Inspiring Learning Through Technologies

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Chapter overview

This chapter explores**:**

- the shift to Technology Enhanced Learning
- useful contemporary digital frameworks and toolkits and
- the main technologies used in TEL practices

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> ‘Today’s digitally minded students have grown up in a world dominated by the internet, social media and smartphones. They now expect these conveniences and this kind of personalisation in all aspects of their lives, so they are less tolerant of mass-market, generic and industrialised services’ (Morgan and Thayer, 2017, p.3).

Introduction

Technology Enhanced Learning (TEL) refers to the use of information and communication technologies (ICTs) to support and achieve improvements in teaching and learning. As a vehicle for change, TEL has ‘a way of addressing much broader and deeper changes in pedagogy, curriculum, physical infrastructure and in some cases, what it actually means to be a student or teacher in a digital environment’ (Cullen, 2014, p.9).

The use of technologies in higher education has a long history that predates digitisation (Bond et al., 2019), and TEL still incorporates a range of analogue (or non-digital) technologies alongside the more recently emergent digital technologies. Developments in interactive multimedia and use of the internet in education from the 1990s prompted new thinking about effective pedagogy, course design, delivery and access, and learner support that continue to resonate today in discussion of TEL. More recently, attention has turned to analysis of the plethora of data generated by students, academics and institutions, for financial, strategic and educational reasons. 'Learning Analytics' – the study of data to gain insights in to student learning processes and outcomes – has driven innovations in pedagogy and practice; while the rapid growth of mobile digital technologies, social media, app ecosystems and gaming have reinforced both the potential and the challenges of TEL for individuals and institutions.

Major challenges around TEL include data security, the cost of technology purchase, maintenance and support, staff training and development time, accessibility and assistive technologies, interoperability, the provision of quality resources, the development of digital skills, and student health and wellbeing. These opportunities and challenges must be embraced, as digital technologies are now fundamental to teaching and learning in the twenty first century. The COVID-19 pandemic of 2020 underlined just how these technologies could be used to enable teaching and learning, but also highlighted some of the challenges. Whilst skills were rapidly adapted, there was little time to attend to the underlying pedagogy.

Universities are making commitments to work actively towards delivery of UN Sustainable Development Goals (SDGs). The fourth goal, 'Quality Education', relates directly to higher education:

> **4.3** By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university
>
> **4.4** By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship
>
> **4.5** By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations
>
> **4.7** By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development (United Nations 2015)

TEL can contribute to the achievement of these goals in a number of ways. The affordances of digital technologies not only permit the replication and supplementation of existing teaching materials and practices for students around the world, but can also transform teaching and learning processes and outcomes. Online delivery of university courses through Massive Open Online Courses (MOOCs), for example, enable students with an internet connection in any location to access

resources and learn with leading scholars – and other students – in ways previously unavailable to them.

This chapter addresses these issues and provides an overview of some of the principal types of technologies in use in higher education today, as well as the pedagogical developments that have accompanied them. It begins by asking 'what has driven the shift to TEL?' before assessing how particular technologies and tools are used. Using examples drawn from contemporary practice, we show how TEL is transforming higher education institutions and practices, and draw upon student experiences of digital teaching and learning.

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Questions for reflection

Numerous tools are available for enabling TEL.

- Create a mindmap of *all* of the technologies you use in your life, inside and outside the classroom. Then consider your approach to this task. Through mindmapping software? Creating a colour coded mindmap? Researching the word 'mindmap' and looking at the evidence base before getting started?
- What are the challenges and benefits of using a variety of tools for promoting TEL? Do some work better for some students than others?

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What has driven the shift to TEL innovation?

Educause (2020), the global future of technology forecaster, in a report published before the COVID-19 pandemic, proposed four scenarios for the future of technology

in higher education: growth, constraint, collapse and transformation. These scenarios were anticipated to play out over the next decade; the pandemic catalysed change requiring universities to move online in a hurry. In the process the propositions for collapse and transformation have been accelerated. The collapse scenario envisages a new system of education in which the needs of the job market are paramount. The transformation scenario suggests dramatic change resulting from climate change and advances in digital technology with institutions restructuring to explore cooperative network models as they seek to reduce the cost of education.

The transformation scenario is reflected in the Ernst and Young (2018) *University of the Future* report which commented that current education revolves around new and improved ways to teach students by leveraging technological developments. Ernst and Young then set out a vision of 'Education 4.0' that empowers the student to structure his/her individual learning paths and align their outcomes with the requirements of industry. Digital teaching and learning practices play a key role in equipping students with the necessary skills and capabilities to enable them to thrive in the future. Research for the UK Government on online job vacancy data in the USA and the UK found that 'essential digital skills are required across low, medium and high-skilled occupations' (Kispeter, 2018, p.57). This is likely to increase as we enter what Klaus Schwab has termed the Fourth Industrial Revolution, characterised by rapid technological development and 'a fusion of technologies across the physical, digital and biological worlds' (Schwab, 2016, p.7). The 2018 McKinsey report (Bughin et al., 2018) focused on the speed with which the adoption of automation and Artificial Intelligence (AI) technologies will transform the workplace. Increasing interaction with ever-smarter machines "will bring numerous benefits…[and] will also *change the skills* required of human workers" (Bughin et al., 2018, p.1, emphasis added). But

it is not only ‘essential’ digital skills that will be needed in the future. Social and emotional intelligence and higher cognitive skills will also be in demand by employers (Bughin et al., 2018, p. 7), a forecast endorsed in research on online job vacancies:

> Most of the evidence about the future demand for general digital skills points at 21st century skills, especially interpersonal skills and cognitive competencies and learning strategies and argue that occupations where workers use digital skills creatively and to solve problems (for example engineering) are likely to grow, while occupation where digital skills are used for routine tasks (such as in HR occupations) are likely to decline (Kispeter, 2018, p.57).

Heitz et al. (2020) identify issues with access and equity in the shift to remote learning, starting with the immediate logistical challenges of ensuring that students have access to the basic technologies wherever they are studying and regardless of their socio-economic status. They also identify a range of social, emotion and human needs that need to be addressed in order for students to study online effectively. For example, institutions need to scale up mental health outreach services for both staff and students. In the UK, the National Union of Students (2020) conducted a survey during the COVID-19 pandemic which found that 20% of students struggled with access to online learning, with black, Asian and minority ethnic students, those from poorer backgrounds, care leavers, students with caring responsibilities and students with disabilities particularly impacted. The ‘digital native’ term, coined by Prensky (2001) labelled the generations of learners entering education after 2000. His work, much cited, implied that students were now entering academia possessing an innate,

natural understanding of and affinity with digital technologies, rather than recognising that digital skills, capabilities and access to technologies are unevenly distributed and need to be acquired.

Relationships between students, teachers and institutions are changing, as students are increasingly understood to be active participants in their learning process rather than passive recipients of knowledge and skills. A 'one size fits all' approach is being replaced by more flexible, personalised learning experiences as universities acknowledge students' diverse backgrounds, experiences and needs. Learning in higher education is increasingly 'blended' with combinations of online and offline, distance and face-to-face, synchronous and non-synchronous delivery – and digital technologies are integral to these practices. The British Education Research Association (BERA), have responded to the COVID-19 inspired move to education online with a special section on Hybrid Learning Spaces (BERA 2020). Here, they start to refine and nuance our thoughts about what the blend of learning means, and offer hybridity as an alternative educational design concept. Traditionally the blend of learning refers to separate synchronous and asynchronous elements. Hybrid learning spaces also refers to the interleaving of formal and informal, face-to-face and virtual, digital and physical spaces and places of learning. As Cohen et al (2020 pp1039) note in their introduction to this special section, "A hybrid is not the meshing of two constituents. It is the two distinctively at once and this duality is what creates something new".

Wahlstedt et al (2008 pp1021) citing Makitalo (2006) suggest that the design of learning environments should not be towards spaces for learning, but towards

interactive social places where learning takes place through social interaction. Raes et al 2020 position technology as both an enabler and a challenger in hybrid learning; well-established asynchronous practice takes us into the spaces of learning, but lacks the social presence of learning places. The visual and audible cues that are normally observable from our learners are lacking, and a different pace for teaching, based on questioning and close attention to the student input is essential to reduce some of these effects. This research suggested that to enable alternative ways of engaging students in our new educational spaces an IT competent is needed - alongside robust internet connections, synchronous hybrid tools that mimic face-to-face delivery can help students maintain closer connections with peers. The three essential components are good audio quality, good video quality and an optimal framing of the teacher (Raes et al 2020 pp4).

Emerging models of hybrid pedagogies include ‘synchronous hybrid learning’ (Raes et al 2020) or ‘Here or There (HOT) instruction’ (Zydney et al 2019), which offer flexibility of course attendance, with students able to come to campus or select to attend the lecture from a location of their own choice. The opportunity is to design activities that draw upon the knowledge of both cohorts. The key then is to include ‘bridges’ between face-to-face and remote students to create opportunities for social interaction that in turn enrich the learning experiences of all students (Cook et al 2020). For true hybridity, formal learning space as outlined, needs to also reflect the informal spaces and contexts our learners bring. To do this, design patterns can be co-created between relevant stakeholder groups which may include employers, learners, instructors, technologists as outlined in Cook et al 2015.

A 2019 survey of almost 30,000 students at fifty universities, further education colleges and sixth form colleges across the UK found that 93% of higher education students owned a laptop, and 83% owned a smartphone. Moreover 85% of higher education students were said to use digital technologies to access lecture notes or recordings on a weekly basis, while 72% used digital tools on a weekly basis to search for resources not recommended by their tutor (Langer-Crame et al., 2019 p. 14).

Further evidence from the UK signals a gap in institutional provision of opportunities to develop digital skills for employability. In the JISC 2019 survey of over 16,000 higher education students, 70% thought digital skills were important for their chosen career, but only 42% said their course prepared them for the digital workplace (Langer Crame et al., 2019 p. 59). This reinforces the findings of a separate 2018 sector wide survey of TEL take-up in UK higher education that found that while 'a common set of institutional TEL services supporting course delivery has been established across the sector [and] despite the investment in TEL services, we are not seeing major changes in the way that technology is being used to support learning, teaching and assessment activities' (Walker et al., 2018 p.1). This underlines the importance of thinking of TEL not solely as a pedagogy to improve teaching and learning, but also a means to provide graduates of the 21st century with the digital capabilities they need for the rapidly changing workplace and way of life. The case study below provides ways of thinking about this dual approach.

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Case Study: Learning, teaching and assessment practices to support the development of student digital capabilities

The various pedagogical approaches and practices enabled or extended by TEL can facilitate the development of both 21st century skills and what has been termed 'digital capability'.

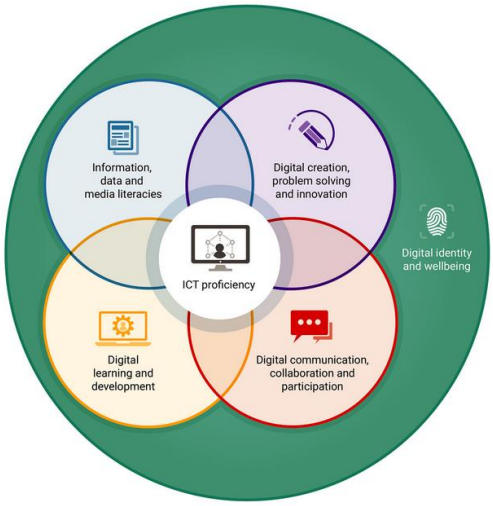

Figure 5.1 Building digital capabilities: the six elements defined

Jisc (formerly the Joint Information Systems Committee), a UK not-for-profit company that researches and supports the development and application of digital technologies and services in higher education, developed this digital-capabilities framework (Jisc, 2018a). While functional digital skills lie at the heart of the framework, it also describes a richer set of digital behaviours, practices and identities. This is a useful framework within which to start to design and plan student activities, as institutions provide workshops, case studies and continuing professional

development (CPD) activities to support staff in thinking about reframing their teaching to be more digitally inclusive. Jisc (2018b) offers a range of online resources to start to map out spaces, tools and tasks, alongside links to consider curriculum changes and transforming assessment and feedback in a digital world.

Examples of how the digital capabilities are used in practice across the sector are illustrated in the Jisc digital capabilities framework. There are also numerous examples and resources freely available through the Open Education Resources (OERs), some of which are included in the 'Additional reading and websites' section at the end of this chapter.

The Jisc framework (Jisc 2018a) comprises six elements:

- **ICT proficiency** – the development of functional skills including use and adoption of appropriate digital devices, applications, software and services and capacity to work with a range of tools, platforms and applications to achieve complex tasks.

  For example, the University of Winchester (UK) has implemented a series of projects to develop ICT proficiency in both staff and students. These include the Mobile Device Scheme in which highly skilled students are recruited to mentor staff on the use of mobile devices, and the iPilot project which analysed over 900 students' use of iPads provided by the university between 2015-17. The latter project found that iPad use had a positive impact on students' perceptions of their own digital capabilities (Elphick, 2018).

- **Information, data and media literacies** – the capacity to find, evaluate, manage, organise, curate, share, and critically analyse digital information and media texts.

The University of Edinburgh developed a 'Wikimedian in residence' project to train staff and students to edit Wikipedia pages on a focused theme. Students studying a diverse range of subjects including reproductive biology, world Christianity, English literature and sociology have researched, written and edited Wikipedia pages as part of their coursework. The residency has had a particular focus on creating and improving articles about the contributions and achievements of women in all walks of life. Through their involvement in the project, students develop skills in evaluating how knowledge is constructed, curated and contested online (University of Edinburgh, 2018).

- **Digital creation, problem solving and innovation** – the capacity to design and/or create new digital artefacts, texts and materials.

Digitised Diseases (http://digitiseddiseases.org) is a collection of 3D models of human bones created at the University of Bradford in partnership with the Royal College of Surgeons of England and Museum of London Archaeology. The collection provides an open access resource for both students and researchers. It supports the study of human osteology and palaeopathology, physical anthropology and related medical disciplines. Students can use this collection in conjunction with hands-on access to real specimens, in an innovative and integrated learning environment (University of Bradford, 2018).

- **Digital communication, collaboration and participation** – the capacity to communicate effectively in and with digital media, design digital communications for different audiences and purposes, participate in digital teams and working groups, and collaborate effectively using shared digital tools and media.

Observing the 80s (http://blogs.sussex.ac.uk/ observingthe80s) is a collection of digitised material developed by undergraduate and postgraduate students working together with academic staff, librarians and IT experts. The project was led by Professor Lucy Robinson in the Department of History. The materials are now available as an open educational resource (OER) and are used in teaching for different purposes, including the module, 1984: Thatcher's Britain, (University of Sussex 2018).

- **Digital learning and development** – the capacity to participate in and benefit from digital learning opportunities, identify and use digital learning resources, understand of the educational value of different media for teaching, learning and assessment, and of different educational approaches and their application in digitally-rich settings.

Inherited Learning is the latest stage of a programme to develop digital history methods in the undergraduate curriculum at the University of Hertfordshire's history department. It engages students in discovering visual and textual material from online archives in response to specific remits. Learners construct the results into new archival collections that are published on the open web and used as a resource on which subsequent student cohorts can build. Harnessing students' propensity to use digital technology in their

studies, as well as generally in their lives, it puts this to use in the service of techniques integral to the evolution of the discipline and the construction of genuine historical knowledge (University of Hertfordshire, 2018).

- **Digital identity and well-being** – the capacity to develop and project positive digital identities, maintain digital reputation, and manage personal health, safety, relationships, and work-life balance in digital settings.

Digital Competency frameworks are common at policy level, for example the EU Digital Strategy (European Commission, 2016), the Irish All Aboard! Project (National Forum for the Enhancement of Teaching and Learning in Higher Education, 2018). In the UK, JISC Digital Capability Frameworks has wide adoption, with a set of analytical tools. However, Biggins, Holley and Zezulkova (2017) identified a gap in digital competence frameworks. Their work illustrates that rather than being seen as separate phenomena, technological tools and human learning, self-development and wellbeing must go hand in hand, when applying digital competence and capabilities frameworks. Similarly, McDougall et al (2018) argue human-centred approaches prioritising staff and students‘ immediate and lifelong wellbeing are key to success in developing institutional policies for student wellbeing, rather than the mere use of digital tools.

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Digital wellbeing is a contested area, with no shared and agreed approaches, or clear legal frameworks regarding responsibilities. However, the EU Digital Wellbeing Educators‘ Project (Digital Wellbeing Educators, 2019, p.2) is seeking a shared way forward, and starts by commenting that online space is not benign: ‘peer pressure,

cyber-bullying, oversharing of personal information can all cause significant problems, inhibiting a young person's development as a confident online learner and citizen'.

The EU project includes a Teachers' Pedagogic Toolkit that classifies tools into seven categories, each with a suite of supporting resources. The aim is to increase the capacity of lecturers to integrate TEL in ways that can inspire engagement in learning and promote the digital wellbeing of students. By teacher's role-modelling effective digital pedagogic strategies, student learning outcomes improve as students' capacity for critical thinking and media literacy transforms the way in which they are able to flourish online.

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The EU Digital Wellbeing Educators' Project: Tools for TEL

Course Creation Tools/E-learning Authoring Tools. Software or online services that enable users to create courses, simulations, or other educational experiences. These tools typically support conventional, presentation-like courses, and may enable screen recording, multimedia, interactivity and non-linear or adaptive approaches. Examples include the blogging and website building tool WordPress, and online course building tool GoConqr.

Presentation Software/Animation Tools. Presentation software is used to display information in the form of a slide show. It has three major functions: an editor that allows text to be inserted and formatted, a method for inserting and manipulating

graphic images, and a slide-show system to display the content. Animation tools on the other hand, are great platforms for presenting your ideas, with a huge variety of pre-made themes, props and characters tailored for making professional presentations. Examples include the game-based classroom response system Kahoot! and the animation and presentation program Powtoon.

Webinar/Meeting Tools. Since webinars enable attendees to interact with each other, they are similar to personal meetings. These tools allow users to participate in a course or project even if they cannot physically attend class. They also offer the chance to share information as documents, photos or videos. Examples include the video conferencing tools Zoom and GoToWebinar.

Screencasting, Audio and Capture Tools. Screencasting allows users to share their screens directly from their browser and make the video available online so that other viewers can stream the video directly. The presenter thus has the ability to show their ideas and flow of thoughts rather than simply explain them as simple text content. In combination with audio and video, the educator can mimic the one-on-one experience of the classroom and deliver clear, complete instructions. Learners have the ability to pause and rewind, to review at their own pace, something a classroom cannot always offer.

Collaboration and File Sharing Tools. Collaborative software is designed to help people involved in a common task to achieve their goals. In more recent years, Cloud collaboration has emerged as a new way of sharing and co-authoring computer files

through the use of cloud computing, whereby documents are uploaded to a central "cloud" for storage.

Bookmarking and Curation Tools. Bookmarking tools are an emerging educational technology that has been drawing more of educators' attention over the last several years. This technology offers knowledge sharing solutions and a social platform for interactions and discussions. These tools enable users to collaboratively underline, highlight, and annotate an electronic text, in addition to providing a mechanism to write additional comments on the margins of the electronic document.

Project Management Tools. Project management tools are aids to assist an individual or team to effectively organize work and manage projects and tasks. Despite its name, project management tools are not just for project managers. They include, but are not limited to: Planning/scheduling, Collaboration, Documentation and Evaluation functionality.

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Questions for reflection

- How can technology help us to support our students on their learning journeys?
- Which technologies from above would enhance student learning in your own context?

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What are the major types of technologies central to TEL practices?

The UCISA survey (Walker et al., 2018) reports on the key technological changes across Higher Education Institutions in the UK. Interestingly, one of the highlighted findings is unchanging priorities, namely the

- institutional virtual learning environment (VLE)
- text matching tools
- provision for the electronic management of assignments (EMA)
- reading list software,
- lecture capture provision and
- audience response systems

Below is an overview of these priorities and discussion of several of the main tools that academic staff may be expected to utilise as the mainstay of their professional practice: audience response systems, everyday social technologies and virtual technologies.

The Virtual Learning Environment (VLE)

The technology most centrally associated with digital learning and teaching is the VLE. Examples of commercially available VLEs include Brightspace, Blackboard and Canvas. Moodle is a free software with which some institutions have developed bespoke systems. Others have utilised ‘enterprise systems’ – software applications such as Sharepoint and Google Docs that can be used across organisations – in place of dedicated systems built specifically for educational use. Irrespective of the

increasingly diverse category of a VLE, there are common factors that set such a system apart from other technologies used in digital Learning and Teaching. A VLE can be integrated into other university systems, such as student records systems and library reading list systems to maximise workload efficiencies and the accuracy of data, and enable broader tracking of student progress. As Learner Analytics progress, VLEs also have the potential to support pastoral, advisory, and additional learning support services.

Fundamentally, a VLE provides a space and a means for the lecturer to scaffold a pathway through learning and assessment content and activities that students can engage with individually, collaboratively, or in interactions with the lecturer themselves. Examples of typical learning and teaching activities that a lecturer might undertake in a VLE (UCISA, 2018) include:

- Communicating with students ahead of face-to-face learning or during online learning.
- Online conferencing or meetings through add-ons such as Microsoft Teams, Zoom or Blue Button. These activities helped to maintain students' sense of belonging during the COVID-19 pandemic.
- Providing a pathway through materials, including VLE embedded and external digital resources, for students to engage with ahead of or following lectures, seminars, labwork, field work, etc.
- Facilitating online group and collaborative work.
- Providing developmental feedback to students.

By engaging students within a large virtual system, VLEs also serve to encourage the development of their digital skills to produce and to collaborate within and outside their own discipline.

Text matching

Text-matching software – sometimes erroneously referred to as plagiarism detection – provides opportunities to support students to develop and use academic standards in written work submitted for assessment. Tools such as Turnitin can be used to promote formative feedback by highlighting issues such as over-reliance on a single source, and the balance between the use of cited texts and the student's own analysis or critique. These tools can compare students' electronically submitted work to continuously updated databases of online text, journals, books, and previously submitted student work. Each piece of submitted work generates an Originality Report indicating matches to sources in the database that allows checking and improvement of citation and quotation practices.

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Question for reflection:

- How would you design a formative activity using text matching software in your disciplinary context in order to help students to write in an academic context?

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Electronic management of assignments (EMAs)

A range of assessment types now involve online submission and feedback/feedforward. This includes traditional essays and other computer processed files submitted through the VLE via services such as Turnitin, online tests and quizzes, assessed blogs, online portfolios and projects, recorded presentations, and videos of fieldwork. Indeed, it is now the case that assessment submission is online by default; that is, it will be carried out through an online submission and feedback tool unless this is not feasible for some reason. When adopted correctly – and with suitable processes and support mechanisms – this shift to online submission and feedback has many advantages for the student, including the ability to complete assessment and acquire feedback from different physical locations.

Methods of online feedback include:

- Audio feedback –a majority of students reported that this type of feedback was of higher quality and more personalised than written feedback in an Australian study of audio feedback to postgraduate students over three years. Feedback was provided in mp3 files ranging in duration from 5 to 25 minutes that were uploaded to the course VLE (Parkes and Fletcher, 2017).
- Video feedback – a number of studies have found that video feedback is more comprehensive and detailed than written feedback, with markers more likely to elaborate on comments, and provide more detail on the positive aspects of students' work than in written feedback (Mahoney et al., 2019, pp.161-2). Typical options include screen capture showing marking on student work and a video of the tutor talking to camera about the work of an individual or a group.

- Peer review – students review other students' work and provide feedback often as a supplement to tutor feedback. The process aids the development of critical thinking, reflective and evaluative skills. Software tools such as WebPA – an open-source product of Loughborough University and the University of Hull integrated into the VLE – allow groups of students to mark each other's (and their own) participation in group work against set criteria.
- Rubrics - online information about assessment criteria and marking rubrics make information and requirements readily accessible and clear to students. The University of Wisconsin-Stout has published online a useful set of rubrics for different types of assessment (University of Wisconsin-Stout, 2019).
- Pre-specified feedback comments – a feature of some text matching tools such as Turnitin, 'quickmarks' are pre-specified feedback comments that a tutor can apply to student assessments. These are often used to address common formatting, grammatical or semantic issues in student writing (Law, 2019)

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Vignette: maximising the use of Reading List software

Reading list software enables students, and staff, to manage course reading lists electronically. It is able to host and maintain links to e-books, e-resources relevant to the course, such as video clips, links to professional bodies, open educational resources and much more. Here, Matt East, a former student at Anglia Ruskin University, reflects on the transition to online reading lists during his time at university:

> When I think back to my time as a student, there were pages and pages of resources to interact with across modules, typically collated as study guide, with little contextualisation being applied. The key question I always had was 'where do I start with all of this?'. Then Talis Aspire (https://talis.com/talis-aspire/) arrived at my institution. This not only allowed academics to pull all of their resources into an active, online [reading list], but it easily provided much greater structure, variety, accessibility, and context to the resources to be used. It allowed me to identify which resources I wanted to use, how I wanted to use them and allowed the academics on my course to provide more information about these resources. Importantly, it allowed the academic to explain why they would be valuable to my self-directed learning, and gave me a much more simple mechanism for finding and accessing this content, allowing me to spend more time on using the resources, and not just on finding them. This almost immediately widened the types of resources that were being used in lists too. Academics started making much more use of media content, blog posts, websites, as well as the traditional core texts and journal publications.

The main advantage for the student is the move away from a bibliography at the back of a document, to something that's living, something that changes based on student interest, preference, or behaviour, and something that can truly be beneficial to students and staff.

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Question for reflection

- What is the potential for you to use of the interactive elements of reading lists to enhance your students' learning experience?

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Lecture capture

Lecture capture can be a contested area. Staff concerns may include: students' non-attendance if they record all of their lectures; the loss of rights to the materials they develop; potential unauthorised sharing. It is essential you understand your intellectual property rights, including the timespan your recordings will be held for and what happens if you leave your institution. Lecture capture can be offered in a variety of ways to suit your own teaching context, as the definition below suggests:

> The term lecture capture covers a range of technologies that create a digital record of what happens in a lecture or class. The simplest form of lecture capture might be an audio recording that can be made available as an MP3 file for students to play back on portable devices. At the other end of the spectrum some universities have a dedicated studio where tutors can record classes for use in online learning contexts (including MOOCs) or blended learning (UCISA n.d., p. 60).

Many institutions now use an automated system of lecture capture and upload for large lectures. With some simple editing skills you can edit such recordings into sections, add in questions for students to consider, and point to journals articles and other resources. The fear that students will not attend lectures is well documented and

pre-dates lecture capture. As far back as 1980, Beard and Seniors reported on low motivation among students and an unwillingness to work independently unless pressurised. Engaging students is therefore not a new issue. Nordmann and McGeorge (2018) point to research as to why students do not attend lectures, noting that this has little to do with the availability of recorded materials. Students will still choose to attend, they argue, and will come if the lectures are well organised, offers interaction in class and motivating, and they can meet with their peers.

In terms of pedagogical benefits, Nordmann and McGeorge (2018) identify key benefits:

- Narrated screen recordings provide a great way to highlight information about software, web sites, documents and other resources.
- Lecturers can review content that has generated multiple questions in- and out-of-class, recording summaries or re-visit the subject in more depth.
- Activities set before and after class that demonstrate key aspects that can be handled more effectively through video.

More widely, this technology can offer the opportunity to record content away from campus. For example, conducting interviews with subject matter experts who would not otherwise attend campus, such as the local MP, the Court of Appeal judge, the football coach or a specialist doctor who consults across the world via technology. Or you could explore geographic-dependent topics such as building architecture, exploring the setup in the back of an ambulance or emergency room, or demonstrating the physical makeup of a volcano, river or forest. This can bring content to the students that they would never normally be able to access.

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Vignette: Inclusive practice

Jisc (2018b) recommends the implementation of institution-wide lecture capture. Their evidence shows that the main inclusive benefit is that of the learner being able to revisit recordings. A study of undergraduate students across biological science courses at Birmingham, Birmingham City and Coventry universities (Nightingale et al., 2019) concluded that supplementary lecture capture can support the learning of a substantial proportion of students disclosing learning difficulties and constitutes an inclusive approach. Indeed, there is a growing body of evidence to show that lecture capture supports the growing number of students disclosing a specific learning difficulty (SpLD). The University of Western Australia (Williams and Fardon, 2007, p.147) found that 'lectures recordings are seen by most UWA students with disabilities as essential, contributing towards creating an inclusive, equitable learning environment at the university'. Almost all of the students with disabilities and medical conditions reported lecture capture as Essential (65.7%). In a similar institution wide case study, Groen et al. (2016) describe the potential impact of lecture capture. They concluded that the ways in which lecture capture can be customised, and the level of personal engagement and decision-making about use and indicate the strong potential for this tool to meet a range of students' needs. A study by Dommett et al., (2019) concluded that the key benefits of Lecture Capture in terms of inclusivity are not made explicit at institutions implementing lecture capture; this reflects work by Walker (2017).

Lecture capture can offer these key advantages for inclusive practice:

- provides the opportunity to review aspects of the class they found difficult to understand;
- provides a study aid for review and revision;
- helps accommodate different learning styles;
- assists students who have particular educational needs;
- support for students with dyslexia or who do not have English as their first language;
- where video is used this can be useful in reviewing complex formulae written on a board, props used by the presenter or the steps of a demonstrated procedure (UCISA, 2018).

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Audience response systems

Audience response systems are tools that enable the lecturer to interact electronically with large or small numbers of students in lecture or seminar settings. Lecturers can set up online polls and questions to assess student understanding during sessions, and students can pose questions to lecturers online, review peer work online, and work collaboratively. Online tools like Mentimeter (https://www.mentimeter.com) allow students to respond to questions posed by lecturers through the student's mobile phone, tablet, or laptop, with the data processed and visualised onscreen. In other systems like TurningPoint (https://www.turningtechnologies.com/turningpoint/) students use small handsets provided by the institution to respond to lecturers' questions. Other tools, such as Padlet (https://padlet.com/) (an online bulletin board application) and even Twitter hashtags, can also be pressed into use as audience response systems.

[start box]

Question for reflection

- Thinking about the diversity in a modern classroom, where a number of students may have Additional Learning Support (ALS) needs and/or English as a second language, how might an audience response system be used to provide you with feedback on your delivery?

[end box]

Everyday social technologies

Social networking tools such as the microblogging platform Twitter, the photo sharing application Instagram and Facebook, along with blogging tools, are useful for asynchronous and synchronous communication with tutors, peers and colleagues. They can be used for collaboration and socialisation, and for promoting reflective learning. Santoveña-Casal (2019), for example, in a study of over 1,900 Spanish education students, found that students who participated in a social media-based activity presented better academic performance than those who did not carry out any activity or who took part in a more traditional learning activity. Luo et al. (2019) studied the types of knowledge promoted by Twitter-supported activities among Masters level education students, finding higher levels of participation than among students using only discussion forums in the institutional VLE and increases in perceived learner-content and learner-learner interactivity. The use of everyday social technologies in formal higher education settings is an opportunity to engage students on familiar ground, as some of these tools are already used informally by many students, although academics and institutions must consider how to ensure that data

created by students for personal and institutional use is not publicly accessible (Anderson 2019). There are also numerous studies showing how students are using YouTube for educational purposes. For example, Barry et al. (2016) analysed the use of the video sharing platform in anatomy learning by medical and radiation therapy students, concluding that integration in blended learning programmes would allow for academic and ethical oversight of the use of online video clips whose provenance may not otherwise be known. Belet (2018) conducted an experiment among 1,325 sociology undergraduates using YouTube videos to distinguish the sociocultural mechanisms underlying content- and medium-related course relevance. Tentative evidence was found that YouTube examples engaged disadvantaged students without negatively impacting other students' learning.

Virtual technologies

Educational paradigms are shifting to include alternatives to physical classrooms and the controlled virtual learning spaces that support traditional content delivery. For today's students reality already includes aspects of the virtual such as computer games, social media and constant online connection. There is huge body of literature and for the purposes of this chapter, the key definitions will enable a framing and orientation.

- *Virtual Worlds* are shared, simulated and persistent spaces which are inhabited and shaped by their inhabitants through the agency of avatars. Avatars are online representations of the participants (or 'personas') which can be customised and designed to suit the context and preferences of the participant. These avatars mediate our experience of this space as we move, interact with objects and interact with others, with whom we construct a shared

understanding of the world at that time (Girvan, 2018). An example of this is a study of widening participation students 'personas' as they represented their learning experiences in Second Life, one of the main virtual world platforms (Burns et al., 2012). Using metaphor, these students explored how they could 'be' and the possibilities of what they could 'become'. The study illustrates the potentials of changing learning spaces on student engagement.

- *Virtual Reality* creates a sense of 3D using fully immersive headsets with surround sound, and these are increasingly used with haptic devices (hand controllers). This suite of technologies enable people to immersively experience a world beyond reality (Berg and Vance., 2017). An example is clinical use of headsets to reduce anxiety and pain in dental procedures (Wiedershold et al., 2014) which cited other examples, such as pain distraction with adults in a burns unit and children undertaking chemotherapy for cancer.
- *Augmented Reality* (AR) utilises the real world as a trigger to play context relevant images, sounds and media as an overlay to a scene watched through the camera of a smart phone or dedicated headset (Holley & Hobbs, 2020). It can be seen as part of a broader mixed reality where varying degrees of virtual enhancement to the real world can be integrated into traditional delivery practice but it also allows learning spaces to be explored more imaginatively and collaboratively. The defining feature of AR that separates it from other media delivery technologies is that it is context sensitive, operating at a specific time and place. At California State University, AR was used with GPS sensors to simulate geology expeditions for students at five institutions who were able to engage with a meaningful geological learning

experience, without having to travel hundreds of miles to the Grand Canyon. Bursztyn (2015) reports on this initiative as an example of AR facilitating experiential learning outside the normal environment of the classroom.

Innovative pedagogies

Underpinning the uses of social and virtual technologies is the desire to explore new forms of teaching, learning and assessment. Innovation in pedagogy is one of the results. The Open University Innovating Pedagogies Report (Ferguson et., al., 2019) outlines ten innovative pedagogies that "have the potential to provoke major shifts in educational practice" in the future. They suggest high impact pedagogies such as playful learning and learning with robots will link school based gaming and develop creativity, problem solving and collaboration skills in Higher Education, with intelligent software assistants and robots programmed to assist teachers to respond quickly to learners' queries or helping with assessment. Drone based learning and place-based learning will start to make it possible to scale learning in the classroom based on the external environment. In the medium impact categories, Virtual studios, Wonder based learning, Making learning 'visible' all have the affordances of working with digital tools that will complement the previous pedagogies. Action learning, a team-based learning approach to solving real world problems has traditionally been offered face-to-face; however, digital technologies such as apps, social media and online communication tools offer expanded opportunities for inclusive practice. Thus, the digital offers real possibilities for drawing together inter and cross disciplinary bodies of work, by bridging the 'place and space' divide, and bring the outside world into Higher Education. Framed

by a critical perspective of digital decolonisation, acknowledging the ways in which digital presence contributes to colonisation throughout the curriculum, the ways of working outlined in the OU report offer a critical digital lens within which to plan a digitally enhanced, rich and pedagogically sound learning environment for our learners.

[start box]

Vignette: Module design incorporating learning activities

An example of the action learning and making thinking visible innovative pedagogies in practice can be seen in this vignette of work developed by Dr Suzanne Kane from Salford Business School.

Using a specific learning theory is a useful way to start to think about designing a module. In this example, theory and practice interwoven into one of new students' first Business Studies modules. The focus is upon building self-confidence as they develop their capacity for learning digital skills. These skills, presented as building their human capital, support both individual and organisational development and suggests the importance of such skills for any future workforce. The students have varied backgrounds and differing levels of prior engagement with digital technology. The pedagogical foundations that of the ipsative approach where students are specifically encouraged to benchmark against themselves, rather than their peers (Hughes, 2014). The ipsative approach was purposefully agreed by the teaching team given their knowledge of the student body and the importance of supporting employability attributes for the long-term development of the cohort. The pedagogical underpinning of the ipsative approach calls for the students to compete

against themselves to progress as individuals and therefore seek to engage with all available opportunities where possible.

TEL factors for the Digital Business Skills module are a blend of online software on external platforms (such as the Duke of York bronze level Inspiring Digital Enterprise Award iDEA award), use of automated processes on the university VLE (such as knowledge reviews), engaging with the BYOD approach (use of smart phones), introducing students to university supported software (such as MS products via cloud-based MS365), also other software not specifically supported by the university (such as bibliographic management software Mendeley), and the introduction of external online information and apps which engage wider thinking on the use of technology as a potential solution provider (United Nations – SDG app). Students work within different digital environments and expect to increase their knowledge and practice capabilities. These factors prompt students to consider whether they will choose to directly engage with all the software, information, and applications for themselves or potentially default to their teammates.

There is also an expectation that organisations they will work for in the future will support such development long-term. One commented:

> "In terms of my future professional life, I believe digital skills are significant in helping me to achieve my goals by working efficiently and adapting to the growing increase of technology used in the workplace…"

Techniques to engage the students with their online endeavours are framed as series of online challenges to allow engagement with new skills and the development of presentation skills. For example:

- Freely available online programme for the development of digital skills at three levels (bronze, silver, gold). Points towards the award are accrued by completing e-badges in the areas of – Citizen, Worker, Maker, Entrepreneur, Gamer.
- Weekly online knowledge reviews (VLE and automated quizzes)
- Five questions based on information from the lecture each week, which include multiple-choice and binary answers. These are in automated quiz format delivered via the module Virtual Learning Environment.
- Video presentations (BYOD and presentation software, referencing software, MS 365 cloud-based suite of apps: OneDrive, PowerPoint, Sway, Word, Excel, etc)
- Students are supported through the seminars to create a short (5 minutes) group video with their smart phones or by using freely available software such as Audacity. If the presentation they have created involves a lecture style format, they also need to consider the types of lecture style software alternatives that they have been introduced to through the lectures (PowerPoint, Prezi, Sway).
- Prior to this, for the support of their collaborative report writing, they engage with two types of referencing software (EndNote and Mendeley – with the assistance of library service staff).
- For the purposes of collaborating on the presentation documents, students are introduced to MS OneDrive via the university provision of MS365.
- Sustainability in business (UN online information and app)

To encourage the development of reflective practice, students are guided in engaging with and downloading online information and using the United Nations Sustainable Development Goals app. The focus is that they should make themselves aware of sustainability in business and how technology may support tech-enhanced solutions for some of the questions we face regarding business and environmental concerns**.**

[end box]

Conclusion

The challenges of embedding digital technologies in learning, teaching and assessment are complex, and rethinking the roles of educators has been at the foreground of the Educause New Horizon (2018 and 2019) expert panel reports. The UCISA (2018, p.1) reports that, despite major investment in TEL, 'we are not seeing major changes in the way technology is being used to support teaching, learning and assessment'**.** This is likely to change in the aftermath of the COVID-19 pandemic and the rapid shift to "emergency remote teaching" in Higher Education in 2020 (Hodges et al 2020). There can be little doubt that the need for us to share, create, co-create, and work with our students to ensure that the benefits of the digital are realised for all, is now greater than ever.

Looking ahead, *The State of XR and Immersive Learning Report*, (Lee et al., 2020) the first of its kind, brought together over 100 worldwide experts to consider 'what next'. The panel concluded the future of learning is immersive, with business, society and learning becoming increasing intertwined. The Virtual offers safe ways of

experiencing authentic learning experiences and this is reshaping ways in which we design our classrooms. The report highlights the role of our students as the drivers in schools and Universities as immersive technologies allow us to inhabit new virtual space and worlds. If we are to "move towards a digital fluency", then "a move towards rich understandings of the digital environment, along with the ability to co-create content and adapt to new contexts is essential" (EY-FCCI 2017).

[start box]

Questions for reflective practice and professional development

1. Consider the list of technologies you created at the start of the chapter, where you mapped your technologies. Reflecting on your map and thinking about your own skill gap, can you select ONE new technology from this chapter to master and try out in your classroom**?**
2. Consider your own use of learning technologies, how do you go about learning, and what might this tell you about how your students learn?
3. How might you develop your own pedagogic approaches in light of the Open University Futures List?

[end box]

Further reading suggestions

EDUCAUSE Horizon Report: 2019 Higher Education Edition.

https://library.educause.edu/resources/2019/4/2019-horizon-report

JISC Supporting an Inclusive Learner Experience in Higher Education Guide

https://www.jisc.ac.uk/guides/supporting-an-inclusive-learner-experience-in-higher-education

Open University *Innovating Pedagogy 2019: Open University Innovation Report 7.*

https://iet.open.ac.uk/file/innovating-pedagogy-2019.pdf

Useful resources

Bournemouth University TEL Toolkit

https://www.bournemouth.ac.uk/about/our-people/centre-fusion-learning-innovation-excellence/tel-toolkit

An example of one UK university's collection of good practices in TEL, including discussion of a wide range of available tools.

The EU DigComp into Action: Get Inspired, Make It Happen Guide

http://publications.jrc.ec.europa.eu/repository/bitstream/JRC110624/dc_guide_may18.pdf

User guide published by the European Commission. Through case studies and tools, the Guide illustrates some of the ways in which aspects of the framework are being implemented.

Learnhigher

http://www.learnhigher.ac.uk/

The website hosts numerous free resources for staff and students around support learning, and accepts submissions of new resources.

UCISA

http://www.ucisa.ac.uk

~~UCISA is the member-led professional body for digital practitioners in education in the UK.~~ The ~~organisation's~~ website contains resources including case studies, surveys, toolkits, best practice guides and benchmark reports on the uses of digital technologies in education.

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