

University Responses to Digitalization at the Start of Covid-19 – Cases in Scotland

Paper for the World Association for Sustainable Development (WASD) Conference on
'Online Learning – the New Normal Post Covid-19', 28-29 October 2020

Aleksandra Webb*, Ronald McQuaid and William Webster, Management, Work and
Organisation Division, Stirling Management School, Stirling University, Stirling UK¹

* Corresponding author:

Dr Aleksandra Webb

E: a.k.webb@stir.ac.uk

¹ Acknowledgements: The work for this paper was part funded by the EU ERASMUS +KA2, Project No. 2019-1-RO01-KA203-063214, entitled ESCALATE (<https://escalate.projects.uvt.ro/>). We are extremely grateful to local experts and colleagues at the university, who shared their knowledge of policy related to digitalisation and employability in HEI.

Abstract

- Purpose: This paper seeks to investigate some of the ongoing issues faced by Scottish and other universities in moving their teaching of under- and post-graduates rapidly online during the Covid-19 pandemic of 2020.
- Design/methodology/approach: A review of academic and policy literature is followed by a series of interviews with university staff involved in online teaching and learning.
- Findings: For most institutions and organisations, the pandemic has accelerated the speed of embedding digital ways of working. This has led to a recognition of the need for practically-focused effective inclusive interventions. These need to be designed and offered more widely to reach individuals from disadvantaged backgrounds and with low level of skills or qualifications and from older age groups. Effort is needed by policy-makers and HEI to better understand challenges and unintended consequences digital learning and working poses.
- Originality/value of the paper: This is an early paper to consider the impact of Covid-19 on the acceleration towards greater university online teaching.
- Research limitations/implications (if applicable): The range of interviewees is limited to one organisation and a wider range of university staff and types of organisation may add additional insights.
- Practical implications (if applicable): Insights from the interviews suggest ways of responding to increasing online teaching and learning in universities.

Introduction

Digitalisation is transforming the skills needed by Europe's young and working population to successfully engage in the world of work in a globalised modern economy. It is changing the way students learn, as well as the ways institutions deliver education. As digitalisation remains high on European, national, regional and institutional agendas, universities across the globe are undergoing constant transformation in order to respond to the needs of the societies and the labour markets. It is argued that for the universities to stay relevant in the increasingly competitive Higher Education sector they must to develop digital capabilities matching the needs of digital age (PwC 2015a). The Covid-19 pandemic has forced universities, as well as governments, businesses and other institutions, to rapidly increase their provision of digital services, accelerating some existing trends, but also moving teaching, and associated research, into using different forms and processes (Webb et al. 2020).

This means that universities have had to develop and adjust additional digital strategies, and digital literacies and skills amongst academics and staff, to respond to the current demands for on-line delivery and global connectivity. Innovative learning and teaching increasingly involves using digital technologies and universities also strive to embed digitalisation in the curriculum and capitalise on opportunities digital university brings to staff and students. In addition, there is high societal expectation that universities

should be key drivers of the development of digital skills and influence digital agendas in their localities to benefit wider society and economy.

However, there are many concerns sound issues around the ‘datafication’ (such as making functions and tasks machine readable) and automation of higher education provision (Williams 2017, 2020). There are also uncertainties as to: which changes are likely to be permanent, or which may be discarded or amended after the pandemic; will changes be more systemic and fundamentally change the approach to the organisation of education for some teaching rather than being limited to certain tasks or functions. Additionally, there are also other ‘unintended consequences’ of the rapid increase in digital education, such as inequalities in access to educational opportunities, increased surveillance (of staff and students), effects on types and content of learning materials and approaches to learning, tie-in to specific technologies or software which create ‘path dependencies’ on what is done in the future, and the effects of different flows of resources and forms of competition between universities, as well as those of personal data protection issues, cyber-security and ethical aspects of student attendance and performance monitoring practices (see for example: Vance and Tucker 2016; Williamson 2020).

This paper seeks to investigate some of the ongoing issues faced by Scottish and other universities in moving their teaching of under- and post-graduates rapidly online during the Covid-19 pandemic of 2020. It first reviews some of the broad policy context for Scottish and UK universities regarding digitalisation. It shows the relation of digital skills development to characteristics of the Scottish national labour market and explores how demands for digital skills currently affect universities, educators and students, and discusses some of the longer-term impacts of digitalisation. It includes early practices that the sector implemented during disruptive and unprecedented times of 2020 Coronavirus epidemic. The following section sets out some relevant aspects of the context for the accelerated move to online teaching by universities. The case of teaching in an unnamed Scottish university is then presented. This is followed by a discussion on the effects the current Covid-19 pandemic on online teaching and some implications for future teaching and learning. Finally, some conclusions are presented.

Background of digitalisation in the UK and Scotland

Enhancing innovation and increasing productivity are two core dimensions by which social and economic prosperity is to be achieved in the age of digital living and working. As a result of the evolving digital landscape and advancement in technology, a number of jobs are likely to change or disappear, while some

existing jobs are likely to be transformed. UK-wide research suggests that up to 30% of UK jobs could potentially be at high risk of automation by the early 2,030s, lower than the US (38%) or Germany (35%), but higher than Japan (21%) (Berriman and Hawksworth 2017). It has been estimated that over 46% of jobs in Scotland are at high risk of potential automation over the next few decades (Thomas and Gunson 2017). These trends are likely to affect some social groups more than others, with young people and women likely to be disproportionately affected (Arntz et al. 2016, Servoz 2019) Indeed, the ONS (2019a,b) found that 70% of the roles at high risk of automation are currently held by women.

The United Kingdom (UK) ranks fifth of the 28 EU Member States in the European Commission Digital Economy and Society Index (DESI) 2020², but still faces a digital skills gap. As digital employment is predicted to rise, these skills shortages are predicated to increase in the next five years, and they will continue to impact all UK nations' businesses, commerce and productivity. Overall in the UK, 71% of the population have at least basic digital skills, compared to an EU average of 57%, and 46% of the population have above basic digital skills, compared to the EU average of 31% (ibid.). Despite strong demand for Information and Communication Technology (ICT) graduates, the UK ranks poorly in the percentage of graduates with an ICT degree, with only 3.6% of all UK graduates graduating with an ICT degree. This equates to 16th in the rankings, just above the EU average of 3.5%. Similar shortages are observed across e-commerce and other newly growing sector relying on advance digital, technological and analytical skills.

The Scottish government's digital strategy sets out their vision of Scotland as an inclusive, ethical, innovative and productive digital nation (Scottish Government 2017). This rests on an aspiration to "*harness the technologies of the Fourth Industrial Revolution to increase economic and social prosperity*" (SCDI 2019:2). The strategy promises investment in the connectivity, digital infrastructure and digital skills development for individuals, communities and organisations. It also highlights technological ambitions to drive further developments in Artificial Intelligence (AI) and machine learning, and to capitalise on growth attributed to data revolution. Some initiatives to tackle the digital skills gap and digital connectivity, improving the nation's digital capability and reducing digital exclusion have been already set up, such as new E-commerce Institute, multiple digital hubs and centres spread across the country, and local and

² The Digital Economy and Society Index is a composite index published annually by the European Commission since 2014. It measures the progress made by EU Member States towards a digital economy and society, bringing together a set of relevant indicators.

national Digital Skills Partnerships, which bring together regional businesses, large employers, charities, and public sector organisations to tackle local digital skills challenges and build thriving and inclusive local economies (FutureScot 2020, House of Commons 2018, Webb 2020). Scottish universities are also responding to demands and ambitions set out by the Scottish Government with national and local practices aimed at improving digital skills of students and staff, and offering competitive and demand driven programmes and courses across ICT, AI, Data Science, Cyber Security, as well as embedding digital skills and competencies more widely through the university curricula.

Scottish policies (e.g. Scottish Government 2018) echo UK-wide policies and strategies, and include a promise for significant investment in education, training and support for equalising access to good employment opportunities and the supporting development of digital and cognitive technology skills, which are aligned with the European Union’s digital competency framework, which includes five key dimensions for realising the opportunities offered by digitalisation (Table 1). These include both physical and technological aspects (connectivity such as broadband and the integration of digital technology, including e-commerce), with more people orientated human capital (such as e-skills), and the use of digital services by individuals (citizens' use of internet services and online transactions) and government (e-Government).

Table 1 Principal Policy Areas of Digital Economy and Society Index (DESI)

1 Connectivity	Fixed broadband take-up, fixed broadband coverage, mobile broadband and broadband prices
2 Human capital	Internet user skills and advanced skills
3 Use of internet	Citizens' use of internet services and online transactions
4 Integration of digital technology	Business digitisation and e-commerce
5 Digital public services	e-Government

Source: Adapted from: Digital Economy and Society Index (2020) (see: <https://ec.europa.eu/jrc/en/digcomp/digital-competence-framework>)

Skills and digitalisation

The McKinsey Global Institute (2019) predicts that, in addition to digital skills, social and emotional intelligence³ and higher cognitive skills⁴ will grow in demand over the coming decade due to automation. Jobs requiring caring, creativity or emotional and social intelligence will be less affected by AI or extensive automation, as machines cannot yet match uniquely human interactions and performance in those roles. Global projections expect expansion demand in healthcare providers; professionals such as engineers, scientists and analysts; IT professionals and other technology specialists; managers and executives; and educators and people in creative industries (artists, performers and entertainers) (McKinsey 2017). It is anticipated that economies like the UK and USA, where creative occupations make up a large part of the workforce, may be better placed than others to deal with the disruption of employment from future advances in automation (Bakhshi, Frey and Osborne 2015). However, in the currently polarised labour market, the danger of automation and replacement is being associated with a range of occupations, not only low-waged jobs. Therefore, workers in those jobs may need to reallocate to tasks that are less susceptible to automation – i.e. tasks requiring creative, emotional and social intelligence, (but successful acquisition of creative and social skills is prerequisite for such transition) or develop advanced digital skills for new jobs and sectors of growth in digital economy.

According to Frey and Osborne (2017), the social intelligence element of jobs is a substantive barrier to their computerisation; as while most workers in transportation and logistics, office and administrative support and production occupations are likely to be significantly substituted by computer capital, people-centred services and occupations are not. Social intelligence constitutes abilities such as social perceptiveness (being aware of others' reactions and understanding why they react as they do), negotiation (bringing others together and trying to reconcile differences); persuasion (persuading others to change their minds or behaviours), and assisting and caring for others (providing personal assistance, medical attention, emotional support, or other personal care to people). An example of such person-centred sector of growth in Scotland is Early Learning and Childcare, which has been recently stimulated by the publicly funded expansion in free childcare (Webb and McQuaid 2020, 2018, Webb et al. 2020).

³ *Social and emotional skills*: including entrepreneurship and initiative taking; leadership and managing others, advanced communication and negotiation skills, adaptability and continuous learning, interpersonal skills and teaching and training others.

⁴ *Higher cognitive skills*: including creativity, complex information processing and interpretation, critical thinking and decision making, project management and quantitative and statistical skills.

In general, it is clear that new sets of skills will be sought by employers in the context of the changing nature of jobs and continuing advancements in technology. However, the term “digital skills” covers a wide array of competencies, knowledge and skills. An important distinction can be made between ‘baseline’ digital skills (i.e. those that are easily transferrable from one role to another, and from one sector to another), and ‘specific’ digital skills (i.e. those that are role or sector-distinguishing and required for jobs in a specific role or domain) (Nania et al. 2019). ‘Baseline’ digital skills are commonly required by employers, with over 75% of job openings across all skills levels requiring digital skills, which suggests these are a near-universal requirement for employment. ‘Specific’ digital skills can be described according to clusters such as: Software and Programming, Computer and Networking Support, Data Analysis, Digital Design, CRM, Digital Marketing, Machining and Manufacturing Technology. Based on analysis of millions of online job adverts in the UK, evidence suggests that digital skills are required in at least 82% of online advertised openings across the UK but the precise skills demanded are not uniform across the country (Nania et al. 2019). Their research suggests that specific digital skills may help workers reduce their risk of automation by 59% and will support career progression and increase in wages as roles requiring digital skills pay 29% over those roles that do not. This difference is apparent at all skill levels, but the wage differential increases at higher wage bands.

Therefore, in addition to the range of soft skills (such as communication, teamwork or project management skills) current and prospective workers need to develop more specific digital skills to maximise chances of employment and success in the digital economy. This may include becoming competent in using digital tools and software such as Adobe Photoshop for designers; computer-aided design for engineers and manufacturing workers; customer relationship management software for sales and marketing professionals; and computer programming and networking for IT professionals. These specific digital skills are required in 28% of low-skill jobs, 56% of middle-skill jobs, and 68% of high-skill jobs (Nania et al. 2019)

Some 88% organisations across UK currently lack digital skills, with many expecting these shortages to increase in the next five years (Open University 2019). As almost all jobs require basic level of digital skills, 72% of employers state that they are unwilling to interview candidates who do not have basic IT skills (CEBR 2018). Interestingly, despite concerns related to loss of jobs due to automation and new consumer trends, not all employees express to be interested in acquiring new digital skills. According to the Open

University (2019) study, overall, just half (48%) of employees say they want digital training. This level increases amongst younger workers, with two thirds (67%) of 18-34 year olds, and a fifth (22%) of younger employees are even funding their own training in this area. In contrast, just one in four (26%) over 55s say that they would like digital skills training.

Barriers in digital infrastructure and connectivity, specific digital skills gaps and access inequalities (including e.g. female underrepresentation in Cyber security and similar training and roles (DCMS 2020) and digital exclusion most generally (CEBR 2018)), need to be addressed to allow people to participate fully in the digital economy, and also to fulfil the UK and the Scottish Government's ambitions for inclusivity and productivity. Because of the 'digital skills' heterogeneity, governments, skills and training bodies need to be aware of difficulties related to a design of interventions that address specific digital skills needs, which may be sector specific.

Digital transformation is generating considerable debate among education providers, policy-makers, economists and industry leaders about its societal impact. As much as digitalisation can support greater work productivity and break down some geographical and socio-economic access barriers, it can also profoundly disrupt society and facilitate the emergence of new previously unforeseen digital barriers. Concerns are growing about how it is affecting issues such as jobs, wages, inequality, health, resource efficiency, social relations and security.

Policy and university responses to online delivery

There have been many examples of proactive developments by Higher Education Institutions (HEI) in addressing and strategizing digitalisation needs, on the one hand, and in filling the digital skills gap across university degree programmes, on the other hand. This section describes these initiatives, which range from: increases in new digital courses (including conversion courses in Data Science and AI⁵); Degree Graduate Apprenticeships; strategies for development of wider digital skills and competencies embedded in degree programmes and additional employability-focused activities for students; and the upskilling of staff to meet digital delivery needs. HEI's are also aware of the challenges that digitalisation poses in terms of how education is delivered.

⁵ <https://www.officeforstudents.org.uk/advice-and-guidance/skills-and-employment/postgraduate-conversion-courses-in-data-science-and-artificial-intelligence/>

Higher Education and Digitalisation: The impact of digitalisation on Higher Education provision

In the last decade various digitally oriented terms and concepts emerged and are prominent in teaching and learning scholarship, such as the *digital university*, *digital literacies*, *virtual learning*, *e-learning*, *on-line and blended learning*, *technology-enhanced learning*. New groups across campuses have been created to enhance learning in the digital university for two reasons (Weller 2016). On the one hand, initiatives led by the digitalisation strategy emphasise importance of digital delivery as reflecting the way students want to learn and thus enhancing student participation and engagement. On the other hand, the argument of efficiency emphasises the operational advantage the learning with technology offers to HEI, in order to carry out teaching in more cost and time effective, and potentially scalable manners, especially in the context of increased numbers of students. Another key reason for universities engaging with digitalisation is their intuitional responsibility for the preparedness of students for work (PwC 2015a,b) As such, the employability agenda has been at the heart of HEI policies and practice, particularly in order to meet the demand for specific skills and also to address the gap in skills often reported by employers (UKCES 2014, McQuaid and Lindsay 2005).

HEI digital strategies, along with the embeddedness of digital practices and the development of digital skills, have initiated a debate around the pedagogical impact of digitalisation. Although technologies have always shaped pedagogic process and have been used to support learning, the exponential growth of use of internet and web-based technological tools in learning and teaching, is profoundly testing the technical competence and confidence of many university teachers and educators (Weller 2016). The emergence of the 'digital immigrant' (Prensky 2001) suggests that there are generational differences in exposure to technology, which often make educators overwhelmed with the choices the digital realm offers, despite their motivation and enthusiasm for adopting digital technologies in teaching. Similarly, despite the wide embeddedness of some aspects of technology in day-to-day communication and living, questions are emerging about the digital capacities of students and their ability to effectively use and navigate through digital environments of learning, despite being considered as 'digital natives' (ibid.). In a context of increasing and fast-moving embeddedness of technologies in teaching, learning and working practices, development of digital knowledge, skills, attributes and behaviours seem to be an area of a paramount importance. This technological shift has called for rethinking of traditional face-to face pedagogies and alteration to how universities work.

In recent years, universities around the world, and also Scottish universities, have heavily invested in the development of digital infrastructures such as Virtual Learning Environments (VLEs) than enable applications of blogs, wikis, document sharing, discussion forums, podcasts, lecture captures, virtual laboratories, screencasts and e-portfolios/e-submissions in on-line or blended learning. Massive Open Online Courses (MOOCs) are examples of wholly online learning experience, which utilises Web 2.0 technologies and social media tools, provide a new way of learning, connecting and collaborating away from the university campuses. Scholars argue that because these new developments have given students more freedom as to where and when they want to study, technology 'adds value' to learning for all learners (JISC 2009:8 in Weller 2016: 174). As new knowledge is being created through and with the technology-enhanced learning, connectivity and digital interactions are being recognised as expected and needed conditions for creating and sharing knowledge in digital age (Siemens 2005, Cormier 2008). This trend somehow reflects the creation of knowledge and innovation in the world of work and matches the new flexible patterns and structures of working (Skills Commission 2014).

For many institutions, despite the appetite for becoming digital universities, the implementation of digital needs and skills is a rather an ongoing incremental process, rather than an already fulfilled mission. Internationally, the 2020 Covid-19 epidemic has highlighted that HEI needs to support both staff and students in acquiring wider digital competencies and not just selected digital skills. At the same time as this digital integration happens, many unintended consequences of learning and teaching in digital realms are surfacing, such as personal data protection issues, cyber-security and ethical aspects of student attendance and performance monitoring practices. Only slowly are these issues getting recognised as challenging and potentially altering the nature of university education.

Scottish Universities response to digitalisation

Scotland's higher education sector has a long history and it is recognised as diverse and internationally successful. It has ambition to be the best place in the world to learn, educate, research and innovate (SFC 2020). Scotland, with a population of 5,463,300 (NRS 2020), is home to 19 Scottish universities, funded to a large extent by the Scottish Funding Council. Universities in Scotland respond to the increasing market demand for digital skills in multiple ways. There is a great awareness amongst university leaders, educators, learning technologist and career/student support services, that the response to digitalisation has to be holistic, including more than just the education offer that directly develops knowledges and skills for specific Digital Skills Clusters, such as data analytics, digital design or programming. A wider

understanding of digital literacies, as a response to educational as well as labour market needs, involve developing student skills and behaviours across all subject areas such as: being able to navigate through the digital environments, work collaboratively using VLEs and various platforms, software packages and social media, search for, critically appraise and use multiformat sources of information by articulating knowledge through various digital artefacts, present themselves professionally in the online realm. Such widened understanding of digital literacies is inherently linked with the employability agenda, which is one of the key focuses of HEI at present.

Key policy-based initiatives and programmes influencing digitalisation in HEIs are generally aligned with the vision for Scotland as a productive, innovative and digital nation with educated and skilled workforce able to successfully engage in the world of work in a globalised modern economy (QAA 2020). The activities focused on the improvement of strategy, policy and practice are led, supported and monitored by the sector's body, the Scottish Higher Education Enhancement Committee (SHEEC) managed by Quality Assurance Agency for Higher Education (QAA). Focus on the HEIs' role in development of digital skills has strengthened the long present preoccupation with development of graduate skills and attributes and their readiness for work, thus ever so closely entangling the employability and digitalisation agendas. The drive for digitalisation, however, has also highlighted the preparedness and gaps in the digital skill base of academics and educators directly tasked with the skills development of their students.

Examples of digital innovation and skills development (Case study university)

This section presents a range of examples showcasing the innovation in digital skills development, using examples from a mid-sized Scottish University. Although these are specific practices enacted in a specific institutional context, similar activities have been introduced or implemented across the HEIs in Scotland.

New courses in digital topics

To respond to the needs of the labour market, an increase in a range of courses focused on development of digital skills have been observed in Scotland, especially in areas such as Data Science, AI and Computing. Locally at the University six tailored specialist undergraduate (UG) programmes and nine post-graduate (PG) programmes are currently in the university educational offer. All of these courses have been designed to develop a range of specialist digital skills such as Software and Programming, Computer and Networking Support, Data Analysis, Digital Design, Digital Marketing and Customer Relationship Management (CRM) (Nania et al. 2019). These are essential skills for finding work and developing careers in computing science

industry, commerce, finance, medicine, media, law enforcement and security and public life. The University offers Graduate Apprenticeship in Data Science (BSc) designed as a combination of work-based learning and high-quality teaching delivered by experts in the field. This practical degree programme is focusing on developing mathematical and analytical skills needed to begin a career as a data scientist or analyst. It is a graduate-level qualification developed by Skills Development Scotland, the national skills agency, which is responsible for implementing the Scottish Government's strategies for upskilling Scottish workforce. Graduate Apprenticeships are delivered in partnership with the industry and the education sector to provide work-based learning opportunities for individuals who are currently employed, which means that Graduate Apprentices work for their employer whilst studying and developing their skills at the University.

Also, *Digital Skills Development Webinars Series* for students and recent graduates was run by University's Innovation and Enterprise hub (in summer 2020). The Enterprise Programme, supported by the University Vice-Chancellor's Fund, aims to help develop essential digital skills for future professionals and entrepreneur. The first series focused on digital strategy, digital marketing, web-design and E-Commerce platforms.

Innovative assessment and Digital Literacy

In addition to digital subjects on offer, universities are increasingly embedding digital content to support student in their learning. They help students develop a range of other digital skills and literacies through authentic and innovative assessments, which increasingly features development of graduate skills needed in today's world of work. These assessments either enable students to present solutions to a problem (often based on data handling and analysis) or communicate gained knowledge in a format of a digital artefact (e.g. presentation, video, podcast, digi-essay), thus in addition to the theoretical and practical insights the innovative assignment require from students to gain a high level of working skills in usage of specific software. Another innovative use of assignments is focused on developing specific working practices and professional behaviours that in contemporary world of work take place increasingly in the on-line space. These skills are often essential in graduates' competition for jobs or their successful exploitation once already employed.

For example, as part of the core skills element of the MSc HRM at the university, the assessment methods were adjusted in 2017 so that students were asked to demonstrate a level of digital competence that the

course leaders felt was becoming essential to the employability of HR graduates. Realising that companies were increasingly making use of online video conferencing and meeting platforms as an alternative to face-to-face meetings, students were given instruction on good video meeting set-up skills – paying particular attention to lighting, sound, background, and camera contact. Mindful also of the increasing use of video CV formats in job interviews, the MSc programme built in assessments where students were asked to speak to camera about their skills and attributes without the use of notes in addition to the technical competencies in terms of camera set up. The module that instructs students on practice and communication skills (interviews, presentations, holding difficult conversations with staff) also makes use of an e-portfolio of video evidence of the skills in actions, and also gave students the opportunity to set up their own practice blog site (not visible publicly) where they marketed themselves and wrote short pieces about HR topics. Digital competence is now firmly embedded as an aim and in the learning outcomes of all HR degrees at PG and UG level at the University. The University's move into digital competences was noted by the Chartered Institute of Personnel and Development in their accreditation of the degree. The programme team was ahead of the curve in relation to the embedding of digital skills as a key element of being an effective HR practitioner and led to 'Digital Working' being incorporated into the CIPD Profession Map in 2018.

Developing Digital Skills of Staff – courses in online and blended learning

In the last five years, Scottish universities have been expanding their teams of learning technologists who support, develop and run ranges of courses focused on the online/blended learning for university educators. The objective is to develop digital skills of academics teaching students. Even before the Covid-19 global epidemic, the uptake of a Virtual Learning Environment (VLE) has been increasing and blended ways of learning has been championed by institutions as way of engaging students in more innovative, collaborative and inclusive learning, developing higher order skills and reappraising the value of independent learning and critical thinking. Some institutions also encourage and support staff to think about digital accessibility and therefore place a lot of effort on promoting a wider and varied use of digital resources in teaching, and particularly the engagement with/use of the open-source resources. University staff are encouraged to attend various CIPD opportunities, such as *the Blended and On-line Learning and Teaching course*, HEA fellowship development opportunities, and a wide range of Teaching Bites sessions focused on digital delivery and tools to deliver pedagogically sound student learning experiences. The most recent emphasis on upskilling academic staff in online delivery has been accelerated by the Covid-19 pandemic in 2020. However, an important question is how much do these choices create a degree of

'path dependency', where future decisions on what and how to teach, research etc. are explicitly or implicitly influenced or restricted by these choices.

Digital transformation of student learning and experience

Digitalisation has been positively linked with student learning experience (JISC 2018a,b). As the universities use of digitalisation for learning becomes more popular and important, so is the need to support students in confident use of the digital learning infrastructure and resources throughout their university journey. According with its strategic vision focused on the enhancement of student experience, the University launched the student digital experience insights survey pilot in both 2016-2017 and 2017-2018 (JISC 2018). The evidence gained from these insights has been significant in helping to lead transformation initiatives in digital learning and services offered to students, which includes development of a new digital learning approach, improvements to services and digital provision (software, hardware and the learning environment), purchase and implementation of a new VLE and lecture recording systems, support with the effective use of students own digital devices, quality of digital teaching on course and in digital security and online safe professional behaviour. The interest in student expectation and engagement with students has been successfully embedded in the process of information gathering through 'Let's get digital -Tell us your digital study needs' campaign, with a strong marketing brand and distinctive, eye-catching images with focused messages that were changed every few days. This brand was used in a series of promotional activities in areas of high student footfall, as well as on digital screens around the University, notices on the VLE and student portals, and in the Student Bulletin. All gathered evidence contributed to development of the Digital Learning Project Board, which provides the direction, scrutiny and governance around the digital learning agenda at the University. This board is currently shaping a new learning and teaching strategy. Some of the initiatives that the University has already undertaken in response to the evidence gathered include:

- Ongoing awareness raising and cyber security training (with a campaign at the outset of each semester and an ongoing presence on Twitter and Facebook throughout the year).
- The creation of a new knowledge base and self-service portal to provide online support and guidance for digital issues (e.g. information in bite-sized, easily digestible, chunks and is available to students at any time and via any device).

- Use of a variety of channels and different styles to engage with and respond to students (e.g. the Student Bulletin, articles on the Information Services blog, use of memes and little snippets released via social media).
- Investment in Panopto, a media management system that offers media creation and management options. Lecture recording is compulsory at the university and the aim is to use Panopto to promote and share its effective pedagogic use across the institution.
- The introduction of a new stakeholder engagement toolkit for all staff to use which promotes use of innovative techniques and shares findings from surveys and other activities.
- A laptop loan scheme is being planned to supplement desktop provision and address student feedback requesting more computers.
- Development of a training module for the institutional VLE to support online learning which is available to new students on pre-arrival along with additional content designed to support their use of the library as well as the development of information, productivity, digital and data literacies (including on-line collaboration/team tools, such as Office 365) and cyber security awareness.

The commitment to transforming the experience and digital capabilities of students at the University echoes the JISC⁶ NUS student digital experience benchmarking tool (JISC 2016). It has been embedded across all the Student Support Services and the Career's Centre, and offers a range of academic skills, development and employability workshops, in group and one-to-one formats.

Impact of the 2020 Coronavirus pandemic

While it is too early to assess the full impacts of the Coronavirus pandemic on the HEI sector, it is clear that the epidemic caused an unprecedented disruption in education and training systems. For example, in June 2020, following the unprecedented use of digital technologies in schools and universities and an unexpected switch to distance/online learning during the pandemic, the European Commission has launched a public consultation to learn from this major event⁷. It included a distribution of a survey and a

⁶ JISC is the UK's higher education digital technology agency which supports post-16 and higher education sector by providing advice, digital resources, network and technology services, and thus it supports HEIs in developing the culture, infrastructure and practices in digital capabilities. JISC is funded by a combination of the UK further and higher education funding bodies, and individual higher education institutions.

⁷ UKRO (2020) 'Public Consultation on new Digital Education Action Plan', more information available on: Last accessed on 26.06.2020

series of summer online outreach events, which will be open to the general public, educational institutions and public and private organisations to ensure a wide range of views and perspectives. A new Digital Education Action Plan will be devised upon recent experiences and practices to consolidate a new European vision for the immediate Covid-19 recovery period and the long-term support for education and training sector's digital transformation.

In the UK/Scotland similar numerous small- and large-scale research projects and impacts-focused feedback gathering events and initiatives are currently being undertaken. The Covid-19 pandemic in 2020 has highlighted the importance of digital delivery of learning and teaching in HEI in a globally connected world, particularly in the face of unexpected disruption of such a massive scale. Institutions such as the Open University (UK), which have historically delivered distance learning, were able to capitalise on their education philosophy and strategy with a business model that featured flexible, remote and digital learning. Some HEIs with solid technological infrastructure and confidence in using the virtual environment were also able to quickly adjust and complete the intended programme of learning. In other relatively underinvested, smaller, or universities with more traditional teaching approaches, the Covid-19 pandemic has questioned institutional and individual preparedness for online learning and remote working. Such rapid requirement to switching to on-line learning took many institutions by surprise. After the initial shock, there is currently a clear mobilisation in the HEI in Scotland for collating and sharing best practice to ensure that both staff and students are able to confidently use technology for teaching, learning and working in the post-Covid-19 reality. A general optimism is often detected amongst academics in Scotland, who despite some concerns related to the substantial time investment needed for transition to the on-line teaching, see this as unavoidable response to the changing times escalated by the pandemic.

Digital Champions and training for staff

Initiatives, such as "Digital Champions" (DC) schemes are currently rolled out across Scottish HEI to enable academics with greater knowledge and experience of using digital tools in learning to support colleagues in their departments and schools. These champions tend to be trained and supported by Academic Development (AD) teams and institutional learning technologists. At the case study university, a 'Faculty Digital Champions' initiative appointed two 'Champions' (i.e. academic members of staff with online teaching experience) from each of the five Faculties. The two areas of this role revolve around:

1. Augmenting the support on offer (Digital Champions are to give advice of how to 'translate' the traditional face-to-face delivery into delivery in VLE and enthuse colleagues to a greater and more student-focused digital academic practice and act as mentors).
2. Being a conduit between AD and the Faculty and ensure better communication in both directions (in order for messages from the AD to flow to academics, and also in the opposite way, so AD can identify existing gaps and organise training).
3. Sharing best practice with colleagues (from the Champions themselves, from the sector, and from other Faculties. A new Online Learning and Teaching Sharepoint site has been set up on the intranet, which brings together all available resources, and links to external sites).
4. Helping AD in the design and delivery of workshops, teaching bites, masterclasses and podcasts to help engage academics across the University. There is already a wide range of support on offer, which include a programme of events and masterclasses, a weekly drop-in session where staff consult Academic Development staff, Learning and Teaching Committee members (L&T) and Digital Champions, and a new week-long module for staff on Online Teaching⁸. In addition, a new VLE module template (for all modules) with embedded online checklist for staff has been designed to guide preparation.

The overall objective of the scheme is to create self-supporting communities of practice confidently and meaningfully embedding the technology in teaching. The knowledge and innovative solutions these communities can offer will be important in the post-pandemic times, when campus-bound learning might become a thing of the past and more flexible ways of learning will be expected from geographically dispersed student populations. Less is being done to train staff in the European Union's General Data Protection Regulation (GDPR) related complexities, to inform students of the ways in which their personal and educational data trails are being used, and to make staff aware of potential consequences of delivery on-line that might enable third party providers to engage in unethical practices, such as reuse of personal data (of both staff and students) for commercial purposes.

⁸ The *Supporting On-line Learning and Teaching* course is a week-long facilitated online course introducing staff to learning and teaching online and the Stirling approach. It is a simplified version, based on an earlier edition of *Blended and Online Learning and Teaching* to respond to the quick switch to teaching and learning online caused by the Coronavirus crisis.

Supporting students through difficult times

The Covid-19 pandemic in 2020 has forced university leaders, academics, technologists and support staff to consider the practicalities of operating in a fully digital space. For many institutions, this was the first 'hands-on' full experience of moving towards a more digital university, and equally the same experience has been shared by many students, who might have been so far used to rather traditional delivery with digital engagement that was meant to only support their normal class-based and campus-based education. Switching to a fully on-line mode of study therefore required a substantial adjustment and a greater responsibility and engagement in learning. However, as students found themselves out of the campus, many lost the support from staff but also access to sufficient technology and infrastructure. Despite the ever-pervasive dominance of technology in our day-to-day lives, still not all students have equal and sufficient access to hardware and internet connection. Supporting students when they are unable to access those crucial services has been reported as the most difficult and often frustrating aspect of the epidemic, during which Scottish universities (unlike schools and colleges) were expected to operate as normal. Currently, additional initiatives to support students and their learning are being developed in the Scottish HEI sector, to include: greater access to digital resources (incl. e-textbooks), adjustment to assessment, more asynchronous and self-guided delivery of courses and all other supportive skills development workshops offered by the library, information centres and the student support services (to include videos on how to use VLE). Additional online support is available for students self-isolating, including access to psychological help, counselling and social support (e.g. buddy system). The new University App, has been developed which integrates services and offers information in the digital mobile format, appealing to student.

More collaborative ways of working

A sector wide solidarity has emerged during the epidemic. There are multiple examples of how employees (academic and non-academic staff) have created divisional and university digital platforms for sharing positive practices on how to better organise work, how to prepare materials/adjust assessment or how to plan forward. The same has been true in the wider sector, where colleagues from across different institutions eagerly share experience and support each other in finding best solutions to the crisis caused by the Covid-19. A general optimism is detected amongst academics in Scotland, who despite some concerns related to the substantial time investment needed for transition to the on-line teaching, see this as an unavoidable response to changing times. Many agree that reappraisal of existing practices and

upskilling in digital skills for delivery of educational content is the worthwhile investment that has a potential to increase the quality of learning and student engagement.

Conclusions

Digital technologies are constantly evolving and becoming increasingly embedded into our lives and work. The future of work is predicated to be greatly relying on basic and specific digital skills but the digital skills gap exists across the labour market and specifically in some new jobs across AI, Cyber-security and E-commerce. There is a concurrent need to up-skill people across their working lives in a range of digital skills. More people of all ages must be given opportunities to upskill, retrain and develop the higher-level and digital skills that are matching the needs of employers. The currently reported gap in what skills employers need and what skills workers suggests that more practically focused effective intervention need to happen. Within this context, universities have sought to increase both specific and generic digital education and skills among students; and accelerated by the Covid-19 pandemic, to rapidly increase their provision of online teaching, learning and research provision. Many of these changes are likely to continue in-whole or in-part post-Covid-19. These include issues of access variety of forms of teaching and learning for students and others, particularly those disadvantaged, and the need for further research on the unintended consequences of the rise in online teaching and wider research and education.

First, there is a need for practically-focused effective inclusive interventions need to be designed and offered more widely to reach individuals from disadvantaged backgrounds and with low level of skills or qualifications and from older age groups. The rapid move to online teaching should not ignore the real situation that disadvantaged students find themselves in, such as in terms of physical access to online resources, necessary digital skills, and appropriate social, pastoral and educational support. A variety of pathways to digital up-skilling and re-training need to be available, including pathways that are based in either formal education setting, workplace or the community. More flexible student funding routes could be made available, especially for mature students and carer-changers to fully enable individuals to engage with learning throughout their lives, such as a “lifelong learning loan allowance” for adults without a degree suggested by the Auger review of post-18 education in the UK (Hubble and Bolton, 2019). Government and Higher Education Institutes need to re-consider how to make the delivery of university education fully flexible and fitting to lives of more learners who are otherwise unable to take advantage of largely publicly-funded university education at under-graduate level. More flexible study (by length of course, time, location and media), enabling students to move between work and study across their

lifetimes, will be important aspect of an effective response to rapidly changing labour markets. Despite an increased demand for lifelong learning, the provision of flexible adult education by UK higher education institutions has been declining in recent years (Tazzyman et al. 2019). With the decline of more flexible ways of studying that are fitting within peoples work and home responsibilities, adult learners have been withdrawing from university enrolment (Butcher 2020). Greater consideration is needed for more flexible and modular training, in addition to traditional part-time and full-time modes of study, should be considered with the decline of more flexible ways of studying that fit within peoples work and home responsibilities, adult learners have been withdrawing from university enrolment.

Second, when operationalising and implementing digital up-skilling both in response to both general digital globalisation and the current Covid-19 pandemic, a significant effort needs to be placed by the policy-makers, and especially HEI, to better understand challenges and unintended consequences digital learning and working poses. For almost all institutions and organisations, the pandemic has accelerated the speed of embedding digital ways of working. The pandemic forced many employers and educators to work and deliver content remotely, learning quickly about solutions focused on short-term delivery of services. Hence the pandemic has acted as a catalyst for quicken upskilling and highlighted areas that will require a more systematic training. Despite the appetite for implementation of digital, on-line and virtual solutions, this will be an incremental process. Many organisations and institution, including the HEIs realised there are gaps to be addressed not only in the skills but also in the infrastructure, as the crisis has also highlighted the social and digital divides.

HEI has entered a new era where learning is increasingly mediated by digital technologies. The pandemic has highlighted that HEI needs to support both staff and students in acquisition of wider digital competencies and not just selected digital skills. However, at the same time as this speedy digital integration happens, many unintended consequences of learning and teaching, and indeed working, in digital realms are surfacing, such as personal data protection issues, cyber-security and ethicality of on-line surveillance practices. Only slowly these issues are getting recognised as challenging and potentially altering the nature of working lives and the university education. There is an urgent need to better understand challenges and unintended consequences digital learning and working poses. Universities and workplaces must swiftly and appropriately respond not just to the demand for digital skills but be able to also recognise complexities and potential consequences of being, living and working on-line that pose ethical and moral concerns.

References

- Arntz, M., Gregory, T. and Zierahn, U. (2016) *The Risk of Automation for Jobs in OECD Countries: A Comparative Analysis, OECD Social, Employment and Migration Working Papers*. 189. OECD: Paris.
- Bakhshi, H., Frey, C.B. and Osborne, M., (2015). Creativity versus robots: The creative economy and the future of employment. NESTA: London.
- Berriman, R. and Hawksworth, J. (2017). Will robots steal our jobs? The potential impact of automation on the UK and other major economies. *UK Economic Outlook*, 30-47.
- Butcher, J. (2020). *Unheard: the voices of part-time adult learners*. HEPI Report 124, Higher Education Policy Institute, Oxford. <https://www.hepi.ac.uk/wp-content/uploads/2020/02/Unheard-The-voices-of-part-time-adult-learners.pdf>
- CEBR. Centre for Economics and Business Research (2018). *The economic impact of digital inclusion in the UK*.
- Cormier, D. (2008). Rhizomatic education: Community as curriculum. *Innovate* 4 (5), https://www.learntechlib.org/p/104239/article_104239.pdf
- DCMS. (Department for Digital, Culture, Media and Sport) (2020). *Cyber security skills in the UK labour market 2020*. <https://www.gov.uk/government/publications/cyber-security-skills-in-the-uk-labour-market-2020/cyber-security-skills-in-the-uk-labour-market-2020>
- Digital Economy and Society Index (DESI) 2020 Country Report United Kingdom https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=66933
- Frey, C.B. and Osborne, M.A. (2017) The future of employment: How susceptible are jobs to computerisation?, *Technological Forecasting and Social Change*, 114(1), pp. 254–280.
- FutureScot (2020). *Digital connectivity spend set to double in 2020/21 budget*, <https://futurescot.com/digital-connectivity-spend-set-to-double-in-2020-21-budget/>
- House of Commons (2018). *Digital Connectivity in Scotland* <https://publications.parliament.uk/pa/cm201719/cmselect/cmsscota/654/654.pdf>
- Hubble, S. and Bolton, P. (2019). *The Post-18 Education Review (the Augar Review) recommendations*.
- JISC (2018a). *Digital Experience Insights Survey 2018: Findings from students in UK further and higher education*.

- JISC (2018b). *Evidence informed digital transformation*. <https://digitalinsights.jisc.ac.uk/case-study-listing/university-stirling/> last accessed on 29.06.2020
- JISC (2016) *JISC NUS Benchmarking tool – the student digital experience*. http://repository.jisc.ac.uk/6140/1/Jisc_NUS_student_experience_benchmarking_tool.pdf
- JISC (2015). *Developing digital literacies*. Retrieved from: <https://www.jisc.ac.uk/guides/developing-digital-literacies>
- McKinsey Global Institute (2019). *Skills shift: Automation and the future of the workforce*: Discussion paper <https://www.mckinsey.com/featured-insights/future-of-work/skill-shift-automation-and-the-future-of-the-workforce>
- McKinsey (2017). *Jobs lost, jobs gained: Workforce transitions in a time of automation*, McKinsey Global Institute December.
- McQuaid, R.W. and C. Lindsay (2005). The Concept of Employability, *Urban Studies*, 42, 2, 197-219.
- Nania, J., Bonella, H., Restuccia, D. and Taska, B. (2019). *No Longer Optional: Employer Demand for Digital Skills*. DCMS: London.
- NRS. National Records of Scotland (2020). *Population of Scotland*, last accessed 6.07.2020 <https://www.nrscotland.gov.uk/statistics-and-data/statistics/scotlands-facts/population-of-scotland>
- ONS. Office for National Statistics (2019). *Which occupations are at highest risk of being automated?* <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/articles/whichoccupationsareathighestriskofbeingautomated/2019-03-25>
- ONS. Office for National Statistics (2019b). *Exploring the UK's digital divide*. <https://www.ons.gov.uk/peoplepopulationandcommunity/householdcharacteristics/homeinternetanddigitalmediausage/articles/exploringtheuksdigitaldivide/2019-03-04>
- The Open University (2019). *Bridging the Digital Divide*. <http://www.open.ac.uk/business/bridging-the-digital-divide> OU: Milton Keynes.
- Prensky, M. (2001). Digital natives, digital immigrants part 1. *On the Horizon*, 9(5):2-6.
- PwC (2015a). The 2018 *Digital University*. *Staying relevant in the digital age*. <https://www.pwc.co.uk/assets/pdf/the-2018-digital-university-staying-relevant-in-the-digital-age.pdf>
- PwC (2015b). *The 2018 university – making the right choices, making it happen*, <https://www.pwc.co.uk/government-public-sector/education/assets/2018-university-making-the-right-choices-making-it-happen.pdf>
- QAA. Quality Assurance Agency for Higher Education (2020). *Strategy*, QAA: Glasgow.

- SCDI. Scottish Council for Development and Industry (2019). *Building a World-Leading AI and Data Strategy for an Inclusive Scotland*. https://www.scdi.org.uk/wp-content/uploads/SCDI_AI-Doc_-_Digital.pdf
- SCDI (2016). *Digital solutions to the productivity puzzle What could digital technology deliver for productivity growth?* <https://www.scdi.org.uk/wp-content/uploads/2018/03/SCDI-Digital-Solutions-to-Productivity-Puzzle-Report-Jan2016.pdf>
- Scottish Government (2018). *Safe, Secure and Prosperous: A Cyber Resilience Strategy for Scotland*. Learning & Skills Action Plan for Cyber Resilience 2018-20. Edinburgh; <https://www.gov.scot/publications/learning-skills-action-plan-cyber-resilience-2018-20/>
- Scottish Government (2017). *Realising Scotland's full potential in a digital world: a digital strategy for Scotland*; <https://www.gov.scot/publications/realising-scotlands-full-potential-digital-world-digital-strategy-scotland/pages/5/>
- Scottish Funding Council (SFC) (2020). *Universities we fund* <http://www.sfc.ac.uk/funding/universities-we-fund.aspx>
- Skills Commission (2014). *Still in Tune? The skills system and the changing structures of work* https://www.policyconnect.org.uk/sites/site_pc/files/report/602/fieldreportdownload/skillscommission-stillintune.pdf
- Servoz, M. (2019). *The future of work? Work of the future! On how artificial intelligence, robotics and automation are transforming jobs and the economy in Europe* https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=58918
- Siemens G. (2005). Connectivism: a learning theory for the digital age. *International Journal of Instructional Technology and Distance Learning* 2:1–8, http://www.itdl.org/Journal/Jan_05/article01.htm
- Thomas, R. and Gunson, R. (2017) *Scotland Skills 2030: The future of work and the skills system in Scotland*, <http://www.ippr.org/publications/scotland-skills-2030>
- Tazzyman, S., Bowes, L., Choudhury, A., Moreton, R., Stutz, A., Nathwani, T. and Clarke, M. (2019). *Understanding effective part-time provision for undergraduates from under-represented and disadvantaged backgrounds*. Office for Students.
- UKCES. UK Commission for Employment and Skills (2014), *Forging Futures – Building Higher Level Skills Through University and Employer Collaboration*, UKCES: London. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/356749/FF_FinalReport_Digital_190914.pdf

- UKRO (2020). *Public Consultation on new Digital Education Action Plan*. Accessed on 26.06.2020, https://www.age-platform.eu/sites/default/files/AGE_response_consultation_digital_education_action_plan_2020.pdf
- UUK. Universities UK (2018). <https://www.universitiesuk.ac.uk/policy-and-analysis/reports/Documents/2018/the-economic-case-for-flexible-learning.pdf>
- Webb, A. (2020). *State of the Art Review of Higher Education Institutions/Universities Responses to Digitalization - Scotland Country Report*, Report for the ESCALATE project, <https://escalate.projects.uvt.ro/>
- Webb, A. and McQuaid, R. (2018). 'Utilising Skills Demand Opportunities to Overcome the Low Professional Status and Attractiveness of a Sector: The Early Learning and Childcare Sector in Scotland' in: Larsen, C., Rand, S., Schmid, A. and A. Dean (eds) *Developing Skills in a Changing World of Work*. Rainer Hampp Verlag: Muenchen, pp. 241-258
- Webb, A. and McQuaid, R. (2020). 'Recruitment and workforce development challenges in low-status sectors with high labour demand – childcare work', CIPD Applied Research Conference 2020, The shifting landscape of work and working lives, <https://www.cipd.co.uk/learn/events-networks/applied-research-conference/2020-papers>
- Webb, A., McQuaid, R. and Rand, S. (2020). 'Implications of Covid-19 for Employment in the Informal Economy', *International Journal of Sociology and Social Policy* (forthcoming)
- Weller, S. (2016). *Academic Practice: Developing as a Professional in Higher Education*. Sage: London.
- Williamson, B. (2017). *Big Data in Education: The digital future of learning, policy and practice*. Sage: London.
- Williamson, B. (2020). *The Automatic University - A review of datafication and automation in higher education*. Report for University and College Union, London https://www.ucu.org.uk/media/10947/The-automatic-university/pdf/ucus_the-automatic-university_jun20.pdf
- Vance, A. and Tucker, J.W. (2016). School surveillance: The consequences for equity and privacy, *Education Leaders Report*, Vol.4, No.4. Available at URL: <https://www.nasbe.org/school-surveillance-the-consequences-for-equity-and-privacy/>