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Digital Learning in Management Higher Education: a multiple case-study exploration

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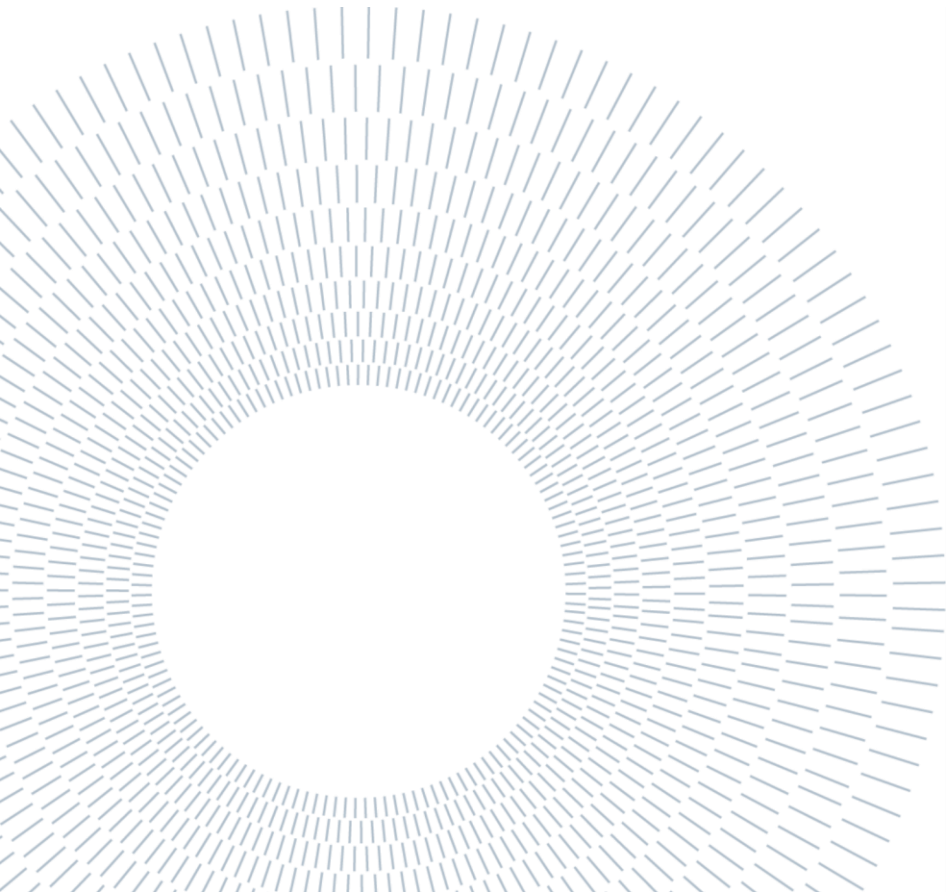
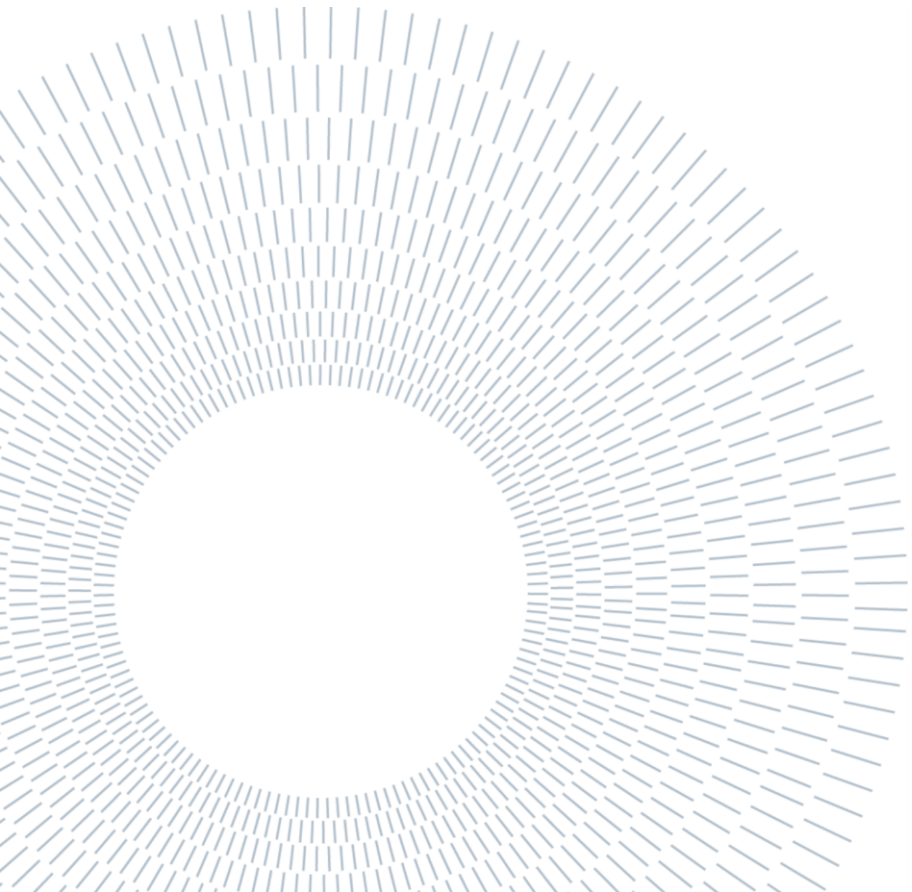


Abstract

Digital transformation of learning has gained traction in recent years. Higher Education Institutions have been embracing new technology and modernizing their practices, business models, and processes in recent years. The present paper explores existing models for the incorporation of digital learning practices in management education institutions. Through an exploratory multi-case study approach, we investigate how 6 leading Business Schools in Europe are approaching the digital learning matter, exploring the different dimensions involved. Drawing on these empirics, we identified multiple overlapping factors that contribute to the institutions' ability to achieve the potential of digital education, in terms of technological, human and financial resources, highlighting the pivotal importance of a good governance structure and strategic orientation. Higher education institutions are in a unique position to move beyond reactive approached to online learning adoption and toward inclusive, long-term digital education ambitions and vision.

Key-words: Digital learning, Higher education, Management education, Emerging technologies , Digital transformation, Blended & Hybrid education, Case-study research.



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Introduction

Higher education institutions have been the epicenter of knowledge generation and dissemination for centuries. However, access to information and knowledge is no longer limited to the physical location of educational institutions. Rather, information and knowledge relevant to a wide range of disciplines can be obtained via a variety of platforms, open-source databases, applications, and web browsers that allow users to supplement their learning. This developing trend, while posing numerous challenges, should be viewed as an opportunity rather than a menace to higher education institutions (Valdés, Suàrez, 2021).

Higher education institutions in the modern era have been embracing new technologies and modernizing their methods, business models, and processes. Digital transformation within higher education institutions refers to the development of new, more sophisticated, and effective methods and processes to further the mission of higher education. Several studies have also stated that digital transformation in learning is about more than just incorporating technology into business processes. Rather, it is a process of examining stakeholders' needs and requirements and assuring the provision of education and research services that meet students' knowledge needs (Eden, Jones, Draheim, 2019). In this digital age, success is determined by an institution's ability to create and effectively capture information related to students, namely their engagement, outcome attainment, satisfaction, and so on (Balyer, Öz, 2018). Concerns have been raised about how higher education handles its place in the knowledge society: indeed the transformation of the BAU (business-as-usual) is imperative to sustain a competitive position in today’s disruptive market, with rising new educational players. Institutions face significant challenges pertinent to the paradigm shift going digital and not only in terms of adopting digital tools in teaching & learning methods but also in

incorporating technology to modify existing systems, processes and communication channels to the better, along with other academic and administrative activities (Jackson, 2019).

These issues are particularly relevant to business schools and management education, which is experiencing growing pressure to engage in significant reforms, driven by the ever-changing dynamics of executive education, increased competition, and rising scrutiny from the public (Ghemawat, 2017). In fact, academics are pointing out inconsistencies with management education teaching, research and business models, pointing out that they pride themselves on helping organisations adapt to change and yet, they themselves rely on old methods and models, taking for granted their position (AACSB, 2022). Whereas, achieving digital maturity will allow these institutions to be more agile in providing an education that predicts disruptions, responds to changing trends and preferences and adapts to changing needs (Alenezi, 2021).

It is worthwhile to note that nowadays, digital natives are a major driver behind the evolution of education methods and delivery: students are now considering digital experiences as an essential part of their graduate experience, making it a factor of institution selection. Especially if we note that digitisation skills are on the rise in the employability sector (Bond, 2018). Today, higher education institutions and notably business schools' mission is no longer to build employability skills of their students for a specific career: employees now rarely work in the same business during their whole career (Mahlow, Hediger, 2019). This is why institutions are now faced with the task to equip students for continuous lifelong learning – focusing on conveying self-efficiency and adaptability skills (Chapelle, 2020).

The present study explores the core elements driving the digital transformation of learning within the management higher education context, presenting an analysis of the enablers and limitations of these elements, and finally suggesting implications on how to best exploit the synergies between them to reach a successful path towards digital learning. Specifically, this study aims at addressing the following research questions:

(i) What are the main dimensions affecting the digital transformation of learning in business schools?

(ii) How do these dimensions interrelate with each other to drive digital learning?

To do so, this paper empirically analyses a set of European business schools by the means of an exploratory case study approach. Through the use of semi-structured interviews with relevant key actors within these institutions, and triangulation of results obtained with secondary data, this paper attempts at answering these questions.

The study is organised as follows: Section 2 covers a review of the literature on the topic - past contributions about digital learning, while a conceptual framework guiding the research is presented in Section 3. Further down Section 4 refers to the steps adopted to conduct the case study methodology used. Section 5 reports the results attained through our investigation, which are ultimately discussed in Section 6, together with implications.

1. Literature review

Digital teaching and learning in higher education

1.1 We live in a time where society is being steadily transformed, resulting in a shift from and exchange -based society to a usage-based one. The role of universities and learning organisations in this transformation is a fundamental issue that challenges its governance. In fact, this transformation has a significant effect on the university's environment, driving it to reinvent itself. (Boyer, 2016)

As a whole, education has been one of the least digitized economic sectors: Higher education has actually significantly lagged analogous to other industries digitally speaking, which may be due to the fact that on average less than 5% of university budgets get allocated to IT spending (Lang et al., 2018). After a decade of growth in terms of alternatives to traditional higher education including Massive Open Online Courses (MOOCs), certification programs and IT bootcamps, institutions are finally moving from the on-campus degree-focused learning to a digital career-focused learning one (Gallagher & Palmer, 2020).

Covid-19 certainly acted as an accelerator to the shift away from classroom, but many wondered whether the persistence of online learning methods would remain post-pandemic and how that would impact the education sector globally. The fact is that even prior to COVID-19, the adoption of education technology was experiencing a significant surge, investments in Edtech reaching US$ 18.6 billion in 2019 and projected to reach the US$ 350 billion mark by 2025. According to investment intelligence company HolonIQ, the first half of 2020 was the one of the largest half year investments in EdTech at US$ 4.5 billion, three times larger than

the average half year in the prior decade. Most of which is focused on higher education and its junction with the workforce (Wood, 2019).

Again, online learning became default in 2020 but in reality, numerous colleges and institutions are simply employing "remote learning" through Zoom classes, a learning method that has not much evolved from the late nineties video conferencing. However, amidst this multibillion dollars market for online education and the emergence of cloud-grounded platforms, many forward-thinking universities jumped on this bandwagon and exploited these trends to further embetter their value proposition, and overall their learning experience. This was confirmed by a study performed by DIGI-HE in 2021 which was performed in conjunction with the European University Association (EUA) (Gallagher & Palmer, 2020).

DIGI-HE is a project aiming at mapping the situation regarding digitally enhanced learning and teaching (DELT) in European higher education institutions. The responses were gathered from 368 higher education institutions from all 48 countries of the European Higher Education Area. Results were compared to a similar study conducted in 2014 with the EUA allowing an assessment of the changes occurred in the past few years, which overall indicates that DELT have been further embraced throughout the academic landscape – most of which now have a more strategic approach towards the transformation (Gaebel et al., 2021). Most universities confirmed that they have plans of exploring state-of-the-art ways of teaching (92%) and enhancing digital capacity (75%) beyond the crisis .

Throughout the last decades, the university has known and been the subject of several change factors, its mission evolving from educating the youth as successful members of society to training cohorts to enter the job market and become enlightened citizens. The Bologna process, for one, has led to the harmonization of educational systems within Europe, changing drastically the way training is undertaken. The disruption was also led by the breaking down of borders – i.e. the emergence of consortiums, the merging of institutions and pluri-national teams on European projects, entailing students to move back and forth between universities, firms, disciplines throughout their curricula… (Boyer, 2016)

While most leaders agree that digital transformation is a priority, they might believe that digital is all about the technology tools, however in reality it is much broader than just technology, digitalisation involves enabling outcome delivery leveraging technology and data to take one closer step to the audience (Nishat, 2021). Today with the digital development across all segments of society, which coincides with the arrival of new learners who are "digital natives", universities had to adapt (Šorgo, Bartol, Dolničar, 2017). The transformation though tends to be reduced to merely the computerising of administrative processes and management, and even though we can note the introduction of many educational innovations in coursework, it is arguable that there has been a true modernisation of academia aiming at adapting the university to new requirements of a digital society that is focused resolutely on learning, according to CNUM (Conseil National du Numérique Français, The French National Digital Council). In one of its reports on the topic of digital learning and higher education published in 2016, CNUM emphasizes the relevance and importance of educational techniques, stating it should be the target of most the efforts and adding: "the digital transformation of higher education is connected with an overarching need for new teaching techniques, new ways of working, of learning [and] of sharing that are already being practised by students and by some teachers". For this to be achieved, all stakeholders must collaborate – students, teachers, administrative staff, authorities of the public sector…

While this is true, the report fails to mention that the transformation refers to the learning environment as a whole (Boyer, 2016).

Too often, the digital transformation of learning is referred to around the availability of technological tools, platforms and so on – which is often diverse but not quite elastic enough to allow for sufficient promotion of range of content – or the transformation of teaching and delivery techniques, relying too often on teachers' willingness.

When deployed effectively by educators, digital technology can fully provide for the agenda for high-quality and inclusive education - facilitating more personalized, flexible, and student-centric learning at all phases of education. It can also allow learning unbounded by the walls of a classroom or lecture hall, overcoming the constraints of physical locations and busy

timetables. Learning can occur in a fully online, or in a blended mode, suiting the needs of the individual learner. Online, blended and now: hybrid learning are clear examples of how technology can be leveraged to cater for teaching and learning processes in non-standard fashion (European Commission, 2020).

The two concepts are often mixed up, after all both teaching styles incorporate traditional ways of learning with technology for scalability and accessibility, yet they aren't identical. According to Prieto, the hybrid model seeks to find a balance between online and presential learning, ensuring the best student experience via any learning technique. Alternatively, blended learning does not compromise on the exclusive aspects of face-to-face interactions (Borokhovski, Schmid, 2014). We will delve more in detail between the nuances of these paradigms later on (Oost, 2021).

Transformation of the learning environment as a whole is in connection with society's transformation: revolving about sharing, lifelong learning, the dissemination of knowledge through disintermediation of activities and structures. (Boyer, 2016)

After all, the market is increasingly demanding for universities to move past the 4-year bachelor as their primary product, towards a centralized package that is more valued by employers. According to strategy consultants like McKinsey & Company, the job market is failing to match the pace of the digital revolution. This means that over the next few years – not to say it's already happening – we will find ourselves with a short-fall of professionals to fill some posts that call for individuals with a specific skill set. Which is why upskilling and re-skilling are crucial to keep up with technological advances and a shrinking lifespan of skills (Hediger et al., 2021).

The differences between the two concepts lie within the objective of the training: whereas upskilling aims at teaching employees new skills to optimize their performance; reskilling (also referred to as professional recycling) sets out to train them to adapt to a different post. Basically, the former means to create more specialised workers and the latter more versatile ones (Corporativa, 2020).

Beyond helping people to stay professionally relevant, the re-skilling & upskilling revolution enables them to be lifelong learners. This shift from the one-&-done degrees to lifelong learning is a key step to achieving a greater education-workforce alignment and cater for career transitions (Gallagher & Palmer, 2020).

A prominent challenge for universities nowadays in positioning themselves as key players when it comes to lifelong learning, notably with the rising popularity of new educational players. This eventually translates to the fact that in order for them to build a high-quality learning experience, they must consider each learner's goals, abilities and constraints, reinventing themselves to allow informal learning, peer-based learning along with new evaluation methods… Practically, this amounts to a cultural revolution that can be reached if the relevant governing bodies have a clear vision with an effective strategy in place, and made operational through an action plan by leveraging the adequate means to this end (Boyer, 2016).

1.2 Digital teaching and learning in management education

Amidst the world's economic development, new emerging trends, and thirst for education: the existing paradigms for higher education - and specifically management education – make the perfect suitors for disruption and modernization.

Business schools find themselves called to transform in order to meet the needs of both the students they educate and those of the industries they serve. Professionals are now envisioning a future for business schools where they act as drivers of change, changing the narrative of their role in the education landscape, in business and in society (AACSB, 2019).

Driven by globalisation, fierce competition in a context of economic uncertainty and growing dependence on technology, management education is experiencing a pivotal period. With speed and agility being the focus of today's digital world, these two characteristics are given more attention in academia and used as a template for imminent educational models.

Online programs being the fastest-growing and thriving segment in management education, it only goes to illustrate how digital technology is being used to deliver expert know-how while assuring convenience - time and place-wise - to students. This change in education delivery although fundamental isn't without its challenges (Morrisey, 2019).

Initially, the online model was designed as a vehicle for retaining student enrolments in a progressive competitive market. Now with practically disappearing traditional geographical boundaries, it is more about boosting said enrolments as well as providing certificates in different management disciplines (Elliott, 2021). Those are particularly attractive since they have the potential to attract sponsorships and tuition funding from corporations, which had dropped over the last decade. After all the transformation in management education is mainly being fuelled by the need of producing managers able to compete on a global basis (Venable, 2021).

Indeed it is expected that in the next few years, less and less MBA graduates will be experiencing traditional face-to-face classes or ever meet their professors throughout their study course, which comes as no surprise given that 79% of online students had answered that online education is at the very least equivalent to traditional, orthodoxy ones. This phenomenon is no longer limited to graduate students as more freshman undergraduates are also following online classes nowadays (true even prior to the pandemic) (Morrissey, 2019).

The executive education market is large and going strong, but it is also very competitive, which means business schools still have a substantial opportunity to grow their market share. Corporate purchasers have expressed uncertainty making use of business schools, in light of the new entrants and their new tech-driven methods (Carringtoncrisp, 2021).

In light of these changing dynamics, the AACSB (Association to Advance Collegiate Schools of Business) which is the accrediting agency for management programs is stressing for more flexibility in the education delivery formats allowing students to be more in charge of their curriculum, it also calls for the expansion of internationalisation within the curricula and partnerships, all the while joining these various activities through an inclusive collaborative strategy.

Sandeep Krishnamurthy, dean of Bothell School of Business at University of Washington, shed the light on the importance of leveraging the intersection of expertise within business schools: be it that of computer scientists, industry folks and business school faculty - with the ultimate goal of creating programs that are in demand by employers (AACSB,2020). It is all about collaboration.

Arizona State University (ASU) found Sandeep's claim to be true as they experienced the success of the first certificate program co-created by the school and Cognizant (a digital business analysis multinational). The train-to-hire program not only provided the company with a wider talent pool but also allowed the participants to gain the right tools and techniques – hence minimizing the learning curve if they were to be hired by the company later on (AACSB, 2022). Participants among the Business Education Jam came to the same conclusions when they emphasized the importance of closing the gap between education and industry practitioners (Boston University, 2015).

At a dean's conference, Sydney Finkelstein – management professor at Dartmouth and speaker to senior executives around the globe - discusses the problems with management education's teaching, research and business models. He points out that business schools pride themselves on helping organisations adapt to change and yet, they themselves rely on old methods and models, taking for granted their position and no longer affirming a competitive advantage over the market, notably regarding new online education providers (AACSB, 2022).

He argues this dysfunction implies further effects such as – but not limited to: the regression of significant research, of societal impact and innovation (Boston University, 2015). Professor Pankaj Ghemawat, professor of Global Strategy at IESE Business school agrees with the latter when he asserts that researchers and practitioners in his field are drifting apart (Ghemawat, 2017).

When asked about their perception about the importance of embracing new technologies in business schools, most business school leaders emphasized on how big data, experiential learning, digitisation, and AI were deemed extremely important, whereas there were mixed

levels of confidence regarding the Business schools' preparedness to embrace the technological advancements.

Conversely, when asked about their confidence that their MBA curriculums meet the needs of biggest tech employers (notably Google, Apple and Tesla), approximately only one in six (16%) leaders were confident, 60% if we consider those who answered fairly confident. Following that statement, pretty few agreed that they considered their institutions operations were doing well in terms of digital integration, and interestingly, two in five disagreed at once.

This again goes to show quite the disparity between leaders' perceptions of what should be done, versus the current reality (Association of MBAs, 2020).

These setbacks can be overcome if business institutions focused on the right opportunities instead of fighting the change (AACSB, 2022). There is a whole set of disruptive solutions that business schools ought to think about harnessing: the recombinant value of technology – AI, VR/AR, blockchain and so on… can help bring out the synergy of all those technologies. (AACSB, 2018)

Of course, such a transformation is not expected to be a linear process, it will require rethinking and reorganizing in unusual ways or underdeveloped. It will entail the incorporation of new models and strategies: more daring, agile, and impactful.

Through collaboration with corporate leaders and industry, AACSB's collective vision for business education identifies five opportunities for Business schools to make their mark as:

- Catalysts of innovation
- Co-creators of knowledge
- Hubs of lifelong learning
- Leaders on leadership
- Enablers of global prosperity

The common theme across all five opportunities is the occasion to do better: all of them stemming from a systemic failure on the part of these institutions highlighting a clear gap at the intersection between industry and practice (AACSB, 2019).

The underlying question for business school leadership when it comes to the implementation of said digital strategy is whether to go for a partnership or build an internal capability. The latter comes with advantages including better control over the product delivery and economic viability in the long run, in that there is no cost sharing. On the other hand, the upside of partnerships translates to faster response time, enhanced marketing all with minimal institutional costs. Typically, the financial model adopted by most OPMs (Online Program Managers) is a shared revenue stream through a long-term contract. OPMs' ongoing growth can only reflect a rising number of schools outsourcing their digital programs (Morrissey, 2019).

With a long list of priorities and with finances being in question, it's important for schools to carefully move forward with the specific needs of their students, faculty and staff members as it is unlikely they'll be able to address all priorities simultaneously. Strategic planning will become a more frequent practice at university level as the pace of changing circumstances increases (Venable, 2021).

1.3 Growth drivers of digital learning

Even prior to the pandemic which triggered and accelerated drastically the movement towards digital learning, numerous parties including employers, providers and higher education institutions were already planning for an online learning strategy development - and delivery as the global market for online learning was projected to reach US$ 350 billion by 2025 according to Research & Markets, numbers forecasted pre-pandemic. This growth in the education sector particularly is being driven by such factors as:

- Technological advances, such as the improved access to broadband and familiarity with technological tools in general).
- Changing learner expectations, with flexibility of study through digital provision being key for learners to balance out their studies, work and personal commitments.
- Rising competition for learners, which incites a more personalised provision by providers.

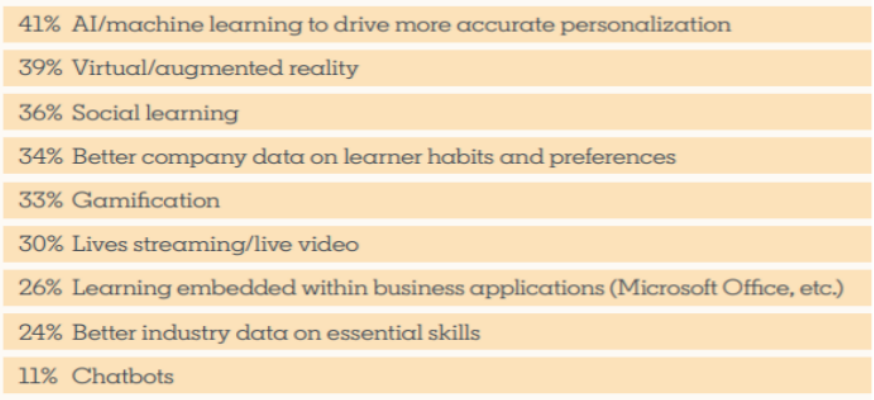
(Phoenix, 2021)

Additionally, to fit their agendas, employers are progressively demanding programs and courses that are shorter, fast development courses that are more likely to be integrated with a worker's day job rather than significant "off-job" learning (CIPD, 2021). This is also driven by the changing labour market which is more driven by digitalisation and automation and consequently rapidly shifting the skills requirements of employees. According to McKinsey research, UK companies for example are to transition up to a third of their workforce into higher skills roles in the next decade (Hediger et al., 2019).

Growth in digital learning, notably among managers, has also been driven by demands to limit employees' time away from work, particularly among top management, who have less time to attend formal training sessions (Ferguson et al 2017) and a desire for the capacity to train people at scale (Scott-Jackson et al 2015). This comes with profound implications for management education institutions who have to follow and adapt to the learners need for agility, personalisation and learning on the go (Fosway Group, 2018).

The competition within the learning & development arena has also gotten fiercer. Private training companies and individual consultants may have always had a part of market provision, but new entrants came in strong, leveraging technology as a key delivery format to grow their marketshare. After the MOOC rise a few years ago, online education providers like EdX, Coursera, Udacity, 2U and Futurelearn are now repurposing their content to target the corporate marketplace (Carrington Crisp, 2018).

In its research prior to the pandemic, Europe's leader number 1 HR Industry analyst focused on talent and learning - the Fosway group, has identified digital learning's content top areas of growth among organisations to be: video, mobile, user-generated content, blended learning, microlearning and curated content (Fosway Group, 2020). Furthermore, according to Donald Taylor's L&D Global sentiment survey 2020, it was found that Learning & Development (L&D) professionals who are mostly described as innovators and early adopters of innovation, are expecting the next digital learning dominant trends to be: learning experience platforms, AI, collaborative social learning, adaptive learning and the use of learning analytics (Donald H Taylor, 2020).



(**Figure 1:** Technologies that T&L professionals think will significantly impact online learning in the next five years)

(Linkedin Learning, 2020)

Some of these rising trends are worth being mentioned for their relevance in teaching and learning as we know it today:

1.3.1 Learning analytics

Generally speaking, learning analytics is the collection, measurement, analysis and reporting of data related to learners within their context (Siemens, Long, 2011). It is a subset of a larger field of data analytics, and it has risen thanks to the abundance of data that has become now available within higher education institutions (Educause, 2021). The purpose of the analysis

of these complex datasets is to improve decision-making processes about the best ways to serve the diverse pool of learners in education settings. The data comes in bulk from various sources including Learning Management Systems (LMS), student information systems and other cocurricular data sources like records of learners' behaviours. It is commonly used on a department-level to make decisions on course planning or students curricula; but because most of this data does not come in neat formats, most of it has been untapped until recent development of methodologies to do so (Agasisti, Bowers, 2017). The point of educational data mining is to better understand not only students' knowledge but also how they came to know and assimilate it and further bridge students' performance gaps (Tsay, 2021).

Hence, transforming data into knowledge to eventually improve education delivery models. Some of the key uses of learning analytics are:

- Supporting students throughout admissions, enrolment and retention path, keeping students engaged until graduation.
- Measuring key performance indicators of students in order to redesign and improve their learning experience (Educause, 2021).
- Provisioning for tailored feedback to students about their learning advancements (Berguerand, 2020).
- Understanding and improving the effectiveness of teaching methods and pedagogical innovations employed, leading to quality learning.
- Provide for broader institutional strategic decisions.

(Lester et al., 2019)

In a recent study, it was find that while 80% of higher education respondents say they use student data, only 40% they use it to directly address performance gaps. With so much data now available, institutions of higher learning must decide where to spend their efforts (Zalaznick, 2020).

While this reveals a promising future for education, institutions will need to continue evolving data protocols to stay aware of the best practices, utilizing it to its full potential while ensuring

that goals will be met at no expense of ethical standards, which has to be carefully with vendors utilizing learning analytics (Alayan, 2019).

1.3.2 Mobile learning and microlearning

Many institutions recognize the importance of mobile devices as learning tools for a wide range of classroom applications (Mohammed, Wakil, 2018). Broadly defined, mobile learning refers to the exploitation of omnipresent handheld technologies along with wireless networks in order to enhance, support and facilitate the reach of teaching and learning. It is yet another innovation of distance learning, since it allows course-based education delivery outside of the setting of a classroom (Li et al., 2015).

What online learning allowed in independence, mobile learning takes further towards accessibility with minimum ties, enabling education on the go through a mobile phone or tablet. Its prominence and growing popularity are largely due to certain catalysts like the large-scale adoption of smart devices in the consumer market, leading to stronger demand for mobile learning content and value- added services in general (Sözmen, Karaca, Bati, 2021).

Where mobile learning really shines is through the mobile-first design, i.e. content designed with the mobile platform in mind instead of just formatting it later on. It employs micro-pieces of content and allow the user to touch the screen regularly to keep them engaged. This type of learning is known as micro-learning, in that it uses bite-size content incremented by minutes instead of hours, allowing learners to access content on their commute to the train or any other intervals, making their learning independent from the classroom (Mohammed, Wakil, 2018).

Online Learning	Mobile Learning
Structured, formal, and time bound	Best suited for short courses that can be viewed quickly
Computers and laptops	Smarts phones and tablets
Detailed information, complex graphics, media and interactivity	One idea per screen with large buttons and simple navigation
Longer and broader courses	Short and bite-sized modules

(Figure 2: Online learning vs. Mobile Learning)

(Floro, 2021)

Research has demonstrated that learners grasp content more clearly and with superior retention levels when delivered in smaller pieces, which a group of researchers in Dreden University of Technology pushed and found that microlearning has the potential to improve information retention up to 20% over other methods (Kapp et al., 2015). This is not to say this way of learning is better or worse than others, but what it surely does is fit content into learners' varying lifestyles.

Lifestyle	Learning Expectations
On-the-go	Engaging, attention grabbing multi-media content
Always-on	Curated, bite-sized content gradually released over longer time intervals
On-demand	Immediate, anytime, anywhere access to relevant information

(Figure 3: Learning expectations by lifestyle)

(Kang, So-Young. (2018). Time to Rethink How We Teach and Learn. Presentation, 2018 EFMD Conference for Deans & Directors General.)

1.4 Educational technologies

Throughout the past segments, we have highlighted clearly the importance of digital technologies and their implication in the transformation of learning. While these are changing at an accelerated pace, the challenge is to make effective use of them in different learning scenarios. It is important to note that a technology need not to be limited to a device specifically, the meaning of the term as we will be using it will expand to a systematic and disciplined knowledge application (Andreina, Plotkin, Educause 2021).

In this chapter, we will dive into the most relevant and enabling technologies that are changing traditional education as we know it, looking into their uses, impact and some of the issues encountered when using them.

Emerging technologies:

Just like social networking and digital conferencing have played their role in improving teacher-students as long as student-student relationships through collaborative learning; digital game technologies have also aided making some learning situations effective and more engaging. In this part, we will focus on X kinds of technologies that were deemed to have demonstrated their potential in improving the learning experience (Huang et al., 2019):

When asked about the perceived importance & preparedness to embrace various technologies in Business Schools programmes, MBA leaders answered that Big Data, experiential learning, digitization and AI seemed to be of utmost importance (Association of MBAs, 2020).

1.4.1 Artificial Intelligence

While its advancements have been surrounding us in all critical sectors and industries, AI is also to drive the education market by automating processes and tasks that can be too demanding for humans to achieve. Traditionally, the problem areas that AI research tackles include – but are not limited to – complex reasoning, knowledge extraction, representation; natural language processing, image recognition, planning, expert systems supporting decision making… Basically, AI is able to simulate the information processing of a conscious thinking brain.

While it is not human intelligence, it isn't expected to replace the human interaction in the teaching process, professionals say AI could relieve a great deal of administrative burden. AI is not just a future plan for education, it is already present now to a relative extents – it is used in chatbots, virtual assistants, assessment gradings… (British Council, 2021)

In a PwC's recent report, *Sizing the prize: What's the real value of AI for your business and how can you capitalise?* Artificial Intelligence is said to work in 4 ways.

- **Automated Intelligence**: the most advanced form of intelligence in which processes are automated in a way to enable bots, machines and systems to act independently

from human interaction. Tasks can be manual or cognitive, routine or non-routine (Zawacki-Richter, Marin, 2019).

- **Assisted Intelligence**: basically helps people perform better and faster, by harnessing the joint power of cloud and big data. Its main goal is to improve tasks people and organisations are already doings, often leaving the hand of the final decision to the end-users (unless a pre-determined action has been defined) (Zawacki-Richter, Marin, 2019).

- **Augmented Intelligence:** a human-centred partnership between people and AI, a collaboration designed to enhance cognitive performances (including learning), helping people make better decisions (Gartner Glossary).

- **Autonomous Intelligence:** capable of making decisions individually with no human interference or capability go interrupt or modify (PwC, 2017).

There are two main important areas that stem from the advancement of AI technology namely: recognition – facial and voice recognition are included, and logic-based reasoning. They are regarded as the main brackets posing the greatest impacts. Recognition technology has proven to have made the most advancements in the past decade (AACSB, 2018).

For instance, Imperial college's iBUG group have undertaken recent developments in facial recognition where machines are trained to pick up movements across the faces using sensors, including nuances not visible to the naked eye (iBUG, Imperial College London). According to recent research, AI would be capable of detecting things like sexual orientation, political opinions, IQ, and other psychological traits by using facial recognition software. Although, such advancements raise a number of issues and ethical concerns about the use of these technologies and their potential of targeting specific groups of people (Levin, 2017). On the other hand, given how difficult it is to educate robots to encapsulate common-sense

knowledge, logic-based reasoning technology has taken longer to attain the same degree of advancement as recognition technology (Artikis, Paliouras, Portet, 2010).

But which industries are expected to be disrupted? It is unavoidable that the proliferation of artificial intelligence will impact most - if not all - sectors in some way (and at some point) in the future. Many researchers and experts, however, have identified a number of industries that may feel the effects sooner or to a greater extent.

According to a McKinsey Quarterly article, jobs requiring a substantial amount of knowledge work (e.g., expertise in decision-making, creative work or planning), as well as people management, will be the most difficult to automate and replace with AI (Chui et al., 2020).

This makes education the least likely to be automated (from a technical feasibility perspective). Despite the fact that digital technology is transforming the field, as evidenced by the various online delivery tools that are becoming available, the essence of teaching includes deep expertise and complex interactions with other people (ibid). Around 27% of activities within the education sector, those accounting for support services (administrative, maintenance etc…) have the highest potential to be automated (Chui et al., 2020).

The most common term we hear when discussing AI applications in higher education is adaptive learning, which Samantha Adams Baker, senior director of publications and communications at NMC, defines as leveraging "basic AI algorithms to personalize learning and deliver content that students need"(Elmes et al., 2017). Educators collect data that informs individual student and class needs as students learn throughout the educational experience.

Although, AI's potential is broader and it is said to expect it for collaborative learning, recommendation engines and in AI-assisted content creation in the future. Besides, some European universities are already making quite the use of it, one of which uses it to identify students struggling academically. Another type of application is sentiment analysis that allows investigating emotions and attitudes of students towards their courses. The next step is a project where machine learning is employed to better understand student SRL (Self-

Regulated Learning) and facilitated by recommending personalised scaffolds (Educause, 2021).

One major example of AI development is the Open Learning Initiative (OLI) at Carnegie Melon University, open for teachers and learners - allowing for continuous evaluation, improvement of course material and contribution to research (*Open learning initiative* 2020). Adaptive learning Initiatives like OLI have implications on all spectrum of higher education stakeholders:

- ***Students*** are given timely feedback to assist students evaluate their own learning, with defined learning objectives. Furthermore, because people learn in different ways and at varying rates, adaptive learning environments might allow learners to progress at their own pace.
- ***Faculty*** receive data on their students' learning, achievement, and growth over time, which assists them in assessing whether a student requires additional assistance with a concept or subject. In this sense adaptive learning is still dependent on the engagement of a faculty member, yet it is still disrupting the traditional classroom model; allowing faculty to take on a more supportive/coaching role rather than content delivery (Reid, 2022).
- ***Institutions themselves*** may see an opportunity to adopt more AI technologies and adaptive learning in order to save costs, increase access and improve quality, by substituting technology for labor and allowing analytics to improve education quality. The data could eventually yield the creation of unexpected partnerships (AACSB, 2018).
- ***Higher education as an industry*** can leverage adaptive learning to change its image from a one-time experience towards a platform for lifelong learning, taking on the opportunity highlighted previously in AACB's Collective Vision Report (AACSB, 2019).

➔ Limitations of AI application in Higher Education:

Although proponents of broader use of adaptive learning, machine learning are quick to emphasize the benefits of technologies in higher education, many also point out a number of hurdles and barriers. For example, according to a survey conducted by Chapman Alliance, generating one hour of eLearning content can take anywhere from 49 to 125 hours, compared to the 22 to 82 hours required to produce content for instructor-led training (Hauptfleisch, 2021).

Another limitation to think about involves responsibility and accountability. While trainers are responsible for the information relayed to students in traditional learning environments, AI implies otherwise, as the authors of the algorithms are not the creators of the content produced by their algorithms. In which case a issue occurs, this presents a problem as machines can't be held accountable in the same manner humans can (Hauptfleisch, 2021).

1.4.2 Microcredentialing and blockchain

Microcredentials were quickly adopted in the higher education landscape. They're defined by the State University of New York as study programs that "verify, validate and attest that specific skills and/or competencies have been achieved". They differ from traditional programs and degrees in that they are offered usually in shorter and more flexible formats and are inclined to have a more narrow focus. Currently more than 700 000 microcredentials are offered from a wide range or sources, their flexibility is believed to be an important contributing factor to this growth (Shaenfeld, 2018).

The spectrum of microcredentials is actually wide and encompasses several areas, of which: (1) short courses and badges, (2) professional certificates and licenses, (3) university & non-university issued nondegree certificates, (4) bootcamps, (5) degree programs/accredited. A key distinguishing factor is the time investment for each one of these areas that can go from 1-10 hours all the way up to 1500 hours for longer programs (Education Design Lab, 2020).

In 2019, circa $2.5 trillion was spent on workforce training, upskilling and re-skilling of which $10 billion was spent on microcredential programs. The ability of access microcredentials in bundled formats creates a unique learning structure which enables in turn infinite pathway possibilities for professional development, especially amongst adult learning who are already in the workforce (Collins, 2021).

This growth has led many institutions to reconsider their curriculum development process, namely the relationships between credit and non-credit programs. For example, the term "credegree" emerged in 2019 in a Forbes article and refers to a program where the student graduates with both traditional degree and an industry-recognized skill or credential – hence the name. Another way this phenomenon is relevant to the teaching and learning landscape is how it affects the education/career dynamics. While many individuals already use them to broaden their skillset, some suggest that a prospective employee may be able to stack credentials together instead of a traditional degree (Collins, 2021). The "micro-pathway" as defined by the Education Design lab, is when credentials can be stacked and packaged as a valid market signal connecting students to high growth careers (Education Design Lab, 2020). Not only that would provide a more affordable option but it also constitutes a more targeted path into employment (Purbasari, 2020).

How exactly does that come in handy? this accreditation system opens up new horizons in the candidate V. Human resources specialist relationship. The practice of quick certification of a potential candidate is already trending thanks to job search databases like LinkedIn, and social media. Specialists behind these sites need a swift way to ensure the candidate is a right fit for the job skills-wise (García-Bullé, 2021).

The question that remains is: "Replace or supplement?"

Microcredentials may play an important role in filling the gaps that universities can't, but can they be an alternative to traditional degrees? (Gallagher, 2019). According to Gallagher, university degrees are still in high demand in the market: while 750 human resources specialists he interviewed said they're moving toward skills-based hiring, Gallagher found most applicants were degree-holders who had accumulated certificates as a supplement

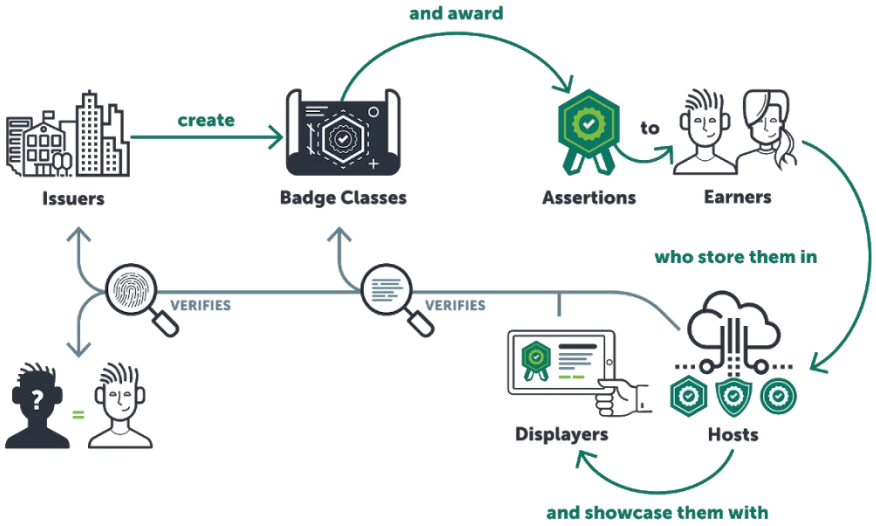
(Elliott, 2022). Instead now, Gallagher envisions the future of microcredentials popularity will vary by industry as there is no data or study that proves yet that these certificate holders are better-performers.

An additional challenge is the increasing competition in this landscape from other vendors and bigger companies like Google, EdX and Coursera (Gauthier, 2020), hand in hand with the recent development of the Comprehensive Learner Record (CLR) which is defined by the IMS as " the new generation of secure and verifiable learning and employment records supporting all nature of academic and workplace recognition and achievements including courses, competencies and skills and employer-based achievements" (IMS Global, 2021).

Evidently, all these factors make it a significant challenge for higher education, whose degree models got disrupted and are increasingly questioned.

Furthermore, micro-credentialing allowed the growth of independent instructors or "digital tutors": consultants, corporate trainers, educators are now able to provide lessons to their own audiences by building virtual schools. The implication down the line is that this decentralised learning will enable the empowerment of independent academics, recruiters and employers – basically anyone willing to create or demonstrate proof of learning (Bayon, 2018).

Their use is not without criticism: besides their low completion rate, regulating bodies are necessary to support the ethical maintenance of microcredentials in order to minimize fraudulent acts (Phelan & Glackin, 2020).

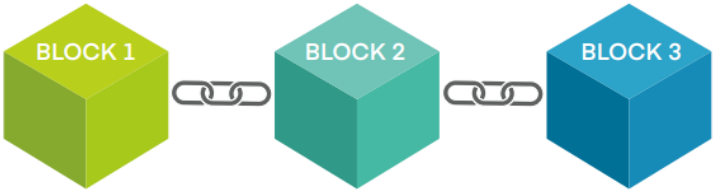


(Figure 4: Microcredentialing issuing process)

(Craig, 2020)

Blockchain technology allows just that. While some microcredentials or digital badges may be static, others are embedded with secure information through decentralized record-keeping systems using blockchain technology (Choi et al., 2019). The artifacts that result from it enable the ability to share these achievements with potential peers and employers in a concise, substantiated method (Hope, 2019).

Although it is often linked with the bitcoin and cryptocurrency, blockchain actually has multiple uses beyond it and can reap benefits applicable to different industries, among which higher education. As its name would imply, records are stored in platforms called blocks arranged in a chain. Once a new record is added, it triggers the addition of a block down the chain linked to the previous one.



(Figure 5: Blockchain representation)

Records could be any sort of information (such as transcripts) that can be stored digitally. Each block contains on top of the stored data a unique identification code called "hash" (AACSB, 2019):

The hash can be considered as the block's signature element, making alteration of data extremely difficult. This way of recording and interconnecting data is extremely useful for the validation and securing academic degrees: it ensures trust, immutability and integrity in a decentralized fashion with no third-party mediators (García-Bullé, 2021). Other potential uses of blockchain:

- *Teaching blockchain:*

As a technology with growing interest within the business community, business schools can start with teaching it as part of their curriculum. Many forms are to be considered: from a course to a full specialization, depending on students' interest and the school's local context. Just like business schools were quick to embrace data analytics and other tech-centred areas in recent years (AACSB, 2019). Graduates possessing expertise in this matter may be increasingly valued and at the same time, business schools could use this niche offering to differentiate themselves.

- *University operations:*

Ideally, blockchain does provide the potential opportunity to change some university functions and roles such as the registrar as the distribution point of records; blockchain can be the new standard model to issue academic credentials (AACSB, 2019).

The current typical method to obtain a certificate depends on the learner completing a succession of criteria like achieving a certain level of performance academically. To award the certification, a thorough verification by the staff ensues which can be time consuming and inaccurate. Learners could instead use a blockchain ledger allowing them to track their own learning and the issue of criteria misrepresentation would no longer be (VaughnCollege, 2018).

- *Institutional collaborations:*

For institutions holding partnerships or alliances with other universities, there is also potential for using blocking in their operations. Research agreements, faculty sharing and cross-institutional activities are just examples of transactions than could be logged in a blockchain ledger to ensure a verified history. This ledger would be extremely valuable for newbies in certain positions like a deanship; allowing them to access the entire history of collaborations without hassle. The value of these logged transactions would only increase as educational providers keep creating more partnerships (Clark, 2016).

➔ **Limitations to blockchain:**

For starters, it is not free. Although it might be almost free to users, it's not for providers. In addition to that, the main challenge that was observed is the different of standards for how blockchains can be constructed even if the underlying principals are the same (McArthur, 2018). Whereas for the specific application of blockchain in education, having a globally accepted standard would be critical for it to be widely adopted in the industry (Newton, 2018). In addition to that, transferring older records into the blockchain would be a hassle considering the point intended is to demonstrate the learners' history. All in all, it is an evolutionary technology definitely worth being investigated, but to this day not yet revolutionary (AACSB, 2019).

1.4.3 Hybrid and blended learning models

Blended and hybrid learning are terms commonly used by providers interchangeably when describing delivery models that use a mix of methods to keep students engaged in learning. Blended has historically been more prevalent and refers to learning that combines two learning dimensions I its style, online learning (self-paced) which takes place in a digital environment

(whether remotely or onsite) and "in-person" or what is commonly referred to as face-to-face (QAA, 2020).

According to Roberto Prieto Chief Education Officer of EIT Digital, although hybrid and blended learning concepts are used interchangeably, they are not identical. The hybrid model entails that participants can choose to attend classes physically, partly, or completely, or follow them from a different location (online), also partly or completely. It seeks to strike a balance that guarantees the best possible learning experience using any method available at hand (Oost, 2021).

Whereas blended learning - according to Prieto – does not compromise the exclusive aspects of face-to-face interactions: learning instructions are delivered online to complement face-to-face classes. Instructional hours were lowered to accommodate for online contacts, or such online interactions were considered as complementary to the face-to-face experience (Irvine, 2020). Of course, the choice is dependent on the learner's individual learning needs.

For the sake of semantic consistency, we will be using the two words interchangeably - considering they have the same meaning throughout this research.

The pandemic played a big role in accelerating the evolution of these new course models, forcing institutions to take the leap quickly to respond/cope with a unique situation. Experts agree that online learning will remain a feature of higher education, especially now that so many universities are experimenting with and enhancing these methods (Educause 2021).

➔ **Benefits of hybrid/blended teaching style:**

- ***Flexibility:*** Hybrid learning enables students – especially working students - to use their time efficiently all the while striking balance by choosing the lectures that work best for them and their schedule (Neelakandan, 2021). Because of the flexibility of this model, students do not have to squander time or energy unnecessarily which enables the creation of an efficient environment both for the lecturers and the students (ibid).

- ***Equity***: By design, in-person classes are friendlier to extroverted students, which can result in fewer perspectives being shared in a discussion. Online delivery modes allow those less assertive students of whose English isn't their first language to contribute more. This applies to students with disabilities or who need special equipment that is hard to accommodate in a class environment. Another aspect to this dimension is the financial one: international students find hybrid learning to be a more cost-effective option (tuition, immigration costs and ticket fees can amount quickly and be very discouraging for some). (Neelakandan, 2021)
- ***Freedom and ownership of learning***: Autonomy is a worthy benefit of such learning models. Students are inspired to establish their own goals, track their progress, and identify their own prospects as a result of the blended learning model. In addition, many of these skills can be applied in the workplace.

➔ **Limitations of hybrid/blended teaching style:**

- ***Technology challenge:***
    - *Infrastructure*: Suffice to say that the success of such a model can be quite costly considering the need for heavy acquisitions hardware and software-wise, even more so when dealing with a large campus/multi-branches. But the investment can be worth it on the long run as opposed to spendings on obsolete brick-and-mortar frameworks. (Winstead, 2022)
    - *Mentality*: All stakeholders in the learning process must agree that the tech resources used in blended learning are reliable, simple to use, and universally acknowledged. Otherwise, the endeavour will most likely languish until some remote goal is achieved. IT literacy is an actual issue and can be a huge roadblock, therefore it's vital to put in place measures to assure high availability and competent technical support. It's also critical to foster a blended learning community in order to spread the word about the benefits of training technology.

- ***Course design:*** What works for in-person instruction does not necessarily work for online training. It is not safe to presume that current courses are ready for online delivery. It's critical to examine students' behaviour, reidentify learning outcomes, review course material, and use this information to develop a blended learning strategy (Rae, 2021).

  In addition to that, it is frequently a bottom-up strategy: blended learning frequently requires teachers or other personnel to take the initiative, hence the need for a formal instructional designer to support this practice (FutureLearn, 2021).

What hybrid learning actually allowed - and that has been leveraged by many institutions - is partnering up with vendors (such as Edtech) to support the hybrid courses, integrating applications with their LMS. This expansion has cast the spotlight on the "learner's development", also allowing them to adapt the new reality around their learning all the while providing them with the necessary resources to succeed virtually (Educause, 2021). To support hybrid learning lessons, teachers make use of various tools, not necessarily new but those allow a smoother blend in communities between remote students and their fellow classmates such as flipped classrooms, the case study method and other gamified designs (Dodson, 2021).

The blended learning arc is a process model that proposes modalities teachers could use whether it's an educational block, week, or semester, to engage students and support instructional learning experiences (Horn & Staker, 2014). It encompasses a useful sequence of events that can be performed through a rotational fashion, allowing students to have some control over when, where and how fast they learn and what path they take (Horn et al., 2017).

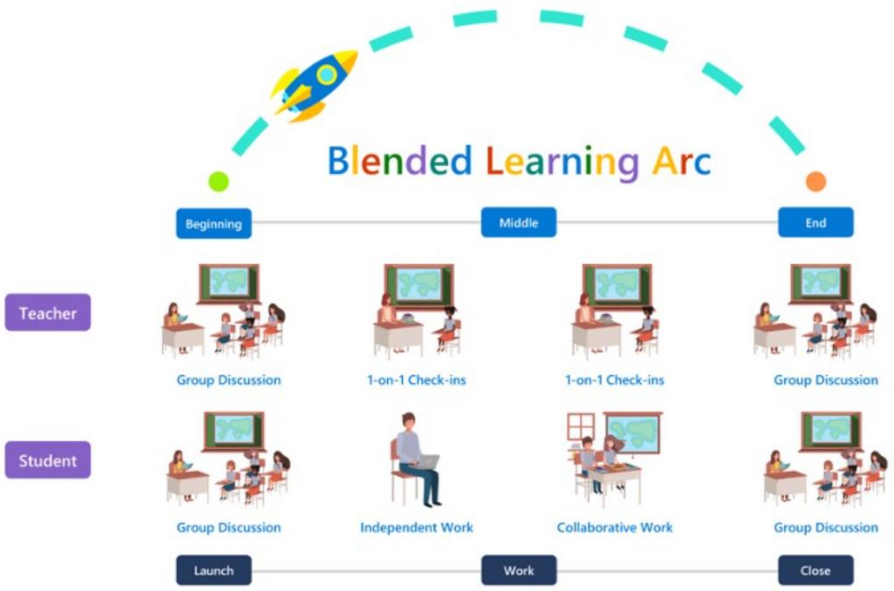


Figure 6: Blended Learning Arc

1.4.4 Virtual Reality

In common parlance, virtual reality is the term most frequently used even though a full spectrum of related technologies exists - varying from those who apply virtual content to those creating full on virtual world - with significant distinctive uses and features (Virtual Reality Society, 2017). A common definition of VR is: a three-dimensional computer-generated environment that can be interacted with a person using specific equipment, typically a helmet/headset containing a screen of censored gloves to create the illusion of a reality, hence the term (Corporativa, 2021).

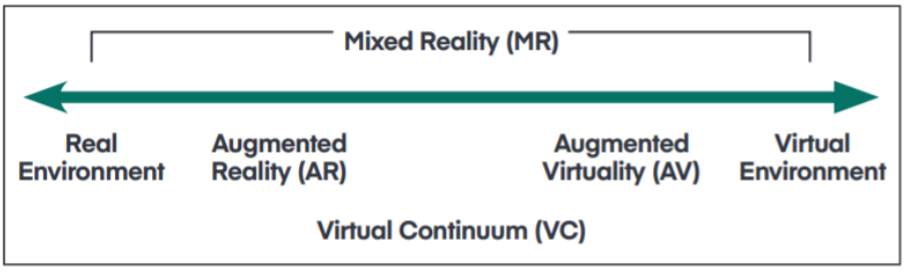


Figure 7: Reality-Virtuality Continuum by Paul Milgram (1994)

Some confusion remains around the terminologies of Augmented Reality (AR), Virtual reality (VR) and Mixed reality (MR). Throughout this research we will be referring to the set of these technologies as Digital Reality (DR), for the sake of consistency.

The various forms of DR present a wide range of opportunities across used different sectors: medicine and therapy, tourism, entertainment and media, training and to our interest, education (AACSB, 2018). The use of these technologies in the education space is being increasingly discussed as universities embrace new forms of tech within their classrooms and especially with the incoming generations of learners exhibiting greater familiarity with it. Globally, DR technology is empowering educators to move away from rigid and overloaded curricula, and experiment instead with new pedagogies which provide students "learn by doing" experiences (Castellanos & Pérez Sancho, 2017).

After all, Augmented Reality technologies create experiences that last longer in students' memories than traditional or even digital books, PowerPoint presentations, or video views. (García 2014, Jabr 2014, Sommerauer/Müller 2014, Zhang et al. 2014) This makes DR of great help to retain information in an orderly fashion in a scattered brain.

Although they aren't synonymous and have different nuances, terms like 'action learning' and 'experience learning' have become popular in recent years: what they have in common is they all underline the importance of experience, exchange with the surrounding reality, and practical applications, and they can be framed within what has now become known as 'active learning.'

This educational tendency can be traced back to John Dewey (1938) and other eminent experts such as Piaget, Freire, Bloom, Gardner and Lewin, who all have emphasized the role of experience in reaching learning objectives.

Some of the potential benefits discussed by leveraging VR in education spaces are the possibility to achieve the following:

- Allowing for a delivery of education that is impossible to accomplish in reality because it's either too expensive, dangerous or simply physically impossible.

- Helping with understanding complex concepts by showing their applicability in real life.
- Fostering the social interaction of learners regardless of their physical location through collaboration in a virtual room. (Castellanos & Pérez Sancho, 2017)
- Benefiting a wide range of students' individual learning styles, particularly visual-spatial which aren't addressed much in higher education and genuinely encouraging active learning.
- Allowing new opportunities of learning process assessment, along with the provision of immediate feedback. (Velev & Zlateva, 2017)

A number of institutions and business schools are already experimenting with DR technology in several ways including course content, pedagogy and even admission processes. Notable examples include:

  - The launch of an online certificate program in ***Stanford University*** featuring customizable avatars for students who can attend classes in a virtual space replicating the university's campus. The avatars are said to allow a more natural and organic interaction between students than videoconferences, hence aiding the peer-to-peer learning (Gellman, 2015).
  - ***ESSEC Business school*** for example is innovating with the Management Game 360, an educational model that places students in a change-management situation through an immersive VR experience. The device used alternates between different key locations of the company during which students are presented with elements and scenarios to analyse (ESSEC, 2017).
  - ***Neoma Business School's*** students can use virtual reality to become "actors in the learning process" by working individually or in groups to solve challenges posed by their teachers in a virtual sales outlet setting (AACSB, 2018)

However, business schools point out that technology has a number of limitations. First, the devices' distribution could constitute a bottleneck, thus schools must expand global access to these technological instruments. In addition, VR necessitates video production on top of the

technology, both of which might be excessively expensive. Experts having experimented with VR teaching say that the effects of participations may not be worth the complexity (Murray, 2021). Furthermore, instructors found setup time to be distracting and time-consuming when teaching (Murray, 2016). Beilenson believes that one major barrier is content rather than the hardware, adding that most learning content is achievable through a two-dimensional screen. This goes to show once again that many education stakeholders still resist adapting their content to DR capabilities. However, as technology advances and individuals become more accustomed to working in virtual worlds, attitudes may shift (Lieberman, 2018).

1.5 Challenges facing emerging technologies

Opportunities that are presented through new educational technologies are inevitably coupled by certain challenges. The first one of which has been arising every so often during the past decade and relates to concerns around privacy, ethics and security issues. On an implementation level, there remains issues unaddressed yet including accreditation, sustainability and scalability of these changes. Regardless of research's impressive advancements in this context, there remains some aspects that are overlooked, overestimated or underestimated. In this section, we will be identifying the main challenges facing the adoption of educational technologies today.

1.5.1 Ethical issues

The use of student data being a crucial for the development of personalised learning, it entails unavoidable security issues. Security is key to technology applications in education, therefore different stakeholders involved have to be mindful of just how much confidentiality and data privacy are crucial and are obligated to disclose what kind of student is being used, by whom and to what end (Huang et al., 2019).

1.5.2 Budget limitations

Great opportunities do not come cheap, a recent study has shown that 75.9% of educators and university administratives saw budget restrictions as the biggest obstacle preventing them from embracing innovative technology. While it may be overlooked, the harmonisation of technology and cost is often underestimated.

Such adoption comes with a massive investment including the needed equipment (hardware, software, licenses) sometimes even the infrastructure to handle the said changes. Furthermore, such investments are often not one-off and require further expenses to cover their maintenance and sustainability in the long run. In reality, there is always more requests for IT spending than there are available resources. (WPG Consulting, 2022), (Gosper & Ifenthaler, 2014)

1.5.3 Instructional barriers (Ability to integrate technology with teaching)

Teachers are considered as the facilitators of the digital transformation, therefore their behaviour and attitude towards it and the technologies at hand can pose a challenge to its implementation. A lack of acceptance and ownership of digital learning technologies among instructors constitutes a key instructional barrier.

Research conducted by the German Federal Institute found that increased use of learning platforms, digital tools, applications, virtual classrooms and collaborative learning requires different modes and methods of instruction; facilitators need to be able not only to up their IT and media skills but also to adapt their training content to these digital changes. The standards of instructional content are even higher in that facilitators must design learning material that is user-friendly. (Huismann, 2020)

Another common theme in the literature is the lack of training and development delivered to the facilitators themselves (Zaidi et al., 2018); research prior to the pandemic has shown that the lack of skills in using these technologies/resistance to learn, has played a role in the inhibition of the online learning development's pace (Belaya, 2018).

1.5.4 Learner's barriers

A persistent barrier to wider application and usage of digital learning technologies has surprisingly been the lack of motivation of learners. Online learning environment's dropout rates were and continue to be higher than those in traditional learning environments, no matter the geographical context. Studies estimate that completion of MOOCs (Massive Open Online Courses) for example are particularly low - especially in contract to their massive reach – reaching below 10% in certain instances. These poor retention rates have been linked to factors such as:

- Learners' poor familiarity with digital learning platforms, particularly when it comes to synchronous learning which can be harder to navigate (Ali et al., 2018).
- Digital learning entails that students engage in self-directed learning, which requires them to assume more accountability for their learning experience and understanding, which may not be to everyone's suiting (Cleveland-Innes & Wilton, 2018). Online learners may have to demonstrate more self-management and discipline skills and be able to independently control the learning environment – with its eventual disturbances/distractions.

Similarly, asynchronous learners also reported experiencing personal barriers like feeling isolated which can impact on the learners motivation, shedding the light on the importance of personal contact and interaction with other learners and facilitators (Mavropoulos, Pampouri, Kiriatzakou, 2021).

1.6 Imperative of strategy definition and organisational culture

If they are to overcome the hurdles and challenges encountered, universities will need to take a longer-term look at the role of digital technology. A unified strategy approach to digital can aid in addressing many of the sector's main imminent risks (Gallagher & Palmer, 2020). When

the epidemic struck, several universities already had digital in place and were able to adapt fast that the industry is facing. When the epidemic struck, several universities already had digital in place and were able to immediately respond. Others were on the lookout for new ideas, talents, and technology. As recent experience has proven, having a long-term digital strategy is now more important than ever . David Maguire, vice-chancellor of the University of Dundee confirms this when he said that ultimately, the digital acceleration observed at university-level was indeed impressive, but what has mostly been achieved thus far has primarily consisted of adding new tools to old methodologies & pedagogy, adding that the integration of digital into the core university plan is the next major challenge. (Maguire et al., 2020)

In addition to that, in their latest Teaching and Learning report, the European University Association (EUA) found that organisational culture to play a complementary but necessary role in promoting digitally enhanced learning and teaching. But what is culture in organisations? It is a tricky notion to define, and there remains some ambiguity about it. Simply put, organizational culture can be defined as the prevalent values and beliefs that impact decision-making and shape the nature of the workplace (Andone et al., 2022). It is generally difficult to change prevailing cultures, which is why educational leaders must consider culture when designing or implementing big learning breakthroughs. Past literature made this point evident when it comes to transformative change. Culture does play a significant role in mediating and influencing how institutions and teachers choose to accept (or not) new digital learning and teaching tools. To fully realize DELT's revolutionary potential, educational leaders and individuals at the frontline of digital innovation may need to urge for a shift in longstanding attitudes, habits, and beliefs (Bates, 2019).

"Culture eats strategy for breakfast," as the late Peter Drucker once said (Engel, 2021).The arising question that this thought provokes is how much can educational leaders effectively influence culture? especially as organisational culture is usually made up of various subcultures, traditions and ways of working depending on academic discipline.

Through their research, the group has demonstrated the value of early adopters, or innovators who generate small clusters of change, as well as the impact that good practices can have on the greater community, particularly in an organization's that fosters, facilitates, and rewards innovation. As a result, everyone must be considered a valuable micro-leader, shifting the responsibility for developing new learning cultures from solely senior management to a more diffused approach (Andone, 2022).

Now that we established that strategy and organizational culture should consistently go hand in hand, how to proceed? *"Start with the strategy"* is the way to go according to JISC's latest report's findings (JISC, 2022). Universities must begin with a long-term vision of its future and the part that technology is likely to play in it (Iosad, 2020). For one, the advantages of a long-term strategic approach are numerous and encompass different dimensions:

- ***Resilience in the face of adversity***: universities already operate in a 'VUCA world,' which is defined as volatile, uncertain, changing, and ambiguous. Those who had a long-term digital strategy in place found that it helped them cope better with the epidemic 2020 crisis. They were able to quickly react. In the future, an improved business model can adapt to market shifts quickly, the required infrastructure in place to provide students with a high-quality experience.
- ***International competitiveness and flexibility:*** A digital strategy can support expansion into new markets for recruiting and delivery, as well as revenue diversification options. It will allow universities to take use of digital platforms' network aggregation effects to massively scale collaboration with employers in order to satisfy changing student requirements and policy agendas.
- ***Technology as an integral component of the student and faculty experience, not as an afterthought:*** Digital solutions are often viewed as tools or point systems within institutions and are implemented on an ad-hoc basis with little support, resulting in a bonus at best and a source of frustration at worst. A more strategic approach, in which digital innovation is viewed as a core component of the experience, will result in better buy-in and, in turn in a clearer return on investment (Maguire et al., 2020).

1.7 Framework propositions to design an effective strategy

In its Europe 2020 agenda, the EU commission recognises that Education and Teaching play a critical role in Europe's ability to remain competitive, overcome the current economic crisis, and seize future possibilities. Although several frameworks and self-assessment methods are in use in various European Countries, no attempt has been made to build a pan-European approach to organizational digital competence (European Commission, 2020). For that end, a European reference framework with a systematic approach was developed with the goal of providing value by encouraging transparency, comparability, and peer-learning.

1.7.1 DigiCompOrg framework

DigiCompOrg framework is an initiative of the European commission, its design was carried out by the Joint Research Centre - Institute for Prospective Technological Studies (JRC-IPTS). This framework can be utilized as a strategic planning tool for policymakers to develop, execute, and evaluate digital learning technologies integration programs, projects, and policy interventions in E&T systems (European Commission).

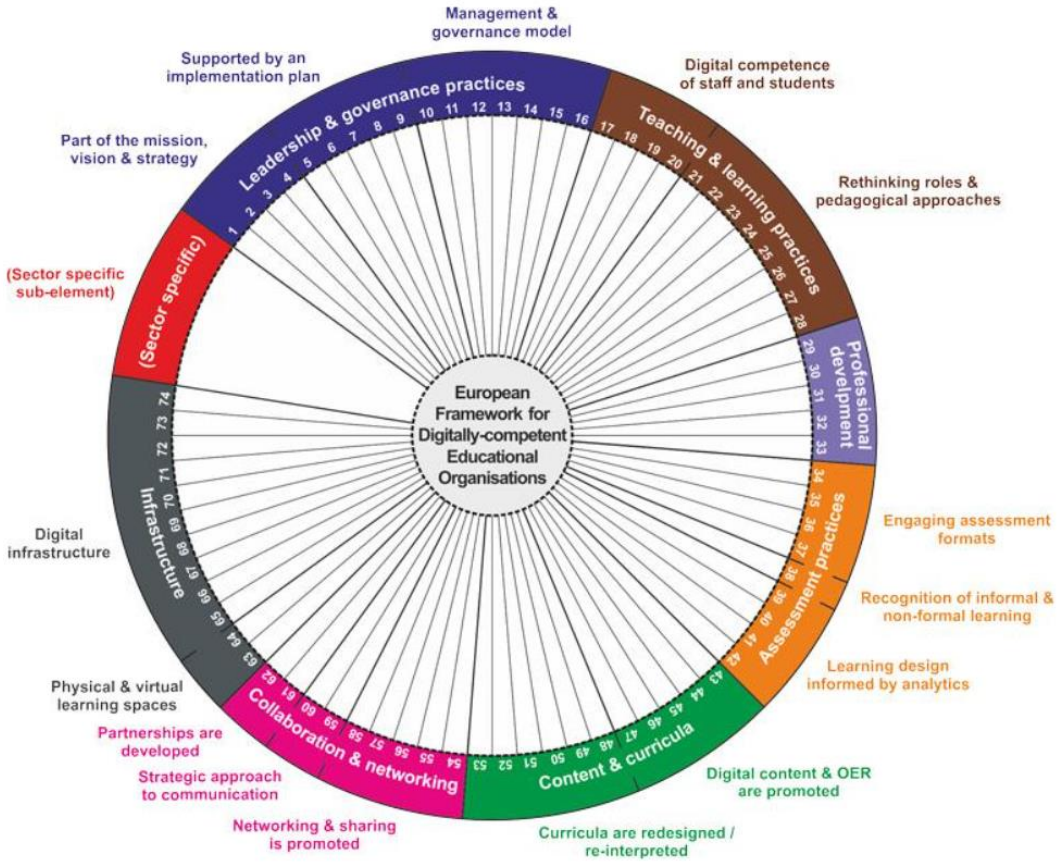


Figure 8: DigiCompOrg Framework

The DigCompOrg architecture is composed of seven key features and fifteen sub-elements that are shared by all education sectors. A set of descriptors was created for each of DigCompOrg's elements and sub-elements (74 in total), emphasizing their interdependence. While culture does not exist as an explicit domain in this paradigm, it does appear in the Commonwealth of Learning's Benchmarking Toolkit among areas like policy, strategic planning, and leadership. (Sankey & Mishra, 2019)

As organisations are different it's important to ask the right questions and not blindly adopt pre-defined format, affirms FernUniversität in Hagen (Andone, 2022). There exists different frameworks out there and it is important for those persons leading institutional policies and processes to familiarize themselves with the current frameworks. We will take be looking at the findings of the literature and some of the proposed frameworks around the block.

1.7.2 EUA framework

In EUA's attempt of the developing their own framework, the DIGI-HE project's analysis of self-assessment tools was considered an the place to start when determining what domains should be included in the strategy (EUA, 2022), along with the literature on the topic (Flavin & Quintero, 2018) and considering the various approaches for strategic development (Innovation Leadership Group, 2020) The group's discussions led to the emergence of 3 key domains:

- Vision, Leadership and Governance
- People, Community and Stakeholders
- Tools, Spaces and Resources

Intertwined with 3 key integration themes that need to be considered with respect to contextual differences, namely: ***Transformation*** (fostering digital transformation implies committing to institutional change), ***Collaboration*** (among all the students, educators and wider-stakeholders spectrum) and finally ***Change*** (recognizing that a major shift isn't a straight line).

Figure 9: Key themes in EUA's framework

The table below represents the major elements and factors that drive each of the domains mentioned above answering the crucial questions: "***Why?***" "***What?***" and "***How?***" (Andone, 2022).

Vision, Leadership and Governance	What is the significance of DELT for the institution? What role does it play in the institution's overall vision? What are the motivations behind the underlying objectives? How do these factors relate to the institution's mission and objectives? What is the ultimate goal? The answers to these questions must serve as the cornerstone of any institutional strategy.
People, Community and Stakeholders	***Educators:*** leaders in incorporating novel methods into their teaching practices. They should be more involved in governance issues, and training and resources should be improved to empower them to co-shape governance.
	Students: Students' expectations of higher education are changing, with more emphasis on flexibility, personalization, and opportunity to develop transferable digital skills. Student-led learning and co-creation are also important aspects of a successful plan.
	Stakeholders: Higher education institutions do not function in a vacuum from the rest of society: both internal and external stakeholders must be involved in conversations concerning DELT, including quality assurance methods.
	Communities: The above suggests a considerable culture shift for both institutions and the students' journey. From early adopters to transformative leaders who are co-creating digital strategies within and beyond their institutions, digital communities of practice are exercising a collective power.
Tools, Spaces and Resources	***The digital architecture and ecosystem:*** As IT tools are rapidly evolving and costly, investment should be adaptable to the different needs of teachers, integrating cloud technology and integration mobile all while keeping cybersecurity as point of focus.
	Scaling learning spaces: Spaces, unlike technology and tools, take a long time to evolve. As a result, venues should be modified or built to allow for the delivery of education in a HyFlex (hybrid and/or flexible) mode. This is to be applied in both physical and digital environments.

Open education: Collaboration from within fosters learning: employ tools for open education and sharing resources including the development of internal platforms for the exchange of ideas and best practices, as well as involving students as co-creators of educational materials.

1.7.3 JISC framework

A different approach was adopted by the "Learning and Teaching Reimagined" cross-sector initiative (JISC, Advance HE and partner UK universities) in their attempt to develop their framework: they set out from the same starting point, by interviewing senior leaders in Higher Education Institutions and digital technology experts, leading them to 4 key themes representing the pillars of the framework (Iosad, 2020).

- Leadership
- Staff
- Business model
- Investment

How is it different? To support vice-chancellors, deputies and other governing bodies, the group came up with a collection of questions set to identify strategic opportunities and mitigating the imminent risks to make the most out of them. (JISC, 2020)

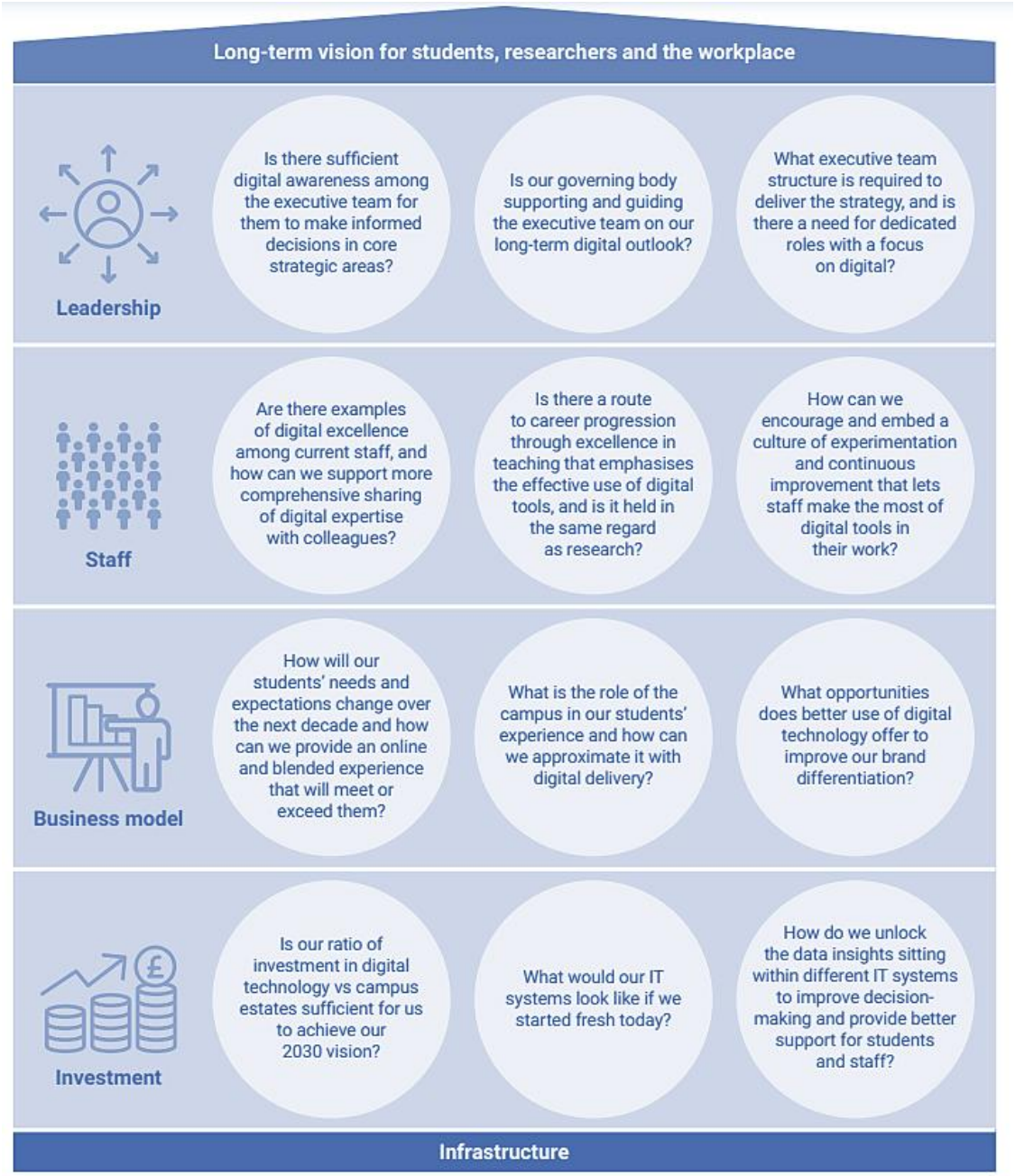


Figure 10: JISC framework

The aim was to eventually keep this framework context-agnostics as we established a "one-size-fits-all" approach was not the way to go (Lim et al., 2019). As answers to these questions will vary, different strategies and ideas will emerge still putting digital at the forefront of delivering a long-term strategy and vision.

2. Conceptual framework

We have now shed the light on the take of scholars and experts on the core elements that constitute the concept of digital learning. We have gone over aspects that make learning today what it is, the potential of emerging trends and technologies and how they can further transform the industry especially in management education, but we've also gone over their limitations and the challenges that are still encountered today.

Beyond operations and processes, academics have emphasized the importance of other more informal factors that affect the effectiveness of strategies and their likeliness to thrive in delivering best-in-class education, such as collaborations, alliances and organisational culture and so on. In light of the literature review conducted, it is safe to say that indeed, the digital transformation of learning is reliant on multiple dimensions. All of which are addressed in our study later on and explore not only how they enable the achievement of the ultimate goal, but also how they correlate to each other. Indeed, we can identify five main dimensions in supporting the strategic transition towards digitalisation in management education. The latters also represent the theoretical dimensions across which our research will be interpreted, namely in building our case studies and in cross-analysing them. These elements unfold as:

- ***Technology***

The "hard" component of our dimensions is technology, which is the enabler of the transformative process. Its definition encompasses everything from technical infrastructure, or the foundation on which digital transformation may thrive, to the skills that must be gained either internally (owned) or acquired externally to make the cut (Gal, 2008). The technology

factor may actually be particularly disruptive in organisations (like higher education institutions) where the adoption of digital innovativeness is observed more slowly as this entails the fundamental rethinking of business models, procedures, and products (Chanias, Myers, Hess, 2019).

We differentiate between consolidated and emerging technologies:

- ***Consolidated technologies*** refer to solutions of increasing complexity used as SaaS that allow collection of data and make available didactic material and also facilitate teacher-student & student-student interactions, namely: Learning Management Systems or Virtual Learning Environments. While the LMS is useful for managing a course's administrative tasks, it is less effective in facilitating learning, mainly as higher education continues to experiment with novel course structures and pedagogical techniques. As a result, there is a disconnect between the LMS's administrative duty and the desire to experiment with novel learning methods (Educause, 2015). This is why more practitioners are moving toward less "one-size-fits-all" applications and instead pursue more personalized solutions: this led to the appearance of NGDLE (Next Generation Digital Learning Environment) – envisioned as an ecosystem comprised of common standard learning tools and components. The ecosystem would then allow universities, departments, and instructors to choose tools that would allow them to adapt and extend the LMS to fit their specific teaching and learning requirements (Eriksen, 2017).

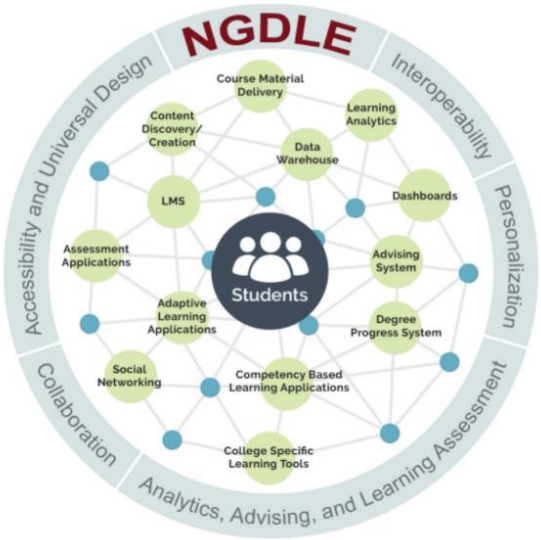


Figure 11. The NGDLE (Credit: University of Minnesota, Office of Information Technology)

- ***Emerging technologies:*** Digital educational technologies are considered as creating new roles for researchers, teachers, and learners, as well as more interactive, simulative, and engaging means of teaching and learning, as well as boosting cooperation and participation. (Elena F., 2017) As we highlighted in the literature review, existing technologies like AI, Blockchain, and virtual realities can allow for the systematic change of the delivery of education as we know it. Leveraging one or more of these solutions can significantly solve existing issues higher education institutions are facing today, and enhance learning through innovative ways of reaching students, making their paths personalised and making business schools hubs of lifelong learning (AACSB, 2020).

- ***Educational formats:***

The rising competition in the market among educational providers with the apparition of new vendors is also driving the rise of different formats of learning (Gauthier, 2020). The growth of digital technologies has accelerated the notion of open mass access, enabling a rise of open educational resources & provision of education through digital platforms (Alevizou, 2015; Deem, Hillyard, & Reed, 2007; McNay, 2005).

This dimension is particularly relevant today with the paradigm shift of learning moving from face-to-face towards blended and hybrid learning, these new and dynamic provision methods entail many changes, among which the format of content (Borokhovski, Schmid, 2014). The manner in which the material is delivered has an impact on how programs or courses are designed. Courses that are constructed around an interaction structure, such as self-assessments, short assignments, conversations, or short lectures, become more appealing than those that merely include a reading list and long livestreams of lectures (Van de Laar, 2020).

The literature review already cast the light on the significance of blended and hybrid models in digital learning. And with those, this provision could take the form of full-fledged degree

programs, credit-bearing short courses, or Massive Open Online Courses (MOOCs), with the latter being unbundled.

Unbundling in higher education is defined as the disaggregation of educational services into its component elements and likely to be delivered by multiple stakeholders (Swinnerton et al., 2019). What this has allowed is the offering of these new programs non-degree courses, badges, certificates and microcredentials, offered as individual standalone modules whether available via an online platform or for credit (McIntosh, 2018) – and these allow the learners to pick and choose, mix and match according to their needs/interests at their own pace and on a pay-per-module model (Morris, Coop et al., 2020). These reasons justify the importance of this dimension in the digital transformation of learning as we know it.

- ***Instructional design***

We have established that the term "digital transformation" refers to more than just the use of advanced digital technology. Higher education institutions must adapt their existing teaching and learning strategies in order to survive and maintain their competitive position in the long run.

Digital educational technologies are considered to create new roles for teachers, researchers and learners: they generate more dynamic simulative engaging teaching and learning approaches, and boost engagement and collaboration (Elena F., 2017). Bond et al. (2018) also have emphasized that digital innovation in the context of education has influenced not just technical changes, but also curricular, organizational, and structural changes. Indeed, teachers are considered facilitators of transformation, and we have already shed the light on instructional barriers being major: this all goes to highlight the importance of enabling the facilitators.

So many factors need to be taken into consideration when designing a course: in fact online provision of classes have different requirements than face-to-face. Also, different learning techniques (simulations, flipped classes, case studies and game-based interactions) can be

employed & recycled among faculty if need be. Synergies need to be leveraged through an organised entity as all best results cannot be achieved if these duties fall under the scope of professors only. Also, differences need to be addressed:

- In balancing synchronous/asynchronous modes depending on the type of learning,
- In facilitating social learning: teacher-student and student-student interactions,
- In providing an individualised experience to learners (adaptive learning) rather than one-size-fits-all models.

Hence the need for formal instructional designers to support these practices. (FutureLearn, 2021).

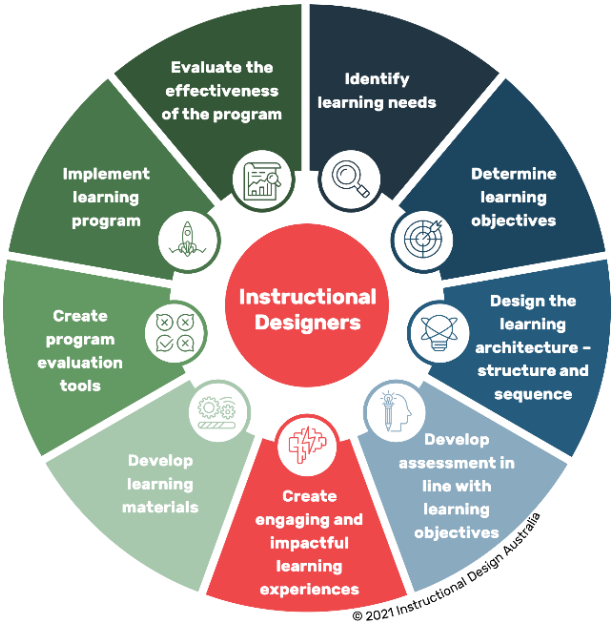


Figure 12: Instructional design scope

- ***Learning analytics***

As discussed earlier, the learning analytics component relates to applications that gather and analyse data on students' learning processes for the purpose of gaining insight into and enhancing teaching and learning processes (Wong, 2017). Throughout the literature review and earlier dimensions, we stressed the relevance of customisation and personal learning pathways: data analytics is required to support just that. In fact, different areas and roles across

higher education institutions may benefit from its use: in addition to instructors, academic advisors, department chairmen, offices of access, and other areas of academic support frequently employ learning analytics to better understand and comprehend the requirements and challenges of learner populations (Educause, 2021).

The challenge today remains in the fact that several components of the digital learning environment capture student data all of which must be standardised to allow for analysis and interpretation. Data privacy is also a concern (Educause, 2021). In spite of this, this dimension remains crucial in the digital learning context as it enables to grasp the synergies amongst the other ones. One fact has been made clear throughout the literature review, the digital transformation of learning is far from being a straight line: it's an iterative cycle enabled by continuous monitoring and improvements. (Marks, Rietsema, 2016).

- ***Strategic orientation***

The final dimension identified within this conceptual framework is not only fundamental but also brings together the previous ones. Successful transformation requires strong leadership and a clear vision. As Learning and teaching become more digitally based, university leaders will require the backing of their governing bodies to make this big and difficult transition (CUC, 2020). At the strategic level, leaders must determine the level of ambition that is realistic in their context and build a strategy that establishes a clear vision for the university as a whole: by allocating the right resources, both human and financial. JISC stressed this point in their "Learning & Teaching reimagined" report: universities must invest in the short-term with a vision on the long-term: adopting new technologies in the core of operations is good but needs to be sustainable and scalable on the long run (JISC, 2020). As most actions discussed have great implications, business models need to be reviewed and rediscussed, making the support of senior leaders and decision-makers crucial. Higher education institutions administrators are urged to examine digitalisation strategically as an interdisciplinary issue (Hochschulforum Digitalisierung, 2017). Indeed, without centralized decisions regarding infrastructure, culture and training & development, it would be very hard to integrate digital teaching to a relevant

extent for students. For this extensive change process, intensive cooperations and alliance between central bodies, organs, faculties and disciplines are necessary – making an organisational framework covering all decision-making levels from expert areas a must more than ever. This dimension will be a pivotal one throughout our research later on.

3. Methodological approach

In this chapter, we will be providing a description of the research methodology adopted across this study, along with a justification for this selected approach: the multiple case-study. Starting with a brief description of this method, we will move on to describe the cases selection criteria, the data collection process, moving on to the data analysis process and finally, the findings generated through it.

3.1 Study design

This research relies on a qualitative approach in order to obtain deeper insights on the elements and factors affecting the digital transformation of learning in the European Management Higher Education landscape. The motivation behind this qualitative choice is the assumption that even on such a high-scale institutional level, each organisation - with its culture, units and processes - remains unique and therefore, we want to understand their individual perceptions about their own journey towards digitalisation of learning under the contextual dimensions we defined in the previous chapter.

To this end, an exploratory multiple-case study approach was chosen to conduct this study, where the principal units of investigation are leading business schools in Europe. To quote Yin's two-fold definition, consisting of scope and features:

"A case study is an empirical inquiry that:

- *investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident.*

Case study research deals with a technically distinctive situation with more variables of interest than data points:

- *where prior theoretical propositions will be helpful in guiding the development, design, data collection and analysis of the data*
- *and where multiple sources of evidence are present, with the need to triangulate the data" (Yin, 2018)*

According to Yin (2003), three conditions ought to be met to determine if this case-study design should be adopted as research strategy: The first requirement is related to the type of research issue under consideration. When the researcher is interested in how, what, and why questions, case study research is ideal – which falls perfectly within our scope then. The second and third conditions are concerned with the degree of control over behavioural occurrences and the degree of focus on current events. Case study research is considered an appropriate technique when a researcher is interested in current events but cannot control or manipulate said events. (Yin, 2014)

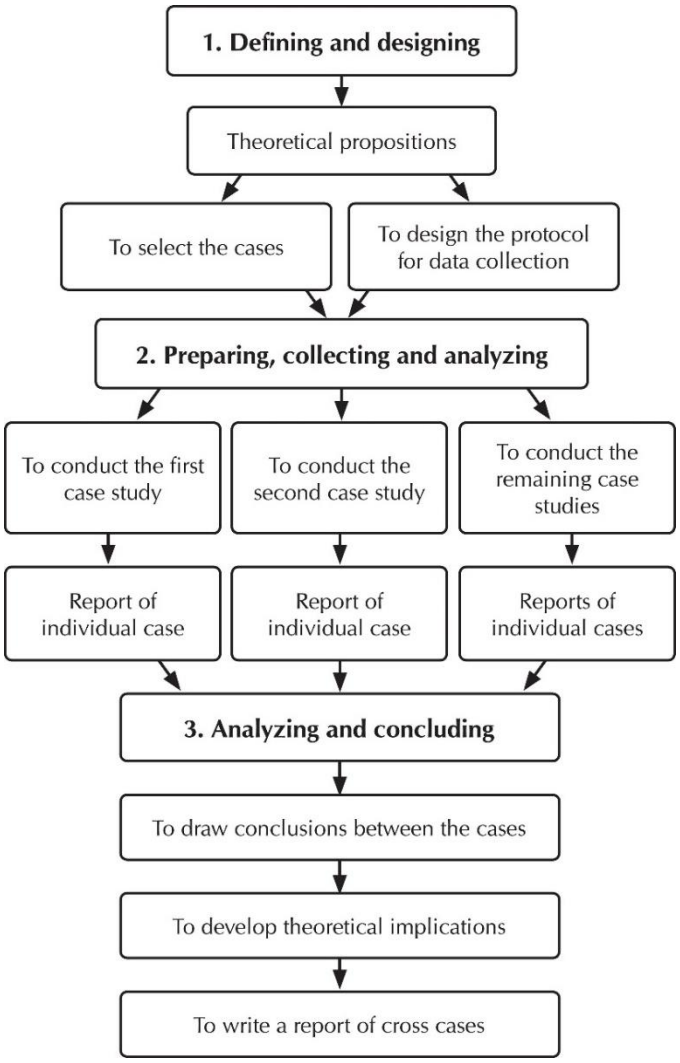
Particularly, the case study method enables the researcher to concentrate on small selection of rich cases providing context for the research questions or phenomena of interest: exploring these examples allows to better grasp the differences and similarities among cases, as well analyse data inside and across institutions. (Yin, 2014) Because it relies on different sources of information, the true strength of this methodology is in its ability to perform with this wide range of evidence —documents, artifacts, interviews, and observations—that sets it apart from traditional historical research. It is particularly appropriate for cross-case comparisons (Chiesa et al., 2007).

A common concern against the case-study method is that they provide poor basis for scientific generalisation. Simply put, the short answer is that like experiments, case studies are only generalisable to theoretical propositions, but not populations. (Lipset, Trow, & Coleman, 1956, pp. 419-420). Conversely, the use of multiple case studies give evidence for broader conclusions of theoretical evolution and study areas, resulting in a more persuasive theory. (Guftasffson, 2017)

Because we're seeking in-depth exploration of cases, we're undertaking a collective case study (Stake, 2006) as we selected several cases in order to jointly provide insight on the digital

transformation of learning phenomenon. There are no specific rules as to the number of cases required to satisfy requirements: six to ten cases should be sufficient to "provide compelling support for the initial set of propositions" says Yin (1994, p.46). Patton adds that contrarily to survey research for example, multiple case studies' sample size is irrelevant and that saturation of data collection until there's no new significant new findings, emphasizing that the meaningfulness of insights have more to do with the richness of the cases selected than their number.

Therefore, for the construction of these case studies, the following steps were performed as listed and shown below in figure 12:



(**Figure 12**: Steps of the multiple case study, adapted from Yin, 2015)

Typically, in multiple case study research, one of the two defining logics are used: replication or heterogeneity. In literature, we can differentiate between *literal replication* and *theoretical replication.* The first one implies that cases studies are selected on the premise that they yield analogous results - in other words, that cases support each other - while the latter means that selection of case studies is based on prediction of contradictory results (in which cases cover a variety of theoretical conditions) . In this study, the literal replication logic is followed.

Commonly in this way, cases are chosen based on their appropriate fit with one another (Yin 2018), i.e. not by using pooled logic (combining cases) like in traditional theory-testing studies. Rather, the researcher examines each case as a separate experiment.

Within each case, we strive to grasp the central study question, and then we try to duplicate these insights across all cases. This way of analysis is carried out to find patterns in the data that provide theoretical insights in the form of constructs, theoretical links between those constructs, and occasionally even propositions (Eisenhardt, 1989). How to form these constructs? By comparing and contrasting cases (i.e case A to B, A to C and then B to C), we can investigate and deal with data from more than one perspective and use various combinations. Differentiating differences and similarities across cases can help identify relevant ones and measures of constructs can be summarized in tables that researchers can use later on to advance insights (Miles et al, 2014).

The goal of case selection is to achieve informational richness rather than representativeness. In other words, cases are chosen for their ability to add to our total understanding rather than merely their similarities to one another. In addition, the use of this logic also provides for a development of a contextually rich theoretical framework (Nonthaleerak & Hendry, 2008; Yin, 2017). For all these reasons, the institutions we defined as case studies were selected by replication logic.

3.2 Defining the unit of analysis

After the study was rooted in context and framed in theory, we had to identify the unit of analysis. In a multiple case-study, the unit of analysis may be an individual person, an organisation, an event, a decision, a process and so on… (Yin, 2017). Consequently, we had to select the appropriate element to be the object of our investigation, and of which findings and conclusions would be related to. It is worth noting that it is crucial to select a unit of analysis that would allow comparison among cases, regarding the methodology we went for.

The choice of unit of study is highly dependent on the primary research questions, which were formulated in the earlier chapter. Let us focus again on the ultimate aim of our study, which is to investigate and understand the nature of relationships between the defined dimensions, how they affect the digital transformation of learning in Higher Education Institutions, and how they corelate to each other for that matter. Next to that, we also want to investigate what elements are the most enabling to the success of such transformation. That is the principal aim of this investigation.

Under the light of the aforementioned above, it quite makes sense to make HEI the unit of analysis of this study. We went one notch more specific and focused on Business Schools of said HEIs, as we highlighted in the previous chapter the relevance of digital learning in management education of today's context.

This selection still seems general enough not to limit the scope of the study considering that said Business Schools to be part of a higher entity, entailing that eventually conclusions can be extended to a wider range of institutions later on.

3.3 Cases Selection

At this stage, the predictable question emerged: "which institutions to choose?". Again, the answer to this question went back to the aim of this study, meaning the cases we chose needed to be rich enough to help us get a comprehensive view on our investigation. From here, it was

clear that institutions chosen had to have at least a certain level of success in digital learning approaches and the presence of already established measures.

Next, we needed to further narrow down our context, which we chose to do so by:

- Limiting our study to Business Schools as we highlighted in the previous section,
- Setting a geographic context for our cases to be comparable.

Accordingly, we focused on the European area as supra-national context in which Higher Education Institutions are turning increasingly homogeneous, specifically in terms of law enforcement and relevant policies in action. That being said, our final sample of cases happens to include only one entity that is not part of the European Union. We thought it may be interesting to observe how this factor plays in our analysis later on. Additionally, after the Brexit, negotiations have tried to solidify existing links and create new links between the UK and EU in order to avoid disruptions as much as possible.

Furthermore, business schools share a common background and are perceived to be very strategic for digital innovation. Indeed, it is particularly critical for business schools to adapt as providers of knowledge, skills, and experiences to help learners prepare for today's fast-changing, digital business environment. Employees are now expected to have a set of digital skills that allow them to cooperate, communicate, network, solve problems, analyse data, collaborate in teams, and create outputs utilizing digital platforms. As a result, business schools are the first actors that has to accept this reality and continue to progress in their digital transformation.

However, not all business schools have taken advantage of the chance to build up their digital capabilities or discover new strategies for transforming their educational offerings and degree structures through innovative use of digital technologies. And as such, because we are most interested in investigating different approaches and journeys related to digital transformation of learning, we had to keep this consideration in mind and target institutions that were competitive in digital learning at the time of our decision.

With the context of COVID-19 and whatnot, most universities had found themselves in the obligation to accelerate their transformation of learning anyway. In order to really have a grasp on innovative cut-out of the edge approaches to do so, notable players in the digital learning arena who acted as pioneers in the matter were pursued. As a proxy for quality, we selected out six European Business Schools among the ones listed in the top 50 as of the Financial Times Ranking 2021, which was the time we selected these companies (FT, 2021).

In addition, our decision was also based on a selection of criteria/characteristics that were considered fundamental to conduct this collective case-study research, namely:

- Geography (European Context)
- Organisational structure
- Information richness and availability of data
- Scale of digital learning involvement
- Consent model
- Availability of appropriate interviewees

After having conducted a preliminary round of desk search aiming at analysing the trends in the higher education industry, a pretty large selection of universities were considered for this research. As a first approach, we built a database of all institutions of interests and conducted extensive search to identify who the right contacts would be. As we highlighted in the literature review and the conceptual framework, many dimensions are at stake which implies the involvement of different bodies and units – not necessarily connected to each other.

We proceeded to collect contacts from all departments and teams who could be involved in any aspect of the digital transformation of learning, hence an initial contact was established to share the purpose of this study and suggest participation. After a certain number of trials, the difficulty to get in touch through e-mailing became evident. Nonetheless, we kept reaching out through various means, always targeting new contacts and expectedly we managed to get in touch – or got redirected towards – the right bodies within the entities.

The goal was to gather a set of potential interviewees personally and find out if they were willing to allocate some time to participate in interviews (which details we will cover in the next section: data collection). After they expressed their willingness, we started the case study design process. A table describing the participants schools is below, which we labelled BS-1, BS-2, BS-3, BS-4 BS-5, BS-6 - standing for Business School.

➔ ***Characteristics of the cases under investigation:***

Infographics	**BS-A**	**BS-B**	**BS-C**
Country	France / UK / Germany / Spain / Italy / Poland	Germany	Italy
Institution Type	Private	Public	Private
Ranking according to FT 2021	14	21	37
# of year active in management education	203 years (World's first business school)	59 years	43 years
# of students	+8,000 (undergraduate & postgraduate) +5,000 (executive education)	+ 4000	+4,900
# of professors	800+ Practitioners and experts 170 Research-active professors	+37 chaired professors	+ 119

Infographics	BS-D	BS-E	BS-F
Country	UK	Spain	Italy
Institution Type	Public	Private	Private
Ranking according to FT 2021	16	12	5
# of year active in management education	18 years	49 years	51 years
# of students	+4,000 (undergraduate & postgraduate)	+8000	14,900 total students enrolled
# of professors	114	+500	837 total faculty and staff

3.4 Data collection

Typically, case study evidence uses may come from six different sources and using all of them calls for mastering the various data collection procedures of each of them. The main objective remains the same: collecting data about events, actions, and behaviours. As the literature on multiple-case study design highlights it: it's important to remember that no single source has a total advantage over the others. In fact, the various sources are extremely complementary, which is why a good case study will wish to incorporate as many as possible, subject to feasibility and adaptability of course.

In addition to that, there are overriding principles guiding the data collection process, which we made sure to follow in order to make sure our case building had quality substance:

1. ***Use of multiple sources of evidence "data triangulation":***
    a. *Researcher's observations:*

        This has been done through a lengthy process of scouting the websites of participant institutions, reading their annual notes, publications, newsletters, mentions in academic papers and journals etc… seeking for information related to our aforementioned dimensions. This was useful as

it enabled us to put the events in context. The weakness of this evidence source I would say is related to its time-consuming aspect, in terms of cost-hours needed to make observations.

b. *Conducting interviews:*

As most line of inquiry we use is pretty rigid, going for interviews was key point in our gathering of data as it allowed us to dig deeper in certain aspects and ask relevant questions as to information that isn't usually communicated online. Another reason why this approach was fundamental to us is related to the flexibility to allow the subjects in question to answer in details, making the answers more reliable, comparable and also appropriate to our research since the main question is to study how our dimensions affect each other.

2. ***Establishing a case study database:*** a formal collection of material that we used apart from the final cases reports, including notes, recordings, documents retrieved from the previous step… all of which was stored in tables which allowed us then to structure and cluster the data obtained.

3. ***Making use of a chain of evidence approach:*** which would allows us to trace inferences made backwards when summarizing our results.

As mentioned before, delivering semi-structured interviews was a crucial part of the data collection process, constituting our primary data. However, before proceeding to this stage, a suitable contact person in a focal department had to be identified. We started out our search using key words such as: "digital learning centre", "pedagogy centre", "instructional designer", "digitalisation office", "open innovation", "teaching and learning hub", "online learning". For each institution, we retrieved a list of potential contacts, their e-mails/phone numbers, which we built gradually.

As a first step, we contacted them through e-mail or LinkedIn messages - which has proven to be the most effective way as the approach is more personal. The response rate was low but allowed us to reduce our potential cases, as mentioned in the section above.

Simultaneously, we started putting together an initial set of questions to collect and evaluate information on how digital technologies are used and implemented in our sample of institutions. The literature review on digital learning methodologies, delivery formats, and supporting technology enabled us to develop a series of specific questions for our respondents to answer the previously stated research question.

It is worthwhile to note that prior to that, as an initial step we organised these questions in an ended-questions format and sent it out as a survey. The response rate was low, and answers were seemingly too similar which didn't give much room for interpretation. At the close of the survey, we asked respondents if they were willing to detail some of their answers around a follow-up interview, which allowed us to lead 2 of our semi-structured interviews later on.

In total, six key roles were participating in the interviews, which paired with our secondary data can be considered as sufficiently representative given the interviewees direct involvement in the digital transformation of learning in their institutions, from and their closeness to main decisional processes of their schools. We went for a semi-structured interview format, consisting of open-ended questions in order to enable free expression and guide interviewees to share their own experience and perceptions. Even though the interview assumed a conversational manner, we still followed a set of questions derived from the case-study protocol (provided in the Appendix), the main topics related to the conceptual dimensions that guided our analysis all along and reviewed past studies.

Starting with a brief presentation of the project and its goals - which was already covered in the initial first contact through mail/inmail, the interviews were led in parts: in general the first block of questions was related to (1) the institutions' strategic orientation towards digital learning and its vision over time, while the second part (2) covered aspects related to its implementation, namely digital technologies leveraged to this end, and finally (3) the roles involved in this deployment.

The interviews were conducted in the period of *December 2021* through *March 2022*, all via web conferencing platforms; each interview lasted on average around 30-60 minutes. All interviews were recorded upon agreement from the interviewee, and later on transcribed. Additionally, detailed notes were taken during, and right after each interview. The questions were in English mostly except for one participant who preferred to hold the meeting in French. To accommodate the process, the interview was led in French and was later on translated by the researcher.

Table 1 contains further information regarding the informants' roles and the main subjects discussed throughout the interviews. Furthermore, we triangulated the information we gathered through our key respondents with secondary sources: public data were analysed through the monitoring of websites, press reports, and institutional presentations (Miles and Huberman, 1994). The same table reports secondary data sources. The latter contributed greatly in framing and directing our interviews, plus, the insights gleaned from secondary data were likely to aid us in comprehending, interpreting, and analysing data gathered from primary data.

Primary Data Source: Semi-Structured Interview		
Institution	*Role in digital learning*	*Duration (in minutes)*
Politecnico Di Milano School of Management	Digital Product Manager - Digital Learning Platform (FLEXA)	36′
SDA Bocconi	Learning Lab Coordinator	54′
ESCP Business School	Associate Dean for Digital Learning - Learning Innovation Manager	40′
Imperial College Business School	Acting Director – Digital Learning Hub	30′
DHBW Mannheim Business School	Learning support – Digital Learning Centre	37′
IE Business School	Director of High Impact Online Programs	31′

Main Topics
Strategic orientation
Funding
Challenges faced in implementing a digital strategy
Lessons learnt (personal perspective)
Technological solutions innovation
Limitations
Faculty support in digital transition
Leveraging learning analytics
Secondary Data Sources
Institution website
Strategic plan publications
Organisational declarations
Inter-university agreements
University newspaper/magazine
Scholarly articles
Data Triangulation

(Table 1: Data sources used in the study)

3.5 Data analysis

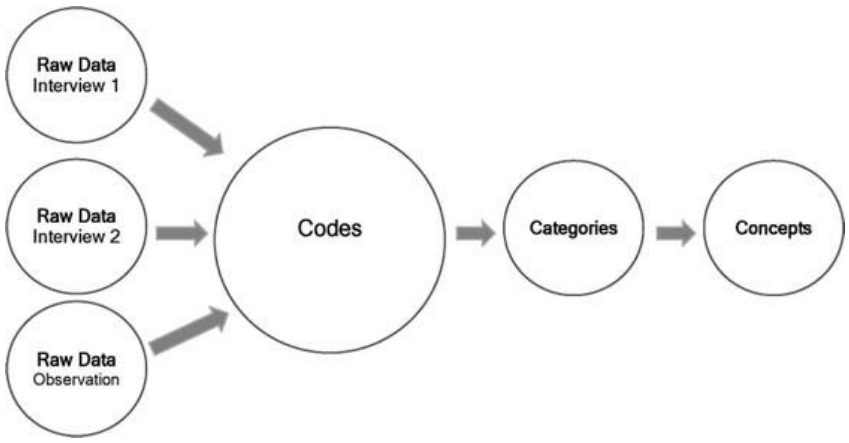
In order to analysed our large collection of data, each interview was transcribed verbatim, and data analysis was managed through MAXQDA Analytics PRO using in-vivo (Strauss & Corbin, 1998) & first-order coding (Van Maanen, 1979). The data was analysed in three phases:

- ***Phase 1:*** which included a case description following an inductive thematic analysis for each case setting.
- ***Phase 2:*** entailed conducting a cross-case analysis to uncover cross-cutting themes and investigate similarities/connections and outliers across the six case settings. Outliers were considered as distinct points of view or case exceptions that strayed from the fundamental themes.

- ***Phase 3:*** involved a deductive investigation as a second-order analysis of the found cross-case patterns and themes pertinent to complexity theory. The data interpretation process involved identifying essential concepts that explain links between theoretical assumptions and themes, as well as emphasizing messages that are significant to policymakers/decision-makers.

As proposed by Lichtman (2013), we opted for a thematic analysis to get the meaning of the collected data and extract themes from the interview responses similar to that of key aspects discussed in the literature review. Lichtman described this method in six steps, which were applied in this research study, and this process was defined as the Three C method: Codes to Categories, which eventually led to Concepts or Themes, as we would refer to them later in this research. The six steps adopted as Lichtman recommends are as follow:

1. Initial coding
2. Re-examining the initial coding (through terms clarification, words reduction)
3. Creating a preliminary list of categories (by organising the codes into categories)
4. Revising the first list in light of additional readings, with an emphasis on crucial areas
5. Going over categories and subcategories again as some make more sense than others
6. Transitioning from categories to concepts/themes and reflect on their significance.



(Figure 13: Three Cs of Qualitative Data Analysis: Codes, Categories, Concepts (adapted from Lichtman)

Our analysis was based on a grounded theory approach, meaning our coding process was mainly inductive rather than based on priori coding framework (Kelle, 2007). This is especially useful in allowing researchers to conduct iterative waves of research across the case methodology and continually re-evaluate where to concentrate the most attention in order to better comprehend the case topic – which cannot be known with certainty ahead of time and is better carried out on a case-by-case basis. Consequently, the analytical process itself influenced the focus placed on specific questions throughout later parts of the process.

Accordingly, our data collection concurred with data analysis, which went on until no new theme emerged. It is only if a certain set of codes could be linked across more than one informant institution that a category was defined.

As for the multiple-case analysis, we started out by developing a description of each case setting. Similarly, identifying themes/factors fitting ease of them was iterative, cycling back and forth between rising themes and collected data. Because of the extensive volume of information generated of each case, we did not include details on each concept/theme, instead we put forth a summary of each case analysis (discussed in Section 4). Overall, the data converged, with our primary data offering richer narratives and contextually relevant information explaining tendencies that showed in the case studies.

3.6 Trustworthiness of the work

- ***Validity:***

Validity was enforced through the use of multiple sources of evidence as we mapped above, and the establishment of a clear chain of evidence. Although only one researcher was involved in the coding of the data derived from transcripts, this was a slow and iterative process which was then peer-reviewed. Replication logic and pattern matching technique were applied to establish associations across the six cases (Yin, 2014). Each of these actions helped in

supporting the trustworthiness of the research as they contributed in establishing credibility (through triangulation), confirmability (through reflexiveness) and transferability (by building in-depth description and explanations). (Guba, 1985)

- ***Reliability:***

To minimize errors and bias, the credibility and reliability of this study were ensured by designing an interview protocol which was followed in each respective session (Yin, 2014). This way, even if we couldn't control the direction of each interview situation, we would at least make sure the main topics were covered. The same was done for case selection as we adhered to common criteria. Also, the contact selection phase was undertaken carefully ensuring they acted as subject matter experts in digital learning within their institutions. Always in the frame of reliability, all interviews were recorded, and notes were kept track of to guarantee the data's integrity.

- ***Data sufficiency:***

Data sufficiency relates to the richness in description of the cases under study. By using multiple sources of data (primary and secondary), triangulation and maintaining a chain of evidence we ensured help this dimension (Creswell, 2000), as this methodology was data-rich and substantially contextual. The number of resources used throughout we believe to be suitable to the complexity of the topic (Yin, 2014).

- ***Ethical considerations:***

As ethical issues command increased attention nowadays, this consideration needed to be anticipated (Creswell, 2009). Interviewees were all willing participants in this research after they have been thoroughly informed about the scope and goal of this research. All of which were informed of their right to withdraw their participation at any time. Furthermore, all participants were ensured anonymity and privacy of their recorded meeting: none of their names, ages or gender will be mentioned. Upon completion of this thesis, all audio/video recordings and transcripts will be effectively deleted.

4. Findings

This section will provides collected empirical information from the cases and the interviews. The results attained highlight the differences and similarities in each case's approach to digital learning, with respect to the flow of the conceptual framework we identified in the previous section. The results are hereby presented case by case, followed by a short discussion joint with findings from the semi-structured interviews, since the latters helped us generate more insight as to more individual aspects of each institution's journey. As most cases converge over certain dimensions, we will be focusing on the ones where they diverge, to trigger interesting points of discussion. Later on, a cross-case analysis with emerging themes will be covered.

		Case 1: BS-A
Strategic orientation	*Strategy commitment to digital learning*	**BS-A** has strategic plan (So'school) encompasses several ambitious projects to improve the students experience, acquire a digital culture, develop and support innovation on a reliable technological foundation, with established KPIs/targets to achieve.
	Budget allocation	Classified information
	Partnerships/alliances in place	- Experimentation with Edtech players such as Domoscio for adaptive learning, Netexplo and Praditus for online module certifications. - Canva, Blackboard collaborate (synchronous), Zoom, FUN, Coursera. - Cottino Social Impact campus (for sustainability integration)
Technology	*Solutions currently implemented* *Future projects*	- Adaptive Model Blended Learning, the Phygital Factory, Art Thinking by Sylvain Bureau, and Marion Festing's serious game are innovations in place on top of Virtual Learning Environments, gamification of learning, AI, Blockchain for certificate recognition (fighting fake diplomas) - 47 projects related to technological innovation in education uniquely tailored to BS-A's objectives.
Educational formats	*Currently implemented* *Future projects*	- Online track of the core courses of the Executive MBA (8 online courses), digitization of 2 catch-up courses; MOOCs, 6 short online modules - Production of 18 online "Units of Competence" for the Skill First project including transcripts, quizzes and case study - 25 online programs available (masters and certificates) to accommodate asynchronous learning.
Instructional Design	*Synchronous/asynchronous balancing* *Social learning* *Instructional team supporting faculty* *Training* *Involvement of students in designing their learning experience*	- A self-service, all-in-one mobile studio with augmented reality called RapidLearning has been implemented as part of a videomaton approach, giving faculty more autonomy to handle their courses. - Faculty is trained through workshops to be made autonomous in the design of their courses. - Management students collaborated with innovator professors in disruptive workshops. - Students feedback is collected continuously to improve the educational offering. - 25% of students have been taught either wholly or partially online prior to COVID. - 29% of the professors have done digital learning (production and/or teaching). - an BS-A micro-learning platform was made available to all staff on the five campuses
Analytics	*How the data is being leveraged*	In 2020 a learning analytics project was launched in partnership with Domoscio (to be integrated into the LMS) that'd allow teachers to get real time data about class performance, struggles, and successful exercises. Thanks to automated data analytics they could promptly intervene on critical issues, identify competency gaps to ultimately custom-design training to each individual student.

In terms of strategic orientation, BS-A has proven to not only fully commit to a digital transformation plan but has also launched a significant number of measures in that sense, related to technological innovation uniquely tailored to the school's need an objectives, covering its six campuses. Moreover, this plan's goals is to enhance the user experience for all stakeholders, from students to executive participants, to faculty, to staff – by combining internal and outward-facing advancements, experimenting through various edtech partnerships and so on.

The school perceives itself as entity as an early-adopter of new learning technologies: feeding a digital library of resources and solutions designed to enable faculty to deliver best-in class innovative education as per the Dean of Learning Innovation's words. This statement was further on confirmed when the interviewee stated that the key to their digitisation acceleration was to work with interested faculty, innovators – which has also proven to be a successful strategy in handling the COVID-19 crisis.

"In the Madrid campus, pedagogy innovation team composed of passionate people and works wonders. The key is working with interested professors first! Innovators."

"We work on a volunteering basis, no forcing: first with passionate people, then we scale."

The pandemic was also considered to be an accelerator, mainly for the laggards. Even if the school does not communicate on a clear quantified budget allocated for these activities, when asked about fundings supporting their digitalisation, the interviewee stated that all digital projects undertaken are internally funded by the school, adding:

" We could benefit from external funding sources but we don't, we'd rather not. Each digital project we undertake is funded by us, and has to have an ROI after a year. We believe as a business school we should be able to handle good business, or we're a bad business school."

This goes to show that BS-A sees it a personal challenge to outdo itself in digitalisation initiatives. According to the interviewee, this fact was also a key element in the success of their digital strategy: undertaking pilot projects with no prior communication, and proving their return on investment first, before getting others on board and deploying it on a bigger scale.

To gain some deeper insight on their experience, we asked BS-A on the challenges they encountered (at least in perception) in implementing a digital strategy. Interestingly, the school's expectations were different from reality, as when they thought change management could be a problem, the real hurdle was related to legal & jurisdiction matters, namely policies related to incentivisation of implicated professors in digital learning, proprietary rights of recorded materials/contents…as the laws across different country campuses differ.

In terms of technology, BS-A is well set, constantly trying new things and evolving systems, they try to capture the best out of most emerging technologies guiding digital learning, from AI to blockchain for certificate recognition. Although, an interesting point arised when discussing the limitations of certain solutions such as the school's project for Adaptive Learning. The interviewee expressed that with all its benefits, human aspects cannot be replaced by the potential of technologies only.

"Adaptive learning is excellent in the frame of executive education. But in a business school, students don't know what they need to know yet, the courses are imposed first because professors know better. Elective classes are available for the flexibility, AI can help with that, but it has limitations. AI can't be more than an advisor in my opinion."

		Case 2: BS-B
Strategic orientation	*Strategy commitment to digital learning*	BS-B considers digital transformation in education as a priority in their overall strategy plan. A digital transformation centre was put in place to rethink digital business models, platforms and ecosystems.
	Budget allocation	- Total budget is classified, approx. 30% was said to be allocated to investments towards the transformation of educational experience. - The ministry of education is providing a budget of 2million euros from the "Digital Innovations for Smart Teaching - Better Learning" funding program for a period of 2 years.
	Partnerships/alliances in place	Alliances with management education institutions are in place encompassing the dimensions: modular and integration-friendly learning platforms (Moodle), Common repository for student internships and employment opportunities, joint research projects. No partnerships with edtech companies are in place, solutions are developed in-house mainly.
Technology	*Solutions currently implemented* *Future projects*	- LMS, Virtual learning environment, learning apps(gamification) - DH-ZIP: leveraging cryptocurrencies and AI to change teaching and learning as we know it. - Cooperative State BS-B 2025: Development of a "digital twin" to digitally map all areas of the university intended to support students before, during and after their studies - E-light: a platform prototype designed to support lifelong learning of students and alumni in a social and interdisciplinary fashion. - AR communication platform (pilot phase) - Edcon project uses synergy potential of university to accelerate the digital transformation of teaching.
Educational formats	*Currently implemented* *Future projects*	- Face-to-face, online/blended/hybrid formal degree programs. - Dual programs in partnership with companies (theory v. practice) and career-integrated postgraduate study programs. - There's a plan to offer in the future: short courses without recognition of formal certificate.
Instructional Design	*Synchronous/asynchronous balancing* *Social learning* *Instructional team supporting faculty* *Training* *Involvement of students in designing their learning experience*	- Numerous tools to support asynchronous learning such as voting, tests with electronic evaluation, forums, wikis, peer reviews… - A business Innovation Center is in place rallying synergies from business and technical units, which focus is on digitization and cooperation in research to transfer knowledge to dual partners (course-specific skills acquired) - Research-integrated teaching is used in order to allow students to digital technologies like AI, machine learning and big data in project-like settings (sentiment analysis for a German bank, recognition of outliers and innovations in machine data…) - An education support centre is available to provide instruction and continuous support in the application of new technologies into class lectures, as well as pedagogical methods. - Optional training on digital teaching pedagogy is available to the faculty, in addition to a dedicated repository of teaching resources. - Students are co-designers of their learning experience: interested individuals may participate in digitization projects across different teams.

Analytics	*How the data is being leveraged*	There is a team in place dedicated to data and learning analytics, findings and insights are then used for student admissions/retention along with the redesign and improvement of the learning experience.

In BS-B's case, despite having formal communicated commitment towards digital transformation of learning and having resources and measures in place, a certain divergence between strategy formulation and implementation was observed. The general impression generated through the interview conducted with a member of the Digital Learning Centre of the institution, was a lack of strategic orientation. In general terms, the topic of senior leadership and decision-makers being unsupportive and genuine reluctance towards digital learning was recurrent throughout the interview.

Supposedly, it is not a matter of funding. The stated 30% of budget being invested in digital transformation of learning was reported to be a reactive approach to the COVID state of emergency that revealed a fundamental lack of infrastructure. Investments in hardware and software had to be made to enable students to follow classes in online modes.

"There was no strategic decision and no strategic guidance for that. I think that's because most of these guys at the top of the decision making, they still believe in face-to-face education."

"The German Government has set up a fund with several million, I think over €50 million for the digitalization of schools and universities, and not even 1%, I believe was actually used of that fund […] Because there was no willingness to."

Despite several enthusiastic individuals including faculty, PhDs and members of the digital learning centre experimenting with new technologies such as VR and mobile teaching, the passive governance had a negative effect on the rollout of these advancements across the school. One assumption related to this is the traditional ideology of control: top leadership deems that pupils belong in a classroom to really ensure they're getting the most of education and that technology (videoconferencing) could never replace the human factor. Furthermore,

the interviewee reports that as a state university, there is no real pressure to develop and digitise fast, there's too much security.

This dimension pretty much governs all the others since its repercussions have a bullwhip effect. As per our findings, BS-B reportedly has resources in place, task units and teams such as the education support centre responsible for looking into the integration of digital tools in different aspects of learning, supporting faculty with lectures and content design and so on… but because of the lack of clear definition of responsibility; a general decentralisation of decision-making is observed. The latter acts a barrier:

"It's often certain people who start innovating and if it takes off, then maybe others will follow, but it's more likely trial and error, rather than a very straightforward path. […] there is no real strategic plan, so that makes it difficult to organise these things."

Another negative impact that can directly be retraced to this dimension materialises itself in the challenges faced by the university: relevant stakeholders within the school that could be part of the change are not properly endorsed or allocated the right resources. An example of the bullwhip effect is represented through the issues observed at BS-B (1, 2, 3):

Lack of governance → Insufficient human resources allocation (1) → Change resistance (2) → Time restraints (3) → Slow results

"IT team is usually very over-worked because they're understaffed" (1)

"They are usually very reluctant to do anything new they want to keep everything as it is: maintenance over proactivity" (2)

"All I'm saying is it took about 2 ½ years to finally decide on one system that now has to be used across university, you can see the process is pretty slow" (3)

		Case 3: BS-C
Strategic orientation	*Strategy commitment to digital learning*	The university has a strategic plan in place encompassing digital learning goals with quantified targets and specific commitments to projects and proper teams and resources allocation. Digital transformation of learning is considered a top priority.
	Budget allocation	Total budget is classified, approximately 60% was said to be dedicated to investments towards the improvement of digital learning experiences and investments in software, hardware, partnerships and human resources.
	Partnerships/alliances in place	- Alliances with management institutions are in place encompassing modular learning platforms and integrated cloud platforms, which the university aims at consolidating even more in its future actions. - Partnership with Microsoft is in place to support the technical development of in-house solutions such as Flexa (the intellectual property is the school's) and Teams for virtual collaboration. - Partnerships with digital service providers like Microsys and Bluit to integrate new solutions with LMS with existing infrastructure.
Technology	*Solutions currently implemented*	- Custom LMS platform to handle delivery of courses, tracking and reporting of students journey that is expected to move towards a VLE. - Flexa: an innovative AI platform to ensure personalised continuous learning to students and alumni and soon to professionals. - D-HUB: the MIP digital learning platform available also in asynchronous micro-learning formats. - Launch of a "phygital campus" converging digital tools and the quality of both actual space and services, through the renovation of university classrooms and innovation teaching methods, the integration of meta-disciplines through projects. - Future projects include integrating Flexa tool with the LMS in order to sustain the same development through academic programs as well.
	Future projects	
Educational formats	*Currently implemented*	- Online/blended/hybrid formal Degree programs. - Short courses with recognition of formal certificate and without. - A library of MOOCs is available through the open knowledge portal, with content targeting both students and professionals.
	Future projects	
Instructional Design	*Synchronous/asynchronous balancing*	- METID: Innovation Teaching & Learning Task force handles designing and testing tools and methods for learning innovation and faculty support. - Training on teaching innovative activities is offered to faculty on an optional basis in the form of workshops, seminars and informal meetings at the EduCafé to share ideas and experiences. - Smart learning approach mixing synchronous, self-paced and semi-synchronous social discussion tools to ensure a good blended learning. - "Passion in Action": a catalogue of open participation teaching activities to support student's development of transversal, social and soft skills, independently from the program they're enrolled in. - A repository of courses and material concerning "designing learning innovation" is available for professors to improve their pedagogy and leverage technology solutions in their course delivery. - Students are put as the centre of focus when developing new features or taking new steps in the improvement of existing tools: feedback is collected and used
	Social learning	
	Instructional team supporting faculty	
	Training	
	Involvement of students in designing their learning experience	

		accordingly to support decision-making. The aim is to include them as co-designers of their learning experience in the future.
Analytics	*How the data is being leveraged*	In its strategic plan, BS-C's action plan for the next 3 years includes developing the use of university data through the Data Analytics centre to strengthen the level of customisation of growth paths. A dedicated team of data analysts is in place to redesign and improve the learning experience of students.

In BS-C, the strategic formulation of the strategy is addressed thoroughly and is deployed through different entities within the institutions, from the Chief Digital Officer who acts as an ambassador of the digital transformation of the school, to the task force in place to support relevant stakeholders through this change, to the team in charge of building innovative AI continuous learning platform, whose Product Owner we spoke with.

In defining the school's direction and identity, the interviewee stated that before all, BS-C is data-driven, meaning a supportive digital environment is necessary to its success. Similarly to BS-A, the school also engages and addresses different stakeholders and makes sure all ends are satisfied.

"It's important to keep in mind the big picture – it is useful for the digital transformation as a whole. If I need to develop a new feature […] different business lines to speak with different stakeholders. Features could benefit a wide range of users/opportunities. That's a complexity we manage everyday"

As a data-driven institution, the interviewee stressed the importance of certain factors in achieving their goals, namely the value of being prepared infrastructure-wise, emphasizing on the direct link between data and student-centricity.

"In my opinion, having a data lakes, data management that is correctly built its very useful because with big data you can predict and develop learning paths more aligned with the individual students."

A lot of insight is lost to lack of communication between data lakes, which is why the school made it a priority to address this challenge by investing in infrastructure and making partnerships with technical providers. This triggered discussions on challenges the school faced/is facing with regards to these factors: namely the resources-related issues since keeping up with the target (students) is a dynamic analysis, products and offerings change with their

changing needs that need to be constantly tracked, which isn't always easy to manage on the resources on hand (both human, time and technological).

"I think it is only an issue of organisation. As a product manager, I'd love to interview students, but I don't have the time next to ongoing projects: this requires focus groups, find the people, define the questions, analyse the results… sometimes the business runs faster than the analysis."

Another noteworthy challenge encountered were also related to change resistance, which in this regard the pandemic helped overcoming a bit with the necessity. Again with the strategy encompassing so many different actors/stakeholders, culture change is hard to achieve.

"We always say that we have to make changes in our solutions, but the first change is in our mind"

		Case 4: BS-D
Strategic orientation	*Strategy commitment to digital learning*	The university has a digital learning strategy in place (2018-2015) with encompassing 3 focus areas: *experience* (digitally enhancing the on-campus experience), *innovation* (thought-provoking and impactful learning & teaching) and *extension* (impact society at large through open access of digital learning).
	Budget allocation	The investment and financial model are changing and currently under advisement, but the digital learning hub unit was operating on 1.5 mln £/year, part of that budget was autogenerated by MOOCs and other open content developed by the university.
	Partnerships/alliances in place	- The school has joined a Management Education Alliance that has at heart a custom-built digital learning platform aiming to transform the future of business education sector (and is the first collaboration of its kind). The platform was designed by Edtech enterprise Insendi. - The digital learning's action plan follows a partnership model with Open Program Management (OPMs) such as EdX and Coursera supporting the college with marketing, positioning and technological platforms and support.
Technology	*Solutions currently implemented* *Future projects*	- The school have a virtual learning environment (VLE) in use, different platforms including Blackboard, Incendi, EdX and Coursera. - The university experimented with hologram technology enabling lecturers to appear as 3D life-size entities hosting lectures in different locations simultaneously, allowing great flexibility of delivery. - The school develop in-house learning apps, games, experimenting with VR and 360 video for immersive experiences to include non-campus students. - AI-based student support mechanisms: they help redirect students towards relevant readings/courses, answer FAQs... - The university has a centre for Continuous Professional Development providing a wide range of short courses aimed at professionals in different disciplines. - Automation of assignments and e-examinations are solutions under construction to be deployed in the near future.
Educational formats	*Currently implemented* *Future projects*	- Online/blended/hybrid formal Degree programs. - Online virtual executive programs. - Short programmes and courses with and without formal certificate recognition. - A catalog of MOOCs is available through external providers and internally.
Instructional Design	*Synchronous/asynchronous balancing* *Social learning* *Instructional team supporting faculty* *Training* *Involvement of students in designing their learning experience*	- A Digital learning Hub is running since 2017 and can offer co-creation and support in any phase of the learning design process (ideation, design, development, delivery, evaluation.) - The Management Alliance provides access to expert digital training, consultancy and programme development support ensuring superior ownership over online offerings. - Trainings and workshops on online design and delivery of content/courses are available to faculty to support them achieve the vision of digital education in BAU (Business-as-Usual). - A repository of guidelines aiding faculty to take teaching online with recommendations for sync/asynchronous modes is available at all times, with guides as to how to create engaging activities, deliver labs remotely… - Students are offered opportunities and encouraged to co-create with relevant teams innovative learning experiences, simulations or apps.

		- An agile methodology is adopted including prototyping and beta testing involving different audiences/stakeholders to test newest solutions/methods. Students are engaged in more than one way.
Analytics	*How the data is being leveraged*	- The school invested in its technical infrastructure to strengthen its learning analytics capabilities, and in that frame is expanding the analytics team to put forward recommendations to college committees to facilitate decision-making, namely: student attracting, student retaining… - Data analysts are also part of the digital learning hub to innovate the way The school looks at data and be able to provide best insights as to how to redesign the education content and method delivery. - Students have access to their learning through dashboards allowing them to track their progress and target better their next endeavours.

In light of the pandemic, BS-D's currently experiencing a major shift in terms of leadership, and financial model. But similarly to Case 1, the institution strategic plan is characterised by self-sustainability as well. The digital learning hub - of which our interviewee is the director – was reported to operate on an important budget, of which a big part was auto-generated through the selling of MOOCs and open content developed by the school.

There's a diligence as well in making units responsible for recouping all the investment, in which they've proven to be successful, which further enhances newer advancements and plans.

"Consider that with my unit, what we achieved is that we have a global audience that the school doesn't usually have. It's a global audience of online learners that is about more than 1,000,000 people subscribe to our MOOCs and open content, all revenue generating."

Another success factor according to the interview is the strong support of leadership which she considers to be instrumental to the digital transformation journey, their advocacy for change is what truly brings value. In that sense, the school identifies digital transformation as a whole, so not just in terms of digital education as an enabler or enhancing the student journey. The vision now is to transform the core functions of the university on top of learning:

"We're trying to understand what's the best financial model to sustain digital learning and digital education as part of our strategy, like as a BAU (business as usual) and not as an isolated experiment. Kind of like looking at the student journey as a whole, not as silos".

In that sense, the pandemic acted as an accelerator for BS-D, even if the school had a good ground to stand on since their journey did not start in 2020, rather they identified that a great

success factor today is due to their preparedness in terms of infrastructure and activities that they could capitalise on (having already proven to be successful), rather than start from scratch.

On discussing hurdles and challenges related to their journey, BS-D similarly to other schools experienced change management efforts, as major strategy changes affect the whole spectrum of stakeholders. Additionally, resources allocation was also a topic of discussion given that changes come with new activities and hence new roles.

"You can't think that an academic can take on additional work without rebalancing what he's already doing. This online thing is just put on top of whatever they were doing."

Case 5: BS-E

Strategic orientation	*Strategy commitment to digital learning*	The school launched in 2020 its Liquid Learning model, a strategic commitment to transform its educational experience. With more than 20 years' experience in the design of online training, it ranks 24th amongst the world's best universities for a digital education. The liquid learning model being rooted in 4 key principles: *Collaboration*, *Active learning*, *Personalisation*, and *Applied learning*.
	Budget allocation	Total budget is classified. The university's digital innovation practices are reportedly mainly self-funded. Part of that budget was autogenerated through licensing activities of solutions/tools developed by the school, MOOCs and is used to maintain, upgrade and enhance existing catalog and the development of new ones.
	Partnerships/alliances in place	- BS-E is part of FOME alliance (Future of Management Education), a partnership leveraging member schools' collective capabilities to shape impactful, collaborative initiatives. The alliance encompasses partnerships with Incendi Learning Platform and edtech accelerator: SuperCharger ventures. - A Partnership with Coursera is in place allowing access to free, certified online classes by through different specializations to alumni network to promote and encourage lifelong learning. - The school and IBM joined forces to create a program for generating disruptive technological ideas and advanced technological prototypes of Artificial Intelligence based on the concept "Learning by making AI". IBM's Academic Initiative platform was made available to teachers and students as part of the partnership.
Technology	*Solutions currently implemented* *Future projects*	- The school uses many LMS's, of which Blackboard Ultra, integrated with various edtech tools such as Feedback Fruits (a tool enhancing students engagement, collaboration & feedback in both sync/asynchronous ways): making interactive even rigid media such as pdfs. - Every single class is equipped with hybrid technology, no blackboard only digital screens to enable equal offering to students both in presence & online. - WOW Room: 48m² curved interactive wall using real-time simulations, holograms, big data analysis, and an AI system that reads students' body-language and understand their emotions and level of engagement, and uses big data to analyse information in real time & gages level of attention. - VR solutions are developed in-house (but also others in partnership with edtech providers) and used in class to enable immersive experiences. - A collection of more 1500 learning assets including short videos, multi-player simulations and interactive case studies are at the school's disposal. - Communities Platform: knowledge and experiences are exchanged with over 50,000 school graduates currently holding management positions world-wide. - The use of blockchain for certificate recognition is a project that is under consideration and may be implemented in the near future.
Educational formats	*Currently implemented* *Future projects*	- Online/blended/hybrid formal degree programs. - Short courses (face-to-face, online and blended) with or without recognition of certificate. - Executive education programs. - A large catalogue of MOOCs is available, with content targeting both students and professionals across multiple disciplines.

Instructional Design	*Synchronous/asynchronous balancing* *Social learning* *Instructional team supporting faculty* *Training* *Involvement of students in designing their learning experience*	- IE publishing: unit that designs, develops and distributes educational materials allowing students to learn through practice, by applying learned concepts & making key decisions. Teachers can brainstorm ideas and go to the publishing unit to make it happen. - Learning pack (for asynchronous lectures): teaching material content prepared by teachers supported by the Publishing team who take care of the format. Structured with various activities to be transversal across different students. - Student's feedback is collected through surveys (both qualitative & quantitative) and used to enhance existing products and offerings. They are also involved in beta-testing of products before rolling-out new solutions across different faculties. - Up to 70% of core professors already possess extensive experience with distance learning. In addition, online teaching resources are at their disposition - Continuous training and support is offered to the teaching faculty by the Learning Innovation team, to keep up with ever-changing technology trends to assist them in making the most out of the tools at hand.
Analytics	*How the data is being leveraged*	Learning analytics is a top priority for BS-E, tracking daily each students learning, engagement, progress (online courses). Insights are leveraged in order to provide a better learning experience and enhance course content for future intakes. Also, predictive analytics are used in innovative ways: for predicting student's final grade for example and focusing efforts on the ones lagging behind and improve their odds at doing better.

In the case of BS-E, the liquid learning strategy envisioned was supported by a reportedly generous internal budget, as digitalisation has been considered a core element of the institution since its establishment. Innovation and technology management are part of the school's values. The school has units in place acting as e-commerce business such as the publishing team: licensing a catalogue of materials to other institutions. Comparably to previous cases, BS-E's strategy is supported by its success and self-sufficiency.

Our interviewee states that almost all revenues generated through these units go back to maintaining, upgrading and enhancing existing content and developing new solutions. But he argues that while that financial model helps, a significant amount of investment is truly the key enabler of keeping digital learning evolving.

"We invest an important amount of money so more than just MOOCs and open content revenues. In other words, we understand that technology needs an important investment, and the university invests on it."

Conversely, BS-E did not perceive COVID-19 crisis as an enhancer of digital learning at their institution. Technology has been part of their values since the beginning, driven by executive education since early 2000s.

"We have been doing this for years, for almost two decades and well, almost two decades and with the online programs as well. I mean, we launched the first MBA program back in 2001."

The school's preparedness actually helped in adopting a pro-active approach to the crisis rather than a reactive one. Because of the nature of the school's mission and vision that is digital at the core, change resistance/management was not an encountered issue. Faculty are comfortable working with technology, instead the challenge resides in keeping them up with ever-changing trends, in terms of training to grasp the full potential of solutions at hand.

"The challenge I think has to do with training the faculty for them to make sure that they get the most out of the technology. And this is something that has to be constantly done because technology is ever-changing and evolving. So it's a continuous training."

BS-E's model being rooted in personalised learning, data analytics are viewed and treated as a priority, keeping the student at the centre always. The use of predictive analytics to support unique student circumstances and pathways. Learning analytics is leveraged fully throughout the whole spectrum in improving the learning experience of students – and goes through an iterative cycle of continuous tracking to embetter course content and identify opportunities to do better.

		Case 6: BS-F
Strategic orientation	*Strategy commitment to digital learning*	The university has a strategic plan over a 5-year period and a 10-year vision. It encompasses quantified targets and specific commitments to offering a life transforming, "more personalized and digital learning experience". Making lifelong learning a one of five key pillars for the 2025 and identifying the relevant KPIs: *experience, glocal, discovery* and *innovation*.
	Budget allocation	Total budget is classified, but the university's digital innovation practices are reportedly fully self-funded.
	Partnerships/alliances in place	- SDA Bocconi has many global alliances with other leading Business schools including double degrees, joint executive programs… - Partnerships with OPMs are in place to support the technical development of in-house solutions. - An edtech forum was organised by the SDA Bocconi's ex-director of Learning Lab in order to fructify opportunities for European business schools to share their knowledge and practices, discussing issues related to digital learning and how to face them.
Technology	*Solutions currently implemented*	- SDA Bocconi uses Blackboard Collaborate as virtual learning environment (VLE) and other platforms. - A large portfolio of innovative learning solutions are developed in-house: management simulations, role-playing games, web-based solutions and interactive assessments and business cases, augmented classroom system… - AI is expected to be leveraged in the near future (3-5years) in order to filter students' needs, identify the right learning content to individual goals: AI solution as a mentor/advisor.
	Future projects	
Educational formats	*Currently implemented*	- Online/blended/hybrid formal degree programs. - Short courses (class, online and blended) with recognition of certificate. - Open executive programs - Executive custom programs: designs personalized programs for public and private organisations, combining their strategic objectives with individual and personal development – tailored specifically to organisation. - A library of MOOCs is available.
	Future projects	
Instructional Design	*Synchronous/asynchronous balancing*	- The Learning Lab is the tech-enhanced innovation centre of SDA Bocconi which designs, develops, and executes high-tech and high-touch experiential learning programs. - BUILT (Bocconi University Innovations in Learning and Teaching): a unit aiming at creating enhanced unique learning experiences through exploration (experimenting new ideas and methods) and exploitation (consolidating innovations at large scale within Bocconi processes). - The learning lab also focuses on faculty training (on an optional basis) supporting them by offering demos and whatnot in adopting the most effective education practices to deploy knowledge in a multi-channel fashion. - Students are often involved and encouraged to take part in course content design.
	Social learning	
	Instructional team supporting faculty	
	Training	
	Involvement of students in designing their learning experience	
Analytics	*How the data is being leveraged*	A data analytics team is reported to be in-house and is in charge of supporting the improvement of content delivery and better adaptation of Bocconi's offer to students in an individual fashion.

In the case of BS-F, a long-term strategic plan (also self-funded) was put forth with clear quantified targets to achieve, striving to achieve key pillars. These pillars also guided the measures and approaches adopted: discovery and innovation were key components to the implementation of the school's strategy. When speaking to the coordinator of the institution's digital learning lab, he shared that one crucial aspect was the involvement of innovators willing to experiment with new solutions: trial and error were key success factor for BS-F.

The latter also pointed out that what works for a school isn't necessary working for another: for the differences in capabilities/capacity, existing infrastructure, financial model, and organisational culture. Which is why he describes innovation initiatives as "safer" approach. In that sense, BS-F also did not perceive the pandemic as a direct accelerator, noting they were infrastructurally prepared and not starting from scratch.

"Thankfully we were prepared more than other schools at least in terms of classroom infrastructure because it was already planned within the strategy prior to the crisis. So the full transition after COVID went smoother than what it could have been."

A challenge that the pandemic did shed the light on though was dealing with change management, related to faculty.

In terms of technology used, the institution's strategy is supported by a wide portfolio of online learning tools most of which are developed in-house with the support of tech partners. Mostly they are characterised by the innovative delivery formats and content creation creativity. The use of other technologies such as AI, VR or Blockchain is not yet implemented, though AI was reported to be the next immediate project meant to support adaptive learning. A limitation to the use of other solutions was reported to be related to the high investment costs that are not yet worth the investment for the school.

"We tried to incorporate some of these ideas, but they imply a very high investment cost that we just didn't have the budget for regarding the benefits. Blockchain: we deem is not useful to us, it's simply a not a good investment for the time being since we have alternative solutions for certificate recognitions that don't require such amount of money."

5. Discussion

The paper addresses the trends and factors involved in the digital transformation of learning, specifically in the management higher education arena. The results we obtained highlight the existence of different approaches and models in handling a digital transition to enhance learners' experience, encompassing several key enabling dimensions, which in turn affect each other in the process. Furthermore, these approaches have shown to induce diverse types of conflict and information flows at various levels of the organisation.

Overall, we can distinguish between two main approaches regarding digital advances in learning:

- *Bottom-up approach*: emanating from innovators, digital enthusiasts, faculty individuals whose personal commitments acted as a driving force in terms of innovation.

- *Top-down approach:* where the governing bodies and top leadership among the school play a very distinct role in directing and managing different units, allocating resources and addressing hurdles along the way – they're the ones empowering different task forces as the operative side of the strategy.

The latter more often than not has proven to be the most effective. A common theme throughout all cases was the importance of supportive leadership in achieving the vision.

On the dimensions we defined throughout our conceptual framework which also guided every step of our multi-case analysis, we can retrieve several similar patterns which we can interpret in some key takeaways. In the previous section (Findings), we focused comments on dimensions and themes we found most relevant with regard to each institution's experience, whereas not so much on others, such as educational formats and content delivery modalities, learning analytics or again Instructional design.

This does not go to say these do not factor particularly towards digital transformation of learning, on the opposite. Based on our results, we came to the distinction that these were all elements that were common throughout our cases, regardless of their strategic approach. In light of our earlier literature review, it goes to show that institutions jumped on the bandwagon trends and are in line with academic and scholars perspectives, some driven by the rising influence power of executive education, others by the necessity caused by the emergency state experienced in the last few years. Below we discuss how all these elements relate to each other.

Divergences were observed mainly in terms of bundling and disaggregation of educational services, and partnerships, all of which are related to the institutions' overall business models. This study did not go so far into exploring those aspects to bring any solid perspective on the matter. In this study we set out to explore the enablers of digital transformation of learning and the dynamics of their relationships in leading to a successful strategic outcome.

The research literature suggests that deploying educational technology for learners, educators, and institutions is difficult. Researchers also warn that integrating digital learning takes more than just a transfer to online formats; it necessitates a strategy and leadership focused on technology-enhanced learning (Arnold & Sangrà, 2018). Our inductive themes expand on this, highlighting the various aspects of this complexity while also building on the previous dimensions.

Figure 15: Key enablers of digital transformation of learning

The figure represents the components our research showed to be the mainstays driving digital learning. Our identification of these elements as being core relates to the retracing of all codes and themes generated through discussing the challenges and success factors of each respective school. We found that they are inter-dependent variables in that, shortcomings related to one of them has a noticeable negative effect on the other. Conversely and interestingly, also positive aspects of each of these dimensions are inter-dependent. Let's exemplify these relationships (R1, R2 and R3) through direct codes and themes retrieval:

R1 (Tech to Org)	***Code examples***
Use technology to identify opportunities to satisfy different stakeholders within the institution.	- "It is it useful for digital transformation as a whole, features could benefit a wide range of users/opportunities" - " To develop a new feature regarding a particular lesson. I need to speak with the teachers, with the students and we coordination individuals: people that everyday manage or the agenda of lessons…"
Leverage analytics insights such as predictive analytics to improve and redesign learning experience for	- "[…] to provide a better learning experience, to enhance learning, to enhance the courses in the future for future intakes." - " If we see that in a quiz that in question #7, say 70% of the people have wrong answers:

students, and to streamline operational processes	Something is happening with this question and it could be because of the question is not well stated or perhaps the concepts were necessarily well explained in the course; so we review this information to enhance the course content and delivery for future intakes, which also benefits professors"
Rely on technological advances and solutions to rebalance organisation's workload	- " You can't think then in academic can take on additional work without rebalancing what he's already doing. This online thing is just put on top of whatever they were doing".
R1 (Org to tech)	***Code examples***
Instructional designers to support faculty and staff in grasping the full potential of technology at hands.	- " There are different teams working together: So there is one team that is looking into how to integrate video in teaching and education? How to integrate Open educational resources? one team looking into digital solutions for handling exams." - "In terms of regular training, we do train our academics on how to design for online and we do have some workshops for delivery online"
Enable the digital enthusiasts willing to experiment within innovation	" There are some professors like in the digital Learning Center who were trying to implement stuff, but again it was really just a small number of people trying stuff we were experimenting with VR for example"

R2	***Code examples***
Allocate necessary resources to overcome:	
Change resistance	" It's a big change management effort, not just the senior management, you know it's a changing culture and mindset and a change in the way we do operations. This is what my unit [instructional designers] is for."
Avoid overworking/understaffing	- " the IT guys: they are usually very overworked and understaffed". - "my team had different focuses and overworked to develop solutions". - "it is only a problem of a question and an issue of organization, but it is also primarily the costs because I know that it is very expensive."
Bypass remuneration & faculty incentivization challenge	- " The challenge that is still not overcome: the policy of remuneration and incentivisation of professor who get implicated in digital learning." - "I would have mounted a 3 people team dedicated to legal and juristic questions related to remuneration to faculty…"

R3 (Financial resources to tech)	*Code examples*
Investment in necessary infrastructures and innovative/experimental tech solutions & edtech partnerships.	- "So we partnered with both EdX and Coursera and the and both of them, they helped us on the marketing side positioning and technological side" - "Investing in a data lake - data management that is correctly built its very useful because with big data you can predict and develop learning paths more aligned with the individual students." - "There are definitely future projects ahead: new solutions for grading assignments, experiments with AI […] Blockchain is costly for now, but definitely a project for the future."
R3 (Tech to financial resources)	***Code examples***
Achieving sustainable digital innovation through technology advancement to reinvest.	- "Then also we are also licensing our materials and we're like licensing in our simulations to other business schools or other institutions Including top tier universities". - "I'd say almost fully these revenues generated go back to upgrading and enhancing the content we have and developing new experiences." - "Through the selling of our MOOCS […] there was a kind of a first successful attempt at self-sustained strategy for digital innovation in learning - "Our publishing team's developed a catalogue of content, it's an E-commerce we have as well […]"

As highlighted in both the literature review, the conceptual framework and throughout our multi-case analysis: the element of strength that has been consistently and unanimously pointed out by our informants has been: having a clear strategy definition, formulation and vision. In this respect, our study has shown overtime it is the underlying governing factor encompassing all other dimensions, which explains its pivotal position in our suggested enabling factors driving digital learning.

Limitations of the study

We are aware of our study's limitations. For starters, our sample does not represent the whole range of diversity found in the management higher education landscape. Regardless of this limitation, our findings revealed common trends across locations, indicating that many institutions face similar issues, albeit with a few contextual differences. Second, our concentration on higher education leaders constrained our understanding of instructors' and

students' perspectives. With these regards, future studies, and research ought to focus on both macro (e.g., national policies and initiatives) and micro (e.g., students' digital learning experiences) dimensions to better understand how those levels interact.

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Appendix

Semi-structured interview protocol

Strategic orientation

1. Approximately, what percentage of the budget is dedicated to investments for the digital transformation of the educational experience? Can you please elaborate on the activities to which this budget is being distributed?

2. What are the type of roles that are typically involved in the implementation of a digital strategy in your organisation?

3. Does your institution benefit from any external funding to support your digital transition? If yes, what kind? (eg: National initiatives…)

4. Do you have any notable partnerships with EdTech companies or are all digital learning solutions developed in-house? If yes, what kind of activities are encompassed?

5. Are there any strategic Management Education alliances in place with other academic institutions? If yes, what dimensions are encompassed in these partnerships? (Examples below)
    - Coordinated admissions process
    - Centralized purchasing power (shared textbooks…)
    - Modular and integration friendly learning platforms
    - Integrated cloud platform
    - Common repository for student internships and employment opportunities
    - Access to educational material for reuse
    - Joint research projects

6. What challenges do you consider you have faced in implementing a digital strategy? (Examples below)
    - Time restraint
    - Rapidly evolving technology changes
    - Change management:
    - Insufficient involvement from general teaching staff
    - Clear communication of the strategy/vision
    - Support from technology partners
    - Lack of endorsement of senior leadership teams

7. How is the process of evaluating the success of the digital strategy in place measured? (If not against specific target)

8. Can you share from your personal perspective any comments with regards to the institution digital transformation journey? (Something that you'd have done differently?)

Technology

1. What technological solutions are currently being used in your institution and how are they leveraged exactly?

    - Custom LMS platform
    - VLE
    - Learning apps, gamification (e.g. simulations and business games)
    - Artificial intelligence
    - Blockchain (for recognition of certificates)
    - Hybrid learning method

2. Which ones do you feel are best supporting your digital strategy?

3. The ones not employed: why not? What are the limitations related to them in your opinion?

4. Which ones do you expect will be use in the next 3-5 years?

Instructional design

1. Who is the responsible entity for the development of digital learning experiences within the institution? And what kind of activities are they performing?

2. How are students involved in their digital learning design experience? And if not, why not?

3. What are the main impacts of digitally enhanced learning and teaching that have been observed at your institution?

Data Analytics

1. Is there staff in your organization dedicated to data / learning analytics – or is the data analysed by a third party?

2. How is the student data analysed used to improve the learning experience? (Examples below)
   - Student admissions/retention
   - Redesign and improvement of the learning experience
   - Provide a personalized learner experience through adaptive learning
   - Student dashboard to assess performance
   - Teacher dashboard to improve training effectiveness

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