New Learning and Teaching Models through Digital Transformation

A report by Professor Martin Weller. Commissioned by the N-TUTORR National Digital Leadership Network

National Digital Leadership Network

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Author biography

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He maintains a popular blog at blog.edtechie.net

Abstract

This report examines five key topics that are influencing new models of teaching and learning. The 2020 Covid-19 pandemic saw a significant shift to online learning and while this raised the profile of online education, the practice since then has been a return to the on campus model, although this has often led to reports of empty lecture halls as students continue to embrace the flexibility of hybrid models. Since 2022 the advent of Artificial Intelligence, in particular Large Language Models, has led to considerable reflection in higher education on the use of essays and exams in assessment and how to best incorporate these tools into teaching. The impact of these two factors, the pandemic and AI, place Higher Education Institutions (HEIs) in the position of having to satisfy their current student base, with an economic model largely constructed around the physical campus, while also developing models that will provide robust and flexible models for students in the future.

This report looks at five topics in this change, namely Hybrid and Blended Modes for Learning and Working, Microcredentials, Generative AI, Extended Reality and Adaptive and Personalised learning. The state of the art for each of this is synthesised and a practical example for each provided.

Introduction to the National Digital Leadership Network Report Series

The National Digital Leadership Network (NDLN) is a collaborative initiative designed to support digital transformation across Ireland's Technological Higher Education sector. Established under the N-TUTORR programme with funding provided through the EU's NextGenerationEU initiative, the network was officially launched in November 2024 to provide a national platform for digital leadership and complementary knowledge exchange and strategic collaboration. While the N-TUTORR programme has now concluded, our network continues its work under the guidance of a steering board composed of sector leaders and external experts.

Digital leadership in higher education extends far beyond technical expertise or the adoption of certain tools and platforms: it's about vision, strategy, and culture change. Effective digital leaders ensure that digital strategies and developments align with institutional and national priorities, not only enhancing teaching, learning, research, and administration functions but also upholding academic values, promoting equity, and driving business innovation. In this context, the NDLN fosters collaboration among higher education leaders, policymakers, and practitioners, providing opportunities to share insights, explore emerging challenges, and develop shared solutions.

As part of its work, the NDLN has commissioned a series of horizon-scanning reports authored by leading national and international scholars and practitioners. These reports explore key trends at the intersection of digital innovation, traditional leadership and strategic planning, providing actionable insights to support higher education institutions in aligning these trends and related opportunities with institutional and national priorities. Covering topics such as the evolving role of generative AI in academia, data-driven decision-making, academic integrity, new models of learning and teaching and new ways to plan for financial sustainability, this report series offers timely advice and direction for higher education leaders navigating the interrelated complexities of the digital and post-digital age.

We extend our gratitude to the N-TUTORR programme for its financial support, and to N-TUTORR Co-ordinator Dr Sharon Flynn for her direction and continued support of the network. Thank you also to members of our national steering board and to our external contributors, in particular Professor Lawrie Phipps.

A big personal thank you in addition to my colleagues in the Department of Technology Enhanced Learning (TEL) at MTU -- especially Darragh Coakley and Marta

Guerra -- whose work has been vital to the preparation and publication of these reports. We are also very grateful to Dr. Catherine Cronin, our chief editor, and, of course, to all our authors whose insights, expertise, and dedication form the heart and foundation of this series.

We invite you to engage with these reports and join us in shaping the future of digital leadership in higher education.

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Executive Summary

To leaders in higher education, the Covid-19 pandemic revealed widespread structural weaknesses across the sector and the urgent need for more resilience through digital transformation. Since 2020, when we saw that significant shift to online learning which raised the profile of online education, many institutions in Ireland and elsewhere have made a return to the on-campus model which established policy, funding, and quality assurance frameworks rely on. Students, however, continue to embrace the flexibility of hybrid models, which has led to reports of empty lecture halls and demand for sustainable digital transformation at scale.

Further complicating matters since 2022 is the advent of artificial intelligence (AI), in particular large language models. This has led to considerable uncertainty in higher education on whether to continue using essays and exams for assessment and how to best incorporate AI tools into teaching.

The impact of these two factors, the pandemic and AI, place higher education institutions (HEIs) in the position of having to meet the needs of current student populations, with an economic model largely constructed around the physical campus, while also developing strategies that will provide robust and flexible models for students in the future. There is a sense that different crises have combined to create a “permacrisis”, prompting leaders to focus on recovery and build resilience.

This report looks at five key topics, namely hybrid and blended modes for learning, microcredentials, generative AI, extended reality, and adaptive and personalised learning. The state of the art for each is synthesised, and each topic includes a practical example as a starting point for how to implement flexibility and resilience into the higher education system.

The key recommendations for implementing these models and developing more flexible systems are:

- **Recommendation 1 –** Determine the principles of adoption: The principles by which a particular institution implements new technology determine the intention and aim behind any new approach and the process for its adoption.
- **Recommendation 2 –** Develop a learning design approach: This deploys a specific method, based on educational theory, to make the design decisions explicit. By deploying a standard learning design approach, institutions can develop courses that make the best use of technology and pedagogy.

- **Recommendation 3 –** Plan for flexibility and resilience: Flexibility in curriculum, mode, presentation patterns, assessment, and use of technology will be a key priority in the coming years. This needs to be planned for and integrated into practice.
- **Recommendation 4 –** Encourage staff to experiment with new technology and approaches: This ethos can be communicated through the promotion process, awards, allocation of study time, development, and programmes of innovation.
- **Recommendation 5 –** Develop a pedagogy of care: Students are a more diverse body now, with “non-traditional” students now in the majority. Acknowledging that students face competing demands, course design needs to embed care, whether this is through more flexible assessment, adaptable study patterns, and/or access to support.

Introduction

Change in higher education sometimes seems akin to that of natural evolution, which Elizabeth Kolbert (2014) summarises as "long periods of boredom interrupted occasionally by panic". The advent of powerful AI on the back of the increased focus on online education brought about by the Covid-19 pandemic means that higher education can be considered as entering one of those periods of panic – or, at least, more rapid change than is usually the case. The intention of this report is to somewhat assuage that panic by focusing on five interlocking key topics. Each of these topics would warrant several volumes in themselves, so the aim here is to provide a useful overview of the key issues, and examples of practical application. The topics are as follows:

1. Hybrid and blended modes for learning
2. Microcredentials
3. Generative AI
4. Extended reality technologies
5. Adaptive and personalised learning

For convenience, because any individual reader may be interested in one topic more than another, these are explored separately in the report, but they should realistically be viewed as a set of intersecting technologies and approaches. It is, for instance, difficult to talk about personalised learning without reference to AI.

The context for this report can be seen as the combination of three factors: educational technology development; the aftermath of the Covid-19 pandemic; and the impact of recent advancements in AI. The first of these factors is the general increase in connectivity, awareness of online activity, and development of educational technology that we have seen over the past twenty years or so. The internet, and particularly the web, was only beginning to gain social recognition in the late 1990s. Since then, there is hardly a sphere of society that has remained untouched by its impact, whether it be health, retail, leisure, and of course education. Although "educational technology" existed prior to the internet, the term has become largely synonymous with online, digital technologies. Nearly all HEIs have some form of virtual learning environment (VLE), content management system (CMS), and extensive administrative systems.

In 2023, the global edtech industry was estimated to be worth USD$144.64 billion with projections to reach USD$598.82 billion by 2032 (Straits Research, 2024). While I would urge caution about many of the claims made by those in the field, there is often a sense that the future of all higher education will be determined by educational technology. While we should treat many of the claims made about specific technologies with scepticism (some of you may recall the overblown claims around massive open online courses [MOOCs] in 2012, for example), the current context is one where educational technology is well established across the sector, students are accustomed to using online services, and there is a wide range of possibilities across all disciplines.

If the general growth of educational technology provides a foundation, then the second contextual factor – the impact of the Covid-19 pandemic – can be seen as providing a boost to the attention and demands of the technology. The pandemic saw a large-scale shift to online education as physical institutions were forced to close. In May 2020, UNESCO reported that over 85% of the world's student population – some 1.4 billion learners from 188 countries – were affected by the closure of educational institutions (UNESCO, 2020). The only alternative for many institutions was to deliver some form of education online, and this sudden switch became known as the "pivot online", or "online pivot". For most campus-based schools, colleges, and universities where face-to-face teaching was still the dominant model, this represented a profound, and sudden, shift in practice. In the immediate aftermath of the pandemic and lockdown, this pivot often took the form of synchronous sessions, lectures and classes online using tools such as Zoom. This placed educational technology and online learning centre-stage. While this was not always a good learning experience for students, it raised awareness of the flexibility of online and hybrid models and revealed weaknesses in a higher education model that was heavily, or solely, based on face-to-face provision.

The third factor is the recent breakthrough of AI into popular usage. While AI has been a topic of interest and promise since the 1970s, it has remained a largely specialised topic until recently. The development of large language models, combined with cheap, powerful computing, has meant that tools such as ChatGPT, Midjourney, Grammarly, and DALL-E offer sophisticated and easy to use tools to the general public. This will have considerable potential impacts for all sectors, but education is particularly subject to its influence. Essays and exam answers can easily be generated by AI, which has implications for modes of assessment; it can be used to summarise information, inform research, generate content, and provide tuition. There are few HEIs that are not now considering their stance and approach towards AI in one or more of these areas.

These three factors provide the context for this report, and for the sense of change, opportunity, and panic that can be detected in higher education. Important questions to be considered by decisionmakers in higher education include:

- How can we best use technology to support our students?
- What are the implications for current assessment practice?
- How should staff be supported in the use of new tools?
- What new pedagogic models best take advantage of the current context?
- How can HEIs offer flexible models to suit the needs of students equitably?
- How can the sector develop resilient models of delivery?

This report will attempt to provide some answers for these in the five relevant topics.

Methodological Approach

The five topics were selected with the intention of identifying those emerging learning and teaching trends that will have the greatest resonance with most HEIs. There are many different perspectives that could be brought to bear with this intention in mind. For instance, one could identify key sociocultural and economic trends and topics – such as climate change, inequality, social justice, and accessibility – and then examine key pedagogic and technological aspects for each, but such topics deserve reports of their own and so are largely outside the scope of this report. The focus of this report is on possible changes to the pedagogic practice of HEIs brought about by technological developments.

To be included in this report, the selected topics needed to conform to the following criteria:

- Have staying power beyond an immediate flurry of interest
- Have broad appeal across disciplines and institutions
- Be at a stage of early implementation with future implications still being thought through
- Have potentially significant implications for learning and teaching

In order to identify such topics, two main sources were used which provide a regular synthesis of developments. These were the Innovating Pedagogy report series[1] from the UK Open University, which since 2012 has published an annual report examining new pedagogic developments, and 25 Years of Ed Tech (Weller, 2020), the book and blog series by the author, which focuses on one relevant educational technology from every year, starting with 1994. The five topics identified arose in different forms across

[1] https://www.open.ac.uk/blogs/innovating/

both of these series, which indicates that they meet the criteria outlined above. Both series of publications explicitly seek to include new topics each year, therefore any instances where topics are revisited in different forms indicates that they have broad appeal, persistence, significance, and are still developing. The number of mentions for each topic is summarised in Table 1 below.

Table 1: Number of mentions in Innovating Pedagogy and 25 Years of Ed Tech series for each topic in this report

Topic	Innovating Pedagogy (max. 110)	25 Years of Ed Tech (max. 30)
Hybrid learning	12	3
Microcredentials	7	4
AI	4	3
XR/VR	7	1
Personalised learning	7	3

This is only a cursory survey and allocation, but it is indicative that these topics recur in different forms for consideration. Other topics emerged from this analysis also, including data and analytics and open practice, which have not been included in this report. The final choice on which topics to include was a decision based largely on currency and impact for a wider audience.

For each topic, the author used academic library search to source at least ten key academic papers, prioritising post-2020 publications. As the intention of this report is to provide an overview of each topic, the focus was on articles that reported systematic reviews and meta-analyses. In addition, one representative example for each topic (from higher education sectors in five different countries) was identified, with the selection criteria that it demonstrated practical, real-world application in an educational context and which could be adopted by other institutions.

Hybrid and Blended Modes for Learning

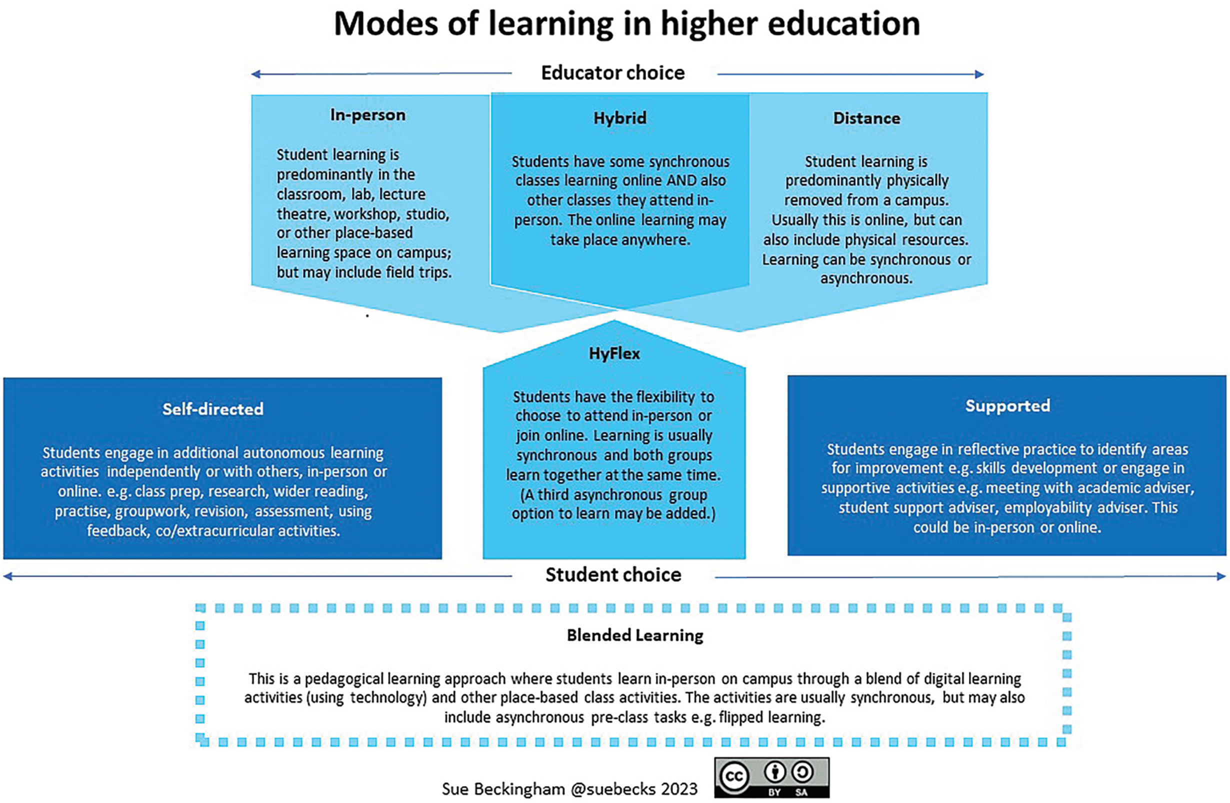
Higher education saw a dramatic increase in online learning during the Covid-19 pandemic, but this was for the most part an emergency response, delivered in the form of online lectures, which did not fully utilise many of the benefits of online learning. The online pivot revealed the need for HEIs to foreground hybrid approaches, and how learning technology has become a central focus in the sector. For example, the 2022 annual survey from the UK Association for Learning Technology (Association for Learning Technology, 2022) found that over the course of the previous year:

The online pivot revealed the need for HEIs to foreground hybrid approaches, and how learning technology has become a central focus in the sector.

- 87% of respondents feel learning technology is more positively perceived
- Most investment in infrastructure and technology has been with regard to recruitment and continuing professional development (CPD) (with 53% reporting a reduction in permanent posts funding)
- 45% of learning technology budgets have increased
- 58% of respondents felt the changes were sustainable
- 67% of policies relating to use of learning technology have been revised, or new ones created

These findings highlight the repositioning and prioritising of learning technology within HEIs, creating a different environment for hybrid learning models than what was in existence pre-pandemic. Hybrid learning is defined as “the intentional use of technology as a replacement of seat time in class to foster an environment for student learning” (Linder, 2017), for example, replacing one face-to-face class with online learning. It can also refer to simultaneous online and in-class delivery and is often used synonymously or in conjunction with blended and flipped models of learning (Saichaie, 2020). The relationships between some of the relevant terms are summarised in Figure 1.

Figure 1: Data mastery components



Different models of combining online learning have been proposed, including hybrid, HyFlex, blended and fully online (Irvine, 2020). The Irish National Forum for the Enhancement of Teaching and Learning in Higher Education (2021a) has identified eight key themes in online and blended learning, namely: teaching online; learning design; building community; synchronous and asynchronous modes; digital assessment learning environments; openness; and MOOCs. This list demonstrates the range of considerations that come into play when we talk of hybrid learning. Elements of hybrid learning which combine online and face-to-face are embedded in all aspects of higher education, with students expressing a preference for online exams (Bell & Burman, 2021), appreciating the flexibility of recorded lectures (EDTL, 2021), and displaying an increased desire for online resources (OpenLearn, 2020). In essence, nearly all courses can be considered blended or hybrid now, with resources provided online via the VLE or library, and lecture capture recordings often available. There is, however, a considerable difference between courses that are blended as a by-product of an HEI's technology infrastructure and ones that are deliberately designed to make the best use of a combination of online and face-to-face elements of teaching.

In contrast to some students' preferences for blended models of education, there has also been a public call for a return to face-to-face education (e.g. Education Hub, 2022). While students have returned to campus, this should not be interpreted as their preferring to return to pre-pandemic models. In a large-scale survey of Canadian students (Veletsianos, 2021), respondents expressed a desire for increased innovation in teaching and learning, and for HEIs to provide greater support and offer more flexibility. Likewise, 44% of Irish students reported that they wanted to continue with online lectures (EDTL, 2021). HEIs therefore need to find ways of implementing hybrid learning models that satisfy both the available opportunities and the caution around online models, while taking advantage of the benefits found in face-to-face provision of lessons. This is a complex problem, as what suits one group of learners or one discipline may not be appropriate for others.

In designing blended-learning offerings, a meta-study examined critical success factors and reported that for learners, self-efficacy was most important; for teachers it was a positive attitude; and for the course it was convenience and flexibility. The use of learning design was found to have a more significant impact for blended students than those studying solely on campus, which highlights the need for careful design in developing blended options (Min & Yu, 2023).

The N-TUTORR report (Carroll et al., 2024) on blended learning identifies four key benefits for students:

- Increased flexibility – learners have flexibility over time and mode of learning
- Enhanced learner agency – depending on the model employed, learners can have increased control over the time, place, and modality of their learning
- Enhanced employability – learning skills in online collaboration, time management, and increased responsibility can have employment benefits
- Enhanced engagement – use of appropriate tools for the different modalities can increase engagement, rather than the one-size-fits-all approach of either solely online or face-to-face.

A key issue for HEIs to address is that online and face-to-face models of education have different requirements for support, staff development, and costing. For instance, face-to-face needs to maintain a physical infrastructure with the associated costs of heating, lighting, security, etc., while online teaching requires more upfront effort in learning design, and necessitates a robust IT infrastructure that students can rely upon for associated support such as 24-hour IT helpdesks. The benefits, for both learners and the HEI itself, of offering blended models thus need to be carefully determined, otherwise financial considerations can result in a model that prioritises one set of learners – for instance, HyFlex models, which simply stream the face-to-face setting, giving online learners a second-class experience.

Example

In Quebec, the CEGEP College noticed that students' performance on higher-level engineering courses was directly correlated with their performance on an introductory physics course (Bazelais & Doleck, 2018). In a comparative study with the traditional lecture-based course, the college introduced a blended model which provided video lectures and then used the lecture time to discuss concepts communicated in the video lectures, followed by a further mini-lecture to revisit the concepts posted in the video lectures and work with learners to solve authentic problems in groups. Performance in exams at the end of the course was significantly higher for the blended learning group. This example demonstrates the potential of explicitly redesigning face-to-face courses for students to make them more interactive, rather than an experience which is largely assimilative.

Recommendations

Blended learning offers flexibility for the learners, and also potentially for HEIs. In the event of any crisis that affects the ability to offer face-to-face provision (such as another pandemic), having courses that are already designed around a blended model will allow institutions to adapt more readily. For HEIs, therefore, implementing a standard blended model will provide them with the flexibility and adaptability required, to an extent, and help ease some financial strains. Further to this standard provision, it is recommended that specific blended models are explored where the pedagogy and design is specifically adapted to the hybrid model. This should be undertaken when there is a clear benefit for learners, a likely benefit for the institution, and staff who are enthusiastic to implement it. The outcomes of such developments can be a set of blended models that a specific HEI can undertake and develop further, with an understanding of the associated costs, impacts, and requirements.

Microcredentials

Microcredentials[2] can be defined as "smaller units of assessed learning recognised by higher education institutions and other trusted credential-bearing agencies or profes-

[2]See Belshaw et al. (2024), also in the National Digital Leadership Network report series, for further exploration of microcredentials.

sional bodies. They are seen by many to address the growing demands of upskilling and re-skilling required by both industry and employees" (Nic Giolla Mhichíl et al., 2020). They can also be viewed as an example of how several technologies and concepts have come together into one commonly shared idea. Microcredentials have their roots in large-scale online educational offerings such as open educational resources (OER) and MOOCs, methods of providing online credentials through digital badges, as well as vocational upskilling. More broadly, microcredentials can be seen as a trend to "unbundle" aspects of the higher education offering. The concept of unbundling views the overall higher education experience as a set of different services, including content, tuition, credentialing, skills development, library services, etc.

The term "micro-" or "nanocredentialing" can also refer to offering digital badges that recognise small pieces of learning or achievement, for example, reviewing an article or attending a conference. The focus in this section is on "microcredential" in reference to a course, with formal recognition. The European MOOC Consortium has proposed a Common Microcredentials Framework (Antonaci et al., 2021), which suggests that microcredentials should include the following criteria:

- A learner workload of 100–150 hours, equivalent to 4–6 European Credit Transfer and Accumulation System (ECTS) credits
- Delivered at Level 6 of the European/National Qualification Framework (EQF/NQF)
- Assessment enabling the award of academic credit
- Reliable method of ID verification at the point of assessment
- Transcript setting out the course's learning outcomes, hours of study required, EQF level, and number of credit points earned

Not all microcredentials will meet all of these criteria, but they provide a reasonable definition of the term. In addition to these criteria, two more common aspects of microcredentials can be added. First, microcredentials are generally completely online. Second, while they can be offered on any topic, they are usually developed with vocational or employability markets in mind, with an aim to address a perceived skills gap in many sectors.

With these factors in mind, the pedagogy of microcredentials needs to be one that meets these demands. The learners will likely be in employment already, have some work and educational experience themselves, be focused on employability, and have limited time. Microcredentials therefore need to be flexible in their delivery, building off models developed by distance education and MOOCs. They are often self-supported, with little to no one-to-one tuition, largely asynchronous in terms of delivery so they can be studied at a time convenient to the learner, and assessed through online methods.

A complicating factor for HEIs providing microcredentials is the degree to which they can be aggregated towards a qualification. This is known as “stacking”: for instance, counting two microcredentials, each worth 15 credits, can be put towards the 120 credits required for a master’s degree. This can be beneficial in promoting alternative routes into study, allowing learners to acquire credits over a prolonged period and creating flexibility and range in the curriculum offering. However, there are issues in developing the appropriate skills and synthesis required for a degree or postgraduate qualification through smaller units of study, so the quantity of such units within an overall qualification framework needs to be specified.

A complicating factor for HEIs providing microcredentials is the degree to which they can be aggregated towards a qualification.

As has been mentioned, microcredentials can be viewed as a development of the MOOC phenomenon, and many existing MOOC platforms have been influential in promoting the concept of microcredentials. As with MOOCs, however, there can sometimes be a pressure on HEIs to be seen participating in the latest development, without any clear rationale for doing so. Critics have suggested that there has arisen a craze for microcredentials due to a desire to unbundle higher education for greater profitability and to direct the university curriculum towards vocational training (Ralston, 2021). More practically, as with MOOCs, there is often a tendency to underestimate the costs of developing such courses while overestimating their potential revenue.

In developing microcredentials, it has been suggested (Ferguson & Whitelock, 2024) that their pedagogy needs to take into account (among other factors) that:

- Cohorts are likely to be large
- Educator–learner ratios may be low
- Focus is often on career, workplace, and professional skills
- Learners are likely to have work and care commitments that take precedence over study

While the last three elements on this list are likely to be true, there is no evidence that the first is the case. Unlike MOOCs, microcredentials require learners pay to enrol in them. While this fee is usually less than formal undergraduate or postgraduate study, it is still substantial, with the average cost of a microcredential course on the popular platform Coursera reported as $1,500 (Welding, 2024). The large numbers of casual learners seen on MOOCs – which were free and usually had a completion rate of only around 10% – are unlikely to be replicated with microcredentials with such costs.

Example

In order to promote professional development in teachers in Australia, a suite of microcredentials was developed at Queensland University of Technology (White, 2021). The team developed a planned pathway into formal learning with a free initial MOOC, followed by a smaller module, equivalent to thirteen hours of learning, and then a more extensive microcredential culminating in assessment (equivalent to sixty-two hours of learning). Combined, these equated six credit units in their Master of Education programme. Although this is a credit-bearing pathway designed to lead into a Master of Education mainstream qualification, it also allowed learners to exit at different points. The initial MOOC offered a low-investment means for the learner to commence on this pathway. The team at Queensland report that the microcredentials are showing sustainability in terms of revenue generation and learner participation.

Recommendations

Microcredentials can be a useful means of reaching new learners and providing professional development or upskilling. The link to higher education credit means they can be offered as a pathway into existing studies. They can be costly to produce, however, and learner numbers may not be substantial. Therefore, microcredentials need to be implemented with a very clear goal, intended audience, and preferably with employment partners and stakeholders.

Generative AI

There is no current technology-related subject that generates as much debate, angst, and rhetoric as the application of AI. For some, it is yet another over-hyped technology that will soon fade, while others suggest it represents a fundamental change not just in education but in its application more broadly in society. The literature on these debates and possible futures could lead to is vast, and beyond the scope of this report, so here the focus will be on its immediate applications and areas to be considered.[3]

AI has long been a topic of interest in higher education, after an early burst of enthusiasm in the 1980s over the concept of intelligent tutoring systems (ITS), which

[3]See Pratschke (2024) and Whittle & Ranson (2024), also in the National Digital Leadership Network report series, for further exploration of the use of AI in higher education.

could teach an individual learner interactively without the need for a human educator. Interest waned somewhat in the 1990s because ITS only worked for very limited, tightly specified domains. Developers needed to predict the types of errors people would make in order to provide advice on how to rectify them. In 1997, experts in the field lamented that "intelligent tutoring has had relatively little impact on education and training in the world" (Corbett et al., 1997). These approaches were based on an approach to AI known as symbolic reasoning, which meant trying to capture the rules people operate by in programming languages such as expert systems. There was, however, an alternative approach to this: machine learning. Whereas expert systems sought to explicitly capture expertise in the form of rules, machine learning extracted patterns from data – top-down and bottom-up approaches, respectively. With the increasing power of computers and the sophistication of the learning algorithms, it was this second approach that led to the current explosion in interest in AI.

This brief historical overview is relevant because it highlights that current AI models don't have real-world models encoded into them, they are generated from existing data patterns. So, for instance, they can generate pictures where people have six fingers, or create academic references that don't actually exist (Czerniewicz, 2024), because they don't know these are incorrect. More positively, however, they can also generate novel content from the data they are given because they can detect and generalise from patterns.

In terms of the application of AI in higher education, the following examples are often proposed as the main areas of impact (e.g. Crompton & Burke, 2023):

- Personalised learning: The use of AI to offer personalised and adaptable content depending on the learner's needs is often proposed as a benefit. See the section "Adaptive and personalised learning" below for more details
- Assessment and evaluation: One of the biggest areas of impact for AI is in assessment. Some of this is reactive – for instance, devising approaches and policies to deal with students using AI to generate essay answers – and some is proactive: for instance, using AI to give students feedback on their writing or performance in learning a language (e.g. Huang et al., 2023)
- Prediction and analytics: Drawing on data generated through VLEs, assessments, and various university systems, AI can be used to predict academic performance, students who might be identified as "at risk", and potential non-completion of courses. Learning analytics can also be used to modify content and offer assistance to educators (JISC, 2022)
- AI assistant: From chatbots to virtual avatars offering assistance, AI's ability

to synthesise information and provide summaries can offer a useful tool for students. This can also be expanded to encompass a return of the intelligent tutoring system, particularly on large courses such as MOOCs, where human instructors cannot support all students

- Accessibility and inclusion: AI can be used to improve accessibility for students with disabilities: for example, converting text to speech, providing real-time captioning to video and audio, and translating content

In addition to these types of applications, what is perhaps most interesting about AI are the questions it makes higher education ask of itself. Such questions include:

What does assessment look like with easily generated content? This is the most immediate focus for many. The initial reaction of many HEIs may be to introduce policies to preserve the integrity of exams, such as a return to more in-person exams, increasing online exam proctoring, and introducing penalties for using AI. What is perhaps more interesting would be if they were to acknowledge the existence of such tools and potentially build them into assessment: for example, having students generate AI answers to essay questions and then critique them. A study of how the world's top-ranking universities are using AI in assessment found that most have accepted it has a role (Moorhouse et al., 2023). In order to develop teacher and learner literacies, two prominent approaches that emerged in the study were running assessment tasks through AI tools to check the extent to which the tool can accomplish the task and having students use AI as a recognised part of the assessment process.

How should assessment be changed? This raises a further question of: What is the purpose of any particular assessment? The fact that current AI can produce effective, but slightly bland, essay answers can be seen as an indictment on the assessment procedures that have been developed over the past few decades. Having spent so long carefully extracting aspects of humanity in higher education content, we may now need to find ways of reinserting it and increasing elements of agency and individuality in assessment, as these are more difficult to replicate. The magazine Times Higher Education offers a range of resources on redesigning assessment which suggest strategies that include focusing more on projects and case studies, using multi-modal assessment, developing collaborations with staff, and focusing on oral presentations.[4]

How can we use it for teaching? If reasonable essays, education resources, and teaching content can be produced automatically, why should educators spend time creating content? As with assessment, the approach may be to generate content and

[4] https://www.timeshighereducation.com/campus/spotlight/great-assessment-rethink

then teach around it, supplementing, explaining, and supporting: for example, using AI to generate stories as a useful English writing aid and then deconstructing them with students (Sharples & Pérez, 2022).

What are the impacts for students? While many students use AI, with one global survey reporting 86% of respondents using such tools (Digital Education Council, 2024), the long-term impacts of its use are not yet known. It can be positive, for example, improving motivation and performance (García-Martínez et al., 2023). However, other studies have found that stories that were written with AI assistance were more similar to each other than to stories created by humans alone, indicating a loss of overall creativity (Doshi & Hauser, 2024). Another study found that students used AI more when under time pressure, and its usage was likely to see students developing tendencies for procrastination and to harm their academic performance (Abbas et al., 2024).

There are many other such questions that leaders and practitioners in higher education will need to ask of themselves, their students, and their institutions. Implementation of AI is not a straightforward process, and it comes with many practical, fundamental, and ethical questions.

One aspect that is likely to garner increased attention is AI's increased levels of energy usage and thus its environmental impact. It has been reported that AI-powered Google answers to queries use 10–30 times as much energy as a standard response (Parshall, 2024), and Microsoft has reportedly restarted the Three Mile Island nuclear power station to power their AI demands (Luscombe, 2024). This demand may decrease in time, and AI might even play a role in solving the climate crisis, but there is also a likelihood that as the models increase in usage and complexity, then the energy consumption they incur will increase exponentially.

UNESCO (2021) sets out a framework for the ethical use of AI, with a number of principles including fairness and non-discrimination, sustainability, the right to privacy and data protection, human oversight, and transparency. Many current AI systems do not adhere to these principles, for example, the data and models they use are not made transparent, and it is difficult for individuals to opt out of their content being used to train them. This will raise ethical questions for HEIs if they are explicitly or implicitly encouraging the use of AI on a large scale, as they may be encouraging the use of tools that students have moral objections to, and that go against their own institutional principles.

Example

AI can be used in research, for example, in generating new drug designs (Paul et al., 2021). In terms of its applications in education, despite all the articles and analyses produced, there are still relatively few examples of it being applied practically, beyond automated writing feedback and existing learning analytics. A more useful example might be to examine how students themselves are using the tools, as this can help inform policy and application to integrate such practices.

A large-scale study in Germany (Von Garrel & Mayer, 2023) found that students reported using AI tools such as ChatGPT in the following ways, presented here in the order of frequency of usage:

1. Clarifying questions of understanding and having subject-specific concepts explained
2. Research and literature studies
3. Translations
4. Text analysis, text processing, text creation
5. Problem-solving, decision-making
6. Exam preparation
7. Concept development, design
8. Language processing
9. Programming and simulations
10. Data analysis, data visualisation, modelling

This list suggests that students are very practical and strategic in their use of such tools, sometimes making up for perceived deficits in their understanding or the instruction they have been given, and other times as tools to inform study. Such a list provides a useful way to integrate AI into education in a productive manner.

Recommendations

There are short- and long-term approaches to AI. The immediate response is to develop policies that address issues of assessment and academic integrity. Given that students are often more experienced in the everyday use and experience of AI, it is recommended that HEIs involve them in the making of such policies. For example, the College of Arts and Humanities at University College Dublin has introduced a traffic light scheme to provide clear guidelines to students with regard to the use of AI in assessment, where individual assignments are marked either red (generative AI is forbidden), amber (generative AI may be used for certain purposes), or green (generative AI may be used but always within academic integrity guidelines).[5]

It is also recommended that HEIs conduct an AI audit to ascertain which tools are currently in use by educators, and by the students, and to what extent. Staff professional development programmes that aid in the understanding of AI, and in particular the redesign of assessments to make them more AI-proof, will be a necessary next step for many HEIs.

Perhaps the strongest recommendation for HEIs and educators is not to panic and succumb to the insistent claim that there is an AI revolution underway. Already there are signs that the initial enthusiasm is waning, and fears that so-called “slop” (i.e. low-quality AI-generated content) is overwhelming the information ecosystem. Defining the value of higher education, and the human skills it develops in contrast to this, is as important, if not more so, than finding ways to implement the new tools effectively.

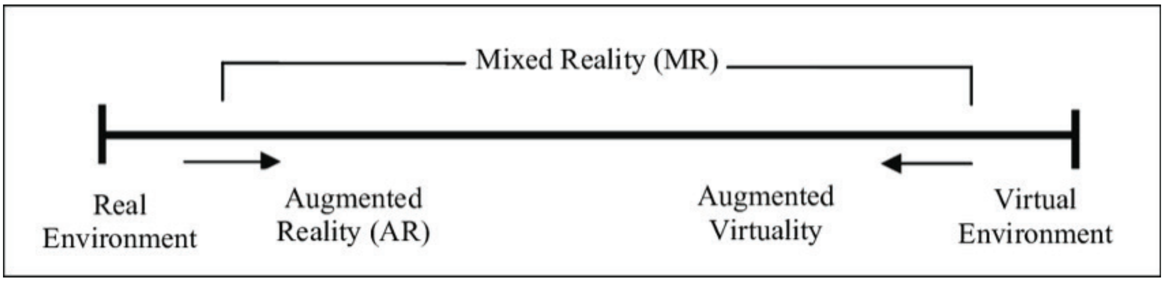
Extended Reality Technologies

The use of computer-generated simulations and virtual worlds has a long history in computer gaming but has only sporadically been applied in higher education. However, as familiarity with these technologies develops among the general public, and the cost of their implementation decreases, there has been a growing interest in their application in education.

The different terms relating to immersive computer worlds are often used interchangeably, but more recently XR (extended reality) has been used as an overarching term to apply to any form of virtual reality. Augmented reality (AR) applies to an overlaying of the virtual world onto the real environment, such as with the Pokémon GO mobile game, while virtual reality (VR) is a fully simulated environment such as the metaverse. It has been proposed that these exist on a continuum of real to fully virtual environments, as shown in Figure 2.

[5] https://www.ucd.ie/artshumanities/study/aifutures/trafficlightsystem/

Figure 2: Continuum of real and virtual reality (Milgram et al., 1995).



The degree of "virtuality" used in any educational context will depend on the teaching goals and the discipline. Two key educational benefits of XR are its sense of immersion – that is, that the user feels they are present in the environment – and agency, that is, they have the ability to manipulate aspects of that environment. This has obvious benefits in some aspects of training and skills development, especially in areas where mistakes are costly and time to practice in real situations is limited, for example, learning to fly a plane.

For AR, there has been a steady application of the technology, varying in degree of sophistication. The near-ubiquitous presence of smartphones, allied with QR codes, means there is no need for specialised tools such as virtual headsets. Thus, AR can be used to enhance experiences, for instance, to improve health and safety at the point of use (Tatić, 2018), as a virtual museum guide (Teixeira et al., 2021), and in training for surgery with the aid of a mannequin (Tang et al., 2020).

At the fully virtual (VR) end of the continuum, there has been growing interest in fully immersive virtual worlds, such as the metaverse, in which Facebook founder Mark Zuckerberg has invested heavily. Three main educational uses have been proposed for such worlds (Kye et al., 2021):

- New social communication space – providing a new dimension and possibility for social connections
- High degree of freedom – users can access a wider range of possible actions and scenarios that are difficult or impossible in the real world: for example, altering gravity
- High immersion in a virtual world – through realistic immersive environments, such as ancient Rome simulations

In between these two ends of the spectrum are models of mixed reality, including the concept of “digital twins”, which is defined as “a comprehensive digital representation of an individual product. It includes the properties, condition and behaviour of the real-life object through models and data” (Haag & Anderl, 2018). This is particularly useful in manufacturing, for example, an industrial process or campus, which uses real-time data from physical systems in the real world to develop a digital twin, which students can access and manipulate.

Interest in using XR for assessment has also been growing, with the possibility of using it for authentic types of assessment, while still allowing for repeatability. It is also likely to be more robust in preventing the use of AI than traditional essay-type assessment. Such assessment may take the form of game-based assessments, where students can complete tasks only by acquiring the appropriate skills or knowledge (Udeozor et al., 2023).

While there are clearly many possible educational applications for XR, its use has been fairly limited. This is the result of several factors. Issues include the cost of equipment to develop effective XR models, the expertise required to develop XR, and the time required to do so, as well as student-related factors such as experience, the awkwardness of using virtual headsets, accessibility issues, and some reports of “VR sickness” caused by perceived motion in a virtual world. There can also be a strong novelty effect in the use of XR, where students enjoy it initially as it represents a change from standard practice, but these effects are not borne out over a prolonged period.

Example

One example of VR that has gained currency is the use of virtual field trips. In these, students are immersed in a virtual environment where they have the ability to make observations on their own. This can be used when access to the real environment is expensive or dangerous, but also for cases when students are unable to attend physical field trips. One such example was students taking a virtual field trip to Greenland to investigate the impact of climate change (Petersen et al., 2020). This took place in Denmark, where there is a national policy initiative to improve STEM (science, technology, engineering, and maths) education, particularly with reference to understanding climate change. Students were given virtual headsets and immersed in a 360° environment where they received information about climate change. They then devised and presented experiments to test the impact of climate change. The authors reported positive outcomes across a range of indicators. This example highlights the value of implementing an XR solution when the alternative is expensive and logistically difficult to realise and when there is a clear goal and pedagogic benefit.

Recommendations

XR is unlikely to provide a universal solution – for example, a fully virtual university – but it is rather well suited to specific applications. Such applications can have significant positive impacts. However, given the expertise and investment required to develop such models, their use should be focused on applications where there is a clear problem that the use of XR can address, rather than applications that might simply be interesting to explore. Examples include improving skills where there is a recognised deficit, providing alternatives to expensive real-world situations, and low-cost applications using AR that can aid students in the campus environment.

Adaptive and Personalised Learning

Personalised learning, where learning is modified to the particular needs of individual learners, has long been a highly sought-after goal in education. The desire to achieve personalised learning has become more prevalent now that so many digital services are personalised for the user. Music selections and playlists are personalised through Spotify, Amazon provides us with individual recommendations based on our purchase history, and viewing preferences are determined through Netflix. Why then, the argument goes, should education persist with a one-size-fits-all approach?

The desire to achieve personalised learning has become more prevalent now that so many digital services are personalised for the user.

Many of the calls for this personalisation in education use analogies that directly reference these services, for example, a “Netflix for learning” (Watson, 2021). What these models usually propose is not a system whereby human teachers modify their content and approach to suit students (which many might argue is what happens in practice anyway), but rather a digital learning environment that “should be tailored to and continuously modified to an individual learner’s conditions, abilities, preferences, background knowledge, interests, and goals and adaptable to the learner’s evolving skills and knowledge” (Shemshack & Spector, 2020).

The term “adaptive learning” is often used synonymously with personalised learning in this context, since the system adapts according to user behaviour to present different resources, prior knowledge level, and modes of engagement. There are different aspects of adaptation, with cognitive, emotional, motivational, and social/cultural variables proposed as the four main dimensions of adaptability (Plass & Pawar, 2020).

However, while there seems to be a consensus that personalised learning is desirable, there is little evidence that it is realisable or effective. One issue is that what is being adapted or personalised varies, and research is often not done in direct comparison to non-personalised control studies. One recent synthesis complained that “we found it challenging to find a sufficient number of published cases that reported effect sizes and details of the sample in order to conduct a formal meta-analysis” (Shemshack & Spector, 2020).

What is being adapted, and how, is also debatable. For instance, the National Academy of Engineering called personalised learning one of the great challenges facing engineering in the twenty-first century, but aligns it with the idea of students having a preferred “learning style”.[6] The concept of persistent learning styles has been comprehensively debunked (e.g. Kirschner, 2017), and so devising systems to adapt to a construct that is itself variable and ill-defined makes any conclusive results difficult to determine.

With the advent of robust AI, however, there is a move to develop AI-enhanced learning environments. Personalisation is one of the key features such systems are marketed on (Tewari, 2024). With AI possessing the ability to develop bespoke content on the fly and offer services such as virtual tutors, adaptation along the cognitive and perhaps motivational dimensions would seem possible. If a student has struggled to understand a concept, for instance, then an AI-enhanced system could offer a range of different resources to aid comprehension. It could also offer instant feedback to aid that understanding.

It is worth reflecting, however, on the underlying assumption that increased personalisation is always beneficial. Learning is, to some extent, a social process, and students benefit from discussion and shared experiences. This becomes more difficult with highly personalised learning, which may be occurring at different paces and with widely varying content. In addition, students who form social bonds are more likely to persist with their studies, and being part of a cohort reinforces this. For instance, when one university moved from an “enrol at any time” model to structured enrolments, retention improved because students were studying as one collective (Schlusmans et al., 2016).

There has been considerable focus over the past decade or so on developing generic graduate skills, such as teamwork, as these are deemed useful in employment (e.g. Wong et al., 2022). It becomes more difficult to assure the development of these skills across a degree if a system is constantly adapting to suit the preferences of individual

[5] https://www.engineeringchallenges.org/cms/8996/9127.aspx

students. Similarly, guaranteeing what content has been covered becomes problematic if much of it happens automatically.

It is also the case that sometimes there are pedagogic and academic reasons for giving students an experience, content, or approach which they may not necessarily prefer. Many students, for example, do not like group work, but there are valid reasons for implementing it in a curriculum. To what extent a personalised system would adapt to a user's preference to avoid such experiences might present a conflict.

Example

Flexibility in the higher education offering is certainly desirable, with adjustment to assessments based on individual needs is commonplace now. Personalisation can be viewed as a pedagogic approach, rather than a technical one, to offer students greater agency and flexibility. For instance, at Warwick University the interdisciplinary modules offer Student-Devised Assessments. These are designed by the student in collaboration with their tutor and may take any form they wish such as a story, workshop, presentation, blog, comic, painting, video, essay, dance, website, poem, song, etc. The assessment must clearly demonstrate and critically engage with theory, and students must provide an explanation of their choice of medium.[7]

At the UK Open University, the Open Degree offers students the ability to create their own degree pathway by combining modules of their choosing, with over 250 modules available. The asynchronous nature of study and largely independent design of modules allows students to create a personalised degree that is meaningful to them.

Recommendations

The topic of personalisation is one that requires a balance between student preferences and academic demands. It is desirable to offer students alternative explanations and resources to explain particular topics, for instance, if that improves their understanding. Flexibility in administration and pedagogy is also necessary for students who have other factors impacting their study. So, for example, the ability to study some content online or in a hybrid format for a period may be necessary. The area of assessment, which is highly significant in structuring understanding and motivation, is one area where personalisation is likely to be effective. It would be more productive and

[7] https://warwick.ac.uk/fac/cross_fac/iatl/study/assessment/

impactful for students to have personalisation and adaptability in these areas than in automated digital systems which might adversely impact the overall sense of community and experience they have.

Conclusions

In the five preceding topics, a range of possible implementations and impacts have been covered. It can seem quite overwhelming to have to consider a stance on all of these, with the knowledge that these are only five topics in a landscape of shifting changes in teaching and learning practice. However, although these are seemingly new developments, they form part of a longer history of educational technology development in higher education that can be drawn on to plot the best path forward.

It has been suggested that engineers forget fundamental lessons in bridge design every thirty years, because that is the average length of an engineering career (Wood, 2012). A similar pattern occurs in higher education. For instance, large-scale distance education courses, and subsequently large-scale online courses, have existed for several decades, so the lessons arising from some of the developments mentioned above are not without precedent.

One lesson from this history of implementation is to consider its purpose. Before committing to the implementation of a technology or technology-driven approach, it is worth asking the more fundamental question, what is this educational technology for? What is the purpose that implementing it is intended to fulfil? This will vary depending on the technology or context and may well not be limited to one function overall. The following are some potential responses to this consideration.

Improve Learning Performance

One obvious response would be to improve student performance, as measured through assessment, tests, or retained knowledge. This is an answer that many advocates for particular technologies will propose, suggesting that students who used a specific technology scored significantly higher on end-of-semester tests. It is worth noting that some of the literature around deeper learning would argue that these short-term successes might not be lasting, and we rarely see the sort of longitudinal studies that would examine whether these students continue to perform better or, as sometimes occurs, in fact perform worse later on.

Making Learning More Accessible and Flexible

Educational technology can help make aspects of learning more accessible and flexible, for example, assistive technologies for students with disabilities. Flexibility was evidenced during the pandemic when the provision of online learning allowed education to continue when face-to-face provision failed. This flexibility and access have long been promoted through distance and online universities, which offer provision to people who cannot attend face-to-face or adhere to a strict timetable.

Financial Benefits

While the use of educational technology rarely leads to the financial savings envisaged by many, it can be cheaper than the construction and maintenance of brick-and-mortar premises, particularly if those buildings are not fully utilised. Online and hybrid models also allow institutions to reach new markets, possibly generating them additional income. Fully online courses tend to have high fixed costs but relatively low variable costs. That is, the initial production cost is high because it requires greater design and resources than a straightforward lecture series, but then the price per student is relatively low, because access to these resources does not change with student numbers. Variable costs, on the other hand, increase with the number of students. For example, the payment of part-time tutors to support students will increase with the number of students. Well-supported online courses can result in high production and presentation costs, so it is crucial to balance these financial models carefully (Weller, 2004).

Student Experience and Choice

Even in courses that are not directly vocational there is a benefit for students to be learning skills about navigating online resources, collaboration, and information handling, as well as experiencing hybrid situations which may reflect working practice. With regard to flexibility, educational technology also allows students some degree of choice as to how they operate, for example, watching lecture capture video, discussing with peers online, using social media forums, and improving their writing with AI.

Improved Pedagogy

Some of these approaches allow educators to teach in ways that simply were not possible before. This includes access to vast databases, or simulations that permit students to experience dangerous or impossible variations, which can make a subject more engaging and provide valuable insights. Models of open pedagogy promote student engagement in creating resources and assessments, and these approaches are supported through the use of educational technologies.

Reflection on Practice

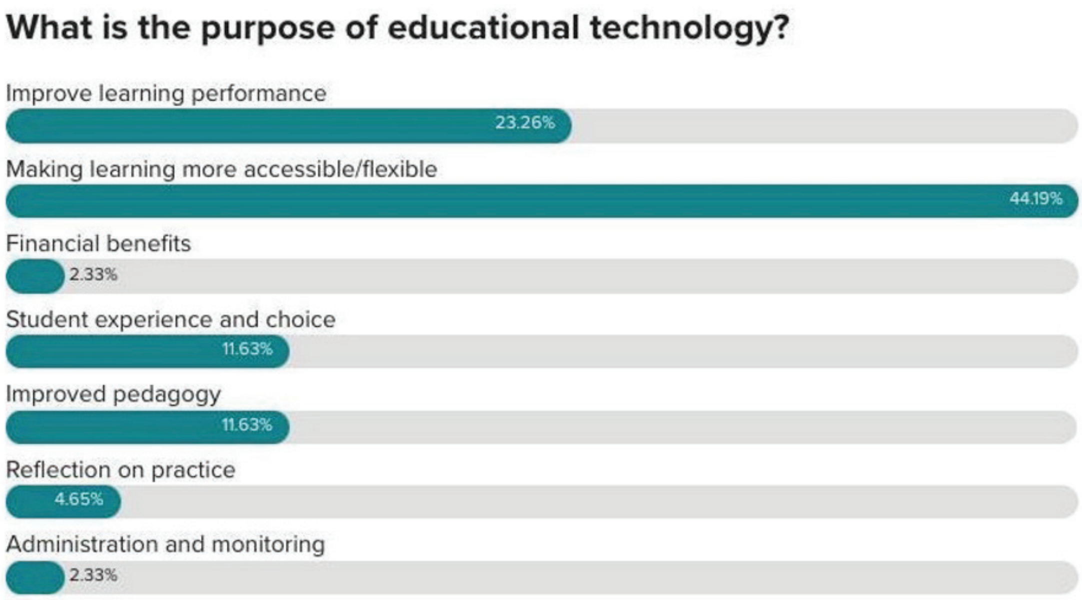
Perhaps less significant, but worth recognising, is that the advent of new technologies often causes considerable reflection on existing practice. For example, as mentioned, the advent of AI has caused much consternation around how students are assessed, and some of this dialogue is likely to be beneficial in improving assessment methods.

Administration and Monitoring

Technology also allows for a good deal of monitoring and administrative functions to be undertaken. Increased data on students may be useful in providing support to those who need it, but it can also be seen as intrusive.

In an informal survey, respondents gave their opinion on which of these seven functions was the most important purpose of educational technology (Weller, 2023).

Figure 3: Responses to the Purpose of Educational Technology



The highest-ranked response was that its purpose is making learning more accessible and flexible. This is an appropriate, student-centric response and could form the basis for any consideration in implementing the five key topics explored in this report: How can they make learning more accessible and flexible?

Flexibility of provision is arguably the most important factor facing HEIs. The pandemic brought into sharp focus several structural weaknesses in the higher education system. These included the close proximity of many people in one centralised location, the campus, which created a perfect culture for a virus to spread. The various components of a higher education system were usually all co-located at that main physical location; even with multiple campuses, there is a tendency to focus on different subject areas but essentially replicate the core components. These components include the main delivery of teaching in the form of lectures, discussion in the form of seminars, assessment centred around in-person exams, resources housed in the library, practical work based in laboratories, and social interaction realised in cafes, bars, and other spaces. The complete closure of that main location meant that it was difficult for many of these functions to continue. The over-reliance on the lecture as the primary model of delivery had the consequence that other options were not readily available. The use of high-stakes examinations that required many individuals to be physically co-located at a specified time allowed no possibility for disruption, resulting in difficulty assessing students. In summary, the function of higher education was too closely allied with its physical instantiation. Once the physical location was compromised, the activities associated with it often had no reliable means of continuation.

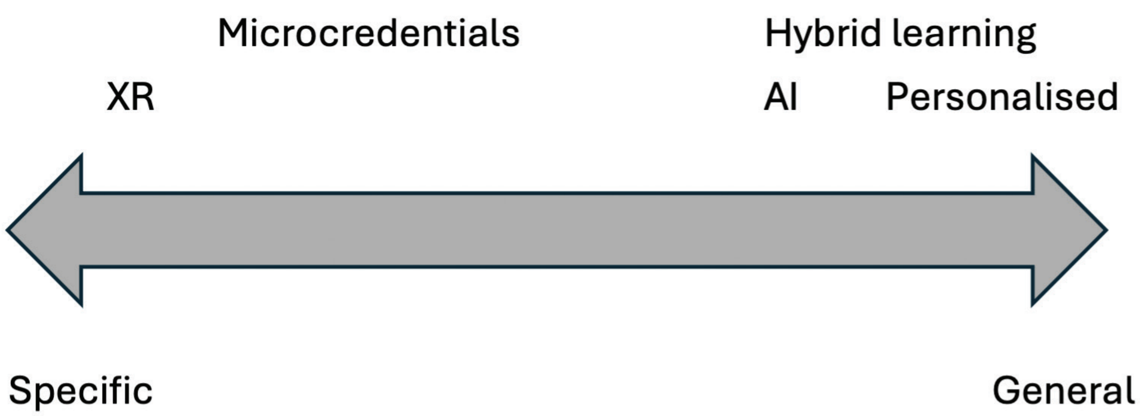
Even if there is not another pandemic, there has been a sense that society is in a state of "permacrisis", or experiencing a series of crises. Collins Dictionary made this its word of the year in 2022, defining it as "an extended period of instability and insecurity".[9] These aggregated crises include climate change, cost of living, global conflict, political upheaval and protest, and threats to democracy, and they all can have an impact on higher education and students. For instance, a cost-of-living crisis may necessitate students working multiple jobs, taking on caring responsibilities, or living far from campus. This can impact their ability to attend lectures, which in turn might account for reports of low attendance, and this subsequently raises questions around maintaining expensive real estate for HEIs. Treating just a symptom of this – for example, mandating face-to-face attendance at lectures – does not recognise the complexity of the situation, nor does it build more robust long-term solutions in higher education.

For both institutions and individuals, then, flexible provision that can adapt to particular circumstances is the key development to undertake. The five topics outlined in this report are approaches that can help with this adaptation. In this regard, it is useful to consider the scope of application for each of the topics (and, indeed, any new technological-based approach). There is a tendency to propose all new technologies as a panacea for all educational ills, but in reality some are better suited to specific domains and circumstances. From the analysis of the five topics in this report, they can be

[9] https://www.collinsdictionary.com/dictionary/english/permacrisis

placed on a continuum of specific–general application, as shown in Figure 4. Those at the specific end of the spectrum are better utilised for focused applications, such as a simulation in an engineering course, whereas those at the general end will raise issues applicable across all domains: for example, hybrid learning.

Figure 4: Specific–general continuum for technology-based approaches

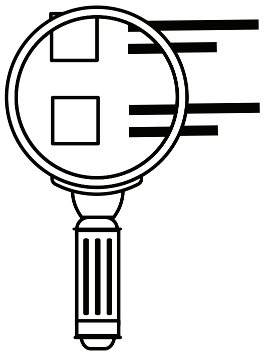


Determining the scope of application for a particular approach, which may vary across HEIs, will help shape the appropriate response, investment, and expected outcomes of its implementation.

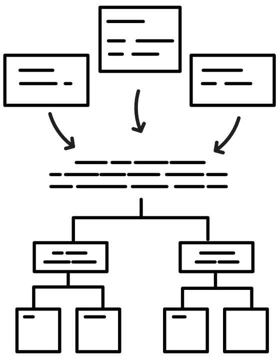
Recommendations

In accommodating the potential changes set out in these topics, there can be a temptation to develop appropriate policies, vision statements, research priorities, and strategic plans. While these can clarify the context for many, an abundance of these can easily lead to "strategy fatigue", where staff and students have an excessive number of competing, overlapping, and confusing priorities. This can result in strategies becoming more of a tick box exercise, which staff and students will ultimately ignore, rather than the meaningful change they are intended to oversee. Therefore, the first recommendation is not to respond to every development with a new policy. There will be some areas where this is necessary, however, such as updating academic integrity policies to accommodate the use of AI.

Recommendation 1 – Determine the Principles of Adoption

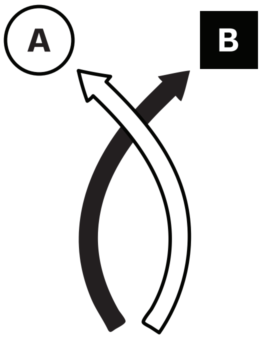


A more robust approach is to determine the principles by which a particular institution implements new technology. What is the intention and aim behind any new approach? What is the process for its adoption? Determining these will provide an existing framework for any new development that arises. For example, the principles might state that all new technology should increase student performance or retention. New approaches will be implemented in a pilot with a clear set of objectives in one faculty and independently assessed by a central unit. These principles will vary depending on the student body, the HEI's areas of specialism, and its mission. Ireland's National Forum for the Enhancement of Teaching and Learning in Higher Education (2021b) proposed that, post-Covid, the sector adopt "a principles-based approach to strengthening how Teaching and Learning is valued at system, institution, department and individual level, including a sectoral conversation to agree those principles".



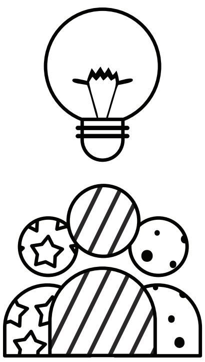
Recommendation 2 – Develop a Learning Design Approach

Learning design can be defined as “the act of devising new practices, plans of activity, resources and tools aimed at achieving particular educational aims in a given situation” (Mor & Craft, 2012). It deploys a specific method, based on educational theory. There are many different approaches to learning design, but they all seek to make the design decisions explicit. It could be argued that the standard lecture series is a learning design, but one that is implicit and unquestioned. By deploying a standard learning design approach across the institution, HEIs can develop courses that make the best use of technology and pedagogy in which those design decisions are clear.



Recommendation 3 – Plan for Flexibility and Resilience

As mentioned previously, flexibility in offering, presentation patterns, assessment, and use of technology will be a key priority for HEIs in the coming years. This flexibility needs to be planned for and integrated into practice. This can be realised through scenario planning, for instance, “what would the institution do if there was another pandemic next month?” It can also arise out of the implementation of the other recommendations here, that is, by developing different approaches underpinned by a strong set of principles and learning design method.



Recommendation 4 – Encourage Staff to Experiment with New Technology and Approaches

While many in senior management will promote the idea of innovation in pedagogy and technology, there are not always the corresponding structures to support it. Staff will respond to the environment they interact with on a daily basis, so this needs to be one that fosters and values developments in teaching and learning. This can be done by rewarding staff who innovate in teaching through the promotion process, awards, study time, development, and programmes of innovation.

Recommendation 5 – Develop a Pedagogy of Care

Students and staff are not automata. The emotional and practical impacts of living through the various crises detailed above will take their toll. Students are a more diverse body now, with “non-traditional” students defined as those who have one of the following characteristics: are independent financially, have one or more dependents, are a single caregiver, do not have a traditional educational background, have delayed post-secondary education, study part-time, or are employed full-time. In the United States, non-traditional students are now in the majority (US Department of Education, 2015), with similar patterns being witnessed in Europe. MacGuire (2024) highlights how the technical universities in Ireland tend to “attract a diverse student body. This includes mature learners, neurodivergent students (who may have, for instance, ADHD, autism, dyslexia or dyspraxia), disabled students, carers, lone parents, students from disadvantaged backgrounds and students from ethnic minorities”. Education needs to become more adaptable for these students. With competing demands, course design needs to embed care, whether this is in the form of more flexible assessment, adaptable study patterns, or access to support.

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