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Jisc

Assessment rebooted

From 2020's quick fixes to future transformation

From fixes to foresight: Jisc and Emerge Education insights for universities and startups

Report 2

janison

From fixes to foresight: Jisc and Emerge Education insights for universities and startups

At Jisc and Emerge Education, we believe that education technology (edtech) has rich potential to help UK universities solve their biggest challenges. We see edtech startups as key to the innovation and agility that higher education needs to navigate the rapidly changing present and future. This is a critical part of building a sector that is resilient to unforeseen changes and that can further transform using advanced technologies, as part of our vision for an Education 4.0.

We have worked as close partners for several years and our collaboration brings together Jisc's 30+ years of experience in providing digital solutions for UK education and research, and Emerge's in-depth knowledge of the edtech ecosystem based on investments in 55 startups in five years. Together, we've developed unique insights into the potential of edtech in higher education.

To unlock that potential, we're undertaking a programme of research. It's focused on exploring the most urgent priorities that university senior leaders will face over the next three years, which we investigated and set out in our initial joint report, The start of something big? Can edtech startups solve the biggest challenges faced by UK universities?

Priority one
Delivering the best, most equitable student experience.

Priority two
Adapting to student evolving expectations about employability and career outcomes.

Priority three
Expanding the university's reach by attracting more (and more diverse) students.

Priority four
Transforming digital and physical infrastructure.

Priority five
Recruiting, retaining and developing world-class staff.

Each report in this series explores aspects of each priority in more detail, mapping current approaches and challenges, and highlighting specific edtech solutions and startups. The reports draw on the expertise of leaders from HE, employers and startups, through Jisc – Emerge Education advisory groups on specific topics, including the future of assessment, the employability journey of students from non-traditional backgrounds, student recruitment in challenging times, employer-university collaboration and the student mental health and wellbeing challenge.

We find that there are plenty of opportunities for startups to hear from each other but very few for them to hear from real customers – universities – and understand in depth the priorities they have and the problems they are facing. This report series does that, providing startups with the information they need to shape their products so as to ensure they meet university needs. For universities, the series offers insights into how the sector is managing change as well the possibilities for the future.

The work on the reports was well underway when the COVID-19 pandemic hit, and we have seen the university sector adapt more rapidly than many thought possible to the challenges of digital delivery. But in the midst of crisis, it is important to draw a clear line between our immediate response and what it tells us about the future. The reports in this series seek to look across the immediate and long-term time horizons to give readers a map and compass out of the current situation and towards the future of higher education.

Ultimately, we want to build a vibrant, highly effective edtech ecosystem, with seamless collaboration between universities and leading startups, to ensure students get the educational experience they deserve.

Paul Feldman
CEO, Jisc

Nic Newman
Partner,
Emerge Education

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Foreword

The Jisc – Emerge Education advisory group on assessment that I had the privilege to chair originally set itself an ambitious ten-year horizon to imagine a world where digital assessment had become normal. Little did we think that digital assessment would become a necessity so soon. The spread of the COVID-19 virus has had a profound effect on so many different aspects of our lives and work. In higher education, the impact on assessment was swift and profound. Consequently, as well as considering the future, our report now also addresses the here and now and includes case studies of emerging institutional approaches to manage the short term as well as drawing on the QAA's useful checklist of reflective questions on moving to online assessment.

The science fiction author William Gibson is often attributed with saying "The future is already here — it's just not very evenly distributed". Apocryphal or not, this observation certainly resonated with our panel of experts. Over a period of six months we heard evidence from a wide range of stakeholders on changes that are already taking place. Changes that will become the new normal in ten years' time. This report seeks to stimulate thought and debate and to prepare universities, policymakers and innovators for the opportunities that technology will bring to assessment of learning outcomes and skills.

Digital assessment is a golf-size umbrella term used to describe a range of activities, from scanning and workflow of exam scripts through to use of simulation, virtual reality and artificial intelligence in the grading process. This report considers how these innovations can provide opportunities to innovate the types and modes of assessment in the context of changing expectations from learners, assessors, providers and employers, to name but a few.

Some of the ideas which emerged were astounding. For example, group assessment where only one person in the group is human and the others are bots matched to have complementary personality traits. Others were equally transformative but more immediately achievable and responded to immediate growing expectations and needs. For example: keyboards replacing pens, multiple cohorts and assessment points, improved plagiarism detection and fraud prevention.

We considered how digital assessment could provide employers with a better understanding of an individual's abilities such as collaborating at distance and providing peer feedback. Similarly, how retina tracking and virtual reality simulation offer new approaches to grading practical skills or assessing fitness to practice.

The group also considered the risks of change such as loss of learner/public confidence in the system, machine bias and increased identity/qualification fraud. In so doing, we took a balanced view, recognising that the current system is not perfect and that digital assessment must therefore be as good as (if not better than) current approaches but that waiting for it to be 100% foolproof is unrealistic.

The report is guided by the UK Quality Code from the Quality Assurance Agency for Higher Education (QAA) and includes three themes to describe the expectations of high quality digital assessment in 2030: relevance, adaptability and trustworthiness. Digital assessment must be relevant and contemporary to today's needs, it must be flexible to cope with specific circumstances (both personal and institutional) and it must, above all else, retain the confidence of stakeholders.

I'd like to thank my colleagues on the panel and the team at Emerge Education, Jisc and the QAA who contributed their time and expertise to this report and I hope that the reader finds our findings thought provoking.

Chris Cobb
Pro-vice-chancellor and deputy chief executive, University of London

Foreword

The higher education sector has adapted rapidly to new practices across its entire operations, from learning and teaching to partnerships, validation, student support and facilities.

As for assessment, its very nature is now changing and at a pace. As the sector adapts, the integrity of assessment needs to be at the front of everyone's minds.

Confidence in assessment processes is a cornerstone of the UK higher education sector's reputation. Higher education institutions have, in a very short time frame, had to adapt their assessment practices to fit online delivery. In doing so, they have needed to ensure that the assessment arrangements are robust, guarding against academic misconduct while also ensuring the fair treatment of students who have had to submit their work in challenging circumstances. How do institutions ensure that remote assessment is secure, verify the identity of candidates for assessment and ensure that they are not making illicit use of reference materials?

While universities compete on many levels, collaboration on standards is key to the global reputation of UK higher education. This report is an example of the value of such collaboration and offers useful insights into current practice, future visions and how edtech startups might work in partnership with universities to help make assessment even more relevant, adaptable and trustworthy. I am delighted that this report includes the QAA's series of reflective questions that universities can use to evaluate their move to online assessment and that will help startups understand the challenges facing universities in this space.

Douglas Blackstock
Chief executive
The Quality Assurance
Agency for Higher
Education (QAA)

Summary

Evaluating and measuring learning outcomes
is fundamental to all education systems.

Unlike primary and secondary education, universities are able to define their own approaches to assessment, with each university free to innovate as suits its circumstances and mission. Over recent years, universities had been considering the potential presented by emerging technologies – opportunities for new approaches to assessment coupled with improvements in efficiency and cost for institutions, and effectiveness for students and teachers.

However, while there were pockets of best practice, the overall pace of change was slow. So in early February 2020, the Jisc report ['The Future of Assessment, Five Principles, Five Targets for 2025'](#) set out to address this. The report suggests that, by 2025, digital technology will make possible assessment that meets five key goals: more authentic, more accessible, appropriately automated, more continuous and more secure. It laid out five targets to be achieved in five years in the development of digital assessment.

But meanwhile, the predominant mode of summative assessment continued to be pen and paper – until March 2020.

The impact of COVID-19, and its resultant lockdowns, on established assessment processes and events has been severe. Universities' responses, as they scramble to maintain the viability of this academic year's assessments, have varied greatly.

We have identified five distinct types of response that we illustrate with short case studies involving seven universities. These approaches, and the challenges universities face in coming up with rapid and scalable 'fixes' in an emergency situation, reveal some of the tradeoffs institutions are having to make and the gaps in the current system.

As they – possibly – catch their breaths after this set of exams, universities are now looking at where they go from here. There will not, indeed cannot, be a return to things just as they were. There is the question of how to plan for an unknowable 2020-21.

Beyond that, what vision might we have for a future that offers not a quick fix but a managed transformation to a well designed assessment system fit for the world that today's school students are heading towards?

For that vision, we look ahead to 2030, to a goal of digital assessment that is relevant, adaptable and trustworthy, and we imagine what the components of that assessment might look like.

And then we ask, how do we move from here to there? What can we learn from the experiences of this spring and summer? What does higher education need in order to get us there? What do we do next?

Introduction

In March 2020, as the impact of COVID-19 and the lockdown measures put in place to contain it became clear, universities confronted a stark challenge: how do you transform long-established assessment processes, at speed and at scale? Hundreds of thousands of students at UK universities who were expecting, in a matter of weeks, to sit in ranks in exam halls, completing the pen-and-paper exams that would decide their final grades after three or more years of study, faced an uncertain future. Within universities, academic and professional staff raced to work out what was possible, what was desirable and what was fair.

Universities took a variety of different approaches based on their current context, their goals for the immediate period, institutional values and, for some, their longer-term digital assessment trajectory. Every approach involved trade offs. Do you place a higher value on trustworthiness and possibly risk equity? Or focus on adaptability / flexibility and accept that the trustworthiness of the assessment may be less rigorous? Does the benefit to students' future careers of completing full exams now, despite the unprecedented circumstances, outweigh the potential immediate effects on mental health?

Based on interviews with a number of institutions, we can identify five distinct approaches to summative assessment in this emergency period: trailblazing, innovative, radical, flexible and incremental. While each of these approaches is illustrated here with a short case study reflecting the characteristics and experience of the university under the lens, many institutions will find that their own approach fits broadly into one of these categories.

The range of challenges highlighted by these approaches offer an insight into the issues that need to be tackled in the medium term and the opportunities they present for digital assessment.

Five fixes

1 Trailblazing:
Radical change to assessment at speed and at scale

Example: University of London, using Moodle, Turnitin and Janison

What was done?

The University of London (UoL) took 40,000 students sitting around 500 exams in 160 countries from solely paper-based, face-to-face, pen and paper to digital testing in one move, which included digitally proctored exams.

"What we were expecting to do maybe two or three years down the road we're going to try and do this summer. We're making an enormous step change in our assessment piece at this moment. In the UK, I don't think anyone else is trying to do this."
Craig O'Callaghan, UoL worldwide director of operations and deputy chief executive

How was it done?

In mid-2019, UoL started a major project reviewing the whole of the digital landscape for assessment, looking at platforms and players and intending to implement one or two pilot projects with smaller programmes the following year.

That all changed very quickly. Within 24 hours of the lockdown announcement, UoL had set up a task force bringing together colleagues from across the university, including specialists in IT, data protection, digital systems, course development, pedagogy, assessment and Moodle, to assess all the options rapidly, based on O'Callaghan's pledge

that *"I wanted every single one of our 40,000 students to be able to be assessed this summer."*

The result was three assessment routes for UoL students:
- Online, open-book exams with a paper to be downloaded and returned within a prescribed time – from four hours to a few days – via Turnitin. Predominantly for postgraduate programmes.
- Online exams via Moodle and Turnitin, for most undergraduate programmes.
- Digitally proctored exams for about 10,000 students using the Janison platform and UoL's UK implementation partner, CoSector.

UoL extended the exam timetable in order to run large-scale tests for students and enable them to practise downloading question papers, uploading them back through Turnitin and into Moodle and, in the case of students doing digitally proctored exams, getting used to facial recognition and uploading identity documents.

Why was it done this way?

An institutional imperative to assess all students was matched by the demands of professional, statutory and regulatory bodies (PSRBs) in the case of some courses, such as law, as well as the requirements of those programmes that have little or no coursework. In addition, there was pressure from students concerned to graduate and move on to their careers.

2 Innovative:
Building on an innovation base and scaling it up

Examples: Brunel University, using WISEflow, and Newcastle University, using Turnitin and Blackboard

What was done?

Brunel was already ahead of the pack in its use of bring-your-own-device digital exams. In the last academic year, 2018-19, more than 2,700 students – about 20% – experienced one or more bring-your-own-device exams.

"We were probably as well placed as we could be."
Mariann Rand-Weaver, vice-provost (education)

Brunel is using WISEflow from UNIwise for digital exams and all course work assignments. Now in its third year of rollout, the platform is familiar to all students and staff and there is a well-established laptop loan scheme to ensure all students have access to the technology they need for exams.

"We have worked as a partner with UNIwise, which is the provider of WISEflow, and that has really helped. It's not as though you go out and buy a piece of software, or access to a piece of software, and then you are left on your own. It's been useful to connect with other institutions who are using the same product and who have got different experiences, and that has been really, really helpful."
Mariann Rand-Weaver, vice-provost (education)

How was it done?

Brunel moved to open-book, take-home exams, without locked-down devices or remote proctoring, mostly sat in a strictly exam-length timeframe (ie a two-hour exam or three-hour exam), with reviewed and revised questions to make the assessment suitable for the format. Some academics took the opportunity to change the type of assessments they were asking students to do, such as setting longer pieces of work completed over six hours, requiring research and demonstration of abilities beyond what would have been possible in a time-limited, invigilated exam environment.

"Having the WISEflow platform means we could effectively change the assessments and let students submit their answers to a platform that was already being used by staff and students. I would be surprised if we don't find that we've got to a place where we wanted to get to much quicker as a result."
Mariann Rand-Weaver, vice-provost (education)

Why was it done this way?

Although Brunel had previous experience of holding remote exams in controlled, locked down and invigilated conditions, such as when holding digital exams for students abroad, the option of running fully locked down, remote

exams wholescale was rejected as too risky, given the speed with which remote exams had to be implemented. Students' devices might not be up to date enough to run the software, they could not be checked by IT services, as they are before BYOD exams, and there might be issues around network connectivity in students' homes.

Newcastle University, which also came from a strong starting position and last year did about 170 online exams, took a similar approach to the trade off between the security of digital proctoring and the risk of students not having access to the necessary technology, connectivity or even a peaceful space in which to sit an exam of that type.

"We felt that doing a two-hour exam in the same way we would have done if we had been on campus was going to cause a lot of stress for our students."
Graeme Redshaw-Boxwell, learning enhancement and technology team manager

Newcastle moved to two options: changing the exam into a piece of coursework or providing a 24-hour take-home exam that could be submitted through Turnitin or taken as a test via Blackboard.

3 Radical:
Minimising stress in the student experience

What was done?

The Open University (OU) had long been ahead of the curve with digital assessment, pioneering an in-house system for electronic upload and marking of assessments around 10 years ago. Over the last 18 months, it had reviewed more up-to-date systems and procured WISEflow.

The OU assessment model is comprised of both continuous, tutor-marked assessment (TMAs) and summative end-of-module assessment in the form of a final, untimed written assessment (EMA) or exam. The OU decided to take a light-touch approach to summative assessment in this crisis period.

Of the more than 300,000 assignments scheduled between April and June, only those that were essential, due to regulatory reasons or the weighting of the course towards a final assessment, were to go ahead. The rest would be cancelled and grades assigned based on continuous TMA results, though

students could request postponement to a later date.

"We really wanted to, where possible, do away with end of module assignments because our students probably face a different reality from the average undergraduate student in a traditional university."
Klaus-Dieter Rossade, director of assessment programme, OU

How was it done?

The OU had generally moved away from final exams in recent years, with fewer than a third of modules requiring them, making this year's switch easier. An emergency management team, chaired by the deputy vice-chancellor and with input from all stakeholders, including students, was tasked with making decisions quickly and communicating them.

"The question might be, do we still need an exam going forward? Some may be required by regulators but the argument to really question whether you need one will be ever greater."
Klaus-Dieter Rossade, director of assessment programme, OU

Why was it done this way?

The OU has a large number of students declaring a disability, of which many declare anxiety and mental health issues. The sudden introduction of significant changes to assessment, such as digital proctoring requirements, could have had a particular impact on those students. Many OU students are also key workers or were dealing with childcare or other caring responsibilities. A key premise of the approach was to reduce student stress at a time of already heightened anxiety. In addition, the OU is thinking radically about assessment more generally:

"I would like to see digital methods fully utilised to make assessment more authentic and a more compassionate experience for students. I am concerned that tech developments are tending to focus on capabilities such as digital proctoring to enable us to deliver exams more cheaply and easily, and yet examination is not necessarily the most valid and reliable way to assess a lot of different disciplines, and represent a huge barrier for many students. I would hope that digital assessment will enable us to assess workplace competencies, digital skills and applied academic skills much more effectively than we're able to do at the moment. And also to offer more opportunities for peer and collaborative assessment in a way that feels comfortable and meaningful for students."
Rebecca Galley, director of learning experience and technology

4 Innovative flexible:
Maximising fairness and flexibility

Example: Arts University Bournemouth (AUB), using WISEflow

What was done?

As a specialist arts university with the majority of student work taking the form of both physical and digital outputs, AUB faced different challenges with digital assessment to many institutions. Using WISEflow, AUB took a 'maximum fairness and maximum flexibility' approach during the lockdown period, with 95% of assessment submissions being digital. AUB ensured that support staff were available to help students, and staff, navigate the process of uploading work to WISEflow and the ability to assess from that platform.

"A priority – and a strength of AUB – has been our agility, our fleet-footedness because of the size of the courses, and our strong sense of academic identity and belonging, which gave us an ability to respond quickly."

Paul Gough, principal and vice-chancellor

How was it done?

AUB entered the period with two advantages: it had been working with WISEflow for more than three years, so final year students were very familiar with online submission, and much of the physical making and workshop activity had already been completed thanks to AUB's 12 / 12 / 6 academic year.

Where physical work needed to be submitted, AUB was careful to ensure that the assessment was not compromised by the move online and students were not disadvantaged by the lack of access to the industry-standard equipment available at the university, even though specific leading-edge technology is a consistent feature of AUB resources. In some cases, low-tech approaches were encouraged – such as a print-ready image rather than a final print for photography courses – with an emphasis on AUB's fundamental teaching-learning principle: the process of making, the modes and methods of enquiry, the contexts for the production and other methodological learning outcomes are assessed rather than merely the finished, polished piece of work.

Finally, AUB pledged to honour students' needs to have a physical performance or show by offering the opportunity to return to the university and finish any uncompleted work after graduation and lockdown.

"We pride ourselves on our employability status. So we want to help our students continue to get jobs in what will be an incredibly difficult economic and employment market. We're really conscious that it is not only their assessments and classifications that count but how good their portfolio is that helps them get employment."

Emma Hunt, deputy vice-chancellor

Why was it done this way?

"Globally, arts education will tend to focus assessment on the final 'product' – the film, dance piece, the artefact, the exhibition etc. While that is important as 'output' we have done a huge amount of work with our students to re-emphasise that it is the process of inquiry, the learning outcomes through the inquiry itself, that is important rather than simply presenting a final exhibition-quality output. Yes, we know that is important but so is the process, *the route map and the methodology, as well as the contexts and critical thinking that have informed the creative making."*

Paul Gough, principal and vice-chancellor

As well as taking the opportunity to emphasise the importance of process in the arts, AUB also declares a 'moral obligation' to help creative practitioners finalise those pieces of work and to get the best portfolio they can to take into their working lives.

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5 Incremental:
Adapting and extending familiar tools

Examples: Coventry University using Moodle, Aula and Manchester Metropolitan University, using Moodle

What was done?

Coventry had been exploring innovative assessment with a view to moving to fully digital assessment with its Curriculum 2025 strategy; the majority of its written assessments were already digital, with about 24,000 digital submissions each week, and it had reduced its loading of final exams by 50% in the last two years. It also already provided fully online courses on the FutureLearn platform. However, Coventry had not yet experimented with digital unseen exams, was in the process of setting up trials with online assessment platforms Inspera and UNIwise and chose not to not rush a major strategic decision.

How was it done?

"There's a need to start to look at digitisation of the exam process and delivery to modernise the process. I think it's ridiculous that we've still got students handwriting exams in this day and age. But in the UK I think there's a bit of a gap in HE for software and for products that support that process."

Andrew Turner, associate pro-vice-chancellor, teaching and learning

Coventry reworked all its scheduled, face-to-face, written exams as replacement assessments – preferably coursework but, if not possible, then an open-book timed assessment with a completion time of 16 hours (and where professional body requirements called for tighter timing, to be completed in a four-hour time slot, within that 16-hour window).

As part of its no detriment policy Coventry enhanced its moderation process, looking not only at individual student performance but also at whether the cohort performance was significantly reduced or significantly over what would be expected in comparison with previous cohorts.

Why was it done this way?

"We've been very much of an opinion that it's better to continue and enable students to complete their assessments and progress."
Andrew Turner, associate pro-vice-chancellor teaching and learning

Manchester Metropolitan University took a similar approach, converting the majority of its 400 exams into a take-home paper released at a set time via Moodle and run in a short time frame.

"We've asked our academics to try to keep it simple and just to use tools that students are familiar with. Whereas students in the past two terms have already used the Moodle tools to submit coursework, now that effectively they're submitting their exams in the same way. Again, they're familiar with those tools, how they work, so hopefully that minimises the impact on our students."
Simon Howells, business analyst, Manchester Metropolitan University

Challenges

These emergency quick fixes needed to respond to a range of challenges and trade-offs:

Scale

Scaling up to go beyond pilots and trials, meeting the need for digital assessment across an entire institution and a wide range of subjects in one fell swoop, was a major challenge in this period, adding a new level of complexity to the situation.

Pace

The pace at which universities had to react was intense and, in general, compelled them to stay with what they knew rather than risk introducing unfamiliar platforms or tools to staff and students at a time of uncertainty and anxiety.

Student access to technology

While locked-down and digitally proctored exams may be the most secure options, they also required technology and connectivity that not all students may be able to access in their own homes. This security/equity trade off is arguably the most common and pressing issue and lies at the heart of the current challenge in making assessment both more trustworthy and more adaptable.

Student expectations

The class of 2020 needed to feel the process was fair (no detriment policies) and recognised the circumstances under which they were being assessed.

There was also a trade off between mitigating student stress and balancing the wishes of those who wanted to feel their course had been completed rigorously, enabling them to move on to the next stage of their working or academic life. In addition, there were student concerns raised about privacy in relation to online proctoring.

"The challenge for us now, I think, is convincing the students that there is comparative and positive experience in their assessment when they're talking through what they have done, via Skype for Business, Zoom or whatever, as opposed to presenting it on a wall, in a theatre or in a screen setting."
Paul Gough, principal and vice-chancellor, AUB

Staff skills

In the Jisc digital experience insights survey 2019, only 34% of HE teaching staff said they were offered regular opportunities to develop their digital skills and only 13% were given time and support to innovate. This had clear implications for staff readiness to embrace new tools.

"We're asking staff at short notice to use things like Zoom or to use open-book assessments or transform things into coursework, and that does require skills and training to do that well, and maybe there hasn't been time to train staff in that."
Andy McGregor, director of edtech, Jisc

PSRB requirements

The recognition by professional, statutory and regulatory bodies of a range of higher education programmes is critical to the career paths of many students. The QAA has been convening conversations between PSRBs and universities to ensure that there can be variety, flexibility and innovation in the way students are taught and assessed, while still meeting the required professional standards.

"I think it'll be interesting to see how professional bodies respond, and how flexible they are and how open they are to changing the way that we assess. I'd like to think that professional bodies are a lot more open to time-limited assessments, more viva style, presentation style assessment, that sort of thing, and to move away from the traditional paper based exam."

Simon Howells, business analyst, Manchester Metropolitan University

Subject-specific issues

Certain subjects offer particular challenges for digital assessment. We have already seen how AUB overcame some of the difficulties around assessing visual and performing arts online. STEM subjects present their own challenges in digital assessment with regard to showing how a student has 'worked-out' a problem. Brunel's workaround involved allowing extra time in the take-home exams for STEM students to photograph and upload their working out.

"It's the challenge for technical and mathematical subjects and seems to apply to all the digital tools and platforms. Some of this would be absolutely doable if every student had a touchscreen where you could use a digital pen. But at the moment, while you can do some basic calculations in WISEflow, it is too cumbersome and would probably take somebody far too long to show workings out, calculations and so on with the current functionality."

Mariann Rand-Weaver, vice-provost (education), Brunel

👓 INSIGHT FOR STARTUPS

"COVID has raised the stakes considerably and it is going to challenge the tech companies to improve. Universities are going to really push them very hard to improve their product sets. Once we've seen this major scale test this summer, we'll learn a lot."

Craig O'Callaghan, UoL director of operations and deputy chief executive

Introduction

The assessment quick fixes of spring 2020 have shown movement towards some of the targets of Jisc's 'The Future of Assessment, Five Principles, Five Targets for 2025' report far sooner than might have been expected.

What more might be possible if the challenges universities have faced could be resolved?

We've taken a longer-term perspective to imagine a world where higher education institutions implement innovative forms of digital assessment that positively serve the student experience; where teaching staff are empowered to take control of the assessment process; where student expectations go far beyond moving pen-and-paper exams online. It is a positive and pragmatic vision of the opportunities offered by the use of digital tools in higher education assessment.

Our view is that assessment in 2030 has to be relevant for the context of future decades rather than previous decades. Employers will wish to understand attainment in ways other than the ability to write long essays by hand or perform feats of memory recall. We believe technology will help assess an individual's ability, for example, to work in a team, solve complex problems, critique, innovate, challenge assertions or collaborate at distance. We believe in the capacity of our higher education system to innovate around assessment over the next decade in ways that meet those needs, inspire decision-makers to take steps towards making this future a reality; and provide practical recommendations on what institutions and technology providers could be doing today to maximise the benefits and address the potential risks of a fully digitised assessment system.

This section is structured around three key themes that we see as a set of minimum requirements for a well-designed digital assessment system in 2030. It must be:

Relevant

Enabling universities to go beyond traditional forms of assessment, dictated by practical limitations of analogue exams, and build systems that are relevant to contemporary needs and reflective of the learning process, and make use of innovative assessment methods too impractical to deliver without digital tools.

Adaptable

Effective in addressing the needs of a growing and diverse student population, a range of providers and any number of geographies.

Trustworthy

Based on solid foundations of academic integrity, security, privacy and fairness.

This can be visualised as a pyramid, highlighting at the top the ability that fully digital assessment will give us to accomplish things that may be seen as too risky or costly to pursue at present; taking into account the practical considerations of delivery so that the system can adapt to the scale and variety of higher education in 2030; and underpinned by fundamental principles of trustworthiness, reliability and validity.

Beyond Enhancement: Assessment in 2030

Relevant	Innovation opportunities
Adaptable	Effective, scalable practice
Trustworthy	Solid foundations

Digital assessment in 2030 must be… relevant

Traditional assessments, such as dissertations and exams, fall short when it comes to evaluating soft skills, are poorly aligned with the behaviour-based assessments increasingly used by employers, and impose structural constraints on developing creativity and divergent thinking. The shift to digital assessment will enable universities to re-imagine how and why students are assessed.

Relevant to their time and meeting the needs of students and employers

There is growing consensus that the value of higher education is not just in the knowledge imparted to students in lecture halls but in the skills and competencies they develop throughout their studies. As lifelong learning rises up the agenda of employers, education providers and policymakers, so does the importance of capturing whether students are building the foundations they will need to succeed in future life. Digital assessment will power the shift from memory recall to assessments

that get to the heart of the new foundational skills of the 2030 economy: human skills as well as business-critical competencies.

How might this happen?

Virtual reality can be used to assess a junior doctor's communication skills not simply through what they say in responsew to a patient's question but also how: the time it takes them to respond, whether they are looking at the patient, their tone of voice and much more. Similarly, our group envisaged remote IT workplace simulations (similar to today's Slack workspaces) populated with a mix of student users and machine learning-powered bots playing out scenarios that uncover the students' ability to collaborate across teams in such an environment. Comparative judgment and peer grading, known today to be effective and accurate assessment methods, will become easier to implement at the scale of hundreds and thousands of students, improving the quality and depth of assessment for subjects in arts, humanities and social sciences.

INSIGHT FOR STARTUPS

Startups can help to plug the gap between universities and employers by using technology platforms to enable collaboration at scale (eg course co-creation, experiential learning projects).

[1] The New Foundational Skills of the Digital Economy

Digital assessment in 2030 must be... adaptable

The expansion of global access to higher education has been one of the great success stories of the past 70 years, unlocking a world of opportunity for billions of people around the world. At the same time, the growing scale of higher education will continue to create pressure on education providers' abilities to deliver a superior student experience that reflects student needs.

Universities also need to deliver a growing range of courses and modes: residential and distance learning, full undergraduate degrees and stackable micro-credentials, apprenticeships – as well as self-directed and lifelong learning for students of different ages, backgrounds and nationalities.

Student-centred and personalised

Currently, assessment tends to follow a 'one size fits all' model. The shift to digital tools will make it possible to redesign elements of assessment from first principles, meeting students where they are and adapting to their individual circumstances. By 2030, the benefits of automation and digitisation will extend beyond efficiency savings and produce tangible benefits for students, particularly those from traditionally underrepresented backgrounds.

How might this happen?

Assessment is a major source of stress to students, impacting their wellbeing and academic performance. A redesigned digital assessment system must be more compassionate. With advances in emotion detection and personalisation, digital assessment systems may also work to detect changes in a student's stress levels and adapt to them, for example by changing the order of questions or offering a break (especially in formative assessment). Digital assessment will also make it easier to allow practice and preparation on the student's own terms.

Anytime and anywhere

Unlike existing approaches, digital assessment is untethered to the physical infrastructure of exam halls and university buildings. While appropriate identity verification measures need to be taken, the pressure to concentrate all assessment activities within a very narrow timeframe and a particular location is significantly reduced.

This will make truly global universities more feasible, removing the requirement to attend exams in person, which restricts access to higher education to those who have the means to travel. This may lead to a re-evaluation of the role of university campuses and improved resilience, with universities less dependent on physical infrastructure that is liable to be disrupted by major global incidents such as pandemics, terrorist attacks or extreme climate events.

Efficient and manageable

By some estimates, global demand for higher education by 2030 will have

👓 **INSIGHT FOR STARTUPS**

Startups can enable more seamless collaborations through shared databases, integrated systems (eg to deliver stackable credentials) and simple, intuitive user interfaces.

increased to between 350 and 500 million students, almost doubling current student numbers and vastly increasing the administration of assessment. Current approaches to assessment at scale often involve the digitisation of analogue exam papers, effectively replicating existing assessment practices with marginal savings in effort.

Fully digital assessment systems will allow large global institutions to mark millions of answers consistently, fairly and rapidly, providing substantial time savings and so freeing up resources for better student support, teaching and research.

At the same time, digital assessment systems must not be restricted to large-scale cohorts and must be adaptable to the needs of institutions or cohorts of all sizes and to different subject

areas. Today, institutions such as Brunel University London, who are leading the way in adopting digital examinations, are seeing benefits in the reduction of effort required to mark individual papers as staff no longer have to struggle to read exam answers.

By 2030, the benefits of fully digital assessment will extend to greater personalisation of assessment questions as well as to widespread use of alternative forms of assessment that are more appropriate to each course and more relevant to the students' needs.

Digital assessment in 2030 must be… trustworthy

The shift to full digital assessment is a significant change for all stakeholders – HE providers, students, policymakers and regulators, as well as the wider public, including employers and parents. It is therefore imperative that innovation is accompanied by measures designed to support academic integrity and ethical behaviour within the system.

Academic integrity

Issues of academic integrity are a hot topic at the moment with a widespread sense of concern over plagiarism and the proliferation of essay mills. A range of existing digital solutions make use of large databases of student-submitted work as well as online search to detect cases of plagiarism, and advances are being made in the use of machine learning to discern a student's 'voice' and flag submissions inconsistent with previous pieces of work. By 2025, we may expect the technology to be in place, and widely adopted, that will allow universities to authenticate learners in consistent and robust ways. We must be mindful, however, of the barriers that such authentication may present to students and, in particular, the difficulties that students from

disadvantaged backgrounds may experience in meeting automated requirements.

By 2030, we would expect these tools not only to become a standard and invisible part of the assessment toolkit but also see a shift to a more student-centric approach through co-design and the development of informal or formal codes of practice – improving trust in the system as a whole.

Data use and ownership

While there are significant questions around the ethical use of student-submitted data, members of our group felt that, in their experience, most students had a broadly positive attitude to the use of anti-fraud and identity verification tools. This extended to the use of digital tools for online proctoring, which enables students studying remotely to sit exams at the location of their choice.

By 2030, we expect regulation to catch up with the change in practices – as suggested by the Framework for the Quality Assurance of e-Assessment recently published as part of the

INSIGHT FOR STARTUPS

Startups that work in partnership with universities to co-create solutions are more likely to be able to demonstrate the real, tangible benefits that demonstrate what digital can offer and secure senior management buy-in.

Startups offering solutions that can collect, analyse and visualise student data and which also integrate with existing university systems will stand out.

EU TeSLA project,[1] which requires providers to implement fail-safe and accessible systems including learner authentication and anti-plagiarism technologies.

If large sections of the university sector move towards digital assessment, there may also be opportunities for aggregating assessment data across the system (for example, in an anonymised national database). Given existing concerns around 'grade inflation', this would provide opportunities to benchmark student performance across institutions and cohorts for a more comprehensive view of the real extent of this phenomenon.

The increased use of digital tools in assessment will lead to the collection of an ever-growing body of data on individual students. The current lack of clarity around the ownership and use of this data (such as student submissions to plagiarism detection tools) must be addressed by any well-designed digital

assessment system if it is to earn the trust of students, educators and the wider public. Debates over ownership of data will also raise some intriguing questions for institutions, policymakers and technology providers to wrestle with – for example, does a 'right to be forgotten' exist when it comes to assessment?[2]

Fairness

The assessment systems we rely on today were, in large part, designed in an era when the student body was much more homogenous. There is growing realisation that these approaches are letting down today's students, whose backgrounds and circumstances vary so much more. The greater variety of assessment practices made possible by the use of digital tools could be a game-changer in closing the awarding gap for BAME students or in mitigating the negative impact of exams on students with disabilities, if the new systems are designed with inclusivity in mind.

[2] Framework for the Quality Assurance of e-Assessment (March 2019)
[3] Students or data subjects? What students think about university data security

Where does 2020's experience take us?

"I'm hoping that the current situation will have opened the Pandora's box in that more academics will see the advantages of using digital technology for assessment and use this as a stepping stone or as a building block for exploring what the possibilities are going forward."

Mariann Rand-Weaver, vice-provost (education), Brunel

How will the disruptive events of spring 2020 change the way universities approach assessment in the longer term and, perhaps, move the sector closer to the 2030 vision of assessment becoming more relevant, adaptable and trustworthy?

Firstly, it must be acknowledged that the 'fixes' explored in part one were emergency processes put in place at speed, under extreme pressure. As Graeme Redshaw-Boxwell, learning enhancement and technology team manager at Newcastle University, puts it, *"there's a difference between getting an assessment online and thinking about online learning, and in the current situation we were conscious the emphasis was more on the former than the latter".*

Even under these circumstances, some universities managed to accelerate, or even turbocharge, planned digital assessment strategies; others put them on hold while dealing with the immediate crisis.

We can see the different tradeoffs shown in the case studies under the three themes outlined in the previous section:

MORE

LESS

UoL Brunel OU AUB Coventry MMU Newcastle
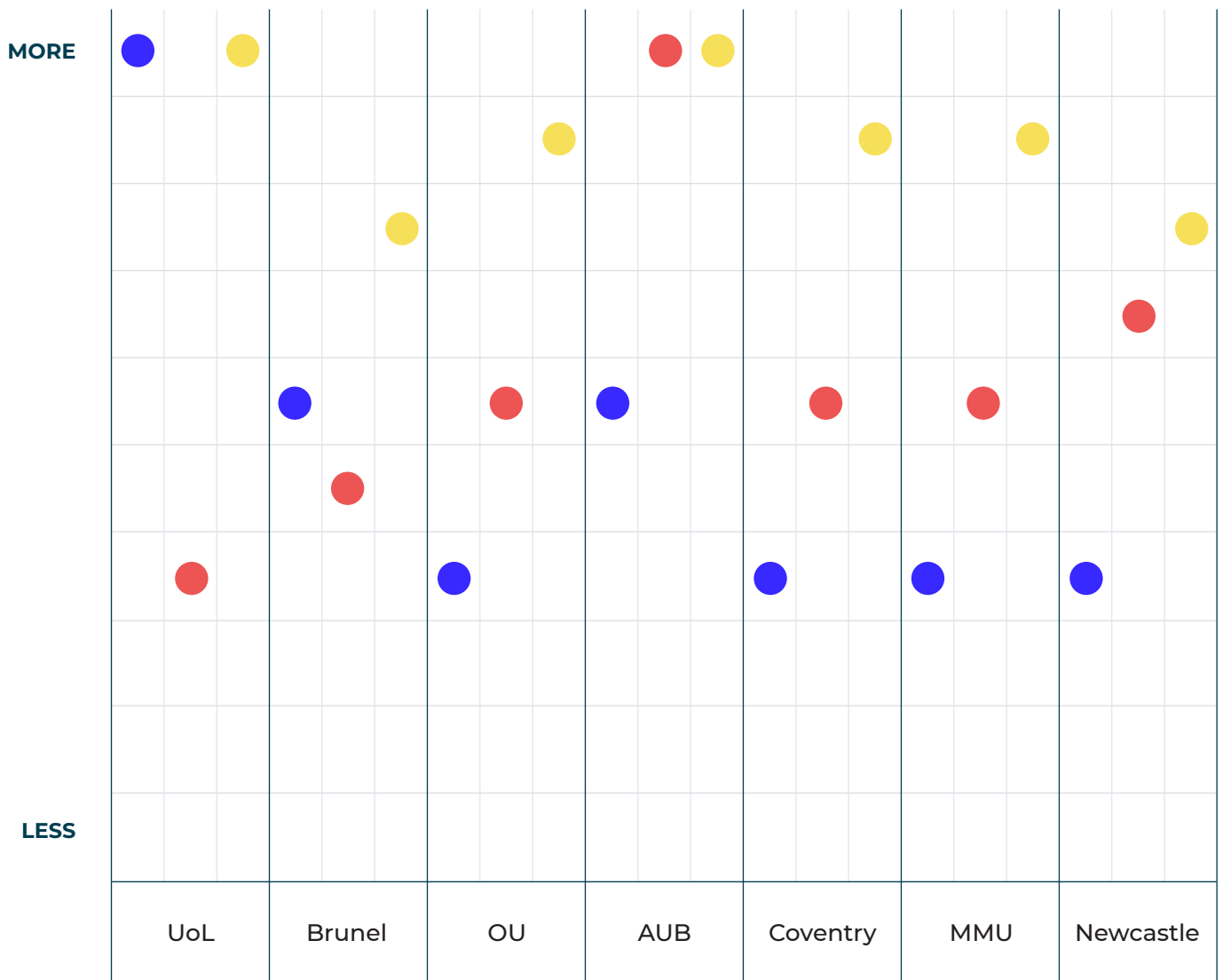
Relevance

Adaptability

Trustworthiness

More relevant and adaptable assessment

Despite the crisis requiring quick decisions, there were attempts to do more than simply replicate pen-and-paper assessment online in 2020 and a strong sense of excitement about the possibilities that were opening up. For the Open University, the improved technology now available to lock down browsers holds the possibility of transforming the work it does with prison education, while digital proctoring offers promise for those OU distance learners who require a more traditional yet adaptable exam process. However, ultimately, the OU is looking towards fundamentally more relevant assessment enabled by technology:

"Those assessment opportunities that are authentic and project-driven and enable students to engage with real-life databases and materials are a much more valuable assessment activity than the traditional multiple choice or essay. I'd really like to push down on that additional capability that digital exams offer, and not just think about replacing that exam-type experience."
Rebecca Galley, director of learning experience and technology, OU

Brunel is also exploring more relevant assessment, having already trialled some 'post-paper' exams, involving manipulating datasets, that rely entirely on technology and would not be possible without it.

"We have the ambition to use digital exams to assess in ways that are not possible with pen-and-paper exams, whereby we can perhaps set sophisticated tasks that challenge students to demonstrate what they can do and apply their knowledge with authentic tasks, rather than just regurgitating their knowledge. We believe this will really help students to demonstrate their skills and capabilities that they need for successful careers going forward."
Mariann Rand-Weaver, vice-provost (education), Brunel

If assessment is to exploit technology effectively and build systems that are relevant to contemporary needs and reflective of the learning process, and that address the evolving needs of a growing and varied student population, this period needs to lead to deeper-rooted questions about what is being assessed and how assessment is devised and developed, not simply how it is delivered.

"I think the current crisis will provide a lot of extra questions around where we've ended up transitioning to more take-home exams. We've been forced to do that, but actually, is that a better way to assess our students rather than having them in a traditional exam setting? Do we want to continue to assess our students in that traditional, closed-book environment? Is working from home a better way for our students to complete their assessment? All of those sorts of things perhaps we wouldn't have been thinking about as much before, I think are very much at the forefront now."
Simon Howells, business analyst, MMU

More trustworthy assessment

The University of London led the way with its introduction of digitally proctored exams at speed and at scale. The trade off between trust and equity was one of the knottiest that universities have faced and reveals clear opportunities for startups and universities to work in partnership with each other to co-create solutions.

"As a sector we need institutions to work together to innovate, to collaborate with both technology and software providers, and employers. Making sure that we are able to share good practice and have enough training opportunities and support for staff, so that we take them with us on this journey."

Mariann Rand-Weaver, vice-provost (education), Brunel

Assessments - market map

We have identified the leading startup players across four key dimensions: online assessments, proctoring, credentialing, and marking and feedback. These dimensions have been identified as the key areas where external providers can add the greatest value for universities. In the

market map below, we have highlighted the standalone assessments tools that universities can procure, rather than the larger technology providers who also offer assessments modules as part of their wider ecosystem.

Online assessments

UNIwise   janison   Virti

inspera   Flipgrid   Sana Labs

Marking and feedback

peergrade   GitHub Classroom

écree

Proctoring

proctorio   proctorū   Honorlock

PROCTOREXAM safe online exams   examity BETTER TEST INTEGRITY.

Credentialing

Hyland   Credly

parchment

Checklist for universities

QAA has produced a series of reflective questions which education providers can use to evaluate and benchmark their move to online assessment:

1. All four Expectations of the UK Quality Code for Higher Education relate to assessment, directly or indirectly. Are any changes introduced compatible with the Quality Code, and consistent with the accompanying advice and guidance?

2. Do you have an existing institutional policy on e-assessment? How could existing policies be adapted for the current circumstances?

3. Do all assessments require a change to practice, or will some remain unaffected?

4. How will you assess learning outcomes without invigilated exams and, where relevant, practical examinations so that the outcomes are equivalent to other years?

5. Are there professional body requirements that will need to be taken into consideration? For example, some professional bodies might require proctored exams.

6. Is there scope for assessment or exam questions to have greater emphasis on unique case studies and scenarios, or on comparative analysis, rather than using fact-based responses?

7. Is the use of viva voce being considered to guard against academic misconduct? And, if so, are special regulations or policies required?

8. How much flexibility can be built into the timescales for students to complete assessments, for example, to help with students' anxieties?

9. What adjustments will need to be introduced to promote equality, diversity and inclusivity for students as a result of the move to online learning and assessment?

10. What allowances can be made to recognise that students have different levels of ability in using technology and engaging with online assessment tools, where these are not directly relevant to their learning achievement?

11. How will you ensure that all students can access the assessment? Do they have the required hardware and software, and do they understand the process for assessment submission including logistical issues such as start and stop times, log-in passwords, and how to save their work? Do students know who to contact if they have problems with these aspects?

12. Technical issues such as computer problems and unreliable internet connections are not normally considered an extenuating circumstance. Should this approach be modified under the present circumstances?

13. Do marking protocols need to be reviewed?

14. How are you working with your students' union to secure engagement with any changes in assessment practice?

15. How effective is your communication with students about necessary changes? Have you considered preparing responses to frequently asked questions?

Additional questions to consider for students based outside the UK:

16. Are students studying in different time zones able to access the support they need?

17. If there is a need for collaborative working, are groups able to function effectively across different time zones?

18. Are there any technology barriers that might present issues in accessing materials and submitting work? Can students studying outside the UK still access the sites and services they need?

👓 Insights for startups

Observation	Implication
Spring/summer 2020 marks a transition point. The problems universities face will change very quickly as circumstances evolve. There will be a period of turmoil for universities. Paying very close attention to their concerns right now is going to be especially important for startups.	Startups can support universities by developing close relationships and listening to them in order to understand, deeply and in detail, their situation, how it is affecting their staff and students and what they are worried about for the future. Universities may be more willing to experiment with new things – especially if startups really do understand the problems universities are facing as a result of the pandemic and how they are thinking about change for the longer term – and may offer co-creation possibilities.
The need for universities to be able to scale up has been thrown into stark relief and has been one of the most challenging elements of the crisis.	This is where startups can make a difference with solutions that meet this need, with fully digital assessment systems that enable scaling-up and with the efficiencies that brings.
Universities' solution choices are constrained by students' access to technology and connectivity away from campus.	Startups in this space can help universities deal with this difficulty by offering a range of options – for example, making it possible for their platform to work in an offline environment if internet connectivity is lost.
Different subjects have their own complexities when it comes to digital assessment, whether that's the need for large amounts of storage space for some visual or media subjects or the difficulty of showing 'working out' online in STEM exams.	There is a real opportunity here for startups to set themselves apart by having a deeper understanding of domain diversity in order to offer solutions to these very specific challenges.
Integration is an issue, according to Rebecca Galley, OU: *"I think that technical solutions are being rolled out fast and I think there will be benefits and disadvantages of doing that. In most cases they're being rolled out in an unintegrated way, so new tools are not being properly integrated with core systems. And I think that that will have an impact on digital student experience that will need some unpicking over time."*	If startups work in partnership with universities to co-create solutions, it is more likely that they will be able to integrate their solution seamlessly with existing university systems and have a significant advantage.

Q+A with Wayne Houlden, founder, Janison

Janison is an Australian-owned, ASX-listed education technology pioneer whose team of experts and developers innovate online assessment and learning solutions for global corporations, governments and education bodies. Janison has delivered more than 5m assessments in the past 12 months.

What do you see as the greatest challenge universities are facing right now in terms of assessment, given COVID-19?

The challenges depend on how universities want to solve the problem. Some are trying to reduce the number of exams. Others are taking the opportunity to accelerate a planned move to a digital platform for exams. Others are looking at hybrid approaches, where they might use quiz engines inside learning platforms and possibly some proctoring software. Each of those approaches is valid in the context of the decisions confronting universities.

We work within the third option as we provide secure, proctored, resilient digital assessments for universities and other bodies, such as the University of London and the British Council.

Digital proctoring can take two forms. At the first level the candidate is video recorded. Their environment is scanned before they start the test and the video stream is analysed by an AI system that flags up anything it thinks constitutes a potential red flag in the candidate's behaviour during the test, which is then escalated to a human who can review the video and decide whether it needs intervention.

At the next level, a human proctor watches a student taking the test via a video stream. An AI sits behind that, providing additional support. We tend to use invigilators in the UK or Australia who were previously working for exam boards as physical invigilators and have moved to digital.

What about the trade offs that universities have to make? For instance, with digital proctoring, they might have to decide if the increased security outweighs the risks?

One of the key learnings from these last few months is just how capable we all are of making change if we want to, from extensive work-from-home policies to the use of Zoom, Teams and Hangouts for meetings, with very few glitches in the technology. I think one of the things that will come out of this period is people will have built some confidence in digital technology being able to solve problems, connect people and provide communication channels. That can extend into digital exams and, for the vast majority of students who use online invigilation, their experience is going to be a good one.

Our platform, in particular, has a number of key features that kick in if a student's internet connection fails. Our test environment – the tools that provide the digital exam to the students – is able to continue to play and record the students' responses even if they have a complete disconnection and, at a later stage, also provide the proctored session back to the server. Our human proctoring system has the same capability.

How do you see the current situation changing assessment and is it a long-term change?

It's probably one of the most exciting periods of my career in many ways. Every day we're working with organisations that are incredibly motivated to look for ways to meet the challenges of successfully delivering exams right now and using technology to do so. The conversations are leading to the rapid development of extra features – because we're discovering new components of how people provided those exams on paper – and they're being quickly adapted into the platform.

I think a lot of people who have seen the benefits of using technology for this situation will move forward with the technology and continue to expand on it. If you look at the University of London, we know that delivering exams in remote locations around the world is an expensive, logistical problem. Using digital technology is far more efficient and cost effective than creating face-to-face environments globally. We don't know for how long those face-to-face environments are going to be closed and we do know that higher education budgets are going to be severely tested in the coming year.

So if we've got technology for equivalent or better ways that are also cheaper than paper exams, it makes a lot of sense for universities to continue. Looking further ahead, one of the most important challenges technology can help to address is how to make assessments more authentic, whether that's through using collaborative tasks as part of that assessment or engaging with virtual environments.

What insights can you offer to a startup in this field?

Startups need to find a niche that allows them to develop innovative practices and build credibility. Strong relationships and partnerships with organisations are essential to gain a rich stream of information and knowledge to guide them in their journey. There are some great opportunities for further innovation in this field but startups need to understand the art of assessment. Some people take for granted the art that's involved in creating, marking, analysing and contextualising great assessments.

When I reflect on the 10 years I've spent specifically in assessment, the most rewarding part is working with committed people with amazing minds who are driven by the desire to do good through testing. Sometimes testing gets a bad name, because it's seen as high stakes and sometimes high stress. It certainly can be, but there's a huge amount of value in what we do. The people that work in these areas really understand and respect that value. It's an incredible pleasure and honour to be able to work with them.

- **The content of this report is independent of any particular solution provider.**

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Authors and editorial team

Alexander Iosad, head of engagement, Emerge Education
Michelle Pauli, Michelle Pauli Editorial
Sue Attewell, head of edtech, Jisc

About Emerge

Emerge Education is a European seed fund investing in exceptional founders who are solving the $8.5tn skills gap. Emerge is backed by strategics such as Cambridge University Press, Cambridge Assessment and Jisc, as well as founders/investors of Trilogy and 2u. The team has a solid track record with 50+ investments, with those companies raising £100m+ from investors such as Local Globe, Stride, Project A, Rethink Education, Learn Capital and Reach Capital. Emerge also convenes Edge, a series of thought leadership forums for higher education and corporate leaders working on addressing the skills gap in their organisations and beyond. Through Edge, Emerge is able to help founders gain unique customer insights and build defining business partnerships that help their companiesgrow faster.

Email: info@emerge.education
Website: emerge.education

About Jisc

Jisc is a not-for-profit providing the UK's national research and education network (NREN) Janet, and technology solutions for its members – colleges, universities and research organisations. It is funded by the UK higher and further education and research funding bodies and member institutions.

Email: info@jisc.ac.uk
Website: jisc.ac.uk