emerge|

How can edtech address some of the greatest *challenges facing HE leaders?* |

Jisc

Contents

Foreword

At a time when technological innovation is accelerating, we've partnered with Emerge Education to look at how technology might address some of the challenges facing HE leaders.

This report covers three principal areas in which fast-evolving technology is impacting the higher education sector: AI and assessment, digital solutions for a smarter campus and student engagement. These are topics that senior leaders have told us are demanding their attention, particularly given the explosion of artificial intelligence (AI) tools over the past year.

We have partnered with Emerge to delve into the impact of technology in these areas because of the lens through which Emerge considers the world of HE: exploring, examining and assessing the value of innovative edtech ideas, bringing them together and tracking the underlying trends, not only in the UK but internationally. Emerge provides a breadth of knowledge and expertise that usefully complements our own, to the great benefit of the institutional leaders we support.

Not every innovation or case study we share here will chime with your own institution's mission or future vision but, taken as a whole, this report provides a set of valuable snapshots that will help you keep track of what's happening in the sector globally and how new digital developments might affect your students and staff.

I hope you find it as useful as I do.

Heidi Fraser-Krauss
CEO, Jisc

Summary

What

This primer – How can edtech address some of the greatest challenges facing HE leaders? – is for time-pressed HE leaders. It offers an overview of current issues and innovation in three topical areas: assessment, student engagement and digital solutions for a smarter campus.

We highlight exciting examples of innovation in these areas and offer market maps of the startups, established players, gaps, opportunities and new innovators in each space.

Why

These three categories were chosen by the Jisc Emerge HE edtech advisory board of sector leaders. They are all areas where innovation is evolving fast and it's important for leaders to have an understanding of how the sector is responding.

How

This paper is based on research interviews with HE leaders and edtech founders, case studies and desk-based research.

PART 1:
AI and assessment |

Introduction

Reflecting on this introduction, I contemplated asking a generative AI bot to write it instead.

Our last report on assessment was only two years ago but so much has changed technically, pedagogically and culturally as we grapple with the opportunities and challenges that come with digitally rich assessment and recent technological developments.

Chris Cobb
Chief executive, ABRSM

The pandemic has crystalised a transformation in approaches to assessment as institutions rethink its relevancy and overall purpose. This goes beyond simply replacing the handwritten exam with increased legibility from digital assessment platforms. Thought now extends into the "what" and the "why" of assessment to ensure it is contemporaneous to today's work and study environments as well as addressing some of the challenges of disability and attainment gaps.

AI continues to disrupt with questions of authenticity giving rise to increased use of formative portfolio assessment and wider use of aural examinations to defend submitted work. Scepticism remains but concerns over capturing academic misconduct are likely to subside again as long-standing plagiarism detection tools adapt to new developments and innovative startups such as Cadmus pave the way to identify text injections, keyboard fingerprints and the progressive development of an essay. This will leave institutions free to focus on developing programmes and pedagogy that embrace technology such as generative AI, ensuring their students know how to use technology judiciously and are ever alert to the rhetoric of AI evangelists and the built-in biases of the technology itself. Generative AI cannot be uninvented and it is incumbent on institutions to ensure teaching and its associated assessment is relevant in a world where AI will be pervasive.

Institutions will also be keen to ensure that the other advantages of digital assessment are realised, such as a more even playing field for disabled students with options for specialist equipment, software and physical environments.

They will also want to explore the possibilities of adaptive assessment, which responds to students knowledge, learning gaps and ability. This is particularly useful in formative assessment where feedback can be immediate and gamified, thus underpinning the learning process.

With more sophisticated and prevalent machine learning there is also the opportunity for improved quality assurance of assessment with second and third marking to ensure uniformity of marks allocation. It can also be used to look at parity of questions to ensure they are of equivalent difficulty, thus paving the way for more question banks with randomised on-demand assessments.

Looking at how far we have come in the past two years, it is clear that we are still only in the foothills of scaling the full heights of digital assessment but it is also encouraging that we are making rapid progress.

Overview

"ChatGPT represents an exciting development of AI technology and as with all forms of innovation, it gives us an opportunity to reflect on the way that we do things. From a learning and assessment perspective, the rise of more sophisticated chatbots shouldn't be seen as a challenge. They are an opportunity to provide innovation around how we support learning, and to ensure that assessment is appropriately designed for modern-day learning."

Matt Wingfield
Chief executive, e-Assessment Association

Assessment in higher education institutions was forced to change extensively and rapidly during the pandemic, with an imperative to digitise exams. Now, assessment is in the throes of potentially even greater disruption with the arrival of a new generation of artificial intelligence (AI) tools. This time, the disruption may not only affect how assessment takes place, but also what is assessed, and why.

OpenAI's ChatGPT burst onto the scene at the end of November 2022, registered more than one million users within five days and swiftly became the best-known of the generative AI tools, described as a "game-changer". The more advanced GPT4 was released in March 2023 but is available only on a paid subscription basis.

Generative AI uses large learning models to generate human-like text based on the vast datasets it has been taught on and it is continually learning and improving. ChatGPT has been joined by similar tools for specific tasks, including Bing and Google Bard, and text-to-image tools such as DALL-E 2, while Microsoft has integrated two AI tools – Copilot and Business Chat – into Microsoft 365, available in Word, Excel, PowerPoint, Outlook, Teams and more.

Why does it matter?

"My concern… is that universities are sleep walking. Meetings are being held to understand how to prevent cheating with AI. But very few are seeing the full opportunity where AI allows advancement on many promised innovations: mastery learning, competency based education, learner profiles, true personalised learning. I'm surprised that AI is generally being treated as peripheral.

Higher education should be in a panic…or a frantic race to adopt and deploy this fascinating technology (perhaps more impactful than the industrial revolution).

To me, AI isn't just a thing - it's the only thing. It's the thing that changes all the other things. For most of us in the education sector, we are seeking vision from our leadership. What are we to do with AI? What is our institutional mission, vision, and mandate regarding AI?"

George Siemens
Professor of psychology at the University of Texas at Arlington and professor and director of the Centre for Change and Complexity in Learning at the University of South Australia

ChatGPT is capable of producing high-quality essays with minimal human input, leading to concerns about new forms of plagiarism, academic integrity and the feasibility of continuing to use essays as a means of assessment. Paul Taylor, professor of health informatics at UCL, tested ChatGPT on an exam question he had written for a course on using digital technology in healthcare and found that the AI's answer was "coherent, comprehensive and sticks to the point, something students often fail to do".

While text-based assessment is seen as the primary immediate risk area, the potential of AI to disrupt media production through its ability to create convincing art, video and audio extends its reach into far more of the curriculum. It's a rapidly moving field and these issues are only going to increase as AI becomes ever more sophisticated. Beyond academic integrity, there are concerns around the inherent bias in AI models and the risk to diversity in the curriculum. There are also environmental concerns. As the sector strives for net zero, the carbon footprint of AI models will be an increasing risk factor. However, while the focus

in the sector so far has been on the risks, this technology also offers opportunities. Rather than continuing the unwinnable arms race of making essay-based assessment plagiarism-proof, the rise of AI could present educators with the opportunity to create more authentic, relevant assessment techniques that focus on critical thinking, problem-solving and reasoning skills.

ChatGPT could also support assessment processes, reducing time and workload for faculty for some currently time-consuming tasks such as generating multiple-choice questions for question banks. It could also support marking and grading. However, to make use of this potential, staff need to have the support and time to redesign their assessments (and redesign the curriculum as assessment design is part of the wider curriculum design process), and a greater understanding of the affordances of the systems and platforms they have in their institution. There also needs to be a broader focus on the role of assessment across the entire assessment and feedback lifecycle, rather than simply digital exams.

What are the responses?

> "Banning it is simply trying to implement an analogue solution to a digital problem."

Kate Lindsay
SVP academic services, HigherEd Partners

The first six months of 2023 saw a shift in attitudes towards generative AI in higher education, from bans on its use to the publication of the Russell Group's AI principles, committing universities to "the ethical and responsible use of generative AI and to preparing our staff and students to be leaders in an increasingly AI-enabled world".

The five guiding principles state that universities will support both students and staff to become AI literate; staff should be equipped to help students to use generative AI tools appropriately; the sector will adapt teaching and assessment to incorporate the "ethical" use of AI and ensure equal access to it; universities will ensure academic integrity is upheld; and share best practice as the technology evolves. Within assessment, the sector is starting to see some creative uses of AI but as pockets of experimentation and innovation rather than widespread assessment design change.

UCL and Heriot-Watt stand out for their more open approaches to the technology. UCL has produced guidance for students (see below) in how to use aspects of the tools effectively and ethically, stating that "we believe these tools are potentially transformative as well as disruptive". Heriot-Watt University is exploring the opportunities to integrate the technology into assessments to "help students become true global change-makers".

It is clear is that students will graduate into an AI-augmented world in their new careers. AI literacy is an important graduate skill to support employability and universities have a responsibility to prepare them for this reality and provide them with opportunities to experiment with AI tools, understand their potential, and teach them to employ ethical approaches to their use.

There are signs that this is being recognised. At the spring 2023 meeting of the Jisc Emerge HE edtech board of higher education leaders – including 60 VCs, DVCs and PVCs – most identified as ready to understand and use generative AI in the education mission rather than ban it.

Who's doing what, where?

"We need to start thinking about this now, not in the future, because students are already using it. The education system has got to catch up with what's already happening."

Mike Sharples
Emeritus professor of educational technology at the Open University

UCL: engaging with AI in your education and assessment

UCL has produced guidance for students in engaging with AI effectively and ethically. It includes a sandpit with examples of the capabilities and limitations of ChatGPT.

How UCL is redesigning assessment for the AI age: background and podcast.

Jisc: how to word advice or policy on AI use

Getting the terminology right in institutional AI policies is crucial and this useful guide highlights pitfalls to avoid.

**Jisc:** a generative AI primer

An introduction to the technology and its implications for education.

Jisc: principles of good assessment and feedback

How good learning, teaching and assessment can be applied to improving assessment and feedback practice.

Kate Lindsay: a framework for approaching AI and university assessment.
This high-level framework is a useful starting point to support discussions.
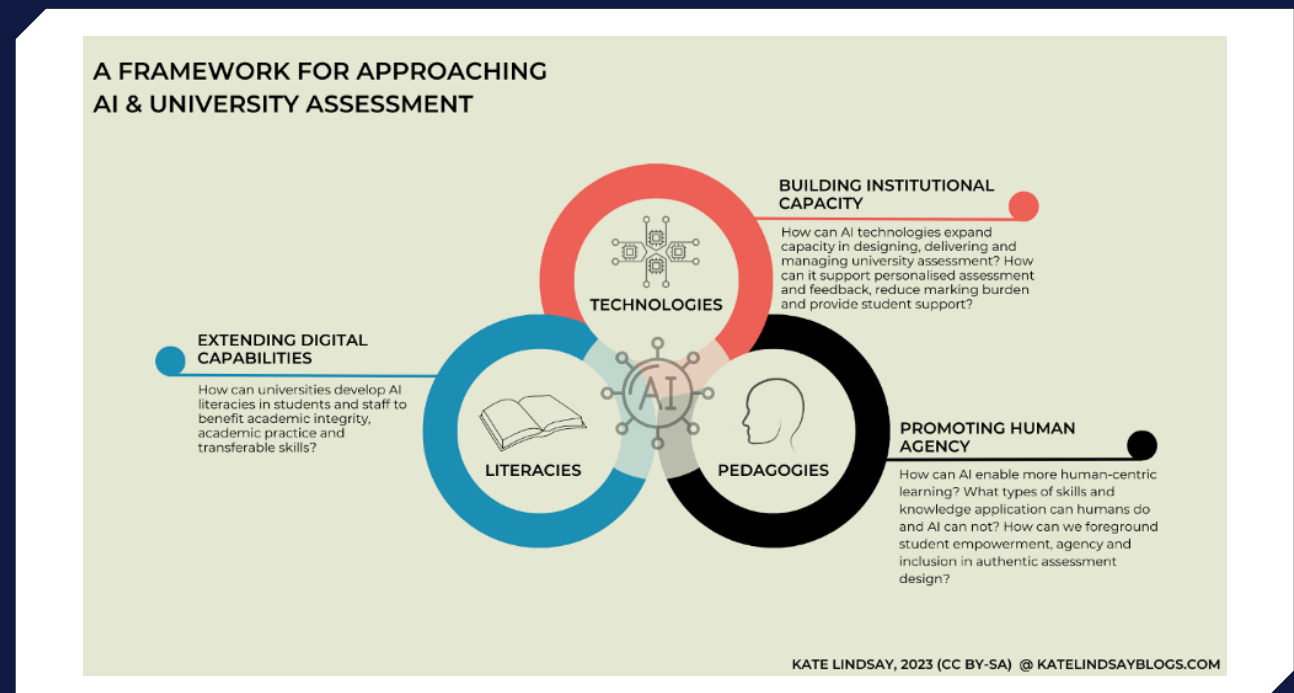
In edtech

On 1 March 2023, OpenAI released APIs for ChatGPT and Whisper (speech to text). Edtech developers are swiftly creating new apps that use the potential of the tool in even more varied ways, such as for conversational language learning, quizzes and virtual worlds.

Early users include Quizlet's AI study coach Q-Chat, an AI tutor that engages students with adaptive questions based on relevant study materials delivered through a fun chat experience. Speak is an AI-powered language learning app focused on building the best path to spoken fluency. It's using the Whisper API to create a product enabling open-ended conversational practice and highly accurate feedback.

Any university still hoping that AI detection services will be the answer to assessment plagiarism concerns may be alarmed by Conch, an AI-powered, subscription-based 'writing tool' aimed at students, which promises "run your writing through our proprietary algorithm and have us rewrite it until it becomes detection free".

"As educators, AI holds us to account to deliver on our promise that we won't just tell people what we know and ask them to regurgitate it back. AI will encourage, perhaps even require, us to deliver more active, participatory experiences and process- and behaviour-focused assessment. In the process, we innovate our pedagogies in a way that makes it possible for our students to develop the critical thinking, creative, communication and AI literacy skills that they need to participate meaningfully in the workplace and the democratic system.

"But, AI is not an automatically positive force in education. Educators need to beware of a new and growing generation of AI-powered edtech which makes it faster and easier for us to deliver sub-optimal teaching and learning practices. By far the biggest risk of AI in education is that it shores up content-heavy, knowledge-check based learning experiences which we know from 30+ years of learning science are flawed and underserve our students."

Philippa Hardman
Creator of learning design engine DOMS,
affiliated scholar at Cambridge University

AI and assessment at the Hong Kong University of Science and Technology

"We're at a pivotal moment in education. Everything is going to change."

Sean McMinn
Director for the Centre for Education Innovation, Hong Kong University of Science and Technology
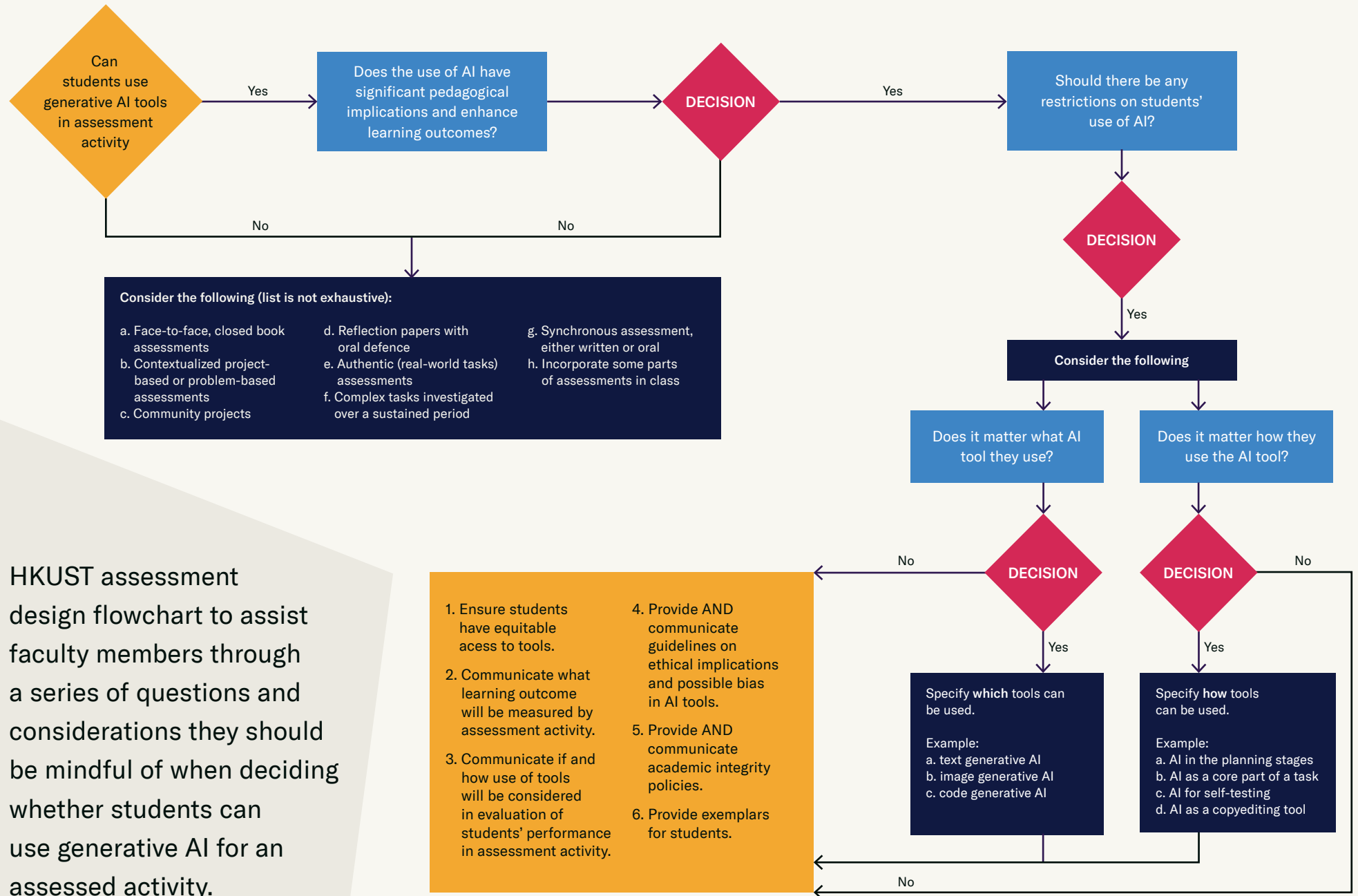
Hong Kong University of Science and Technology (HKUST) moved quickly to embrace AI as fully but responsibly as possible. In February 2023, faculty members were offered four options for how they would prefer to address AI in their individual courses: completely ban it from assessment tasks; limit the ways in which it could be used; limit the types of AI that could be used; or allow its use with no restrictions beyond maintaining academic integrity and honesty. Around 80% of faculty chose the fourth option.

The result has been an explosion of creativity in relation to assessment tasks. For example, in the business management school, students on one course now use AI to design, create and then deconstruct a case study rather than simply discuss a case study chosen and purchased by the school.

Looking to the next academic year, and based on feedback from a taskforce comprised of faculty and students, the university is exploring a number of possible approaches to assessment activities, including a hybrid, flipped model approach. Here, the formal assessment might be a midterm series of small stakes quizzes to identify any gaps in students' knowledge and the summative assessment a problem-based or project-based approach where they start to apply that knowledge.

In addition, the Centre for Education Innovation team and HKUST's IT department are designing an AI platform that will act as a chatbot for faculty members to use to generate lesson plans, quizzes and other course design elements. Rather than educators facing the ChatGPT blank user interface, HKUST's bespoke AI platform will be trained by the university with relevant literature, guidelines and best practice. It will ask guiding questions and also answer questions if faculty members are struggling, for instance, to write intended learning outcomes and map those to actual learning activities and assessments.

HKUST assessment design flowchart

Can students use generative AI tools in assessment activity

— Yes → **Does the use of AI have significant pedagogical implications and enhance learning outcomes?** → **DECISION** — Yes → **Should there be any restrictions on students' use of AI?**

No / No →

Consider the following (list is not exhaustive):

a. Face-to-face, closed book assessments
b. Contextualized project-based or problem-based assessments
c. Community projects
d. Reflection papers with oral defence
e. Authentic (real-world tasks) assessments
f. Complex tasks investigated over a sustained period
g. Synchronous assessment, either written or oral
h. Incorporate some parts of assessments in class

DECISION — Yes → **Consider the following**

Does it matter what AI tool they use? → **DECISION** — No → / Yes →

Does it matter how they use the AI tool? → **DECISION** — No → / Yes →

Specify which tools can be used.

Example:
a. text generative AI
b. image generative AI
c. code generative AI

Specify how tools can be used.

Example:
a. AI in the planning stages
b. AI as a core part of a task
c. AI for self-testing
d. AI as a copyediting tool

1. Ensure students have equitable acess to tools.
2. Communicate what learning outcome will be measured by assessment activity.
3. Communicate if and how use of tools will be considered in evaluation of students' performance in assessment activity.
4. Provide AND communicate guidelines on ethical implications and possible bias in AI tools.
5. Provide AND communicate academic integrity policies.
6. Provide exemplars for students.

HKUST assessment design flowchart to assist faculty members through a series of questions and considerations they should be mindful of when deciding whether students can use generative AI for an assessed activity.

Assessment partnership: Cadmus and the University of Manchester

Online assessment platform Cadmus has had a partnership with the University of Manchester (UoM) since 2021, when the university rapidly moved to online learning and assessment and needed a solution to:

- Assure academic integrity in an online environment.
- Enhance opportunities for underrepresented and minority groups who were disadvantaged by non-inclusive teaching and assessment, improving the degree awarding gap.
- Maintain teaching and learning quality in a disparate environment.
- Support students and educators facing change fatigue to adopt and execute new learning technology with ease and efficiency.

Cadmus worked closely with key stakeholders over one semester to transition four academic units online across various disciplines. This included four subjects, 20 educators, three unit coordinators, 589 students and seven assessments.

Cadmus actively engaged UoM students throughout the assessment process, not just at the point of submission. The scaffolded assessment experience, in-app academic skills support, referencing guides, and assessment checklists reduced opportunities for academic misconduct and improved the student experience and results.

2%
Increased student pass rate

11%
Increased student high distinctions

86%
Students accessed assessment feedback through Cadmus

89%
Positive student experience

80%
Students want to use Cadmus again for assessment

100%
Positive educator experience

"For us, the real key is around education, prevention, design and then detection. So, how can we design AI into what we're doing so that students can best leverage it? What do we need to change in our assessment designs that now incorporate the ability for this tool and the functionality and the affordances that it delivers?

At the heart of academic integrity is quality assessment design and how you facilitate that. It doesn't matter how good your academic integrity measures are – if the quality of what you've designed is really low, it's then very hard to get great integrity outcomes."

Herk Kailis
CEO Cadmus

Cadmus's response to generative AI has been to emphasise its long-standing academic integrity capabilities, which provide proactive learning support throughout the assessment process to avoid academic integrity breaches, rather than trying to catch misconduct at the point of submission.
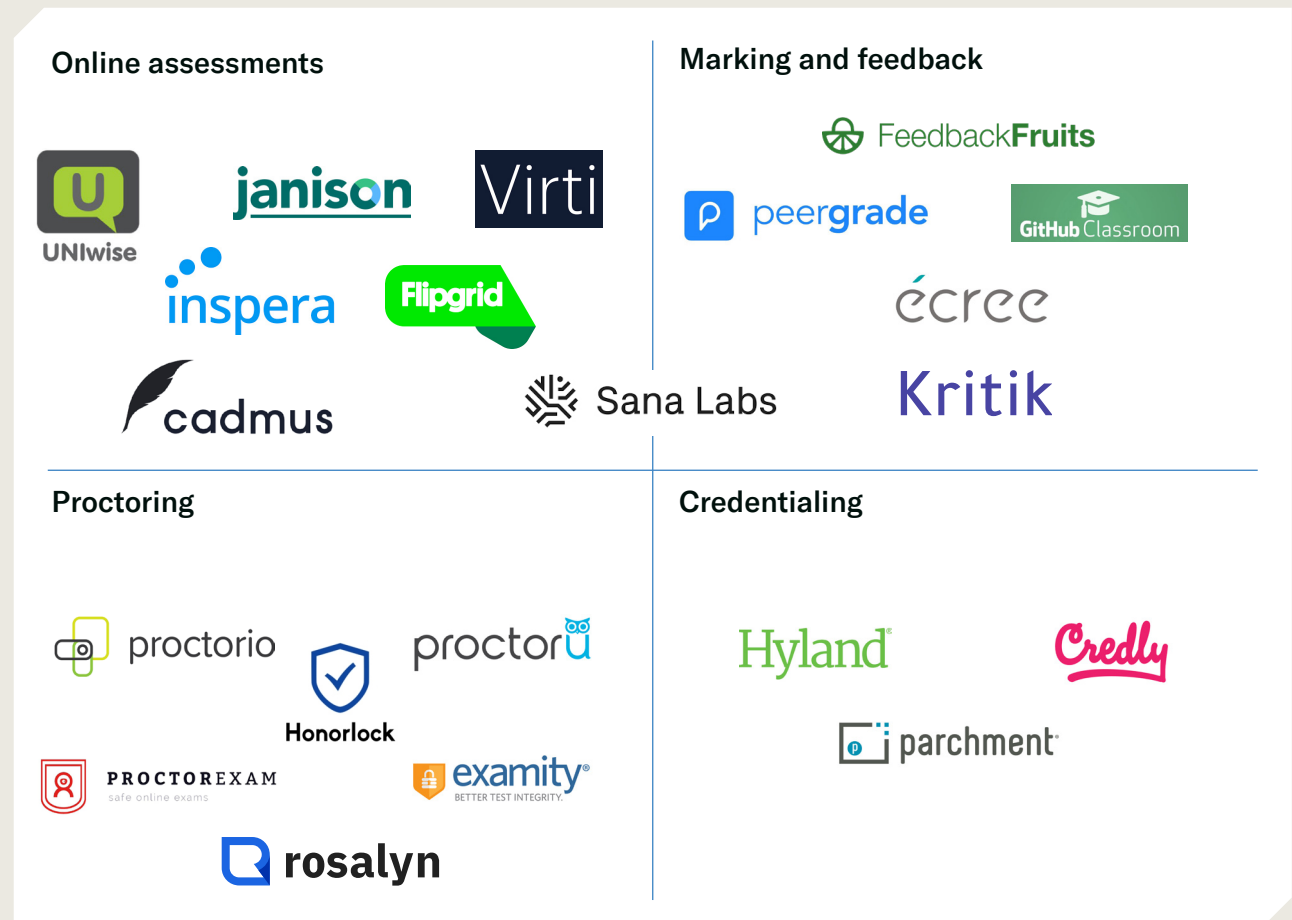
"The university has commenced education sessions and briefings with academics on how best to utilise Cadmus analytics to identify the authenticity of students' work. Digital evolution of platforms such as ChatGPT won't go away; they will only become more sophisticated. This reinforces the need for higher education to move to authentic, real-world assessment practices, so we can embrace digital innovation as it continues to arise."

Professor Gabrielle Finn
*Vice-dean for teaching, learning and students
at the University of Manchester*

Technology for assessment 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 on the right, 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 · cadmus · Sana Labs

Marking and feedback

FeedbackFruits · peergrade · GitHub Classroom · écree · Kritik

Proctoring

proctorio · proctoru · Honorlock · PROCTOREXAM safe online exams · examity BETTER TEST INTEGRITY. · rosalyn

Credentialing

Hyland · Credly · parchment

Digital solutions for
a smarter campus

Introduction

It is impossible to be in two places at once. But what about being in a place and a *space* simultaneously?

As I walk through my university campus it has become normal to see students and staff doing just that. They might be located in the library while collaborating in an online project, or engaging with a hybrid seminar on the main campus while sitting in the satellite campus across town. These activities challenge the idea of campus as a physical place and reveal that it is really a blend of connected physical places and digital spaces. And, as blended learning and online study expands, this will become more and more the case.

It is the connections that link place and space together that will be the key to the success of the campuses of the future. Which means there is huge opportunity for innovative edtech solutions that can facilitate these connections. It is going to need more than smart campuses and the internet of things. These are a vital first step but focus primarily on improving the physical experience of a campus and are of limited interest to the increasing number of students and staff who expect to engage with the university remotely. It will require a reimagination and detailed mapping of the interactions that campuses facilitate in both place and space, and the development of new technologies to codify, capture, process and manage the complex information flows that represent and inform them. We can already see the direction of travel through the release of Apple's Vision Pro headset and Meta's metaverse, and we can expect continued growth in the technologies to enable digital spaces.

The physical campus will always remain an important part of a university's identity, but it is no longer *the* university. Future campus investments will need to reflect this with the construction of new virtual environments, which have the potential to be just as important as physical buildings.

Nick Mount
Academic director,
University of
Nottingham Online

Overview

Higher education is in the midst of a reimagining of the digital campus and the extent to which it needs to be a physical place. Post-pandemic, there has been a shift towards digital campuses conceptualised as 'space'.

A campus is traditionally thought of as being rooted in a physical, geographical location – a **place** – but it need not be.

A campus co-locates expertise, skills and ideas that can cross-fertilise each other and generates outputs that would not be possible outside the campus. As somewhere designed to facilitate specific activities or interactions, it is a **space**.

A digital campus can be a digital place or a digital space, or both. A digital campus need not be physically realised. It could be entirely virtual or a blend of virtual and physical. What really matters is what the campus facilitates.

Physical campus   Smart campus   Digital campus

The movement along on the continuum between place and space determines how a digital campus is designed to engage students and staff. It also determines the extent to which investment to support the development of digital activities (including the digital competencies of students and digital-led research) should be centred on new buildings or enhanced digital and data infrastructures to support greater virtual engagement.

Irrespective of whether it's a space or a place, we need to ask, "What must we to do to make those connections and cross-fertilisations possible, to deliver the outputs we desire from the campus?"

Here we're focusing on two aspects at either end of the place/space continuum: the smart campus as a digital place and the virtual campus – the metaverse in this case – as a digital space.

From smart campus to intelligent campus

Many place-based universities function as mini cities with their own accommodation, roads, shops, energy plants and transport systems. Just as smart cities are improving the quality of life, sustainability and safety of some major cities, so are universities increasingly looking to enhance student experience, operational efficiency and teaching and learning through smart campuses.

A smart campus is a networked campus, using ubiquitous, reliable connectivity and embedded Internet of Things (IoT) sensors across the physical estate to produce data that can be used to create a series of benefits. As Deloitte puts it, smart campuses are "institutions that use next-generation technologies woven seamlessly within a well-architected infrastructure."

In its guide to building the future intelligent campus, Jisc distinguishes between a 'smart' campus that uses sensors to collect and transmit data autonomously but lacks the analysis capability, and an 'intelligent' campus marked by these key features:

- The availability of connected devices and sensors
- The ability to collect, store and process data (including combining it with other data)
- An understanding of what the data is and how it can be used
- A set of goals to benefit campus users

Those benefits can be hugely varied. At the University of Edinburgh, the data is being used to improve the sustainability of on-campus buses and feeds an app to let students discover if there is a study space available in the library when they reach the campus.

The University of Birmingham, which is taking a highly strategic approach to developing as a smart campus, is looking at innovations such as personalised route finding, intelligent timetabling, optimised use of academic spaces, energy management and smart travel. It is also using the smart campus to meet its commitment to reach net zero by 2045, a driving factor behind many smart campus initiatives.

This includes the University of Glasgow, which is also taking a strategic approach with its smart campus digital masterplan to create a campus that is 'open, connected, adaptable and sustainable'.

Jisc is working with Honeywell, a global leader in connected environments, to create a foundational smart buildings service. It is running a proof-of-concept pilot with five institutions with a view to establishing a common core platform that will provide baseline smart campus services for the sector, available on the Janet Network.

It will deliver analytical dashboard insights for monitoring building health and comfort metrics such as electrical consumption, temperature, pollutants, asset availability and much more. It will not use any personal data.

But, alongside the clear benefits there are also risks that must be recognised and managed, predominantly around ethics and security. Campus users will have understandable concerns about their personal data and privacy that need to be addressed.

While some aspects of the intelligent campus can enhance security for users, the vulnerability of IoT devices to hacking is a threat, based on the type of data and the criticality of the device. Jisc is exploring the use of 5G technology as an enabler for creating secure air gap networks for IoT devices.

Along the continuum

However, while for many universities the traditional approach has been to invest in the campus as a 'place', whether digital or not, many students today do not necessarily see the affordances of the physical campus as the primary factor in the quality of their experience and success.

They are looking for a greater blend between place and space, with digital infrastructures enabling a far more fluid campus experience that can shift (possibly several times a day) from the physical to the virtual.

This fluidity is also now a defining feature of the working world that many students will enter, with an increasing shift away from place-based conceptualisations of work, especially in the knowledge-led roles that graduates tend to be well-placed to inhabit. This transition to workplaces that require workers capable of shifting in and out of physical and virtual spaces is likely to accelerate and so universities should be equipping their students for this future now by developing their digital campuses.

The truly digital campus is one in which both physical and virtual spaces are *supported and seamlessly connected.*

A 'digital campus' uses the connections provided by technologies – perhaps provided by the smart campus – to blur the distinctions of where a student or member of staff is so that they can collaborate and engage with others and facilities seamlessly.

We are seeing rapid movement towards humans existing in multiple digital realities and there are enormous opportunities for universities to benefit from this (for example, a blending of a physical and virtual operating theatre for trainee doctors) if campuses are designed to support flexible transitions from the physical to virtual realities.

This idea moves beyond smart sensors and data flows – it requires counterpart realities that can share these data flows and adapt in real-time to them.

Metaversities: the next frontier for the digital campus?

'The metaverse' entered common currency in July 2021 when Facebook announced that it would dedicate the next decade to bringing the metaverse to life, and then rebranded as Meta. Since then, the initial hype has dulled and Meta has made more than 20,000 redundancies and announced a repositioning of the metaverse as just one of a number of investments, to focus instead on artificial intelligence.

Still, the metaverse remains an attractive, if elusive, concept. It's widely acknowledged to be – at least – an immersive virtual world where users can socialise, work and play. Beyond that, it's open for debate, although McKinsey adds some more depth by suggesting:

- The metaverse encompasses immersive environments, often (but not always) using virtual- or augmented-reality technology
- The metaverse is "always on" and exists in real time
- The metaverse spans the virtual and physical worlds, as well as multiple platforms
- The metaverse is powered by a fully functioning virtual economy, often (but not always) built on cryptocurrency and digital goods and assets, including non fungible tokens (NFTs)
- The metaverse enables people to have virtual identities, presence, and "agency," including peer-to-peer interactions, transactions, user-generated content, and "world-building"

> "The metaverse is still very much a hypothetical concept that requires extraordinary technical advancements before it can be made to function as intended."

Paul Bailey
Head of co-design, Jisc

However, despite its conceptual elusiveness, 'metaversities' have sprung up. Victory XR, which supplies the immersive VR technology that allows remote students and academics to meet and learn on a virtual campus has launched metaversities at a dozen universities across the US.

There are signs of success. At Morehouse College in Atlanta, the VR world history class registered a 10% increase in student grade point averages relative to grades in both the same class taught concurrently via Zoom and taught face-to-face the previous year. The college also collected empirical data in its other VR classes that showed an overall increase in student satisfaction, engagement and achievement relative to traditional and online formats.

Whether these metaversities are really 'the metaverse' or not, they show the potential of immersive learning. They also highlight some of the issues inherent in the metaverse. The equipment is expensive and its use risks exacerbating digital divides. There are legal, ethical and regulatory issues, especially around the profit-driven elements of the metaverse and questions of who owns, monetises and shares the data collected within it.

Who's doing what, where?

Jisc: Guide to building the future intelligent campus

Fully updated and extensive guide to using data to make smarter use of the university estate, including benefits, ethics and security.

Jisc: An educators' guide to the metaverse

Wide-ranging overview of the potential and risks of the metaverse.

University of Edinburgh: using geospatial data to help students find study space

EDINA is a world-class centre for data and digital expertise at the University of Edinburgh. It's been working on projects to highlight the value of geospatial data and how it can help to underpin a sustainable, hybrid campus. This includes an interactive campus map promoting sustainable travel options and a study space occupancy initiative. This uses the campus map project data to create a booking app, allowing a student to book study space in the dozen places available on campus and avoiding them travelling onto campus to find there is nowhere in the main library for them to study.

It shows trends – whether the study space is becoming busy or not – and suggests other, less busy places to study on campus. It currently uses swipe card data but this is to be replaced with anonymised live occupancy data from wifi connectivity.

Keele University: smart energy to reach net zero

Keele University has the ambitious pledge to reach net zero by 2030. SEND, its Smart Energy Network Demonstrator, is a cutting-edge, real-time energy management system designed and installed in partnership with Siemens UK.

The largest of its kind in Europe, its role is to intelligently optimise energy generation, distribution, storage, forecasting and balancing across the campus.

It combines with Keele's pioneering renewable energy park, an array of 12,500 solar panels and two wind turbines generating clean, renewable energy. With combined battery storage, the site supplies up to 50% of the campus's electricity requirements and any excess is fed back into the local power grid to serve neighbouring communities.

"We now understand when people are arriving on campus, what they need to do and how they can use energy more efficiently. We can use the network underneath that to drive changes and make things happen, such as turning things on and off.

Some of the things we're doing are revolutionary but, with all the groundwork that's been done, some of it is also basic, like turning off aircon units in data centres at night or when it's minus 10 in the winter, which we can do because all our aircon is monitored through our building management so we've got visibility of temperature changes."

Mathew Bailey
Head of network services

University of Nottingham: Digital Nottingham

The University of Nottingham's new city campus, Castle Meadow, is focused on digital and data innovation, emphasising experimentation, collaboration and knowledge exchange.

"The digital campus from Digital Nottingham's perspective is about whether we can broker and facilitate new kinds of conversations between the city and the researchers that we have at the University, and collaborating with Nottingham Trent University, to create new partnerships.

If you have a digital and creative maker space in proximity to a place where you can engage with the public and demo things, what does that enable that isn't enabled elsewhere on the campus? Can we do new things with new communities, new engagements?"

Professor Paul Grainge
Academic director for Digital Nottingham

Arizona State University: ASUniverse, ASU's digital twin

At ASU's cutting-edge Learning Futures studios, a student-led collaboration is building a digital twin of ASU's Tempe campus, designed to connect fellow students in the metaverse. The student-led collaborative effort aims to blur the lines between the physical and digital environment by allowing students to participate in campus tours, events and classes in an immersive experience from anywhere with access to the internet.

ASU's five-year partnership with Zoom and ASUniverse includes virtual Zoom kiosks that function as a window to the physical world where visitor avatars can connect via live Zoom meetings with people outside the virtual campus, such as professors and student services staff.

"It's part of this human evolution that's going on where we're becoming integrated with our technology. Our technology is just an extension of ourselves that allows us to connect at a level that brings the world closer."

Jesse Murdock
ASU graduate student studying architecture and a digital twin specialist at Learning Futures

Digital campus market map

This is a nascent market with vast potential for growth and this market map shows the key emerging and leading players.

Physical space

MeshSmart   Smart Networked Environments   Planon Building Connections   LOGICALIS Architects of Change   SIEMENS   COMMSCOPE®

Schneider Electric   HONEYWELL FORGE   FUSEFORWARD   SEAtS Software Education Success Platform

HELLO LAMP POST   CenturyLink™   spacebasic

Campus design   OneCampus BY TRANSACT   Campus operation

boomi   ICS.AI

VICTORYXR   metaverse LEARNING

Spatial   eon reality

SECOND LIFE   Labster   AXON PARK

Virbela   StudyStream

ENGAGE

Digital space

We have identified two areas – campus design and campus operations – where external providers can add the greatest value for universities, both in the traditional 'smart' campus (delivering an improved experience in the 'real world') and the digital campus (designing better virtual experiences, including in the metaverse).

	Physical space	Digital space
Campus design	IoT sensors, digital wayfinding, engagement monitoring, smart energy	Virtual campus, VR/AR immersive learning environments
Campus operations	Network infrastructure, data platforms collecting and processing information, dashboards, campus management platforms	Tools enabling virtual study and student collaboration, metaverse

Large enterprise providers remain the backbone of HEI investment, so in this market map we have highlighted both standalone tools that universities can procure and larger technology providers who offer campus solutions as part of their wider ecosystem.

As we can see, big incumbents have so far focused on enhancing the 'smart' capabilities of physical environments, emphasising integrations, data analytics and end-to-end 'connected campus' solutions. A cluster of new players are building innovative virtual learning environments in the metaverse, but there is a lot of space for further innovation around how the digital campus might fundamentally rethink the student experience.

PART 3:
Student *engagement* |

Introduction

The salience of edtech student engagement tools has only risen since our previous report on the topic in January 2023.

At a time when the UK government is proposing action on 'low-quality courses', the data continues to show clear correlations between student engagement, academic outcomes, progression and retention. And, as concerns about student mental health increase, the government-appointed student support champion, Professor Edward Peck, is paying particular attention to student engagement and wellbeing.

Meanwhile, the rise of personalisation, AI, learning analytics and increasing student preferences for mobile and cloud services all offer exciting opportunities for universities to change and improve their approaches to student engagement.

As senior leaders, we know that enhancing student engagement is vital and there is enormous potential for digital solutions to help – but we also know it's challenging. The student body is diverse, and increasingly so, and the university experience is complex, covering a very broad range of domains from cognitive and academic to emotional, social and vocational. The effects of the pandemic are still being felt and will be for some years to come; the 2023 graduating cohort is the first to have undertaken a full three-year degree under the shadow of Covid-19. Other external factors also play a role in the student experience, from marketisation and greater emphasis on skills and employability, and increases in the number and proportion of international students, to staff industrial action around pay and pensions.

Despite all these challenges, we can sense a clear trend towards more student-centric, personalised systems in higher education. In the following pages we highlight some examples of what's out there that really works, what's good practice and what skills and capabilities are needed to make the most effective use of these solutions.

Ian Dunn
Provost, Coventry University

Overview

Student engagement is a major focus in global higher education, not least because data shows clear correlations between student engagement, academic outcomes, progression and retention.

As we highlighted in our previous report, Enhancing student engagement using technological solutions, student engagement has been firmly in the spotlight in the UK through the work of many organisations, including the QAA and the Office for Students (OfS) (and its devolved nation equivalents, and predecessor Hefce). OfS has been active in student engagement through its 2020 three-year student engagement strategy, and via the mechanisms of the Teaching Excellence Framework (TEF) and National Student Survey (NSS).

The general trend in the student journey is that digital is enabling end-to-end coverage, moving from generic, piecemeal university systems to student-centric, personalised systems. There are many examples of how edtech is already contributing to improving student engagement, but space permits only a few areas to be covered here.

Wider digital student experience trends

From	To
General university computer labs	Accommodating BYOD
Wifi hotspots	Complete campus coverage
Multiple separate applications	Single sign-on integrated service
Partial coverage of student journey	Coverage from recruitment to employment
Face-to-face weekdays 9-5 service	Online self-service 24 x 7
Generic university systems	Student-centric, personalised systems
No support for disabled students	Assistive technologies or adaptations
Piecemeal, bottom-up tactics	Deliberative strategy
In-house DIY development and delivery	Public-private partnership (PPP) model
Traditional big system incumbents	Burgeoning edtech marketplace

Learning analytics and student wellbeing

"It has become clear to me that our current approach to student support needs some rethinking. The arguments for revising how we deliver support services are powerful and the prospect of data-driven approaches to reform is especially compelling."

Edward Peck
Government higher education student support champion and vice-chancellor of Nottingham Trent University

In student engagement, this progression can be seen in the evolution of learning analytics, particularly in the area of student wellbeing and student services, which are now having to deal with the impact on students of the cost of living crisis.

According to research from the Office for National Statistics in November 2022, 91% of student respondents said they are worried about the rising cost of living, and around 45% of respondents reported that their mental health and wellbeing had worsened since the start of the autumn term 2022.

As a result, student services are also under increasing pressure due to these challenges, rises in student registrations and funding shortfalls across the sector. Putting analytics and data governance at the heart of these services could help them to tackle these pressures and better support students.

The evidence for the benefit of learning analytics in general is strong. Research from analytics startup Solutionpath and Wonkhe in 2022 showed that early intervention can significantly improve student engagement. A Teesside University case study indicates that the earlier an initial intervention is made with a low-engaged or unengaged student, the lower the chances of that student withdrawing from the course at any point.

Similarly, findings from the University College Birmingham show that early engagement and attendance are crucial predictors of students' later retention, attainment and engagement.

The University of West England's research suggests that the early period of engagement is even more critical, as disengaged students during this time are more likely to remain unengaged in the second semester.

When it comes to student wellbeing specifically, a pilot project at Northumbria University, which was supported by the Office for Students, shows that using analytics – based on data already collected by the university – helped the university to target resources more effectively, improving outcomes while reducing the strain on its student services.

Northumbria's experience is featured in Student analytics - a core specification for engagement and wellbeing analytics, in which the government's higher education student support champion, Edward Peck, sets out the core data needed to generate insights on students' engagement and wellbeing. He argues, based on the Northumbria evidence, that there is a relatively small number of data points required to deliver insights into student engagement and wellbeing, and that these are likely being collected by HEPs already.

Who's doing what, where?

Jisc: student analytics - a core specification for engagement and wellbeing analytics

Higher education student support champion Edward Peck has outlined his vision for efficient and scalable student services through better data governance and predictive student analytics in this report.

Jisc: learning analytics

Jisc has provided a learning analytics service co-designed by the sector since 2018. Its code of practice and senior manager's guide support effective and ethical implementation.

The Open University: Taylor, an AI-based digital assistant

Taylor is a digital assistant designed to have a dialogue with students who disclose a disability. It's an alternative to filling in forms and helps students better understand the support available to them, and feedback from students and staff has been positive. As well as addressing a particular issue, Taylor is building up the OU's general knowledge about the potential and challenges for using chatbots, virtual assistants and other AI technologies.

Arizona State University: Dreamscape Learn

Dreamscape Learn was developed through a two-year partnership between ASU and VR company Dreamscape Immersive, merging academia's advanced pedagogy with the entertainment industry's emotional storytelling. Dreamscape Learn's Immersive Biology in the Alien Zoo is a virtual reality immersive biology curriculum in which students explore biological concepts and hands-on tasks within an 'orbiting intergalactic wildlife sanctuary full of endangered life forms'. Starting in 2022, two classes have now been taken by 6,000 students. Initial research suggests that, following the Alien Zoo experience, student grades in lab work improved substantially. The Alien Zoo lab cost about $5 million to develop. In January 2023 Dreamscape Learn raised $20 million in series A funding to continue building its virtual reality-enabled coursework and platform.

A medflix of surgery: Brighton and Sussex Medical School

Virtual Reality in Medicine and Surgery (VRiMS) is free at the point of access, high-quality VR training resource not limited by institution, organisation or reason for training. It aims to improve patient care and wider health understanding using extended reality, especially in low to middle income countries. VRiMS uses a sustainable approach to learning by providing trainers, training and equipment. VRiMS is also an academic group that uses qualitative and quantitative methods to evaluate extended reality.

- 6,000 participants worldwide

- 101 countries

- 1,300 hours of live broadcasted content

- 52% increase in the VRiMS course participation rate since its launch in 2019

- Funding from Health Education England (HEE) to create an open repository of 360 VR with virtual studio overlay for anatomy, medical and surgical content, including using material from the public display dissections

- Funding from HEE for true virtual reality with six degrees of freedom for a basic life support app, a fire safety app for NHS mandatory training, a chest drain app using high fidelity hand gesture control, an augmented reality facial skin cancer app and metaverse resources for medical institutes.

During the Covid pandemic, Brighton and Sussex Medical School continued to teach student doctors but access to the dissection facility was limited. Professor Claire Smith and Professor Jag Dhanda realised that the camera in the operating theatre light, which is used to show unique pathological or anatomical features to the rest of the room, could be used more creatively. They installed 4k cameras, connected a feed to Zoom and Teams and became the first medical school in the UK to live stream dissection to students.

From there, the project expanded to include 360 degree surgery. The team learned how to overcome the limitations of 360 cameras using virtual studio overlay and livestreamed across the world, while also recording for later viewing. This medflix for surgery is a complete open-access resource for anyone inside or outside of medicine and surgery from any country to view that content.

"We started to livestream 360 video cadaveric surgery through virtual reality to around the world, particularly to countries where surgical access for training is limited. We hosted and sponsored surgeons from low to middle income countries to attend BSMS for an in-person event and live streaming to doctors in Uganda and Kenya and beyond.

"It was just fantastic experience for these surgeons who have huge populations they serve with significant disease burden but little opportunity for postgraduate surgical education. It suddenly removed the physical barriers of training," says Professor Smith. VRiMS now travels around the world in LMICS creating resources for surgeons and doctors.

Using a low-cost headset, which could be as basic as a Google cardboard-style box that a phone slots into, surgeons can watch an operation with the depth perception that is important in surgery while also being in control of different angles of view, rather than having only a bird's eye view from an overhead camera in the 360 video virtual studio overlay.

"It's about just-in-time training, it's about a surgeon who needs to do a procedure that they've only done once before, and they need that training then and there in the half an hour before they see the patient," says Professor Smith.

• See also Staffordshire University's work on 'simmersive' learning.

Technology for student engagement market map

This map represents a snapshot of the market, highlighting some noteworthy tools in each category. It doesn't cover all organisations and tools in these categories.

It's helpful to look at how tools built from these technologies fall across the student journey, which we've divided into four blocks: discovery and enrolment; non-academic support; academic support; and career development and employability.

Discovery and enrolment

AdmitHub   ApplyBoard
enroly   CINTANA EDUCATION
UNIBUDDY   educatly
akorn

Non academic support

invoke Learning   StudySmarter
OCELOT   Knowunity
STUCOMM   Stellic ....   RE UP
SignalVine
vygo   wooclap

Academic support

NULU   MINERVA   INSENDI
immersify EDUCATION   ment.io   SMART SPARROW
STUDIOUS DIGITAL EDUCATION   immersify EDUCATION
texthelp   codio   TOP HAT
TeachFX   PATHSTREAM

Career development and employability

Handshake   Riipen
potential.ly   FOURTH REV
AstrumU   Forage
Podium Education   VIRTUAL INTERNSHIPS
Quinncia

Discovery and enrolment:

Covers all the tools developed to help students through the recruitment process, from discovering the university, applying and paying the fees, to navigating the visa process for international students, and enrolling.

For example: Unibuddy is a student recruitment platform that connects prospective students globally with current students. It is an interactive way for prospective students to learn about the university on platforms they're familiar with, beyond what's on the university's website.

Non-academic support:

Includes tools that support easy communication among students, faculty and administrators for mentorship, retention, and health and disability support. These tools help instil a sense of belonging among students and impact the quality of student experience and outcomes.

For example: Vygo is an engagement platform that connects students to older peers for peer support and tutoring services, to alumni for career advice and mentorship, and to staff for transparent and seamless student support services. ReUp uses AI to identify and engage at-risk students through a combination of automated and human-led communication to reduce and re-enrol students at risk of withdrawing.

This category also includes tools that allow administrators to analyse engagement data and student feedback data to improve support services, such as Invoke Learning and Unitu.

Academic support:

Covers teaching and learning tools that develop learning communities, build interactive course content, and analyse classroom engagement and collaboration.

For example: the Minerva Project, Codio, Insendi, Smart Sparrow, Studious and Immersify Education are all tools used for building interactive course content. TeachFX analyses voice during class to measure the student engagement, the equity of voice and the discourse patterns. Mentio is an AI-enabled discussion platform that provides structure to forums for more collaborative thinking. It also assesses the discussion and grades students on the quality of their participation.

Career development and employability:

Covers all tools that help students develop personalised career pathways, including course recommendations, project-based education and job recommendations

For example: Riipen provides a marketplace of project-based learning opportunities with real companies, which can be imbedded into coursework or taken as internships, so students are more engaged with what they are learning in the classroom and can apply it in the real world.

PART 4:

Overcoming barriers |

Overview

Digital transformation – or using digital technologies to improve teaching, learning and research and enhance the student experience – is necessary but challenging for UK universities.

The accelerated adoption of digital technologies during the pandemic was welcome and needed but does not equate to true digital transformation. Genuine transformation requires long-term investment, strategic leadership and a critical evaluation of the systems, processes and activities that underpin the work of a university.

For years, universities have underinvested in their digital infrastructure, resulting in struggles with outdated systems, inadequate skills and legacy architectures. Coupled with poor data management, a lack of strategic leadership and an unwillingness or lack of experience in working with edtech startups, digital transformation can become a complex, risky and expensive undertaking.

However, the benefits of making this investment are enormous, offering greater resilience and efficiency, new opportunities to bring in additional revenue, better learning outcomes and greater flexibility for students. It is an investment universities cannot afford not to make.

The challenges

Legacy technology

Legacy technology remains a significant issue for almost all universities. Institutions are constantly attempting to make better use of and integrate existing digital tools, cloud-based architecture and Software as a Service (SaaS) solutions. Proliferation of hardware, processes and software through academics' individual choices can also add complications, although flexibility is needed so that academics have the freedom to develop the digital solutions that their research demands. Greater integration of interoperability standards would help, making integrations across diverse digital solutions easier.

There are two major risk factors for every HE provider with legacy systems: cyber security and challenges in recruiting IT staff. Cyber security is already a significant issue for the education sector, with Jisc's latest cyber security impact report underlining ransomware as the number one threat. The demand for IT professionals also outstrips supply in the UK, causing a salary inflation race for the best, which many universities find hard to maintain.

Data silos

More effective use of data offers immense potential but is still a mountain to climb for many universities. A lack of data integration – bringing together disparate sets of information – is currently impeding progress. In HE, IT has tended to evolve in an organic way, resulting in piecemeal, in-house, one-off siloed systems rather than a holistic picture.

Decentralised university structures of departments, school and faculties has made data silos the norm. The result is many individual point solutions, multiple points of failure and weaknesses, but few common standards and limited interoperability. Beyond data, creating a meaningfully integrated experience for all the various elements in a university's digital environment can be a challenge.

For more in-depth analysis of these challenges, see Digital strategies in UK higher education: making digital mainstream (Skelton, 2023)

Working with startups

Universities can find it hard to work with edtech startups, despite the potential benefits.

There can be a mismatch of pace and priorities: universities are typically large and bureaucratic institutions with established processes and priorities while startups are often fast-moving and focused on rapid growth.

Universities may be understandably cautious and risk averse and have real concerns around integration challenges, data security and privacy, uncertain sustainability and scaleability, and alignment with academic needs.

Strategic leadership

Too often 'digital' is delegated out of the senior executive team by leaders who avoid technology-related projects because they lack confidence in their own IT skills.

Insufficient digital awareness among the executive team makes it harder for them to take informed decisions in core strategic areas.

Digital capability and confidence

While there was a huge leap forward in staff and student digital capabilities over the past three years, there is still work to be done.

According to the Jisc 2022 teaching staff digital experience insights survey, more than half of respondents felt they were not given enough time to explore new digital tools. Just 44% of respondents received guidance about the digital skills needed in their role, with only 14% receiving an assessment of these needs.

Keys to success

Jisc's report, [Digital strategies in UK higher education](): making digital mainstream (Skelton, 2023), explores digital transformation strategies and identifies components for success.

Six keys to success

1. Robust and secure technology infrastructure

Basic infrastructure – the fundamental building blocks of a university's digital estate – need to be regularly upgraded and improved. This includes:
• a secure and pervasive wired and wireless network
• a robust approach to managing user access and identity
• a good understanding of the institution's data model and data flows
• a consistent approach to data integration
• a clear enterprise architecture that joins the dots

2. Effective processes for managing investment and change

To be effective these processes are likely to be lightweight and iterative rather than the traditional project-management approaches so common within HE. Start small and respond to what works.

3. Strong stakeholder engagement and customer focus

Focus on the needs of the staff and students using digital systems and get some benefits out to users early. Either pilot in one area or build the minimum viable version and make it available to all, then adapt in the light of feedback.

4. Digitally aware executive leadership

Digital transformation needs clear direction from the top table, with a digitally confident executive leadership – across multiple roles to avoid digital being siloed – that recognises it is a long-term programme and not a quick fix project.

5. Development of all stakeholders' digital skills and capabilities

Staff and students need to be given the time and space to gain confidence in making the most of new platforms and technologies. Some institutions have addressed this by putting people and capabilities, not technology, at the heart of their digital strategy, with a focus on training and skills development.

6. Evidence-based centres of expertise in digital research and education

Small but well-regarded research institutes in digital education and broader digital society can work alongside the professional digital education services, helping to develop institutional strategy. They offer a depth of experience within the institution and can help to join up and amplify the impact of digital, across research, teaching and all the university's missions, providing a rigorous evidence base of what works.

Digital strategy prompts

When creating a digital strategy for your own institution, or embedding digital into existing strategies, it may help to consider these questions.

Where do we focus our attention and resources?

- What is our attitude to digital: is our main priority operational resilience and business continuity; enhancing the university's mission; or major changes to our business model?
- How could digital enhance the unique selling point and reputation of our institution?
- How can digital improve learning, teaching and assessment?
- How can digital drive our research forward?
- How can digital improve our links to the local region, or our global presence?
- In which of these areas do we want to be a digital exemplar for the sector, and where do we want to follow?
- How do we provide an inclusive experience for students with different needs (eg digital poverty, disabilities, part-time, carers and international students)?
- How do we make sure our organisational practices, buildings and technologies are environmentally sustainable?

How do we gather data, to know what is needed?

- How do we baseline our existing digital maturity and capability?
- How do we gather the expectations and experiences of our staff, students and other stakeholders, to ensure we truly understand requirements for the digital systems they use?
- How do we unlock the data insights sitting within different IT systems to improve decision-making?

What do we need to put in place for successful digital change?

- Which internal processes and governance structures need to change so that we can track the performance of our digital strategy, and respond to new opportunities in an agile way?
- How do we improve the digital capabilities and confidence of all our staff?
- How do we ensure the wellbeing of staff and students working and learning in a digital environment?
- Is there sufficient digital awareness among the executive team and the board for them to make informed decisions in strategic digital areas, to inspire and model good practice?
- Should we have a centre of expertise in digital practice within the organisation, with an evidence base to know what works?
- What would our IT infrastructure and core systems look like if we started afresh today?

These questions can be found in Digital strategies in UK higher education: making digital mainstream and the Jisc/Emerge Education report Digital at the core: A 2030 strategy framework for university leaders, (Iosad, 2020), which contains many other helpful prompts to consider.

How can edtech companies and universities work together effectively?

A vision of why

It is not unheard-of for an edtech company to approach an institution with a pre-set menu of platforms and solutions, saying "pick one", while the institution has no idea why, or what the benefits are, feeling grateful that the need for these 'solutions' is over and they can get back to business as usual.

While situations are not usually as polarised as this, the description carries more than a grain of truth about many provider-university relationships. What's needed is a genuine vision shared by all parties of why they are doing this, why they are talking and what the goals and outcomes should be.

The first question from any edtech provider should be 'tell me about how your learners learn'? The technology is there to support the pedagogy, not the other way around. Unless this principle is acknowledged and feeds into every aspect of digitally enhanced learning, outcomes and benefits will be limited.

Finally, ethical considerations must be paramount and ALT's Framework for Ethical Learning Technology (FELT), which is designed to support individuals, organisations and industry in the ethical use of learning technology across sectors, is a good starting point.

Honest communication

Building a shared vision starts with open, clear and honest communication on all sides. Edtech companies should not be over-promising or sweeping away uncomfortable truths and should be honest about where the technology is at – both in general and specifically their own tech.

Institutions should be open about what they do not know or understand, and their scepticisms, reluctances and barriers to change. Both should be open about the challenges a project brings.

Trust

Parties need to earn and build trust – trust that everyone is working towards the same goals, sharing the same vision and the same ultimate intention to make a positive impact in the lives of learners.

Collaboration

There are few edtech solutions where one size truly fits all. And there are many universities that do not want to buy off-the-shelf but are looking for bespoke answers to their own particular needs, whether it's tech that will genuinely integrate with their existing legacy tech or a provider that will work to understand how they can answer a university's needs rather than just look for where their one-size product might be made to fit.

There are also universities that, faced with a menu of finished products, would not know where to begin. A partnership approach is the answer, where the transactional seller-buyer relationship is replaced by one in which all parties bring together their knowledge and experience to find what will be truly valuable.

Empathy and respect

Edtech providers need to take time to understand a particular university and its needs – rather than a generalised notion of 'a university' – and how their products and innovations would fit the very many aspects of that institution, to a point not just of comprehension but of empathy. Universities too would benefit from empathising with the visions and innovative approaches of founders and edtech creators.

Middle ground

Universities sometimes complain that edtech providers are too inclined to wade in with absolute visions, asserting that "this is how it's going to be" in the future of higher education, and how their products and services serve that vision, while the universities do not share or even believe in such a vision. Edtech providers are predicting inevitable disruption at a time when some universities are struggling to embrace digital in a strategic way. There is a middle ground in which the best innovations, ideas and content that have emerged from the last two years are truly valuable to the universities that have adopted them and offer such value to others. There is also a middle ground in which edtech providers have a point about how the world is changing and about the way today's students interact with that world, and about the value of bringing into universities their innovations and content, developed by pedagogically aware specialists.

Who's doing what, where?

Developing a digital strategy: Jisc's framework for digital transformation in higher education

Jisc has produced a structure to guide the development of strategic vision and planning, fostering innovation, streamlining business processes and operations, and developing partnerships for collaboration. It highlights how policies and processes might align to promote cross-team approaches to reduce complexity and fragmented processes.

Knowledge creation and innovation >>

Knowledge development >>

Organisational digital culture >>

Digital physical infrastucture >>

Knowledge management and use >>

Knowledge exchange and partnerships >>
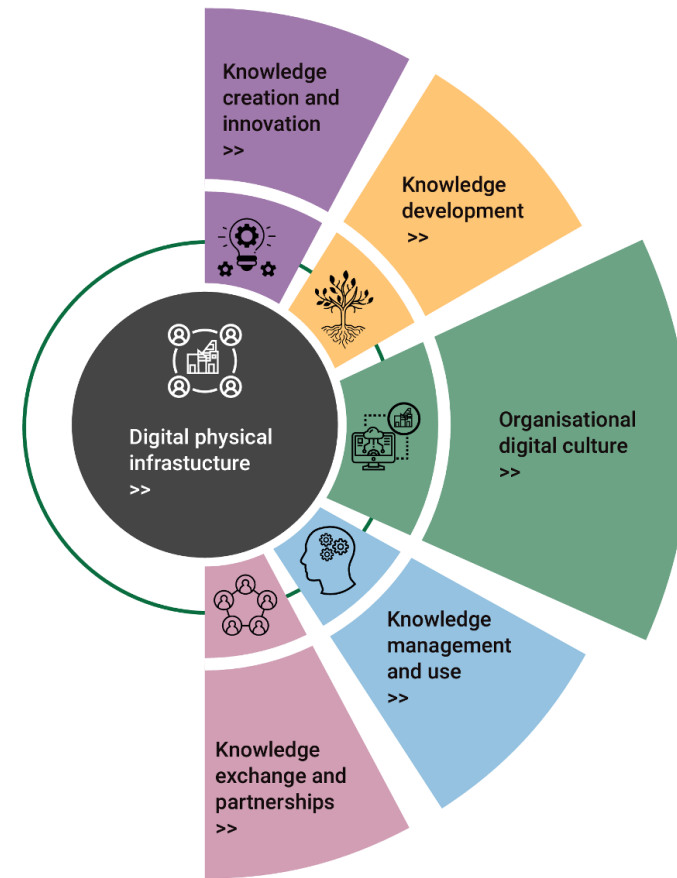
Tackling legacy architecture: Learn Ultra and Durham University

A VLE pivot in the pandemic from a legacy on-campus system to a clean cloud-based version without a migration

In 2020, recognising its pressing need for a new VLE, Durham University took a bold step. It rejected the convention of migrating from old to new and instead started entirely afresh, with a clean install.

This enabled it to:

- Provide staff and students with a far more sophisticated, state-of-the-art VLE in time for the following academic year
- Avert the risk that its 20-year-old legacy system might simply not cope with the increased demands of fully online teaching and learning
- Ensure security and GDPR compliance for legacy and new data, including sensitive student performance and personal data.

Durham University's VLE was more than 20 years old. This early installation of Blackboard Duo, running on in-house servers, was creaking under the weight of countless modifications and year-on-year patching to the point where supplier support was impossible. It had also become a vast storage system for many years of content, squirreled away in a complex labyrinth of folders and subfolders that was never intended.

Then came March 2020 and the recognition that Duo's usage was about to surge with the transition online and the infrastructure might not survive. The need for a move to Blackboard's up-to-date, cloud-based VLE, Learn Ultra, was clear and urgent.

Moving the many legacy processes to Learn Ultra was impossible: they were bespoke to the in-house installation. And moving the data was a substantial challenge not only because of volume and file structures but in terms of data security and compliance. Not least, no one knew what all the data consisted of so it was wholly inappropriate to move it elsewhere and make Blackboard the data processor. A clean install was agreed. The move took less than a year and by the start of the autumn semester, staff and students were introduced to a completely new VLE, with ample supporting materials. Access to the legacy VLE and its past data repository was also retained.

Benefits:

- A state-of-the-art cloud-based VLE in a time of reliance on remote access to learning and teaching
- A focus away from document storage and towards pedagogy, with a fitting strategy for online delivery and blended learning
- Improved engagement for those who spurned the old VLE
- Monthly software updates for the latest processes and services
- Infrastructure that easily meets demand and is maintained day-to-day by the provider, freeing up in-house resources
- Robust data governance

"Covid gave us a great opportunity to do things like this. We'd been talking about it for years and suddenly the pandemic became a shortcut because these things were needed."

Nicola Whitton
Director of the Durham Centre for Academic Development, Durham University

"We didn't decide to change our educational model because there was something wrong in the university, or because we had problems attracting students, or financial issues. We changed because we believe this is the direction for the future of education and we want to be leading the way. If you want to make change happen, you have to be able to show by example with leadership."

Jose Escamilla
Associate director of the Institute for the Future of Education, Tecnológico de Monterrey

Supporting education innovation:
Novus, Tec21, IFE and Tec de Monterrey

Since 2019, the undergraduates at Tec de Monterrey (Mexico's Tecnológico de Monterrey university) have been studying under the university's innovative Tec21 educational model that enables them to become independent, lifelong learners in their professional field. Many of Tec21's innovations are projects developed by academic staff under the Novus initiative developed by the Institute for the Future of Education. Novus:

- Was created to reinforce evidence-based educational innovation culture among the university's professors
- Funds around 70 projects a year brought as proposals by senior academic staff
- Is open to proposals from teams across all faculties
- Expects each project to be applied within student curriculums, tackling a specific problem with specific achievements in terms of pedagogy, curriculum or technology to improve learning outcomes

Education innovation is in the lifeblood of Tec de Monterrey, evidenced by the development of the Tec21 educational model that started in 2012 and was deployed at scale in 2019 to all the undergraduate programs. Tec21 educational model outcomes are defined by competencies, all undergraduates develop competencies by solving real world challenges, working regularly with "development partners" from government, industry, business or society and being assessed on the

evidenced development of disciplinary and non-disciplinary competencies, including soft skills such as problem-solving and teamwork.

Many Tec21 innovations start life as projects created by faculty teams and funded by Novus, which fosters an educational innovation culture among the university's professors by offering the incentive of significant financial support for educational projects.

Novus is open to all faculties, calling each year for proposals for team-based projects that are to be applied within student curriculums. Projects last for up to two years with activities that may cover a couple of weeks, a month, a full semester or whatever is appropriate. Each proposal must be tackling a specific pain point or problem with specific proposals in terms of pedagogy, curriculum or technology to improve learning outcomes, achieve better motivation, attention, stress-reduction or similar. Part of the backing is for training in educational research, to equip teams with the ability to provide rigorous educational evidence for their outcomes.

Novus is run by the university's Institute for the Future of Education, which promotes research, innovation, and entrepreneurship in educational innovation to address today's educational challenges and "create the future of education".

10
years funding projects

70
projects a year

$700k
annual project funding

20%+
of faculties benefiting

18-24 months
project durations

Novus-funded tech projects include

- 3D visualisation (and 3D printing) of maths equations, achieving 40% improvement in students' spatial maths skills – a better understanding of how an equation is represented in space and how to relate the spatial representation to an equation

- A more realistic representation of professors in online classes using the "professor avatar", a semi-holographic, 2D representation of a professor that sits crystal-like alongside a class or lecture presentation, successfully providing a greater sense of the professor's presence

"If you want to make change happen, you have to be able to show by example that the leadership wants the change. One of the measures is the amount of money and time you invest."

Jose Escamilla
Associate director of the Institute for the Future of Education, Tecnológico de Monterrey

About Emerge Education/ Jisc research and reports

How can edtech address some of the greatest challenges facing HE leaders was chosen as a topic of importance to the sector by members of the Jisc Emerge higher education edtech advisory board.

Mary Curnock Cook, CBE
Chair of the Jisc Emerge higher education edtech advisory board

Nic Newman
Partner, Emerge Education

The board is composed of higher education leaders and meets regularly to collectively define and develop a positive vision for higher education's long-term technology strategy and the role of high potential startups in it.

Through this group, our aim is to encourage debate, conversation and sector research to:

• keep refining the long-term vision for technology in higher education for 2030 (with a focus on the foundations that must be laid in the short term to enable this vision)

• produce practical guidance on the most effective emerging technologies that can enable higher education to achieve its long-term goals

• show impactful case studies that provide real-life examples and key learnings for VCs, PVCs and HE senior leaders

• ensure that startups are equipped with sufficient sector knowledge to bring meaningful solutions to the sector

Reports

Enhancing student engagement using technological solutions
- Chaired by David Maguire, published September 2021

AI in HE student journey market map plus category descriptions
- (Emerge market research, published with HEPI)

Technology-enabled teaching and Learning at Scale
- Chaired by Ian Dunn and Gideon Shimshon, published June 2021

Assessment rebooted part 2 - a year on (long-form blog)
- Chaired by Chris Cobb, published May 2021

The Future of Student Recruitment (long form blog)
- Chaired By Katie Bell, published 2021

Revenue Diversification in Higher Education
- Chaired by Keith Zimmerman, published March 2021

Student and staff wellbeing in higher education
- Chaired by John De Pury, published January 2021

Learning and teaching reimagined: a new dawn for higher education?
- The final learning and teaching reimagined report - the sector collaboration between Jisc, Advance HE, UUK and Emerge. Published November 2020

The future of employer-university collaboration — a vision for 2030
- Chaired by Nick Petford, published November 2020

Digital at the core: a 2030 strategy framework for university leaders.
- Chaired by Graham Galbraith and David Maguire, published October 2020

Employability rebooted: democratising the future of work
- Chaired by Quintin Mckellar, published July 2020

Digital learning rebooted
- Chaired by Ian Dunn, published August 2020

Assessment Rebooted
- Chaired by Chris Cobb, published May 2020

Can edtech startups solve the biggest challenges faced by UK universities?
- The original research, published March 2020, updated November 2020

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