

Technology-enabled teaching and learning at scale

A roadmap to 2030



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

Report 8

LearningMate[™]

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

CONTENTS

Foreword	5
Summary	6
Introduction	8

PART 1: A turning point for teaching and learning

Towards a blended future	10
What do students think?	11
What do staff think?	12
What's changing now? How universities are looking ahead	12
Critical move: from translating content to transforming pedagogy	13
Key challenges	14
... for students	
... for staff	
... for institutions	
Scaling up technology-enabled teaching and learning	17

PART 2: Emerging models of technology-enabled teaching and learning

Three areas of opportunity	20
Resources	21
Delivery	26
Support	36
Market map – the key players	42

PART 3: Roadmap to 2030 and practical recommendations

Advice for universities	44
Advice for founders	49
What makes a good pitch? Top tips for founders	54

Conclusion	55
-------------------	----

Q+A interview with LearningMate	56
--	----

Acknowledgements	59
-------------------------	----

Foreword

Teaching in higher education has been shaken to the core over the last 18 months. The pandemic has seen some brilliant and some catastrophic attempts to support students and their learning during the temporary shift to remote teaching. This affected all students at all levels of education and in all parts of the world. Such a level of disruptive change and opportunity to experiment has never been seen before and, we hope, will never be seen again. It is, however, a moment for us all to reflect and imagine what we would like teaching and learning in higher education to look like in the future.

This green paper aims to explore, from a range of perspectives, the role that technology may and indeed ought to play in ensuring that students have ever greater opportunities to learn. Technology that can support both students and academics to not just enable but also enhance learning, so that the experience can be a joyful and fulfilling one. Technology that can support the personalisation of the learning journey. Technology that can help universities build a stronger, more inclusive community and widen access for more people to engage with and benefit from higher education, which can form the basis for a more just society.

The paper exposes some of the complex questions that technology-enabled teaching and learning poses for higher education leaders about the nature and structure of their organisation. The processes for identifying, piloting and procuring new technology will require more flexible and agile ways of working

across institutions. We hope this can provoke wider debate on a national and global scale.

This report, developed through conversations with 50+ university senior leaders, edtech startup founders and sector experts makes a powerful case for the opportunities technology brings for teaching and learning at scale. In partnership with Jisc, Emerge Education and LearningMate, we have developed this green paper to provide a long-term vision for the potential of technology-enabled teaching and learning. We also set out practical guidance and short-term steps that must be laid as a foundation to enable this vision. We've highlighted some leading examples of innovators from the UK and around the world which offer key examples of best practice.

We hope that the paper sparks debate and underlines the fact that there are many people working on the same issues. Higher education is a deeply collaborative community, willing to share knowledge and insight in order to better serve our students.



Ian Dunn
Provost, Coventry
University



Gideon Shimshon
Associate principal
digital learning
and director of QM
Online at Queen Mary
University of London

Summary

Technology-enabled teaching and learning at scale – a roadmap to 2030 is based on research interviews with 50+ university leaders, edtech founders and higher education sector experts.

It explores the changing nature of teaching and learning, the promise of a blended future, and the systems and organisational infrastructure that will need to be in place to enable flexible, interactive and personalised learning design for the widest possible range of students.

It outlines three key areas of opportunity for technology-enabled teaching and learning at scale, and offers recommendations for universities and startups.

1 A turning point

- The future of higher education is blended
- This means technology-enabled opportunities, not technology-led design
- Scaling up blended teaching and learning means:
 - Flexible, blended and fluid *delivery*
 - Intentional, pedagogy-informed, personalised and outcomes-focused design
 - Interconnected, insight-rich and supportive data
 - Student-centric, subject-specific and values-led institutional *differentiation*

2 Three key areas of opportunity

Three key areas for opportunities and emerging new innovators in blended teaching and learning are:

- **Resources:** how might technology transform core teaching materials and improve access?
- **Delivery:** how can we use technology and appropriate pedagogy to engage students most effectively with blended teaching and assessment?
- **Support:** how can we remove roadblocks to learning to ensure a smooth, personalised learning pathway for students?

3 Top three recommendations

Universities	Founders
Be proactive and strategic: use mission to inform a cohesive, student-centred theory of change, then identify gaps in provision and invest accordingly	Embed pedagogy at the core of your product
Devise innovation frameworks to make decisions with pace and agility	Pursue a consortial approach and build brand recognition
Focus on data management	Focus on ecosystem integration

4 Reasons to start thinking long-term now

- **For students:** develop employability skills demanded for the fourth industrial revolution
- **For staff:** require stability and consistency to forestall fatigue as a result of recent technological churn
- **For institutions:** urgent need to actively promote the value of blended learning for applicants, against the 'value for money' agenda



INSIGHT FOR STARTUPS

There are approximately 10,000 universities worldwide with more than 200m students. This number is expected to double by 2030. Today, a universal teaching and learning software solution charging only \$5 per month per student already has an enormous target market size of \$12bn, in a gigantic \$2tn market. Many solutions can also extend into the growing \$240bn corporate learning, as well as K12, markets.

Introduction

In March 2020, almost overnight, campuses around the world closed and universities had to implement a digital online teaching strategy.

While the potential for technology to transform higher education has always been there, Covid-19 bypassed many of the barriers to innovation and opened a window of opportunity. The 'pivot to online' was sudden and driven by the need for continuity. In most cases this meant improvising and using the first tools that were available to patch up a disjointed digital infrastructure for remote teaching and assessment.

Five months later, in August 2020, Jisc published [Digital Learning Rebooted](#), which looked at the 'quick fixes' universities introduced to enable remote teaching and set out to consider their potential to catalyse long-lasting change. The report laid out three requirements looking forward to 2030.

Digital teaching and learning should be:

Intentional: delivering a learning experience that is built strategically from the ground up to improve on current practice.

Seamless: a systemic, ecosystem-based approach will help to break down the silos between different tools, emphasising the importance of an intuitive and consistent experience (alongside reliability and security).

Supportive: designed to help every student make the most of their learning no matter their location or background.

Now, almost a year later, what needs to happen to embed these requirements as part of the new normal? What organisational changes and infrastructure investments need to be implemented to scale up existing best practice? Universities face a decisive moment, to reflect on their experience of the past year and think through its implications for a long-term digital teaching and learning strategy.

A comprehensive survey of HE leaders, lecturers and students, recently [launched](#) by Jisc, Universities UK and Emerge, offers a sense of the shape this strategy might take. It illustrates that while leaders feel overwhelmed by challenges, they believe change is here to stay and see great potential for technology to create flexibility, break down barriers to access and help institutions reach more learners. A wealth of general guidance for the sector is now emerging. [Gravity Assist](#), the report of OfS chair Sir Michael Barber's digital teaching and learning review, captures key learnings from this extraordinary phase of change and recommends core practices for universities to adopt in response. Yet

while universities are aware of the journey they need to go on, the possible routes they might take and the tools they might use are myriad and varied.

This report offers:

- A detailed overview of the edtech landscape
- Key factors to be considered when scaling up technology-enabled teaching and learning
- Challenges, trends and opportunities for teaching and learning resources, delivery and support
- Best practice case studies
- Recommendations for universities and edtech founders

In the new world of blended education a university's technology infrastructure will be as important as its physical campus. The edtech market is large, open and rapidly evolving. Where the digital teaching and learning space has historically been dominated by large publishers and learning management system (LMS) providers, we are now also seeing a wave of new, agile players emerging to meet the changing needs of learners and universities, including learning experience platforms (LXPs), massive open online courses (MOOCs), digital assessment, learner analytics, community building, and more.

In the first part of this report, we examine this new digital teaching and learning landscape, surveying the gaps, opportunities and emerging new innovators. Through interviews and

market research, we have identified factors which will need to be at the heart of scaling up a flexible, personalised, inclusive and engaging blended learner experience.

In the next part of the report, we look more closely at the challenges and opportunities across three areas – resources, delivery, and support – alongside compelling case studies where universities and early stage edtech companies are working together to shape the future of technology-enabled teaching and learning at scale.

This paper is based on research interviews with 50+ edtech founders, university leaders and higher education sector experts, and, throughout, we present inspirational stories that illustrate the potential for technology to radically reimagine teaching and learning.

In the final part we offer recommendations for universities and edtech founders. What do universities need to consider to stay up-to-date in this fast-moving, fluid market? And how can edtech startups tailor effective solutions and maximise their impact for learners?

Towards a blended future

Higher education has a long history of trying to tackle the thorny problem of technology for teaching and learning, with limited success.

The experiences of the past year, when universities around the world were forced to abandon campuses and rely wholly on remote teaching and learning in response to the Covid-19 pandemic, exposed this lack of digital readiness. Digital provision and investment have been thrust to the forefront of the agenda.

Getting through this academic year has primarily been about patching up and scaling up an emergency response. What universities needed in 2020/21 was the means to deliver pre-existing learning, teaching and assessment remotely, ensuring inclusive access for students and just-in-time training for staff. Despite shortcomings, big tech players such as Zoom and Microsoft provided the easiest solutions for universities to adopt because of

their ability to provide the necessary infrastructure reliably, at scale and at short notice. However, these providers have limited specific focus on tailoring their products towards higher education, beyond core LMS and communication infrastructure integration, as they pursue multiple markets as agnostic ecosystem players. They may not be long term solutions.

The reactive, limited forms of online learning that emerged as an emergency response must not become the “new normal”. If temporary fixes and workarounds do become enduring solutions, there is a risk of embedding all sorts of inadequacies and inequities in provision, some of which universities haven't yet had a chance to think through.

“Universities have learned a lot this year. There has been an enormous shift into the online space and how we use technology, but there has been an intellectual shift as well. People are much more engaged in the conversation about technology — there is collective upskilling and sharing of experience. We are rethinking the whole teaching experience and the role of faculty will be changing, from delivery of content to supporting learning. That’s a big culture change, and it is going to take time, investment and technology.”

Ian Dunn, provost, Coventry University

What do students think?

Wonkhe's student experience research highlights that "Covid-19 has thrown teaching quality into sharp relief, in the absence of all the other activities that would otherwise be filling up students' days." Students see the limitations of translating existing content, formats and support systems to lacklustre online arrangements.

Yet while students have encountered challenges, they have also for the first time experienced many of the benefits of online learning, including reduced travel, more flexibility and less stress. The latest [Pearson and Wonkhe research into students' experiences of online and blended learning](#) (February 2021) found that the great majority want some aspects to continue, including recorded lectures and online tutorials or check-ins with tutors. According to [Gravity Assist](#), 61% of undergraduate students would like their assessments to be delivered online or through a combination of online and in-person delivery once the pandemic is over, and 71% of students believe one or more aspects of their courses should be delivered online.

Students' openness to the idea of continued online learning post-pandemic depends in large part on the quality of their experiences so far. The latest [student academic experience survey from Advance HE and Higher Education Policy Institute \(HEPI\)](#) notes that the overwhelming majority report only basic technology is used as part of teaching – yet where advanced technology is used, students are significantly more likely to feel they have received good value, that they have learnt a lot, and that the skills they have gained will play a key role in their future. In response to a follow-up question which asks how important technology is to learning, 45% of students overall feel technology is very important but those exposed to the most advanced technologies are the most likely to be convinced of its importance, with 66% believing technology is very important to learning. The report concludes that this data "should provide evidence to help drive the continued advancement of learning technologies at a time when circumstances are likely to require it."

As such, student demands and expectations for digital learning will continue to increase even after Covid-19. When asked about their key priorities by Wonkhe, 59% of students chose "high quality online teaching". Improvisation – using the most convenient tools that are available to patch up a disjointed digital infrastructure – will not be enough to meet these expectations. And to ensure maximum impact, innovations in teaching and learning will also need to be accompanied by high-quality support systems, such as timetabling, registry, student support, and more. Universities need to plan for a fundamental redesign of the learning and teaching experience as part of a blended future.

"Universities will soon realise that students have fluid expectations. We are competing for user experience with places like Amazon – that's the expected standard. If we are saying, 'our systems are a little bit less worse than they were three years ago', that's a long way from saying 'I want this to be as seamless as my experience with Amazon'."

Daniel Perry, chief information officer, Keele University

What do staff think?

According to Gravity Assist, [52%](#) of staff would like to continue delivering digital teaching and learning long term. Their confidence with technology has improved, alongside a new openness to experiment, but they remain unclear about how to use technology to create a strong connected teaching experience.

A rare opportunity has been created to redesign and improve courses and curricula, but it needs to be met with more support and upskilling – both technological and pedagogic – for increasingly stretched staff. (Although, as Jisc's [learning and teaching reimagined surveys](#) show, the confidence of teaching staff in their digital skills already increased significantly between March 2020 and September 2020, from 49% to 74%.)

What's changing now? How universities are looking ahead

The work of the past year has been an emergency response to an unprecedented situation, where students, academic staff and professional services staff alike were asked to rapidly upskill in response to an extreme set of circumstances. Taking this momentum forwards, now is the best time to build technology solutions that change and improve teaching and learning at scale.

This will require huge strategic shifts for universities. To date, university spending on technology has focused on core infrastructure. Most mid- and large-sized universities spend significant amounts on technology used to attract students and process applications (through [CRM](#) and similar software), store student information and educational materials ([SIS](#) and [LMS](#)), manage business intelligence ([ECM](#) / [EBI](#)), and manage staff and business operations ([ERP](#)). This is all in addition to IT services, telecoms, generalist software, hardware and devices and data centres. In total, US universities alone spend [\\$16bn per year](#) on technology.



INSIGHT FOR STARTUPS

The global higher education LMS [market](#) was estimated at \$1.7bn in 2017, while the global student information systems [market](#) alone is \$8bn and the ERP HE [market](#) is \$8bn. Online programme managers (OPMs) constitute a \$7bn [market](#), and in 2019 massive open online courses (MOOCs) were a \$5bn [market](#).

Online programme managers (OPMs) act as effective but costly wraparound service providers that create online degrees, while massive open online courses (MOOCs) help digitise and market existing resources for wider consumption. Both improve digital provision, but they essentially help move existing education online for new audiences. Neither offers the radical reimagination of teaching and learning at scale that is required to captivate core student audiences.

Critical move: from translating content to transforming pedagogy

Universities have been talking about “digital by design” for a while now, but so far it has largely been a case of retrofitting online provision from on-campus frameworks. What would be different if we imagine starting again?

- What would an institution-wide flipped classroom look like, where knowledge acquisition is asynchronous and in-person encounters offer real pedagogic and social value?
- What would a fully integrated digital and physical campus look like?
- Do universities still need a VLE?
- What might replace the lecture?
- What does a virtual or hybrid classroom look like, and how would it operate?
- How might a data-driven model for student co-creation of the education experience change the tools and techniques universities adopt?

The future of digital teaching and learning in higher education

Old versus new teaching and learning formats		
Teaching and learning	Old formats	New formats
Lectures	In person	(Guided) async online
Tutorials	In person	In person / sync online
Office hours	In person	Sync online
Laboratories	In person	In person / async online
Study groups	In person	Async online
Study spaces	In person	In person

Technologies and tools change constantly – the future of higher education is an integrated, multi-channel approach where the learning process is co-created with the student.

“We started out with this idea of a blended flexible pedagogy, but actually my ambition is that we need to conceive of ourselves as a blended, flexible institution. All universities have fetishised, to some extent, the structural norms of a university: you have lectures, you have classes, you have exams, you need a place linked to a name and an identity. I’m interested in what blended learning will do to that set of assumptions. There are a whole number of things here which provide flexibility and opportunities for people with different learning styles that physical space doesn’t allow. We’re so focused on short-term gaps and solutions that we’re not seeing the big picture: what would a university look like if you were going to start from scratch?”

Professor Matthew Weait, deputy vice-chancellor, University of Hertfordshire

Key challenges and considerations

If the opportunities, need and desire for transformation are now clear, challenges to achieving this at scale still remain alongside key considerations for universities once a more comprehensive transition to blended approaches are in place.

... for students

- **Access:** Digital poverty is a key issue that has [come to the fore](#) during the pandemic. In the UK, according to OfS polling, 52% of students said their learning was impacted by slow or unreliable internet connection, 71% reported lack of access to a quiet study space, and 18% were impacted by lack of access to a computer, laptop or tablet. The digital divides will also affect some international students studying remotely in their home countries.
- **Accessibility:** This is a legal requirement for UK universities under the [2018 public sector web accessibility regulations](#). Any redesign process must build in accessibility and inclusivity by using universal design for learning principles, so that no student is at a disadvantage through no fault of their own.
- **Digital skills:** We should not assume students are “digital natives”, as fluent in the skills of how to learn online as they are on social media. Metalearning will be crucial. Students will need to understand how to learn independently online, how to self-regulate their learning, and effective social working with peers. Universities will also need to be alert to the differences between incumbent learners (who have been using online for a while) and transitional learners (who are still coming up to speed).

- **Community:** How can technology recreate the serendipity and sociability of multiple in-person touch points provided by campus facilities, which enable different cohorts and student groups to mix? For many students, this is a vital aspect of the 'university experience'.

... for staff

- **Digital capability, confidence and motivation:** Long term, the biggest challenges do not concern navigating new tools but rather skills, motivation and – most of all – time. Knowing how and why their individual contributions are making a difference will help staff embrace new pedagogies and explore new teaching methods, but there will also need to be an investment of time for staff to redesign and rebuild parts or all of their teaching.
- **Pedagogy and learning design:** There are many examples of current practice, but staff are struggling to find a universal evidence base for what works in blended formats that assesses the impact of different interventions on student retention, progression, outcomes, awarding gaps, and so on. Finding evidence-based models will be a collaborative effort between academics and pedagogical advisors, in order for each university to benefit from learnings across the sector and find opportunities to align their pedagogic approach with the digital services available.

... for institutions

- **Financial pressures:** HE senior leaders are under even more financial pressure as governments and students challenge the value for money of degree programmes. The role of expensive physical assets, including lecture halls and libraries, will be re-examined, but expectations will remain for a high standard, fully integrated physical and digital campus. A related challenge will involve keeping up-to-date with technologies to futureproof estates and virtual learning environments.
- **Diversity, access and inclusion:** The true cost of fully accessible and inclusive online provision may not have been fully accounted for thus far, in terms of the adjustments and accommodations that will be necessary in an online environment.
- **Data infrastructure, ethics, privacy and security:** While this area remains fragmented and poor, adding layer upon layer of new software brings associated costs and complexity. Half of institutions surveyed in a [recent report](#) by the European Universities Association pointed to a need to enhance or develop policies on data protection, cybersecurity and more.
- **Collaboration:** Every university has been forced to reimagine its own context at short notice, which means the adoption of technology has been siloed and inward-looking. Can HE come together as a sector to establish benchmarks for effective practice?

- **Staff workload:** Academic staff have now been working at tremendous intensity for 12 months, and universities must find a balance between keeping up momentum with an awareness of the limits to staff capacity.

For all stakeholders, **usability** and **stability** are fundamental challenges. Students and staff quickly become fatigued by constant changes involving tools with poor user experience and integration.

Meanwhile, existing software systems are adding new features at a very rapid pace. Systems and networks need to be resilient and reliable.

“Universities focus on adding new systems on top of what already exists. That often translates into buying a Ferrari and putting it in the middle of a very muddy field. So you buy a wonderful learning analytics platform, only to discover six months later that your data streams are terrible, that data cleansing is not happening, and therefore that the learning analytics system you’re paying a fortune for cannot deliver because your underlying data systems are unfit for purpose.”

Professor Alejandro Armellini, dean of digital and distributed learning,
University of Portsmouth



INSIGHT FOR STARTUPS

The range of challenges highlighted here offers an insight into the issues that need to be tackled in the medium term and the opportunities they present for technology-enabled teaching and learning at scale.

Scaling up technology-enabled teaching and learning

Online learning is not simply a digital reflection of what we do now.

We believe that to make the most of its potential, by 2030 digital learning in HE must meet three requirements. It needs to be **intentional**, delivering a learning experience that is built strategically to improve on current practice; **seamless**, with a reliable, coherent and integrated foundation; and **supportive**, designed to help every student make the most of their opportunities.

Across the UK and beyond, there are extensive clusters of expertise and many examples of experimentation in online learning but, with a few notable exceptions, it has rarely reached mainstream deployment levels. The question for universities now is how to scale this trailblazing work and imbue it through the whole institution, rather than in isolated pockets of practice in departments. Based on research interviews with 50+ university leaders, edtech founders and HE sector experts, we have identified several factors that must be taken into account when universities consider how to scale up the very best of technology-enabled teaching and learning.

Delivery: flexible, blended and fluid

Before March 2020, the sector tended to provide two fixed and separately managed offers for on-campus and online students, often taught through two different sets of materials and even by different teaching staff. Post-pandemic, the line between on-campus and online students will be increasingly blurred. Universities will need to optimise across varying preferences to meet the demands of face-to-face, hybrid, blended and online classes.

Design: intentional, pedagogy-informed, personalised and outcomes-focused

Courses will be designed to optimise student engagement and collaboration using principles of active and peer-to-peer learning, and taking full advantage of developments such as gamification and immersive technologies to support learning outcomes. Accessibility and inclusion must be at the heart of design, so that digital learning can respond to the needs and preferences of a diverse student population. Academics have traditionally taken responsibility for course

design, yet, despite support from expert professional services teams, they often lack time and incentives to develop up-to-date pedagogical expertise, especially when it comes to designing for digital. Universities will need to review the agility of existing course development processes and consider the roles that learning designers and learning technologists might play alongside academics in creating pedagogically sound and outcomes-focused learning with an emphasis on skills, knowledge and individual progress.

“To achieve optimal learning outcomes students need to be in an engaging and motivating environment. We need digital tools, grounded on decades of learning research and experience, that focus on enabling student success: every student, everywhere, even those with sub-optimal technology or connectivity. An engaging classroom is one where each learner has a voice and is invited to actively learn, together. High-quality education should be accessible to, and engaging for, everyone.”

Dan Avida, co-founder and CEO, Engageli

Data infrastructure: interconnected, insight-rich and collaborative

Data is not necessarily insight. Universities are flooded with data streams and dashboards, but because of their siloed nature and poor quality they are still lacking relevant, actionable insights and recommendations to improve teaching and student support. Currently, universities might be counting logins, downloads and page views from the VLE as evidence of student engagement. When properly designed and built, digital learning offers stronger points of reference in which more meaningful data can be collected, analysed and used to improve the learner experience. More interoperability standards will be needed to connect disparate aspects of the teaching and learning ecosystem.

“We are seeing more and more universities moving their core student offer online. But many are still doing this through their LMS, which is essentially just a very limited content repository. Successful migrations and creation of online content will require solutions that enable course design and learner analytics while supporting different student learning modalities like remediation, adaptive learning, and competency and skills-focused education.”

Prasad Mohare, senior vice-president of higher education, LearningMate

Differentiation: student-centric, subject-specific, values-led

The digital maturity of UK higher education institutions varies tremendously. Some have well-established digital strategies, and the staff capabilities and infrastructure to deliver them. Others are in the early stages of their digital readiness.

Meanwhile some disciplines are clearly more readily translatable to online teaching and learning than others. There are specific challenges in both teaching and assessment with subjects that require laboratory work, field work or physical interaction such as the performing arts.

One of the additional challenges of digital learning will be creating a strong sense of belonging to a single community for all students - especially those who may not fit the 'traditional' profile. The specifics will vary across different institutions, depending on the exact configuration of their learner community, but universities will need to rethink their current assumptions about presence and participation. In particular, campus-based universities that depend significantly on accommodation, catering and other sources of place-based revenue will need to be convinced that digital innovation in learning and teaching will not result in an intolerable loss of footfall, but will enhance the experience of on-campus and online learners alike.

This report on teaching and learning at scale adopts a necessarily high-level perspective: each university will need to determine its own trajectory, taking these factors into account, according to its current state of digital maturity, institutional values, long term digital strategy, and the particular needs of its student populations.

PART 2: Emerging models of technology-enabled teaching and learning

Through market research and interviews, we can identify three broad areas where technological innovation can play a major role in enhancing teaching and learning at scale: resources, delivery and support.

In this section, we will take a deep dive into each category and provide a breakdown of the trends, challenges and opportunities in each area. We will explore some of the ways that emerging technology can meet institutional changes, challenges and requirements for teaching and learning at scale, both now and in the future.



RESOURCES

The core materials for enabling teaching and learning.



DELIVERY

The infrastructure for facilitating and assessing teaching and learning.



SUPPORT

The services and tools for aiding and enhancing learning

Resources

This category represents the materials we use to enable teaching and learning – materials that students consult asynchronously, before or after class, and are used as the backbone of the curriculum, including textbooks, supplemental readings, videos and more. In most cases these resources are also referred to within lectures, seminars, labs and other synchronous learning encounters, but in some cases they serve as the core self-serve educational experience.

Direction of travel

Resources are still dominated by publishers who have transitioned textbooks into digital and interactive formats, joined by the rise in online video-centred courses. As Covid-19 presses universities to do more with their digital resources, opportunities arise to: provide cheaper access to textbooks and e-books, make the most of open educational resources, create teaching resources and knowledge communities, and offer digital course creation services.



Resources landscape analysis

Subcategories

- Textbooks
- Courseware
- Video courses
- Custom digital courses

Trends

- Textbook shift to digital and drop in spend
- Improvement in textbook interactivity
- Rise of MOOCs as courseware
- Rise in digital curricula quality

Challenges

- Textbooks still the centre piece of the course
- Lack of courseware breakthroughs
- Poor completions of off-the-shelf courses
- Difficulty in creating and analysing courses

Opportunities

- Improving access to textbooks
- Courseware authoring platforms
- Immersive ready-made video content
- Digital course creation for core instruction

Subcategories

- **Textbooks:** Represented mainly by large publishers that have built formidable author and distribution networks. Publishers have made a slow transition into digital, mainly through e-books with limited functionality, though free open educational resource companies (OERs) have emerged over the last decade, including Lumen and Openstax.



INSIGHT FOR STARTUPS

Publishers still represent the biggest category in education ([\\$140bn](#)) and in higher education ([\\$10bn](#) globally, [\\$3.2bn](#) in US alone). Digital now [represents](#) a majority of revenues.

- **Courseware:** This [term](#) ('courses' + 'software') represents interactive e-books that either serve as replacements or supplements to physical textbooks. Most publishers today have some courseware offerings through which basic e-books and pdfs are given additional functionalities, such as assessment, editing and/or analytics features.
- **Video courses:** Online video-based courses in universities have so far mostly played a small role in remedial and supplementary education, such as supporting the delivery of introductory courses with transferable college credits. Meanwhile, MOOCs offer primarily off-the-shelf content that may be used as part of an existing on-campus or online course – which universities have thus far turned to for [additional revenue](#), brand awareness and pipeline building. This is beginning to change as Covid-19 and the recent introduction of Coursera for Campus have encouraged universities to start exploring MOOCs as core or supplemental education for existing students.
- **Custom digital courses:** Online degrees are one of the fastest growing areas of higher education, and many service businesses specialise in working with universities to design curricula and courses, leveraging mostly third-party technologies. Online programme managers help universities build, recruit for and deliver online programmes. Covid-19 has accelerated the demand for support in creating online content and courses for existing core students, through fully managed end-to-end external support or specific targeted services.

Digitised textbooks – these are scanned, digital facsimiles of printed, published textbooks with static layouts.

Ebooks / digital textbooks – these are resources designed for the internet, and may come with additional interactive features, such as videos, questions and assessment tasks.

Trends

- **Textbooks becoming digital:** In the US, the move of publishers online and the introduction of all-you-can eat textbook subscription plans ([piloted](#) by Cengage Unlimited), as well as pressures from the rise of alternative resource providers such as OERs and MOOCs, has led to [drops](#) in the price of digital textbooks and a lower overall [spend](#) for universities. In the UK, however, e-books are limited in availability and licenses are prohibitively expensive – e-book costs for a single user [can often be](#) ten times the cost of the same print book.
- **Improvements in textbook interactivity:** The last decade has seen a range of format innovations, such as videos, online interactive homework and assignments. Instead of recommending long textbooks academic staff can now easily customise and focus on key required elements that are easier to keep up-to-date.
- **Rise in MOOCs as courseware:** In their early days MOOCs [attempted](#) to be remedial university education solutions, as well as stepping stones for entry into university. Since the Covid-19 pandemic, MOOCs are increasingly being used as a basis for core curricula as well as a supplement to it, [with](#) authoring and curation tools [taken up](#) by 3,700 universities. This approach bridges the gap between video-centred MOOCs and digital textbooks, while aiming for higher engagement and completion rates.
- **Rise in quality of digital curricula:** The increased adoption of content design and authoring tools and services is leading to improvements in the quality of digital curricula. Providers such as [LearningMate](#) use pedagogy-informed principles to support universities in the difficult task of translating offline resources into online courses, breaking learning down into small outcomes-focused elements that support better impact and personalisation of learning, as well as using analytics to inform understanding of learning progress and efficacy.

CHALLENGES

- **Textbooks still central to curricula:** Textbook fees remain [exorbitant](#), yet textbooks [are still](#) the go-to recommendations for teaching resources, due to a lack of time and incentives for universities to create their own materials or go through limited and hard to navigate OER libraries. Resource recommendations also remain highly decentralised, with [83% of staff](#) making their own decisions about teaching materials. Although staff tend to promote used copies and rentals where possible, a large [proportion](#) of students choose to avoid textbooks altogether, which has negative impacts on grades and outcomes.
- **Lack of courseware breakthroughs:** The majority of digital textbooks are simplistic e-books. Companies that have built subject-specific content, assessments and homework tools have in most cases either failed to scale or become early [acquisition victims](#) of conservative major publishers.
- **Off-the-shelf courses still suffer from poor completion rates:** The opportunity for MOOCs to function as an effective standalone or even supplemental course is still a long way from reaching its potential, as universities struggle to understand how best to integrate it into their courses. While major players have over the years invested a lot in technology to improve student engagement, [completion rates](#) remain very low (<4%). [Comparing](#) MOOCs with on-campus courses is tricky, because learners have different motivations and levels of commitment, but the nature of mass design will continue to pose similar problems. This likely explains why recent years have seen a [shift](#) of MOOCs into the OPM space, as a more hands-on proposition with better student engagement.
- **Difficulties in creating and analysing courses:** The accumulative nature of curricula makes it difficult to create a smooth, seamless digital experience for students or to collect meaningful and actionable learner insights for staff, most of whom struggle to keep up-to-date with what is happening outside of the classroom to better support their students.

OPPORTUNITIES

- **Improving access:** Digital libraries are now a priority for universities. With universities as direct buyers, opportunities arise to create more [aggregators](#) and better distribution channels, such as [BibliU](#), that simplify the title-by-title purchasing process, enable better prices through economies of scale, and standardise inconsistent textbook formats for course integrations.

- **Building courseware:** There is an urgent need for solutions that empower academics to create digital materials and courses through existing resources, new recommendations, easy-to-use authoring tools, professional and community support, and learner analytics. Machine learning offers the potential to build and refresh courseware with smart AI driving analysis and suggestions. Only when courses are streamlined, integrated and created with [pedagogical intent](#) will data analytics become meaningful, actionable and allow personalisation.



INSIGHT FOR STARTUPS

Learning from past mistakes, it is clear that solutions will need to reduce reliance on limited OERs and large single publishers, while enabling the creation of transparent, transferable open-source courses. Courses like [Habitable Worlds](#) represent a gold standard here.

- **Immersive, VR and augmented reality video content:** Practical learning environments such as labs presented significant equipment costs for universities before Covid-19, but are hard to recreate online. Online simulations can augment and prepare students for lab experience by increasing practise time in convenient, low stakes environments, with results shared remotely to support further learning. This in turn can free up limited physical equipment and increase availability for in-person usage. Simulations also widen access to environments and artefacts not normally accessible for individuals or groups. [Touch Surgery](#) is a leading innovator in this space, with a library of educational surgical course simulations. [Labster](#) science lab simulations allow staff to set preparation and revision assignments while monitoring student comprehension.
- **Digital course creation:** While some universities will create their own courseware or pay for ready-made resources, other institutions, especially those looking to transform their brands through online leadership, will want comprehensive change. Covid-19 offers an opportunity to recreate the OPM model for on-campus, blended and hybrid full-time students. Attractive blended digital offerings can improve core student experiences, retention and increase future enrolments. In addition, by blurring the line between core, online audiences and even MOOC participants who want to feel more part of a 'proper' university experience, such offerings can significantly increase target markets and university revenues. [Minerva Project](#), a teaching pedagogy leader, uses its online curriculum and technology platform [Forum](#) to support universities transform their offerings. [LearningMate](#) supports universities to migrate, manage and create top-tier modular and reusable learning experiences with robust data integrations and interoperability.

Delivery

This category represents the infrastructure required to facilitate and assess teaching and learning, from lectures, seminars, labs and tutorials to exams, essays and adaptive assessments.

Direction of travel

The experience of remote learning due to Covid-19 has prompted heightened attention to technologies and environments that support online and blended learning by enabling interactive instruction, student engagement, and actionable on-the-go learner insights and analytics. As learning becomes increasingly blended, the more challenging it becomes to deliver engaging, high quality and impactful education for students inside and outside of the classroom



Delivery landscape analysis

Subcategories

- Content storage and management
- Engaging instruction platforms
- Student engagement environments
- Assessment and proctoring

Trends

- LMS product and ecosystem improvements
- Surge in online instruction and comms demand
- Assessment technology improvements
- Increased openness to online testing

Challenges

- LMS blockers to innovation
- Ongoing interactivity challenges
- Assessment shortages and the rise in cheating
- Proctoring privacy concerns

Opportunities

- Video lecture engagement
- Live interactive instruction
- Learning experience platforms
- Feedback infrastructure and analytics
- Authentic assessment design

Subcategories

- **Content management and storage:** Learning management systems (LMS) have for more than two decades played a [fundamental role](#) in hosting, storing and managing learning resources, with basic assessment and discussion features. LMS play a central ecosystem role by integrating many things, from student information systems to courseware.
- **Engaging instruction platforms:** These are platforms and tools that help facilitate and enhance staff-led live and blended instruction, from clickers for polling and assessment to live online lectures. Unlike LMS, which are established in most universities, interactive instruction software was a more niche offer before Covid-19.
- **Student engagement environments:** This category represents solutions that create an engaging asynchronous communication, discussion and learning environment which ensures teaching staff and students are connected and supported beyond the physical lecture and tutorial environments.
- **Assessment and proctoring:** This category encompasses a range of options to rethink assessment in the wake of technical challenges, privacy concerns and anxieties about academic integrity experienced during the temporary shift to remote online examinations. Amid experimentation with a variety of alternatives – from open book essays and multiple choice online quizzes to digitally proctored traditional exams – some universities are grasping the opportunity to make changes not only to the mode of assessment but to its very nature.

CASE STUDY

Piloting active group work and social learning in the virtual classroom

Like many higher education institutions worldwide, Queen Mary, University of London, is reimagining the classroom for hyflex and hybrid teaching. The shift to online learning environments requires a different kind of pedagogy, and QMUL is seeking to implement teaching strategies that facilitate peer-to-peer connections, deepen student engagement and prompt active learning, especially group work.

"I finally have an easy way to lead meaningful group work and case studies. I would choose Engageli over any other existing tool that my university offers."

Dr Christou is an early adopter academic who began piloting [Engageli's](#) digital learning platform in December 2020, with classes of postgraduate law students. She experienced the challenge of

transitioning to online during the pandemic and tried many different platforms: “It is difficult to read the energy of the room in an online environment. When you split students into breakout rooms, you just kind of lose them. That’s why I was excited to try Engageli.”

In Engageli, students work in small collaborative ‘learning pods’ of 2-10 on virtual tables that coexist within larger class settings, much like study groups in a well-designed active learning classroom. They are able to collaborate and interact organically with each other, and to discuss work among themselves simultaneously as the class takes place. QMUL’s students favoured Engageli’s interactive notebook, where they could take notes within the platform, annotate slides and save to their computer, as well as the in-built polls and quizzes that kept them engaged and active.

“Other platforms and tools limit the students you can see in parallel to sharing slides. In some you don’t see the students at all. Here you never lose anyone. I can see them in the gallery or join individual tables to interact with students directly,” Dr Christou explains. “I felt as if the experience was more like a real classroom, with the students right there in front of me. They are sitting at tables, I can quickly see what they are doing, they can ask their classmates questions, they are chatting and interacting”.

Dr Christou keeps a pulse on her students’ experience in each class using Engageli’s engagement metrics. She highlights the game-like

aspects: “students love to make sure the emoji meter is always green. It’s motivating.” She uses these metrics to ensure students are on the same page and to asks them guiding questions like “do you agree” or “do you understand”, receiving a quick indication with an emoji or “thumbs up.” Engageli tracks student activity both individually and as a group aggregate, providing actionable insights in real-time but at the same time avoiding invasive practices. Engagement metrics are based on more than 100 data points that are meaningful for learning.

Access and inclusivity is built in to Engageli, which is designed to provide a high-quality experience while reducing bandwidth requirements. The platform is mobile-friendly, and can be accessed in-browser without installing software. Every class is available as an interactive session with live closed captioning and interactive class recordings. Engagement doesn’t end with the live session. Students can participate in polls, ask and answer questions and take notes even when class is not in session.

Engageli was founded in 2020, so impact data is still evolving, but QMUL is “excited about the potential”, as Gideon Shimshon, associate principal of digital learning and director of QM Online, states.

“We need to find better solutions for the future classroom. We are in search of disruptive tools that will take us to the next level by rethinking the classroom. Engageli brings that to the table.”

Trends

- LMS product and ecosystem improvement:** Many leading LMS providers, led by Canvas, have taken a cloud, open-source and ecosystem approach. This has created opportunities for the community to improve over time and to allow customisation and greater functionality, such as assignments, asynchronous communication, lecture capture and live video features.
- Surge in demand for online teaching and communication:** Given the momentum built over the past year, when many staff and students have been converted by the convenience and flexibility offered by blended options, there are now opportunities to rethink not only the delivery of lectures and seminars, but also performance- and practice-based teaching.
- Improvements in assessment technology:** There has been progress in assessment technologies, from assessment creation tools and plagiarism detection to multiple-choice auto-grading and subject-tailored grading tools. These all support academic staff in giving better, faster feedback while protecting the academic integrity of the institution. Research [suggests](#) that automated essay graders have reached a level where, using algorithms and access to large graded datasets, they can accurately predict human essay scores.
- Increased openness to online testing:** One of the biggest limitations to the flexibility of online teaching and learning has been the exam. Even some of the most progressive online degrees have required part-time students to travel to physical sites to take high-stakes end-semester assessments. When Covid-19 lockdowns forced the cancellation of a wave of exams, some universities adopted proctoring solutions.

CASE STUDY

Community-centred active learning

Coventry University has been engaged with digital and blended learning for some time on a small scale, alongside and embedded within campus-based learning and teaching. The planned switch to Aula from Moodle, following a successful year-long pilot of 1,800 students in which student engagement with learning content on a daily basis more than doubled, was accelerated by the move to fully online teaching and learning during lockdown. In March 2020, Coventry began working with

Aula on a new approach to learning design, fully transforming all of its programmes for online learning – around 1,200 modules – ready for September.

Coventry is now developing its digital approach in a sustained way for the future, across all six of its campuses.

“Aula is mobile-first, making it easily accessible for students, especially those who may not have access to laptops at home. It is also simple

for our academic staff to use and will help us create an experience for students of being in a learning community and not being alone in their study."

Andrew Turner, associate PVC
for teaching and learning

Coventry's previous VLE acted primarily as a repository for course materials, which resulted in limited interaction among students, and between students and academic staff. Aula's design is inspired by social media platforms for a more user-friendly interface: when students arrive on the platform, they always land in the community, to replicate the feel of walking into a classroom.

Students browse learning content and module materials, and communicate via a central newsfeed, where they can share comments or join in conversations. With one click, they can create small working groups or chat privately with peers, friends and academic staff. Aula's platform also integrates with existing tools such as OneDrive, and more, to ensure a seamless user experience. Students at Coventry reported feeling better connected to their

learning community: 78% (compared to 41% benchmark) said that Aula easily connected them to their learning community, compared to the Jisc benchmark of 41% for student connectedness through a traditional VLE. Across 100 modules, which went live in May 2020 as part of the first cohort using this approach, two-thirds of modules received satisfaction scores higher than 90%.

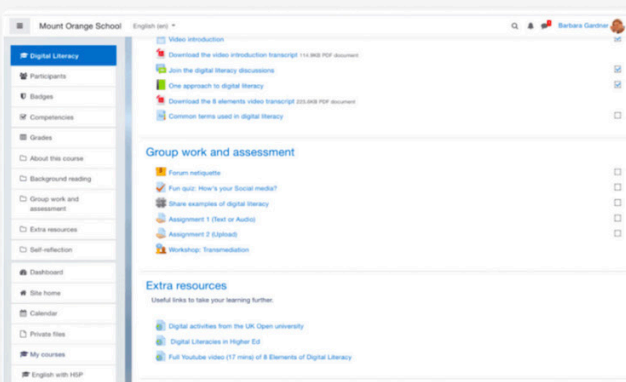
"With Aula, we've been able to transform the learning experience so quickly and smoothly that now we have all students and academics on the platform, delivering the kind of quality learning experience we just couldn't scale with the VLE."

Andrew Turner

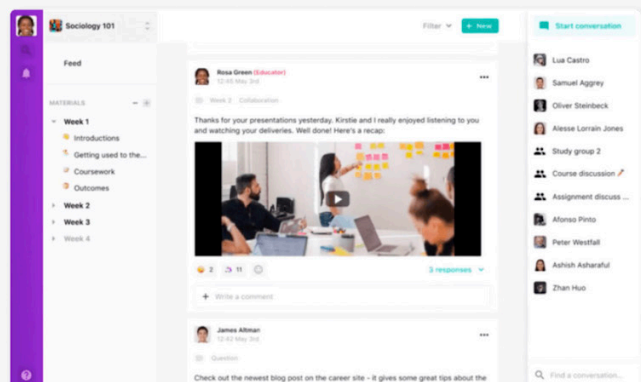
Aula's team of learning designers worked one-to-one with Coventry's academics in the transformation of their modules, so that the university was able to implement the changes at speed and at scale.

The process requires only eight hours of an academic's time to get up and running, including an introductory workshop, personalised delivery training and co-creation of

Typical VLE



Aula LXP



customised module designs with a dedicated learning design coach.

This helps ensure that staff have the skills and confidence to create truly-engaging hybrid learning experiences that intentionally maximise student engagement to boost student retention, satisfaction and grades. Academics can access further support 24/7 once their teaching begins.

“We are building a learning experience platform which does not seek to replace the VLE with a new shiny interface, but instead resolves the underlying pedagogical problems – the need for collaborative opportunities, ease of use and mobile accessibility.”

Anders Krohn, co-founder and CEO

CHALLENGES

- **LMS can block innovation:** For all its successes aligning with the organisation and management of learning at scale, the LMS has so far failed to become a collaborative student-centred system. Students use it to access materials and grades, but not as an engaging place to collaborate on academic work. For staff, the LMS as a content agnostic platform has struggled to provide meaningful and actionable learning insights. As the guardian of infrastructure and data, the LMS has avoided a decade of ‘the LMS is dead’ [predictions](#) (through acquisitions and feature developments), but they nevertheless can be described as legacy systems rather than open architecture based systems that can co-exist easily with other systems. This makes it difficult for other players in the learning ecosystem to expand their functionalities, remits, analytics and impact.



INSIGHT FOR STARTUPS

If the traditional LMS is to be replaced, a flexible, scalable and responsive admin and organisation tool to sit between student record systems and course delivery to enrol, rollover, schedule, sequence, and more would be needed. A dedicated lightweight management tool to support this could enable experience, content and collaboration tools to be integrated, and swapped in and out as needed, without affecting course delivery and admin.

- **Challenges in technology and interactivity:** As the world pivoted to online communication through Zoom, Google and Microsoft, education incumbents tried to create offerings of their own. Most have been out of their depth in video technology infrastructure. While the education market has been a driver of growth for tech giants, it has almost [unanimously](#) been [dissatisfied](#) by [features](#) that limit interactivity and inhibit reproduction of the [best of in-person learning](#) experiences. Teaching virtuosos like David Kellerman have shown that it is possible to create the [dream science class](#) through Microsoft Teams and integrations, but it is unlikely such offers will scale as packaged products.
- **Finding meaningful assessments:** Difficulties persist in offering meaningful feedback at scale for open-ended assessments (as opposed to closed or multiple choice answers), while anti-plagiarism technologies remain [susceptible](#) to [cheating](#) and the [growing](#) 'essay mill' industry. Assessment design is crucial, but this is time consuming and difficult. Academic staff need more assistance to build authentic, pedagogically sound assessments that meet their own learning outcomes and connect with real-world applied problems.
- **Proctoring privacy concerns:** During the Covid-19 pandemic, many universities found remote proctoring necessary to fulfill assessment obligations, as it was too short notice to substantially change assessment formats. Yet concerns [persist](#) from staff, students and parents around the data usage and privacy [practices](#) of software providers, as well as [challenges](#) associated with third party services assessing in relation to PSRBs. This has exposed the weaknesses of traditional formats and creates an opportunity to [rethink assessment](#), especially the [ongoing role exams should play](#).



INSIGHT FOR STARTUPS

Providing effective assessment strategies is a big problem. Assessment models in the past have required secure environments. The move now is towards models which reflect real-world activities and more open-access, open-book learning. This is an opportunity to rethink assessment processes – universities need assessments that provide real-world value. They should assess not just whether learning has taken place, but also if it can be used.

OPPORTUNITIES

- **Video lecture engagement:** Lecture capture technology has existed for years and is for most universities already closely integrated with the LMS. But as recorded video lectures become the norm, rather than catch-ups or aids to revision, there are opportunities to support better and more inclusive student engagement through interactive and adaptive video. Leaders in this space like [Panopto](#) are focusing on new functionalities, including better captioning, multi-language capabilities, easier annotation, and video feedback to students.
- **Active and collaborative alternatives to lectures:** [The role of lecturers](#) and the [effectiveness](#) of the lecture format has often been debated, especially as staff/student ratios have increased and widespread lecture recording places pressure to differentiate lectures from asynchronous video recording. While live video lectures today are often [inferior](#) to live in-person lectures, technology brings huge opportunities to change this – either to improve the effectiveness of lectures, or to replace lectures with more engaging learning contacts. [Engageli](#) has created a new digital learning platform that rethinks the digital classroom and supports academic staff with engagement and management features, while keeping students busy through inclusive, social and active small group learning.
- **Learning experience platforms:** Our online social lives are connected and active through platforms such as Facebook, Instagram and Whatsapp, while Slack and Microsoft Teams ensure that everyone in an office is available to chat in two clicks. Education does not have a similar fit-for-purpose platform that connects students and teachers outside of the classroom, so continuing conversation remains limited to email and message boards. The isolation many students struggled with during Covid lockdowns has revealed the importance of a go-to platform for combined learning and socialising online, such as [Aula](#).
- **Feedback infrastructure and analytics:** Better understanding of student learning progress would provide a foundation for tailored support. Students constantly give signals showing if they are struggling or not following in class – multimodal learning analytics can collect a more comprehensive picture of the experience for learners and as learning environments become more digital and interconnected there will be opportunities to empower staff with actionable insights before students reach crucial assessments.
- **Authentic assessment design:** A more sustainable long term solution would look not to 'fix' the issue of cheating but instead look to understand the issue and design new methods for formative and summative assessment. The answer is not necessarily better proctoring but also constructive alignment of assessment with learning outcomes and employability agendas, with a focus on supporting students in developing good academic practice and promoting clear understanding of academic integrity.

CASE STUDY

Using AI to enhance asynchronous student collaboration and assessment

The Wisconsin School of Business had tools to facilitate staff-to-student engagement online, but wanted to enhance student-to-student engagement while also finding a way to assess participation in an efficient and objective manner. Their main requirement was a tool that could be used by the entire program to ensure consistency of student experience.

In 2020, WSB partnered with [Ment.io](#), a next-generation student discussion board that uses AI to increase engagement, collaboration and in-depth exchange of knowledge. The platform was initially rolled out as a pilot with seven early adopters and then extended to additional academics in the business school. The university is now evaluating Ment.io as its standard software for its MBA programmes and as a tool to enhance the learning process across the entire campus.

The pedagogical premise is optimising the asynchronous aspects of flipped classroom learning. Ment.io encourages students to engage at their convenience with topics in preparation for class or as a continuation of classroom discussions, with the emphasis on responding to one another and deepening engagement with learning content. Academic staff post discussion questions every week and the platform guides students to respond, using a socratic method to

invite them to agree with or challenge each other's statements. The platform's prompts ensure depth of conversation as well as breadth, using AI pattern recognition to organise answers on the main discussion page according to their importance and agreement levels according to the group. At WSB Ment.io integrates into the learning management system and Microsoft Teams, but it is also available in-browser, enabling a seamless, accessible user experience.

While staff can take part in discussions – such as initiating one-to-one chat with students, adding clarifications and highlighting top comments to drive focus – in many cases students run the discussions on their own. One student at WSB observed that they “like the discussion aspect of Ment.io that encourages disagreements. It is a more interactive asynchronous discussion board for students.”

“The Ment.io assessment tool measures students based on six different dimensions which are evaluated in real time. This helps a lot and drives people to not only post individual answers but interact with their peers.”

Professor Enno Siemsen, associate dean

Students are assessed across three categories: engagement (activity, participation in discussions, viewing other answers), collaboration (which

measures depth of interactions with others as well as frequency), and an AI-generated peer-review score for the quality of their contributions.

The platform uses this assessment process to empower students to take control of their own learning. Ment.io's analytics help students understand how to improve their own performance. A personalised analytics page shows students who they collaborate with most and how many peers they collaborate with compared to the team average, and also shows who they should be collaborating

with to improve their score (increasing inclusivity of participation, too). The assessment tool also saves time for staff by enabling better analysis of individual student needs. At WSB, staff adjust the relative weight of these assessment components to their preference, and even use other analytics (such as time stamps, contrarianism levels, and more) to enrich their assessment.

"Deep discussions, easy to follow, easy to grade, good student experience."

Professor Enno Siemsen

"I think that our aim as a sector is to equip you to offer brand new opportunities for learners via major technological advancement. By expanding the university's online portfolio we can open the doors of digital opportunity – removing the barriers of location and access and opening up education far beyond our campus. This will enable us to serve a greater number of students than ever before. Our transformative digital-first teaching programmes will drive inclusivity and empower you and your students to be agents of change in a fast-moving world."

Ultimately, we want to improve modules, we want to look at program outcomes and support our students better – that is the holy grail of personalised learning. Analytics is simply the process of how we use data to facilitate better conversations between lecturers, support staff and students. We want to create a data lake, with real tangible input from across student services. But for a good dashboard, it's one thing to see the data – having that backbone is key, but currently most work goes into cleaning, which is time consuming and not cost effective. You also need the ability to present the data in a simple way to lecturers, and empower them to do their own analysis and deep dives, so that data offers answers and guidance."

Gideon Shimshon, associate principal digital learning and director of QM Online at Queen Mary University of London

Support

Estimates suggest that up to [96%](#) of students will require additional help with their learning at some point in their university experience, but institutions struggle to cater effectively for individual students' needs. Support is currently mainly offered through fixed office hours and study group times, with academic advisors offering specific advice. The increased flexibility and personalisation made possible by blended learning affords opportunities to scaffold support around students, and meet them more directly at their points of need. Learning support needs to complement and integrate with student support elsewhere in universities, such as [mental health and wellbeing services](#).

Direction of travel

As this area evolves beyond simply sharing learning assets such as study notes, there are opportunities to innovate using audio and video, and to create subject-specific learning pathways, essay writing aids and peer to peer support communities. This will go beyond academic content, to support the development of technical skills and metalearning strategies.



Support landscape analysis

Subcategories

- Study materials
- Homework support
- Essay and test prep
- Tutoring support

Trends

- Large centralised student resource pools
- Grammar and citation support
- Homework step by step aids
- Micro-tutoring on-demand support

Challenges

- Lack of learning pathways
- Limited effective essay writing support
- Student learning silos
- Tutoring business model challenges

Opportunities

- Subject specific platforms
- Learning pathways
- Essay writing support
- Video and audio platforms and communities

Subcategories

- **Study materials:** Study notes, guides and flashcards can all help students expedite their own learning, but active reflection is a powerful way for students to support each other through sharing materials. Few print providers like [CliffsNotes](#) survived the shift to digital, as user-generated content became more and more powerful.
- **Assignment support:** Textbooks have for a long time been vital to flipped classroom practices, with add-on questions to chapters so that students can reflect on their own learning, and a support industry has arisen to provide task answers and on-demand Q&A solutions.
- **Essay and test prep:** Services offering support with producing citations, improving grammar and avoiding plagiarism have thrived. For exam-based courses and qualifications, a [\\$450m+](#) test prep market has arisen, especially in areas such as medicine and law.
- **Tutoring support:** While study materials and resources can go far, there will always be cases where students need highly targeted and specialised human support. The global tutoring market is large and fragmented, with an estimated size [from](#) \$100bn [to](#) \$200bn. While it is driven by Asia and K12, higher education represents a sizeable and rapidly growing segment accelerated by the interruptions to study caused by Covid-19.

CASE STUDY

Using virtual lab simulations to support practical teaching

Dr Seth Racey, senior lecturer in applied sciences at the University of Northumbria, has always been interested in e-learning tools and regularly used videos of biological and biomedical techniques in his teaching.

As Covid-19 temporarily put a hold on in-person lab work, he turned to [Labster](#) as a direct lab replacement for students learning at a distance.

Labster's 200+ virtual labs cover the fundamentals of biology, chemistry, physics and general sciences, teaching students the techniques, skills, processes, protocols and underlying theory. Dr Racey quickly found that virtual labs can offer a more interactive experience for students, and that the simulations, lab manuals and library of science images can be used in various ways – from full lab replacement to a

supplemental learning activity that helps the students prepare for the wet lab and optimises face-to-face teaching.

"I want to teach a number of techniques that you just cannot get 150 students to do. I can organise an assay for 150 students. It's hard, but I can do it. But I can't get 150 students to do mass spec or some sort of column chromatography. You have one or two of those devices in the whole university, and you can't get 150 people to sit in front of it. It just doesn't scale. So having the ability to do a simulation of, say, mass spec or fluorescent microscopy is great."

Dr Seth Racey

Dr Racey supports teaching for an enzyme-linked immunosorbent assay with a virtual lab simulation on the same topic – *"I'll ask the students to do the simulation before the lab so that they get a lot more out of the lab"*. Students can learn from trial and error in the virtual lab before reaching the physical lab.

Student engagement has emerged one of the main challenges of blended teaching and learning, but Labster's pedagogy-informed design uses gamification and storytelling

approaches to help keep students engaged with course materials.

Staff can track student activity in the lab, enabling early intervention and support when students are struggling or not engaging. And simulations integrate into learning management systems like Blackboard, Canvas, Moodle and Google Classroom to seamlessly facilitate student progress monitoring and assessment.

The challenges presented by remote learning during lockdown might have been expected to lead to a drop in performance, but students' grades have remained steady, in part due to ongoing access to virtual labs. Labster provides a learning tool which students can use at their own pace, to reflect on their own progress. Every virtual lab poses multiple choice questions as students progress through the simulation to reinforce their learning.

Students at the University of Northumbria have rated using Labster as a positive experience. Around 1,000 students at the University of Northumbria have now played Labster simulations across more than 30 modules, from biomedicine and biochemistry to chemistry, physiology and sports.

Trends

- **Large centralised resource pools for students:** Many different companies have attempted to build go-to places for students to access, create and share study notes. Key challenges – for external material creators and user generated communities alike – have always been around providing access to large, high quality content pools. In the last five years, [Coursehero](#) and [Quizlet](#) have emerged with add-ons or freemium business models.
- **Grammar, citation and writing support:** An influx of citation support software businesses have simplified the process of access, storing, correct capturing of academic sources and avoiding plagiarism. Chegg became a market leader through numerous acquisitions for [Chegg Writing](#). In addition, mainstream grammar services like [Grammarly](#) have been useful essay writing aids for students. Tools like [MyStudyWorks](#) observe and support the writing process, which ensures institutional confidence in authenticity of work as well as building writing skills and resilience to essay mills.
- **Assignment step by step aids:** As platforms have gathered more data, assignment solution services have become better. Students can now find worked-out solutions to textbook questions through [Course Hero](#)'s 'Textbooks Solutions & Explanation', using software that gives worked out answers to equations. Students are even able to get automated responses to photos of maths problems through Chegg's [Math Solver](#).
- **Micro-tutoring on-demand support:** The micro-tutoring market has grown around moments in which students are unable to progress using software solutions and university support. Students do most of their homework at night, yet most university teaching staff are available only during the day. Students want support when they are stuck, not when they can schedule a meeting with a tutor later in the week.



INSIGHT FOR STARTUPS

Universities consistently remark that existing options for information management systems are not fit for purpose. Their preference is for a Student Lifecycle Management System, but the market is still providing Student Information Systems and Alumni Management Systems. Universities are seeking management of the student over their full lifecycle, including when they become alumni.

CHALLENGES

- **Lack of learning pathways:** While there is an abundance of study materials and resources for students to use, there is no clear structure for students to follow to get from a certain starting point to a required end-goal. Many students struggle with basic study skills, and are ineffective at finding and optimising techniques and materials for their own needs – especially those who are already disadvantaged or who lack informal support networks. Expensive tutors are the most likely creators of personalised study pathways as things stand.
- **Essay mills and cheating:** Writing is one of the key skills deficits of graduates and more than 20m students [consider](#) writing help an ongoing need. As a result, a large [\\$100m+](#) ‘essay mill’ industry, still legal in many countries, has [arisen](#) to help students camouflage plagiarism and pay for bespoke essays. In the UK [1 in 7 students](#) have admitted to paying for an essay at least once during their studies. Only a [small proportion](#) are bought through essay mill websites; a majority are commissioned through gig work platforms, making tracking and prevention difficult.
- **Student learning silos:** Peers are likely to be the best sources of support, but current peer-to-peer environments are mostly based on content uploading and sharing. When it comes to human study support most technology solutions are focused on formal tutoring, where students are supported by professional tutors.
- **Tutoring business model challenges:** The tutoring market is a competitive, labour-intensive space resulting in high prices and low net margins. Matching supply and demand around specific questions and topics is difficult. General tutoring support businesses have been at a disadvantage compared to companies with core offers around textbooks or specific study materials who have then upsold (micro-)tutoring.

OPPORTUNITIES

- **Subject specific platforms:** It is not possible to study all subjects using the same tools and environments. While flashcards and study guides can play important content-agnostic learning roles, there are opportunities to create subject-specific learning platforms that cater towards high-demand subjects (such as sciences and medicine), and maximise the impact and effectiveness of learning in each. Another important dimension is tailoring towards mobile formats, which enable learning on the go through focused formats and intuitive user interfaces. Examples in medical subjects include [Osmosis](#) and [Amboss](#).
- **Learning hubs and pathways:** Student-centred learning platforms and pathways can save time by helping students store, annotate materials and create personalised study plans.

**INSIGHT FOR STARTUPS**
















Building student-centred learning platforms positioned around study pathways is likely the best entry point. While students go to LMS and study material websites to download resources and then leave, platforms such as Study Smarter are building go-to study environments for students to upload those resources and learn from them through various supportive tools.

- **Writing support:** AI-support for writing is the greatest technological challenge in education today, even when the linguistics technology gets there, with essay mill industries thriving and essay writing increasingly unpopular as an assessment method. However, providers that find ways to give feedback on sentences, paragraphs and full essays, like [Ecree](#), will find ongoing demand from students beyond education as writing skills represent one of the [biggest graduate gaps](#) that follow students through their careers.
- **Video and audio platforms and communities:** Instead of live one-to-one tutoring that dominates video today, there might be opportunities to build student learning community platforms around video and audio, where students can participate synchronously or interact with, summarise and share study clips through searchable and transcribable audio and video files. This would make studying more social and inclusive. Many universities are introducing structured peer assisted learning sessions, while [StudyStream](#) has created a 24/7 virtual focus room for students to help each other work productively online with accountability (and also embedding live on-demand peer tutoring).

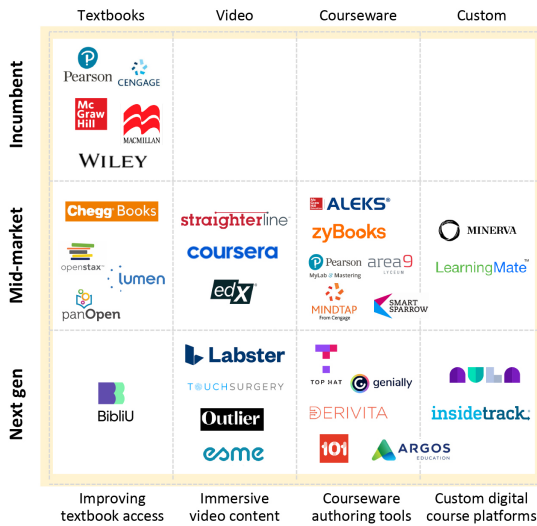
Market map – key players

We have identified leading and emerging players that are set to transform each of the three areas of opportunity in technology-enabled teaching and learning, and provide a flexible, personalised, supportive and engaging blended experience.

Digital teaching and learning innovators

 Resources	 Delivery	 Support
 Improving access	 Video lecture engagement	 Subject specific platforms
 Courseware creation	 Live interactive instruction	 Learning pathways
 Immersive video content	 Learning experience platforms	 Writing support
 Custom digital curricula	 Feedback & analytics	 Video and audio communities

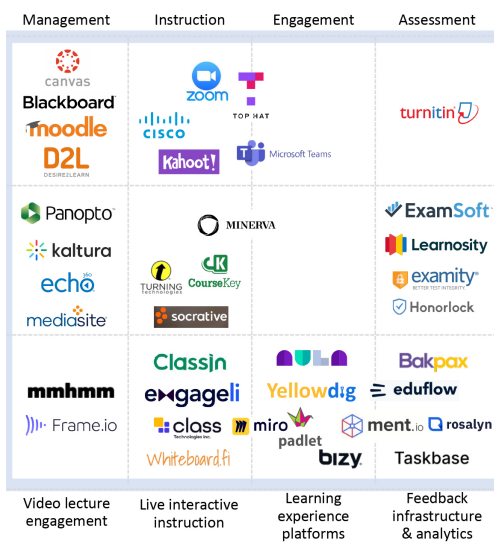
Resources



Digital teaching and learning HE landscape

We have split companies in each of our core categories –resources, delivery, and support – into 3 types, based on their maturity and size. As with all such attempts at categorisation, of course, the lines are blurry. This map aims to arrange companies according to their core focus – thus big businesses like Chegg are split up, while some larger companies that have been recently acquired are presented as separate.

Delivery



The 'incumbent' axis represents leaders in their field. The nature of their offers has, in many cases, come to define their category.

The 'mid-market' axis represents businesses that have either achieved leadership in more narrow markets, have plateaued with rapid growth, become acquisitions given challenges to scaling, or in some situations are en route to incumbent status.

'Next gen' companies represent the areas we believe could represent the next big waves in digital technology and learning.

Support



Advice for universities

Here we outline some of the considerations that universities must take into account when deciding on how they can use technology to develop or scale up their blended teaching and learning offers – and we explore some of the initiatives they can adopt to mitigate common barriers.



The time is now for a holistic edtech investment approach

- **Link technology investment to mission and student needs.** The competitive landscape is different for each institution. Asking the question 'how will we be different' will become increasingly important for institutions seeking to differentiate their digital teaching and learning offer. The first step will be to thoroughly understand market trends for each student population (undergraduates, graduate students, non-degree students), map out potential future scenarios and determine where they want to focus and compete in terms of methods of differentiation. Complete commitment to student success must be operational as well as philosophical.
- This can in turn drive a **theory of change**, so that decision-making can be proactive rather than reactive. Connections need to be forged between learner journeys and institutional goals and metrics, and from there to digital literacy and data needs.
- Edtech investment **needs to become core business as usual.** An investment framework could be developed that enables HE to use standard best practice ROI and payback periods. The creation of standard metrics can be then used by institutions to measure and benchmark success in their own implementation assessments.
- Senior leadership needs to initiate financial conversations with boards in the coming months to identify the extent of investment required and **clarify the risk appetite** over the next three years. Universities need to set out clearly how much they are willing to invest – and how much they are willing to risk failure – in order to explore innovations that may offer a pedagogic advantage.
- Universities need to put in place **innovation frameworks**, so they can work with startups and new services in ringfenced safe ways. So much of what is required here revolves around change management, and enabling institutions to make decisions at pace and with agility. Progress on technology-enabled teaching and learning is not just about edtech; it requires a more flexible operational structure to be in place, with fast centralised decision-making systems and lean, efficient (while still rigorous) procurement processes. Strategically, these frameworks must be flexible enough to allow for the different operational needs of departments and for different groups of learners.
- A **requirement specification** will assist universities to prioritise investment across short, medium and long term by identifying gaps in existing provision and [evaluating the capability of their existing online systems](#). Universities will need to revisit and critically assess their own digital platforms every three to five years to remove redundant software and/or features.

- Requests for investment must be accompanied by a **detailed benefits statement**. This should be driven by a clear vision of the desired outcomes: to enable students to do x, technology should look like this. The technology needs to be acquired and built so that more students are successful, retention is improved, and thus income is maintained. Similarly, if students can achieve their full potential and if the university can remove equity gaps, increased student satisfaction will more likely lead to greater follow-up potential around upskilling, reskilling or graduate study for alumni.
- **Resource optimisation** is the other side of this coin. A benefits statement also needs to be clear about costs that can be reduced by a holistic edtech investment approach. Currently, universities are using lots of small pieces of software and integrating these in-house, which is very expensive but doesn't always show up on balance sheets. Accounting principles that capture the total cost of ownership in terms of time, effort and resources would help universities be clear about what to turn off and which costs will be offset. Universities also need to optimise the use of their resources to minimise costs. For instance, data retention policies for learning content might cost hundreds of thousands of pounds due to storing video content and assessments.
- **Procurement expertise** will become fundamental. Universities already have people with expertise in procuring buildings and capital expenditure. They will need more people who understand tech journeys, data protection and associated issues.
- **Clarity on the economic justification model** is vital to effective investment. For example, the cost of developing high-quality video materials is huge and it is impossible for universities to compete with professional production companies or YouTube, especially for creative courses. Universities are also worried about how quickly online material will date. It may be more prudent in the long term to argue instead for more investment in tech infrastructure. This could be combined with carbon net-zero priorities.
- **Sector-wide collaboration** is vital to scale effectively. Industry-wide initiatives and investments – across HE, FE and schools, can avoid duplication of effort.

“Any new, innovative edtech team in a college or an institution is a vessel for change. I see this type of unit as a way to kickstart development and transformation, and as a transient entity. It introduces new expertise in the organisation and it needs to quickly establish its reputation in order to engage effectively with faculty. With the Digital Learning Hub, we had a strong network of support in senior leadership, and at the start we focused on quick wins. But long term I would say the key is to transfer this expertise widely across the organisation, with local adaptation for practical skills and subject specific challenges.”

Noemi Azzolina, acting director, Digital Learning Hub, Imperial College London

Academic roles are changing

- **Digital fluency** must become a key criterion for staff recruitment. Literacy alone is not enough. Universities should define a minimum standard for digital fluency, with reference to Jisc's [Digital Capability Framework](#), which sits alongside and complements investment in existing professional development and recognition programmes such as Advance HE's Fellows programme, which includes evidence of effective edtech within its pedagogical framework.
- **Discussions are needed to prepare staff** to adopt new ways of teaching for the academic workforce of the future. Institutions need to go on a cultural journey to help staff commit to new ways of working, and this could be difficult if technology-enabled teaching and learning is perceived as a short-term necessity rather than a long-term strategy. Open discussion at the earliest opportunity – with an emphasis on investing in staff, valuing existing knowledge and skills, and thinking about how to further value their contributions – is the most effective way to bring them on board.
- Universities also need to **work with unions to reimagine workload models**. Edtech is not a threat to employment; the nature of employment is changing. Universities do not want to lose subject expertise; rather, they must also bring in pedagogic and technological expertise. Terms and conditions will also need to be identified for collaboration courses with industry.
- Universities will need to invest in **learning design at scale**, and consult on the changing role of the academic in pedagogic practice. Academic staff are used to assuming responsibility for the design and delivery of modules, but we cannot expect academics to become experts in digital pedagogies as well as their subjects. The workload allocation of comprehensive training across the whole workforce would be a huge buy-out of time, in addition to the cost of platforms. Tailored, individual and specific course design for organisational blended learning is a big investment, but the outcome should be to create a new comfort zone for teaching staff, so that they feel supported and stable operating in these new circumstances. The future of learning design will be more collaborative and team-based.
- **Investing in staff skills** will be an ongoing concern. During 2020/21 staff underwent an extremely fast adoption process, learning how to use new technologies and forming local communities of practice to teach each other and discuss technology-informed pedagogies relevant to their own contexts. One takeaway from this is that top-down centralised training is less effective than informal support networks. Academic staff want small, close community support from colleagues who understand their context and their discipline. However, most universities are moving towards centralised professional services. Possible alternatives to this involve placing an IT contact or learning technologist in faculty teams (which is expensive and risks duplication), or a “hub and spoke” model, with local support line-managed centrally.

- **Partnering supplements existing expertise**, it does not supplant it. Internal in-house units have done phenomenal work to prepare staff and students for the challenges of the past 18 months. Partnering cannot be seen as a shortcut to savings but rather an investment in complementary, sometimes niche expertise to enhance the teaching and learning experience for students and staff alike.

Take control of data

- An **institution-wide strategy for ethical data management** is necessary to create a holistic data landscape into which edtech solutions can integrate. Many universities don't realise how data rich they already are because they are not effectively capturing, storing and interpreting this data. A data stewardship model could be used to define the data and identify assets within their own data domains, create processes and procedures along with access controls to ensure compliance and security, and maintain quality using customer feedback and internal reporting metrics to evaluate issues. Monitoring data usage in this way can help optimise workflows and communications, and provide insight into how and where teams can use data to help in day-to-day decision-making. This level of management cannot take place at departmental level – it must be consistent across the institution to ensure seamless interoperability.
- **Personalised learner analytics** are key to meeting the needs of different learner demographics. The next generation of analytics will be to personalise the learner journey, creating and collecting data as students progress from class to class with different instructors. Consensual data will become more and more important, as students may want to offer more data to get a more personalised experience. Dashboards will evolve to offer personalised views, for staff and for students, which links to digital literacy: they need to know what to ask for.



INSIGHT FOR STARTUPS

"I think students will want much more of an ability to personalise the data that they provide and that they choose to see. Some students who are competitive may want to see exactly where they are compared to everyone else, because it's going to drive them forwards. For other students, that can be completely disempowering. So I think we'll mature beyond an assumption that the institution just shows you one view of your data. We need to equip our students to know what they want, and then enable students to really control at a granular level what data they want to provide to the university."

Daniel Perry, chief information officer, Keele University

Advice for founders

Here, we outline some of the factors that technology providers must consider when formulating their offerings and approaching universities, in order to maximise their value for both institutions and learners. We also explore some of the initiatives they can adopt to mitigate common barriers.

Product advice

- **Keep it simple and stay focused:** If you cannot explain your product in one sentence, you are most likely going to fail. Understand the challenges that the sector is grappling with and prioritise solutions for challenges where there is no product available, rather than offering different options for the same area of focus. Every success story in education to date has targeted very specific student pain points and learning resources: Chegg became a unicorn thanks to an early focus on textbooks rentals, Quizlet through flashcards, Coursehero through study notes, and Varsity Tutors through connections with tutors. Focus on achieving large scale against a specific gap before significantly expanding product functionality.
- **Embed pedagogy at the core:** For your business to genuinely embed pedagogy, you need to rigorously understand this discipline (read up on research covering 'active learning', 'collaborative learning', and 'teacher student engagement') and have the right leadership team in place (eg chief academic officer or head of learning). Pedagogy cannot be an afterthought, as we have seen in the consistent failures of many MOOCs to improve retention and LMS to increase engagement.



INSIGHT FOR STARTUPS

"You have to make it easy for the academics. At the moment, online learning and development teams do all this work, but that's not really scalable. One learning designer and another learning developer can work on three to four courses at any one time – you can't change a whole university's approach to learning design through that. You need to make the platform great for academics to just plug things in directly. ."

Anna Wood, managing director, Cambridge Online Education

- **Sell solutions not features:** There are around 25,000 HE institutions worldwide, of which 5,000 are in Europe and the US. Given this finite market size, you need to prove that your value proposition or product expansion path meets a defined need and can command a high enough price to remain successful. We have previously [talked](#) about this through the lens of model market fit theory. Businesses in education that do not achieve model market fit end up as mid-market players that struggle to raise further capital, fail to scale or are absorbed by market leaders.
- **Understand data fundamentals:** Education does not have a data *quantity* problem – it has a data quality problem, and without quality data there can be no meaningful insight. Instead of overwhelming staff with yet another isolated dashboard, focus on understanding how your solution connects to a university's broader data infrastructure and embeds pedagogy in learning design. Universities spend so much time looking over data structures and manually inputting data because of the lack of compatibility between finance, HR, student record systems and more. If the computer doesn't know what outcomes we are solving then all the data in the world will not help.
- **Build holistic, integrated solutions:** Universities don't want single solutions for particular problems. It is, for example, not feasible for each variation of assessment to require a different technology platform. The edtech solution in itself may be great, but a standalone product or a delay to integrate won't work.



INSIGHT FOR STARTUPS

“Every piece of software now has fairly sophisticated analytics behind the scenes, but in many HE contexts we want to be plugging all of those data feeds into one dashboard that showcases what students are doing, offers some insights to tutors and shows them how to ask for what they need, because not all of the data that we collect will be relevant. Many universities increasingly have to plug each individual piece of technology into their specific teaching and learning context. Integration with other technology platforms is a key piece of doing this well, and often presents us with another unique set of challenges. We need a consistent, holistic data landscape rather than a series of technologies that help teams in a siloed way fix one part of the student journey jigsaw.”

Emily McIntosh, director of learning, teaching & student experience, Middlesex University

- **Support is as important as product:** Changing how staff teach and how they expect students to learn is hard. Learning how to use new software can be a step outside of their comfort zone for many staff. Consultancy or advocacy on instructional design is often more important than tech itself. The biggest challenge for universities is integrating technology in a meaningful way.
- **Prioritise inclusivity and security:** Diversity and inclusivity are vital criteria on university decision-making lists. If you are helping 99% of students but neglecting 1%, it is not good enough. Similarly, if your data security and sharing protocols are reliable 99% of the time, it is not good enough. Inclusivity means building products that any student can use regardless of disability (eg video captions for those with hearing difficulties), income (eg being able to participate even if you do not have the fastest laptop), and location (eg enjoying the same experience whether you are joining in-person or online). Budget time and resources accordingly, expect a lot of paperwork, and do not neglect the importance of this category.
- **Be ready to face changes:** Change may be necessary in the university's requirements, and in the need to integrate with other systems/tools, which can be managed by having a flexible architecture for your solution. Ensuring a rapid speed of development also needs to be considered. Be willing to be flexible in approach, take feedback from an institution when the product is not fully meeting their needs, and adapt plans swiftly.



Sales advice

- **Understand the HE market:** Holon IQ's recent [report](#) highlights that one in three universities seek partnerships to help deliver digital capability, one in two prefer to outsource, and the balance see them as a short-term solution. Companies rethinking digital teaching and learning resources will need to tailor towards these different audiences, acknowledging large but varying learning design and learner experience capability gaps and appetites. While some university contexts will lend themselves more towards off-the-shelf digital content solutions, others will seek high touch specialist support.
- **Pursue foot-in-the-door strategies:** Be careful how much you are expecting from universities. They are risk-averse, with procurement departments that protect against mistakes but also slow down and prevent rapid adoption of new, expensive or complex products. Offering low-risk pilots, trials or small early rollouts that are priced under procurement thresholds could be smart ways to build trust and reputation before expanding to other departments and universities. Another option is to approach relevant faculties direct and find early adopter academics.
- **Build a reputation:** Selling to universities is one of the most difficult sales processes after selling to government. Given the financial and reputational risks, as well as sheer operational complexity, universities find it difficult to work with startups. The best edtech startups focus on finding a couple of pioneering large universities with a proven appetite for innovation. This proves the effectiveness of their products, and they can then rely on testimonials and case studies to attract interest. Most universities are followers of trends.
- **Understand university motivations:** A vague promise of better student outcomes and experiences is not enough on its own. While Covid is driving universities to rethink the education they offer, edtech companies need to show how their solutions can either help increase revenue, improve student retention and / or reduce time and costs. The stronger your business case and the more robust the evidence, the easier the sell.



INSIGHT FOR STARTUPS

“One of the mantras in my team is that everything we try to offer and provide should be easy to adopt, hard to fail.”

Andy Beggan, dean of digital education, University of Lincoln

- **Be user-focused:** Technological solutions must be implemented in a way that takes account of the audience they're there to serve. They need to be intuitive, streamlined and seamless. Staff experience is as important as student experience here: staff are often protective of their academic IP, fear for their jobs, and are wary about the amount of time it will take to get up to speed. It is difficult for edtech businesses to find the balance between easy adoption and large impact. Solutions offering more holistic, transformative change can be difficult to sell given large behavioural change requirements. Smaller solutions are easier to adopt but can struggle to deliver meaningful integrations, functionality and impact.
- **Pursue a consortial approach:** Universities haven't got the bandwidth to engage with micro ideas so they turn to big players, who are increasingly trying to swallow up all bits of functionality. Universities are also trying to get the best ROI from expensive procurements with Microsoft, Blackboard and others. Those who have tried to integrate smaller niche solutions, even with a high level support, have struggled. One possible solution is for smaller companies to hook in with big companies and be a cog in a bigger wheel.
- **Be prepared for procurement:** The level of work required for a university even just to investigate a new potential solution is immense: it takes weeks to perform privacy impact assessments, data protection statements, and to go through the finance process. To speed this along, it is important for universities to know how edtech providers are partnering with other universities or companies behind the scenes. Providers could showcase that they've used those collaborations to refine their technology, or that they have worked with other providers as this university, to demonstrate a similar ethos. Universities also need to see longevity from vendors. The cost of change is huge, which makes universities risk averse, but if startups can demonstrate that they have a roadmap to stability and are in it for the long term, this will look like a more viable investment.



INSIGHT FOR STARTUPS

"It's got to be incredibly simple to use, always reliable, and useful to the student experience or the staff experience. If you tick those three boxes, then you have your magic product."

Gavin McLachlan, vice-principal and chief information officer and librarian, University of Edinburgh

What makes a good pitch?

This is a difficult environment for startups. While there is widespread appetite for change, universities are inundated with pitches at the moment. A good first impression can make all the difference. Here are some building blocks that can be put in place from the outset to ensure a good long-term working relationship.

DO

- **Make contact at the right level.** Vice-chancellors can be useful advocates at the level of strategy but they aren't always best placed to assess a product's relevance on the ground and they are not the contacts with whom you will have an ongoing working relationship during implementation. Pro vice-chancellors or vice-principals of learning and teaching / education can be a good place to start, but often innovation in tools comes from the bottom up, based on feedback from practitioners. Every institution is different, so find out whether they have learning technology teams, dean of digital education roles, digital education services, and/or a chief information officer.
- **Be clear, succinct and efficient.** Include a very short (1-2 mins) video to demonstrate the product.
- **Wait for contact.** A pitch needs to catch an institution at the right moment – that might not be at the point of first contact but a good product will make an impression, so leave your details.

DON'T

- **Use rhetoric about the broader edtech landscape.** A clear, to the point headline is more useful to assess the suitability and potential fit of the product.
- **Overload with multiple follow ups.** This is a competitive sector and many universities are not currently engaging with unsolicited pitches. Universities may use the Edtech Advisory Forum to warn each other about overaggressive or misleading sales pitches. A good product will get a reputation. Word of mouth endorsements from network contacts are powerful – universities are much more likely to pay attention to successful rollouts at other universities, or to effective use within their own faculties which can be scaled up, than an unsolicited email.
- **Send generic emails.** Universities need an immediate sense of how your solution solves a particular problem for them, and how implementation will be tailored to their particular circumstances. Pro formas are swiftly dismissed. Don't waste their time: look for this information (institutional ethos, student demographics, "Curriculum 2025/2030" strategy documents and so on) online.

Conclusion

Throughout our work on this report, it has been evident that there is a real and significant appetite for sustained change, and a genuine excitement about technology-enabled teaching and learning's potential to transform the learning experience for all students.

The future of higher education is blended. While Covid-19 has thrown in new challenges, it has created many new opportunities, and it has expedited awareness of (and confidence with) digital ways of working for both staff and students. Taking these experiences and scaling up blended learning offers so that they pervade higher education's 'business as usual' will be the next step. This does not entail technology-led or technology-centric design, but rather making the most of technology's ability to enhance existing provision, sharpen student engagement, and widen accessibility. Getting to this point will require concerted efforts to address barriers to effective investment and scale-up activities - something we hope can be achieved with the help of the recommendations in this report.

Through market research and interviews, we can identify three broad areas where technological innovation can play a major role in enhancing teaching and learning at scale: resources, delivery and support. Using these insights into the rapidly evolving edtech landscape, each institution will need to find its own way forwards, taking account of its own current state of digital maturity, institutional values, long term digital strategy, and the particular needs of its student populations.

Yet sector-wide collaboration will remain vital to effectively scaling up blended learning. Industry-wide initiatives and investments can avoid significant duplication of time, effort and money. While each university may take its own path, we are all facing the same challenges as we move through this terrain.

There is still a long way to go but there is a shared sense of optimism and enthusiasm in the sector.

Q+A with Prasad Mohare, senior vice president at LearningMate

For 20 years, LearningMate has worked with education institutions around the world to help them build, deploy and streamline their digital infrastructure, from curriculum design and course development to learning process optimisation and data analytics.

To date, LearningMate has supported more than five million students to access content. LearningMate Transform is a subscription tool developed to meet the changing needs of universities, paired with instructional design and technology services that enable institutions to rapidly transition to effective online and blended learning. Whether teaching students on or off-campus, the solution empowers institutions with proven course frameworks, a learning outcomes manager, a learning object repository, and a collection of teaching and learning best practices.



What do you see as the learning design implications of the shift to digital since Covid?

Covid-19 is making the future happen faster, accelerating higher education's transition from face-to-face to blended teaching. But the "zoomification" of learning is not good, and will affect the learning and teaching process in the long term. We strongly believe that the future of the classroom is digital, hybrid, hyflex and collaborative.

But has our pedagogical model adapted to meet today's demands, or the demands of the future? The priority will be to improve student engagement both in the classroom and outside the classroom, and this will require embedding instructional design principles throughout.

There are three key aspects to this process: defining learning outcomes and aligning all learning and assessment resources/activities to these outcomes; designing module structures and module components to cater to both on-campus and off-campus students; and designing with student engagement in mind from the outset. It is time to swap "for now" approaches to sustainable and scalable efforts.

What are some of the common pitfalls that make implementation challenging for universities?

The context of most implementation challenges is scale – how institutions can provide the best quality teaching and learning experiences for all their learners, remote and in-person.

LearningMate tries to support problems universities typically encounter for teaching at scale by emphasising standardisation of pedagogy and digital resources, and consistency in learning and teaching experience without compromising academic freedom.

This scaffold allows flexibility for academic staff and subject matter expertise to drive the scaling of the design process.

The most critical component of the design process is mapping learning outcomes to institutional goals and then to identify learning resources. Often these are scattered across LMS, libraries, OER resources, faculty curated and created resources, third-party tools and publisher repositories – there are big technical hurdles to bringing all these together in a seamless experience for the students.

We work with institution partners to collect learning resources under one roof or to reference them from one central repository. By a similar process we can also consolidate data, freeing up universities to more effectively track learner participation, engagement and progress.

How has LearningMate helped evolve your university partners' programmes to better engage students learning online?

We very swiftly facilitated the shift to online courses in response to Covid-19, but we are also here to ensure the long-term integration of learning experiences and practice into traditional programs. How do we make remote learning more efficient and engaging,

so that faculty are prepared to engage students for both in-classroom and off-classroom learning experiences? How can we identify and implement technology, tools and content that increase accessibility and engagement for students?

We've been working with academic leadership teams to design, develop and deliver learning and teaching, and with chief information officers and IT directors to roll out digital transformation projects with minimal impact on existing students, faculty, and learning and teaching ecosystems. Our approach aims very much to be a trusted partner who brings in close to two decades of experience in digital transformation in education.

In our experience, ensuring close alignment between learning outcomes and learning resources is the most effective way to create a learning pathway that is as smooth and streamlined as possible. For us, the most fundamental part of the higher education experience is "enlightenment", when students learn more about the world and themselves.

A standardised pedagogical model can be invaluable, providing students with a consistent experience across modules and courses so that they can focus solely on content, rather than re-learning how to learn every time.

We collaborate with our university partners to simplify their course templates and nudge students to stay on track with student success, faculty and personalisation. We also work with academic teams at our partner institutions to disaggregate digital resources from learning experiences

and thus release much-needed bandwidth for them from mundane, non-core activities, such as digitising learning material, templates, and more.

What have you learned about digital community building from your work with universities?

The student co-creation agenda will become increasingly vital, so universities will need to lead course design with their student community. But we also see the significance of building communities of digital practice for staff. The HE sector is coming together as one community, sharing best practices and lessons learned from the past year.

Institutions who are further along on their digital journey are supporting those a bit further back, and we conduct monthly sessions to share best practices. It's imperative we focus on faculty training for online teaching to ensure we move forward together. By making time for training, with scheduled meetings to share

what is working and not working with individual online courses, a university's in-person and digital community will grow together.

What advice would you give to a startup in this space?

Take the current challenges as an opportunity to think differently and reach out to students in a more flexible manner. It's time to use what we have learned about online learning to become more strategic about how we are addressing their needs. We are still figuring out what works and what doesn't – I doubt if anyone has an answer to all the problems the sector is facing today. It's best if we can work together, taking problems piece by piece, one step at a time. As we figure things out, new challenges will emerge. It's a journey of continuous improvement.

Acknowledgements

Emerge Education and Jisc would like to thank all the contributors to this report for their time and expert insights. In particular, we would like to thank the members of the EmERGE Education action group on operating systems for teaching at scale, led by Ian Dunn and Gideon Shimshon, and everyone who so kindly spared the time to be interviewed for a case study during an exceptionally busy time. Thank you.

Alejandro Armellini, dean of digital and distributed learning, University of Portsmouth

Anat Itay-Sarig, head of academic relations, Ment.io

Anders Krohn, co-founder and chief executive officer, Aula

Andy Beggan, dean of digital education, University of Lincoln

Andreina Bloom Parisi-Amon, vice president (learning and teaching), Engageli

Anna Wood, managing director, Cambridge Online Education

Ashley Wheaton, principal, University College of Estate Management

Blair Grubb, vice-principal for education, University of Dundee

Brian Irwin, head of digital learning and practice, Sheffield Hallam University

Chris Cobb, pro-vice chancellor, University of London

Christine Broughan, pro-vice chancellor (education), Northumbria University

Craig Mahoney, vice-chancellor, University of the West of Scotland

Dan Avida, co-founder and chief executive officer, Engageli

Daniel Perry, chief information officer and university librarian, Keele University

Dave Hall, university secretary, The Open University

Emily McIntosh, director of learning, teaching and student experience, Middlesex University

Gavin McLachlan, vice-principal and chief information officer, University of Edinburgh

Gideon Shimshon, associate principal (digital learning) and head of QM Online, Queen Mary, University of London

Graham Galbraith, vice-chancellor, University of Portsmouth

Heidi Fraser-Krauss, executive director of corporate services, University of Sheffield

Helen Best, dean of academic strategy, Sheffield Hallam University

Ian Dunn, provost, Coventry University

Justin Cooke, chief content and partnerships officer, FutureLearn

Lou Pugliese, executive vice president, University of Maryland Global Campus

Mary Curnock Cook, network chair, EmERGE Education

Marta Baniukiewicz, Labster

Masud Khokhar, university librarian and keeper of the brotherton collection, University of Leeds

Matthew Jenner, director of learning, FutureLearn

Matthew Weait, deputy vice-chancellor, University of Hertfordshire

Michael Gaebel, director of higher education policy, European University Association

Nachiket Paratkar, senior vice-president (higher education), LearningMate

Neil Morris, deputy vice-chancellor (digital transformation) and chair of edtech, University of Leeds

Nicola Whitton, director of centre for academic development, Durham University

Noemi Azzolina, acting director, digital learning hub, Imperial College London

Osama Khan, pro-vice chancellor (education), University of Surrey

Prasad Mohare, senior vice-president, LearningMate

Rawad Hammad, programme leader, MSc Computing and ICT, University of East London

Rob Howe, head of learning technology, University of Northampton

Ruth Ayres, pro-vice chancellor for education, Aston University

Sven Schutt, chief executive officer, International University of Applied Sciences (IUBH)

Talia Kolodny, director of partnerships, EMEA, Engageli

Vicky Gosling, director of digital experience, University of Falmouth

Thank you to report sponsor, **LearningMate**

Authors and editorial team

Mario Barosevcic, principal, EmERGE Education

Jan Lynn-Matern, partner, EmERGE Education

Charlotte Jones, research fellow, QMUL

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


Design by **Stoats & Weasels**

About Emerge

Emerge Education is a European edtech seed fund investing in world-class 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 the founders of globally renowned Edtech companies. Together, we are building the future of learning.

Emerge Education

15 Fetter Lane
London
EC4A 1BW

info@emerge.education
emerge.education
medium.com/emerge-edtech-insights
 @emergelab

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.

Jisc

4 Portwall Lane
Bristol
BS1 6NB

info@jisc.ac.uk
jisc.ac.uk
 @Jisc