation that promote the principles of inclusion and equity of access and opportunity. The UK Equality Act (2010) established the public sector's duty to exercise its function to 'reduce the inequalities of outcome which result from socio-economic disadvantage' and extended the circumstances in which a person is protected against discrimination. Similar legislation, focused on ensuring individuals' access to equal opportunities, can be found in Canada, Australia and the United States of America.¹ The 'digital divide' is a barrier for many under-represented student communities, who may have protected characteristics, from accessing digital learning and teaching provision.

Agreed at the UN General Assembly in 2015, the United Nations Educational, Scientific and Cultural Organisation (UNESCO) Sustainable Development Goals (SDGs) have four objectives that are particularly relevant when considering the digital divide. These include: SDG1 'No poverty'; SDG4 'Quality Education'; SDG9 'Industry, innovation and infrastructure';

¹ Canadian Human Rights Act (1985). Since 2015, provincial and territorial legislation has been agreed that identify the 'protected grounds' or 'applicable characteristics' within each region. A detailed overview of the different provincial and territorial Human Rights Codes can be found here in the Canadian Centre for Diversity and Inclusion's ['Overview of Human Rights Codes by Province and Territory in Canada'](#) (January 2018); Australian Human Rights Commission Act (1986); H.R.5 - Equality Act. While not an active law, this bill passed the US House of Representatives on 25 February 2021 and the Senate Committee on the Judiciary held hearings on the bill on 17 March 2021.

and SDG10 'Reduced Inequalities'. Since 2015, QAA has worked across the entirety of the organisation to support the engagement of UK higher education institutions with the UN Sustainable Development Goals. In partnership with Advance HE, QAA published the second edition of the QAA/Advance HE [Education for Sustainable Development Guidance](#) in March 2021. A student-focused resource, [Education for Sustainable Development - Student Resource - Starting the conversation](#) and a [recording](#) of the launch of the revised guidance sit alongside the revised guidance document. QAA Scotland considered the UN's Sustainable Development Goals within the context of the [2018-19 Focus On: Graduate Skills](#). Simon Barrie's [plenary speech](#) at the Focus On: Graduate Skills event explored the use of the SDGs to develop curriculum which addresses future challenges facing our international community.



Tackling the digital divide impacts nations across the globe, including Scotland. Initiatives to tackle the digital divide in Scotland have been developed and piloted for many years before the COVID-19 pandemic. In 2016, the Carnegie Trust UK published a report - [Digital Participation and Social Justice in Scotland](#) - which found that 'At present, however digital technology - the great enabling and empowering force of the 21st century - is further exacerbating existing, deep-rooted inequalities.' In 2017, the Scottish Council for Voluntary Organisations, with support from the Scottish Government, launched [Scotland's Digital Participation Charter](#). Focused on upskilling Scotland's population, the Charter was an early framework to increase digital inclusion in the public sector.

The COVID-19 pandemic and the resulting transition to digital provision, has drawn a greater focus to the impact of digital exclusion on disadvantaged student communities within Scotland's higher education sector. QAA Scotland has completed a study of institutional responses to COVID-19, which includes information on the introduction of interventions to support historically disadvantaged student communities. This study, entitled 'Scottish sector learning from the COVID-19 pandemic', will be published in October 2021. In August 2020, the Scottish Funding Council announced the creation of a £5 million fund to support colleges and universities tackle digital exclusion among disadvantaged students. While this fund was created in direct response to the impact of the COVID-19 pandemic on disadvantaged student communities, it emphasises the Scottish Government's continued prioritisation of digital inclusion in Scotland's public spaces.

The Carnegie Trust UK's 2020 report - [Learning from lockdown: 12 steps to eliminate digital exclusion](#)¹ - sets forth 12 recommendations for action to address the digital divide. In considering these broad recommendations for the public and private sectors, it is crucial that Scotland considers and learns from existing international practice in higher education and institutional approaches to addressing issues relating to digital exclusion and accessibility that could readily translate.

To facilitate this learning, this report is based on a scan of international practice from 29 higher education institutions across the globe, including the USA, Canada, South Africa, the EU, China, Japan, Australia and New Zealand (see Appendix 1 for a full list of the institutions reviewed). The scan of international practice drew together information on institutional practices and approaches via desk-based research of institutional website information and supplementary conversations with institutional staff. This exercise suggests that the following are issues relating to digital exclusion and accessibility encountered on a global scale:

- lack of hardware - for example, laptops or secure internet infrastructure
- lack of appropriate software - for example, subject-specific software applications
- unsuitable learning environment
- minimal institutional support for student and staff use of digital technologies - for example, support for specific learner groups or digital upskilling.

Issues and methods of mitigation

While each national context for digital accessibility and exclusion is different, several common themes emerged in the issues faced by higher education institutions. The common issues and approaches taken to mitigating their impact on the student learning experience are laid out below:

Hardware	
Issues	Methods of mitigation
<ul style="list-style-type: none"> • Poor or no internet infrastructure • Unreliable internet connection and insufficient bandwidth • Lack of support from internet service providers • Lack of access to appropriate hardware 	<ul style="list-style-type: none"> • Government investment in a robust technical infrastructure • Community access centres • Free space optical (FSO) links² • Inform students of the minimum technological hardware and software required of university studies • Laptop loan schemes • Provision of 4G dongles

Provision of hardware

In response to COVID-19 and the rapid transition to the wholesale digital delivery of learning and teaching, many higher education institutions introduced emergency technological hardware lending schemes. The provision of technological hardware to address unequal access to required technology for learning and teaching has proven to be one aspect of an effective institutional approach to eliminating digital exclusion and increasing accessibility. Methods can include loaning or granting laptops or desktop computers to students, as well as ensuring that students have access to sufficiently stable internet connections to support

² FSO links are a network of communication channels with a faster and longer reach than traditional wireless internet.

their digital learning experience. Examples of this approach to mitigating issues relating to students' access to required technological hardware can be evidenced by institutions across the globe.

The University of Cape Town (UCT) are spearheading a campaign to raise funds to provide laptops, food vouchers and stable internet connectivity for final-year undergraduate and postgraduate students to support their completion of studies and entry into the South African workforce. Similarly, the University of Witwatersrand (Wits) identified that digital exclusion can be caused by student financial hardship, resulting in an inability to purchase required technology, as well as a lack of digital infrastructure in areas of South Africa. The University is working with communities and internet providers to increase the free-space optical (FSO) links available. Additionally, the University of Witwatersrand has made a commitment to provide its students with the wireless data required for their online learning requirements in 2021. The University has worked with four internet service providers to make a data offering of 10GB daytime data and 20GB night-time data per month available to each Wits student. Kyoto University also identified that student access to a stable internet connection would support increased digital accessibility and inclusion. The institution now provides its students with technical support, specifically for remote access of the institutional learning management system.

Prior to COVID-19, institutional approaches to increasing digital accessibility and inclusion for students centred on the provision of appropriate learning technologies, specifically hardware. Many institutions have increased or broadened the technology lending schemes to support their student learner communities. The University of British Columbia (UBC) hosts a Laptop Lending scheme through which students can borrow laptops for a short amount of time. The availability of laptops for loan is regularly updated on the UBC Library website. Other technology, such as laptop chargers, audio equipment, video cameras and projectors, can also be loaned through the Chapman Learning Commons Help Desk by UBC staff and students. Stanford University allows currently enrolled students to borrow hardware, including laptops and computers, to undertake their university studies. The institution also offers the rental of other technical equipment to support students' studies, including 3D printing and scanning equipment, audio equipment and accessories, and camera packs and accessories. Similarly, the University of Amsterdam offers a short-term laptop loan scheme for students in addition to signposting to external organisations that operate longer-term laptop loan schemes for students during term time. The University of Auckland identified that a specific learner community - in their case, young Maori learners - were disproportionately impacted by digital exclusion. The institution believes that digital enablement of under-represented student groups is critical for equitable access and educational success. To address this issue, the University distributed more than 400 Chromebooks to young Maori learners. The institution has also called for the New Zealand federal government to ensure that every student has access to the digital learning and teaching resources required for their university studies.

Clarity of expectations of use of hardware

As the use of digital technology in university learning and teaching increases, both in response to COVID-19 and emerging technological advances, institutions must be transparent with prospective and incoming students about any expectations around the use of technological hardware. If, in reality, a student would be unable to effectively undertake their university studies without access to a personal computer or other related devices, this needs to be communicated to students prior to the beginning of their studies. The University of Southern New Hampshire explicitly advises incoming students of the basic computer systems and software programmes required to enable their learning experience. Similarly, the University of Cape Town explicitly outlines the level of access to technology and wi-fi needed for students to effectively engage in their learning and teaching. This information is

clearly listed on an institutional Frequently Asked Questions webpage for prospective students, ensuring that information about technological requirements is readily accessible to potential new students. The University of Melbourne operates a 'Getting setup at UniMelb' webpage which provides new students with instructions on getting connected to the institutional VPN remotely and accessing required software packages. The webpage also clearly articulates the level of access to digital technology and skill required to use digital tools for a student to effectively undertake their university studies at the University of Melbourne. This webpage is public-facing and is accessible to prospective, incoming and current students at the University. As institutions move to a greater use of digital provision and technologies in the future, a concerted effort needs to be made to ensure that students are not only aware of the technical hardware requirements required to effectively engage with their studies, but also the institutional support, whether through loans of specific hardware, and grants or bursaries, available to them.

Software	
<p>Issues</p> <ul style="list-style-type: none"> • Lack of access to subject-specific software • Complex and/or multiple digital platforms required for study • Complexity of software and its demand for memory/space on hardware 	<p>Methods of mitigation</p> <ul style="list-style-type: none"> • Design-inclusive digital platforms • Improve accessibility of learning resources on multiple forms of hardware, including mobile apps • Adapt learning and teaching resources to use minimal amount of bandwidth

Provision of subject-specific software licenses

Many HE programmes require subject-specific software licences to support students' learning and teaching. In addition to the almost global use of Microsoft Office tools (or the equivalent), institutions have invested in programming software licenses to support varied subjects of study from mathematics to sociology. While many institutions maintain institutional licenses for subject-specific software, it can be more challenging for distance learning students and other under-represented student communities to access these licenses, particularly if they are unaware of the requirement to use specific programmes or tools during their studies. The provision and explicit signposting of subject-specific software licenses is essential to addressing digital exclusion and increase accessibility for all student communities.

The University of Melbourne's Student IT team has developed a single institutional webpage that signposts links for students to access software required for their studies. The webpage identified which software packages can be downloaded to a student's personal computer or mobile phone, the software licenses and packages that are only available on the University Library's computers, and software that can be streamed online from university servers. The institution has also created online tutorials for frequently-used software packages to support students in developing their digital skills. Similar to the University of Melbourne, the University of Cape Town's Information and Communication Technology Services hosts an institutional webpage dedicated to providing information about the software available for staff and student use. The webpage includes signposting to software licensed by the University for staff and student use, freely-available software, and software for which UCT staff and students can access preferential pricing. Stanford University's Learning Technologies & Spaces team has developed a comprehensive webpage to clearly articulate the software required for students to effectively undertake their university studies. The webpage signposts

to 'Essential Stanford Software' (Stanford-licensed software offered free to all students) and 'Stanford Software Licensing Webstore' (software for personal purchase at discounted prices for Stanford staff and students). In addition, the webpage includes information about the software applications available on institutional computers and their locations.

Clear signposting from institutional webpages ensures that all students have the same amount of information about the software available to them through their University. Ensuring the equitable distribution of information about software required to succeed during a student's university studies must be a central part of any institutional approach to increasing digital inclusion and accessibility within its student learner communities.

Environment	
<p>Issues</p> <ul style="list-style-type: none"> • Cost of internet access • Low-income households and/or disadvantaged backgrounds • Lower socioeconomic groups • Rural geographic locations with limited infrastructure • Unsuitable study spaces at home or shared accommodation • Poor working environment due to noise, space, competition for hardware 	<p>Methods of mitigation</p> <ul style="list-style-type: none"> • Work with local organisations to provide students with access to suitable study space • Provide an option for students to live in university accommodation where appropriate technological infrastructure is guaranteed • Introduce flexible timetabling • Enable access to learning and teaching synchronously and asynchronously • Laptop loan schemes • Provision of 4G dongles

Physical environment

A student's experience of digital exclusion can be exacerbated by their physical learning environment. The student experience of learning remotely during COVID-19 has provided evidence that a student's physical environment can negatively (or positively) impact on the student's ability to effectively engage in their learning. A student's physical environment has not been the traditional focus of institutional approaches to addressing the digital divide - the historic focus of these approaches has been on the provision of appropriate technological hardware or other required resources. However, institutions have begun to explore the ways in which they may be able to support students to study remotely as an approach to addressing the issue of unequal access to appropriate learning spaces during COVID-19. The University of Southern New Hampshire offered students, who identified that they did not have an appropriate environment to undertake their learning remotely, the option to live on campus and complete their studies from on-campus housing.

It should be recognised that using on-campus accommodation to house students who do not live within an environment that supports the effective learning experience is not possible for all institutions. Institutions can also explore the use of their communal, on-campus learning and teaching spaces to better support these students. The University of Amsterdam has encouraged students, who are unable to access a stable internet connection at home, to book study spaces on campus through the University Library. While many universities may run or have run a booking scheme for on-campus study spaces prior to COVID-19, the explicit identification of this service as a support for students with limited access to a physical

environment that supports their effective learning, helps to raise student awareness of available institutional support services to address their own personal learning circumstances.

Digital environment

An accessible, consistent and stable digital environment is necessary for students to effectively learn remotely. An accessible virtual learning environment (VLE), elsewhere referred to as a learning management system, is essential to support equitable access to learning and teaching for students in a digital environment. VLEs can also be used to signpost or host tools to support students in increasing the robustness of their own personal digital environment. Stanford University's Information Technology Department has created advice and guidance on solving home networking issues to support students and staff working remotely. While these resources have been developed as a result of COVID-19, it is clear that they would also benefit students and staff with unstable or limited internet connections to access learning and teaching resources. Similarly, the University of Witwatersrand operates *Ulwazi*, which is their institutional learning management system. *Ulwazi* includes resources to support students' learning online, including an application to check network coverage for students' residential area.

Existing distance and/or digital delivery

Insights into successful remote delivery of learning and teaching can be garnered from universities with longstanding distance and/or digital delivery of learning and teaching. Universities with significant portfolios of distance learning programmes, such as Athabasca University (Canada), University London Worldwide (UK), Deakin University (Australia) and Central Queensland University (Australia), emphasise that learning and teaching need to be possible regardless of a student's physical or geographic location. The flexibility of styles of study and timetabling are key to the successful delivery of distance learning and teaching. However, flexibility of delivery and geographic location must also be balanced by an online provision of student services to ensure that students have the skills necessary to succeed in their studies.

Support	
<p>Issues</p> <ul style="list-style-type: none"> • Poor institutional support for the development of digital skills • Lack of support for teaching staff to develop curriculum that uses innovative or accessible approaches to technology 	<p>Methods of mitigation</p> <ul style="list-style-type: none"> • Provide digital literacy training, support and resources for teaching staff • Financial support for training and purchasing of accessible technology • Implement an institutional approach to digital learning and teaching that considers the unique needs of individual students • Introduction of 24/7 technical support • Implementation of digital safeguarding

Digital upskilling

A common feature of institutional approaches to increasing digital inclusion and accessibility is the provision of digital skills training for both staff and students. The University of Southern New Hampshire provides students with access to a 24/7 online tutoring system in addition to 24-hour technical support which can be accessed by telephone, online form or live chat. Harvard University's Information Technology team has developed a comprehensive suite of guidance, hosted in the 'IT Knowledge Base', on a variety of hardware, software and connectivity issues that students and staff may experience. The Knowledge Base is organised thematically, supporting an easy and accessible navigation of the breadth of resources and training available. In addition to the Knowledge Base, staff and students can access personalised help from IT staff members via Messenger or the logging of a ticket. The University of Michigan's Information and Technology service delivers an annual series of workshops to support staff to effectively use new academic technology in their learning and teaching. The workshops cover the use of institutional systems, like the learning management system, emerging online learning and teaching tools, and approaches to encouraging student engagement in online environments.

Where possible, some institutional approaches to supporting students' digital skills development utilise the knowledge and expertise of other students. UBC operates the Chapman Learning Commons. The Learning Commons has a website that is run in collaboration between UBC Library, the Centre for Teaching, Learning & Technology and the Centre for Student Involvement & Careers. The website is an evolving collection of student-curated learning resources to support academic success. Stanford University operates a 'Peer Technology Specialists' scheme, where current students provide information technology training and support to their peers. Appointments with Peer Technology Specialists can be made during the work week. Outwith normal working hours, students can access information and resources relating to getting online on the scheme's webpage.

The design and delivery of digital skills training is essential to addressing issues of digital exclusion and inaccessibility within higher education. It is not enough to provide hardware and/or software to support students' learning and teaching if they are unable to use these materials effectively. Where possible, creating peer advice and support systems to deliver training is an effective and empowering approach to the development of students' digital skills.

Support for specific learner groups

Digital exclusion, often referred to colloquially as the 'digital divide', is not only exclusion based on lack of access to appropriate technology or the skills needed to use digital technologies effectively. Digital exclusion can also affect student learner groups who cannot effectively use digital technologies because the technology is not accessible to them due to a protected characteristic, such as a disability. Digital accessibility is not about making technology merely available, but truly accessible for all of our student learner communities.

Institutional approaches to increasing digital inclusion and accessibility can take on many forms, including the development of institutional policy, design and delivery of training, and commitment to embedding digital accessibility in the curriculum. Harvard University has explicitly committed to making its digital information and resources easily available and accessible to all students. The institution has a dedicated Digital Accessibility Service with responsibility for ensuring that the University's information and resources are readily accessible to all students and staff. In addition to developing training and resources on accessible learning and teaching, the University has adopted three institutional policies to support their commitment to digital accessibility: the Harvard University Digital Accessibility

Policy; Settlement Caption Requirements; and Accessible Technology Procurement and Development Policy. The University of Toronto's Ontario Institute for Studies in Education (OISE) has developed a guide to support schoolteachers and higher education teaching staff to explore the fundamentals of digital pedagogy and learning. The guide includes a collated list of relevant resources, including articles, best practice documents and blog posts, to support practitioners in developing their knowledge about digital accessibility. While there are many different institutional approaches to increasing digital inclusion, specifically for student learner communities, a common feature of these approaches is the emphasis placed on embedding digital accessibility in institutional governance, and learning and teaching practice.

Personalised student support

In addition to broad skills training for staff and students and tailored support for specific learner communities, some universities also provide personalised support for individual students. Research staff at Harvard University's Graduate School of Education have conducted research into the 'digital divide', particularly in schools. The recommendations from this research are just as relevant for higher education institutions. One key recommendation is the need to understand the unique situation facing each student to provide them with the appropriate personalised support for their circumstances. While it is important to recognise that Scotland's higher education institutions have significantly larger numbers of students than its schools, it is still achievable to signpost personalised support to students through academic adviser and peer mentor schemes. A consistent and equal knowledge and experience of using digital technology cannot be assumed across our student learner communities.

Conclusion

While the COVID-19 pandemic forced a large-scale transition to digital provision, it was not the impetus for the solution to the 'digital divide'. Instead, the emergency pivot to digital provision emphasised the need for institutions, both in Scotland and globally, to introduce robust measures to support equitable access to digital learning and technologies for their student learner communities. The provision of appropriate learning technology, whether hardware or software, will continue to be at the centre of many institutional approaches to digital inclusion moving forward. However, institutions must also consider the breadth of digital exclusion experienced by their student learner communities. The design and delivery of digital skills training, embedding of digital accessibility in institutional governance and learning and teaching pedagogy, and the clarity of expectations around student use and capacity to use digital technologies, should be considered as part of any university's review of its approach to digital inclusion.

Recommendations	
Provision of hardware	Institutions should explore long-term approaches to ensuring that their students have access to appropriate hardware to effectively engage with their learning and teaching. These approaches might include the introduction of short or long-term loan schemes, or grants/bursaries for the purchase of technology.
Clarity of expectations of use of hardware	Concerted effort needs to be made to ensure that students are not only aware of the technical hardware required to effectively engage with their studies, but also the institutional support, whether through loans of specific hardware, and grants or bursaries, available to them.
Provision of subject-specific software licenses	Institutional webpages should clearly signpost to information about required subject-specific software and how to access it through the University. These webpages should be reviewed by relevant academic and professional services colleagues on an annual basis.
Physical environment	Institutions should explore measures that can be introduced to support students who do not have an appropriate physical learning environment within which to undertake their studies.
Digital environment	The institution should review the accessibility, consistency and stability of the virtual learning environment (VLE) on an annual basis. Student feedback on the usability of the VLE should be incorporated in this review process.
Digital upskilling	Institutions should introduce training for staff and students in the digital skills required to effectively engage with a digital provision of learning and teaching. Where possible, creating peer advice and support systems to deliver training is an effective and empowering approach to the development of students' digital skills.
Support for specific learner groups	Institutions should introduce support for specific learner groups to ensure that a move to increase digital provision does not disadvantage any learner group. The introduction of institutional strategies and/or policies on digital inclusion and accessibility should be considered.
Personalised student support	A consistent and equal knowledge and experience of using digital technology cannot be assumed across our student learner communities. Institutions should review the support available to individual students on a regular basis.

Appendix 1: Institutional practice reviewed

USA	Harvard University
	Stanford University
	University of Michigan
	University of Southern New Hampshire
Australia	Central Queensland University
	Deakin University
	University of Melbourne
Canada	Athabasca University
	University of British Columbia
	University of Calgary
	University of Toronto
South Africa	Stellenbosch University
	University of Cape Town
	University of Witwatersrand
Europe	Aarhus University
	University of Amsterdam
	University of Bologna
	University of London Worldwide
	University of Twente
China	Chinese Academy of Sciences
	Chongqing University
	Tsinghua University
	Zhejiang University
Japan	Kyoto University
	Tohoku University
	University of Tokyo
New Zealand	Massey University
	University of Auckland
	University of Canterbury

Appendix 2: Glossary

Appropriate hardware	Students have the hardware that allows them to effectively access all course content. Hardware is of the specification required to ensure that the students is not disadvantaged in relation to their peers.
Appropriate software	Students have the software they need to effectively access all aspects of the course.
Appropriate study place	Students have consistent access to a quiet space that is appropriate for studying.
Asynchronous learning	Learning that does not occur in the same place or at the same time for a whole cohort. Students can access resources and communicate at any time and are not restricted to accessing this learning at any specific time. Enables students to learn at their own pace in their own time
Digital	An umbrella-term used to describe learning and teaching which involves or relates to the use of computer technology. It is recognised that digital information can be accessed offline and can be engaged with in a variety of situations.
Digital access	The ability to participate in learning through digital means. This includes providing appropriate hardware and software to facilitate access to digital learning.
Digital literacy	An individual's ability to use digital information and relevant technologies to find, evaluate, create and communicate information. This type of literacy requires cognitive and technical skills.
Digital skills	Digital skills includes digital proficiency, digital productivity, information, data and media literacies, digital creation, problem solving, innovation, digital communication, collaboration and participation, digital learning and development, and digital identity and wellbeing.

Digital poverty	The recognition that some students have less or inferior access to devices by which to engage with digital approaches to learning. This also extends to a lack of access to an internet connection with little or no bandwidth which would negatively impact the quality of their digital learning experience.
Flexible learning	Using different modes of study and technologies of learning to enable students to manage their studies around other commitments and priorities, and providing freedom of choice for learners of ways and times to learn - for example, through digital lectures or evening learning sessions.
Inclusive learning	Inclusive learning and teaching recognises all students' entitlement to a learning experience that respects diversity, enables participation, removes barriers, and anticipates and considers a variety of learning needs and preferences.
Learning management system	Digital design and delivery platform - usually accessed using devices - which enables various methods of teaching and learning delivery to be used. Through a learning management system, a provider can use, for example, video or podcasts to support and enhance digital learning methods.
Mobile learning	The use of mobile devices (for example, phones or tablets) in teaching and learning activity. This term can encompass more traditional learning activities (such as reading digital versions of journals) or less traditional activities such as engaging in virtual simulations.
Online	An umbrella-term which focuses on the connectivity of the learning, teaching and support delivery methods that may be employed by an institution.
Personalised learning	Personalised learning is an educational approach that aims to customise learning for each student's strengths, needs, skills and interests. Students can have a degree of choice in how they learn as compared to the face-to-face lecture approach.

Platform	In the context of e-learning, platform would normally describe the software infrastructure on which a virtual learning environment (VLE) is constructed.
Reliable access to the internet	Students have reliable and consistent access to an internet connection. Reliability and bandwidth of the internet connection are at a sufficient level for ensuring that a student is not disadvantaged in relation to their peers.
Robust technical infrastructure	Technical infrastructure and systems work seamlessly and are repaired promptly when needed.
Synchronous learning	Learning that takes place with participants all engaging with material in real time, although not necessarily in the same place (for example, some students may participate onsite while others may participate remotely - both at the same time).
Trained teacher or instructor	Students have a trained teacher or instructor who is equipped to deliver high quality digital teaching and learning.
Virtual learning environment (VLE)	A platform for supporting learning and teaching (particularly digital learning) and providing a space for learning resources. The precise functions and facility provided by each platform will vary and there will be options to customise and add packages depending on needs. In most cases, a VLE will, as a minimum, provide a repository for documentation (for example, programme/module information, timetables, policies and procedures), provide a message facility, and support the submission of assessments and provision of feedback on assessed work.

Appendix 3: Useful resources

Barber (2021) *Gravity Assist: Propelling higher education towards a brighter future*. Report of the digital teaching and learning review. Available at <https://ofslivefs.blob.core.windows.net/files/Gravity%20assist/Gravity-assist-DTL-finalforweb.pdf>

Jisc (2020) *Digital Learning Rebooted: From 2020's quick fixes to future transformation*. Available at <https://repository.jisc.ac.uk/7979/1/digital-learning-rebooted-report.pdf>

Jisc (2020) *Learning and teaching reimagined: A new dawn for higher education*. Available at <https://repository.jisc.ac.uk/8150/1/learning-and-teaching-reimagined-a-new-dawn-for-higher-education.pdf>

Jisc (2021) *Digital at the core: a 2030 strategy framework for university leaders*. Available at www.jisc.ac.uk/full-guide/digital-strategy-framework-for-university-leaders

Office for Students (2020) *Digital poverty risks leaving students behind*. Available at www.officeforstudents.org.uk/news-blog-and-events/press-and-media/digital-poverty-risks-leaving-students-behind

QAA (2020) *Building a Taxonomy for Digital Learning*. Available at www.qaa.ac.uk/docs/qaa/guidance/building-a-taxonomy-for-digital-learning.pdf

QAA (2020) *Questions to Inform a Toolkit for Enhancing Quality in a Digital Environment*. Available at www.qaa.ac.uk/news-events/support-and-guidance-covid-19

United Nations, Department of Economic and Social Affairs, *Sustainable Development Goals*. Available at <https://sdgs.un.org/goals>