Education

Trade challenges and opportunities post pandemic

Foreword

Education systems around the world have been undergoing significant structural transformation in adapting to the needs of modern digital and globalised societies. The UK Government has been leading the transformation of the education sector by fostering the development and deployment of innovative technologies, educational resources and training methods, such as moving to cloud-based services, high-speed broadband and supporting digital skills development. This can offer improvements in educational outcomes across the country and fuel productivity growth, supporting the UK's long-term shared prosperity vision.

The UK has been a global leader in providing world-class education for many decades. The education sector is an important source of employment in the country, with 1.5 million people employed in public education alone. Education also offers significant export opportunities; exports and cross-border education activity (including English-language teaching) generated an estimated £20bn (US$27.5bn) in 2016.

The Covid-19 pandemic has been an unprecedented disrupter to learning on a global scale. However, it could also be a catalyst for a fundamental digital transformation of the sector, accelerated by the take-up of online and hybrid learning models. This presents as an opportunity for education providers to further export their services, tapping into online tuition markets globally. This, however, requires the education sector to adopt innovative delivery methods, new technologies and appropriate training and support for education professionals.

The education sector in the UK benefits from a vibrant and fast-growing education technology (EdTech) sector,

contributing an estimated £3.5bn (US$4.8bn) to the economy, with an estimated £300m (US$414.5m) generated from exports in 2021. The sector expanded by an estimated 71.5% in 2020, as the nation's students and workers shifted en masse to online platforms. In 2019, the UK Government developed a strategy to support further development of the EdTech sector.

The UK Government is also supporting domestic businesses' ability to offer their world-class education services around the world. Through Free Trade Agreements (FTAs), knowledge development and promotion, as well as providing financing directly, we are helping to further promote the UK's world-leading education offer.

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Director General
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Department for International Trade (DIT)

About this report

Trade challenges and opportunities in the post-pandemic world: Education is an Economist Intelligence Unit (EIU) report, supported by **the UK's Department for International Trade (DIT).**

Section 01

Global education sector growth and outlook

01

Global education sector growth and outlook

By the time Covid-19 made its presence felt, the global education sector had reached an impressive scale, having grown strongly over the previous decade, particularly in higher education.

Total enrolment–encompassing primary, secondary and tertiary levels–stood at 829 million students at end-2019, an increase of 14% over 2010 (Figure 1). Higher education enrolment grew by 25% during the same period.

Monetary figures for education output are harder to come by, but that of higher education technology (encompassing hardware, solutions and services) provides an indicator of sector strength. Valued at US$1.1trn in 2019, this market's size is projected to expand more than twofold to US$2.4trn by 2027, according to one research firm.[1]

North America boasts the largest number of educational institutions and universities in the world, generating US$368bn in revenue in 2019. The number of institutions is increasing steadily in Europe, however, as are those in Asia-Pacific, as the importance attributed to higher education in many of the region's countries grows.[2]

The pandemic has undoubtedly curbed the sector's growth, at least temporarily. According to the United Nations, institution closures and other forms of disruption at all education levels had affected some 1.6 billion students in 200 countries by mid-April 2020–94% of the global population of children and youth.[3] Joysy John, CEO of 01 Founders, an EdTech start-up, and formerly Nesta's Director of Education, says that the pandemic negatively affected university enrolment rates in the UK and Europe. Many international students, she adds, have deferred their placements, impacting the revenue of universities that rely on this income stream.

Figure 1: Growing student population: *Global student enrollment, 2010-2019 (million students) growth rates*
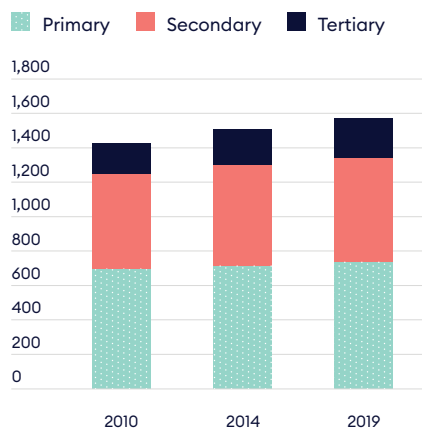

Source: UNESCO, data sourced from the World Bank's Education Statistics website.

New directions in international student mobility

Universities in North America and Europe have benefited enormously in recent decades from an inflow of international students. In 2018-2019, more than 5.5 million students studied in degree programmes outside their home countries, more than double the number doing so in 2000. Around half of that figure were studying in degree programmes in the US, UK, Australia, France, Germany and Russia.[4]

Figure 2: Global learning: *Inbound mobility of students in higher education, 2018/19*
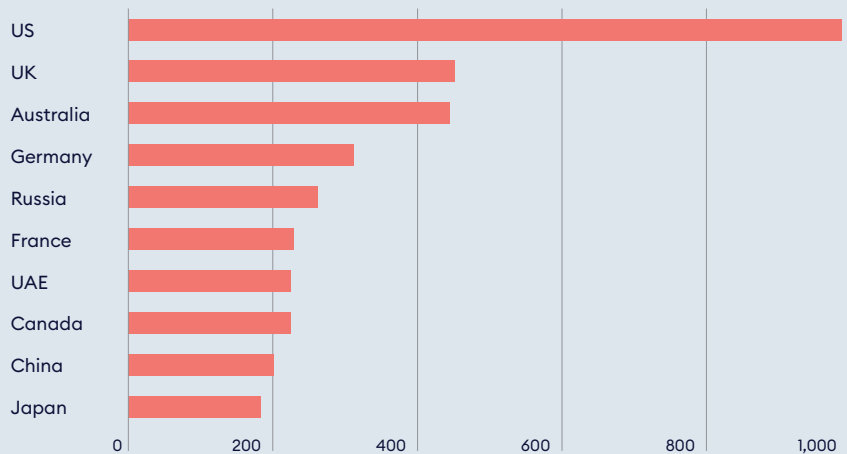
Source: UNESCO

However, the directions of student travel are shifting, according to Ming Cheng, a professor of higher education at Edge Hill University in the UK, whose areas of research include internationalisation of higher education. An increasing number of students from Asia as well as the southern hemisphere, she says, are choosing to study in China, Singapore, Japan and other Asian countries.[5]

The pandemic has added momentum to this development. "Asian students and their parents will remain concerned about safety in Europe while Covid-19 infection levels remain high," says Ms Cheng. But there are other factors at work. The high costs of a US or UK degree are one, she says, leading some Asian students to question its value when many students are finding it difficult to get ideal jobs after studying abroad. Another is a complaint, particularly from Chinese students in the UK, about limited opportunities to integrate with domestic and other international students. Chinese students need to be able to improve their English-language capabilities, which, says Ms Cheng, is difficult in some business schools when most of those in the class are Chinese. Weak English proficiency affects students' employment opportunities. "Western universities need to address these concerns before East–West student mobility returns to pre-crisis levels," says Ms Cheng.

Returning to growth

The future course of the pandemic is difficult to predict, but higher education has an opportunity to revive its growth. "If universities are able to harness technology, they will increase their reach and make their offering much more accessible," says Ms John. The digital challenges that educational institutions at all levels face are considerable, however. In parts of Asia, according to Mike Michalec, Managing Director at EdTech Asia, "higher education institutions are slowly adjusting to the demands of online learning. Governments are only just beginning to understand that there is value in hybrid delivery as a form of risk mitigation for future scenarios where teaching and learning might be postponed again."

Universities must also face up to another challenge: proving their degree programmes represent value for money. Given the increasing cost of university education and the debt that students accumulate, particularly in the US and UK, says Ms John, as well as the difficulties many graduates have today in finding jobs, "the value-add of getting a master's or other degree from a well-known institution isn't what it used to be."

It is clear that the education sector must embrace the challenge of re-thinking its delivery models to remain fully relevant to students' needs. Covid-19 has been a highly unwelcome disruption to learning, but it could also be a catalyst for such a transformation based on digital technology.

UK perspective: Growth challenges for higher education

According to a number of different metrics, the UK's higher education sector is a significant contributor to its national economy. According to Oxford Economics, a research firm, UK universities generated £53bn (US$73m) in gross value-added output in 2014–2015, accounting for 2.9% of total GDP.[6] Education exports and cross-border education activity (including English-language teaching) generated an estimated £20bn (US$27.5bn) in 2016, according to the UK Department for Education, representing an increase of 26% since 2010. Higher education, buoyed by large inflows of international students, accounted for just over two-thirds of this figure.[7]

The weight of revenue from international students highlights the challenge facing UK universities as the global pandemic recedes. Sector-wide, university finances are under pressure due to international student deferrals, as well as increasing demands from domestic students for tuition discounts to help manage a heavy loan burden.[8] At a time when they are being called upon to prove their continued value for money (see the discussions above), the country's universities must be ready to adapt their pricing and delivery models with the help of digital technology.

Fortunately, the education sector as a whole benefits from a vibrant education technology sector. Though many are still in their infancy, UK EdTech firms contribute an estimated £3.5bn (US$4.8bn) to the national economy, with exports in Q1 2021 expected to generate nearly £300m (US$414.5m), according to one recent report.[9] Experiencing a high rate of expansion and being a magnet for global venture capital investment (see Section 3), EdTech is likely not only to become a prominent generator of education sector output in the UK, but also to provide its educational institutions the technical wherewithal to advance their own digital transformation.

Section 02

The digital imperative

02

The digital imperative

> ## "
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>
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> (formerly Director of Education, Nesta)

In education, as in other spheres of activity, the pandemic has brought in its wake what are probably irreversible changes.

The lockdowns forced universities and schools to shift wholly to distance-learning models almost overnight. Far from all were ready. "Universities around the world found that most of their faculty were unprepared for it," says Barbara Kurshan, Senior Fellow in Education and Innovation Advisor at the University of Pennsylvania's Graduate School of Education. In the UK, according to Ming Cheng, many university teachers panicked when suddenly told to adopt platforms such as Teams, Zoom or Blackboard, having never taught online before.

By mid-2021, students had returned to classrooms in most (though far from all) countries. Nevertheless, educational institutions can be certain that blended or digital-only modes of learning are part of their future. According to Joysy John, those universities that had a digital strategy in place before 2020, with faculty and staff fully on board, have coped reasonably well with the pandemic disruption. Others have had to scramble but are now moving forward with digitalisation. "Institutions can no longer be in any doubt that digital technology is revamping the traditional model of education," she says.

Established universities cannot afford to put off investment in their digital future, as they face growing competition from new entrants into their market. The strongest challenges are coming from online-only providers of MOOCs (Massive Online Open Courses). This segment of the higher education market enjoyed rapid growth in 2020, increasing its international base of registered learners by some 50%, taking the total to 180 million (a figure which excludes China).[10] Although much of that growth was a result of the pandemic, the major players in this segment–led by its biggest, US-based Coursera–are attracting substantial new funding to fuel continued expansion.[11]

Since their emergence over a decade ago, and despite their early growth, MOOCs are widely regarded to have failed to change higher education in fundamental ways.[12] As they refine their models, however, there are expectations that MOOCs will have a larger impact in this sector in the years to come.[13]

Figure 3: Going digital: *Top 3 online-only MOOC providers, by registered users (millions)*

■ New users in 2020
■ New users in 2019
▦ Previous
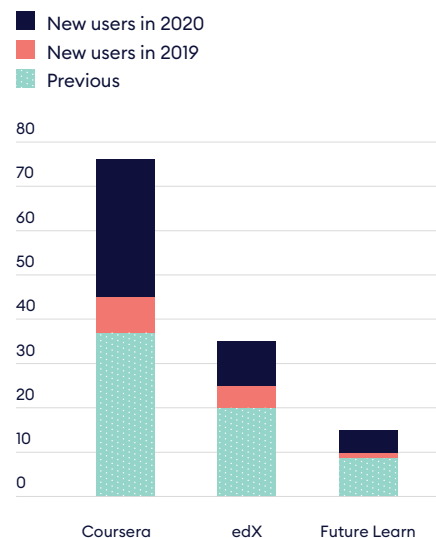
Source: Classcentral

More change to come

Online learning platforms are just the tip of the iceberg of what technology advances are bringing to education. Augmented and virtual reality (AR/VR) are enabling immersive learning methods that give students an integrated, multi-sensory experience of the object of study. Assistive

> ## AI has numerous other applications in classroom environments, whether physical or virtual.

technology, such as speech-to-text tools, helps students with disabilities overcome impediments to learning. Robots with embedded artificial intelligence (AI) capabilities are already finding their way into classrooms as teaching assistants.[14]

AI has numerous other applications in classroom environments, whether physical or virtual. Ms Kurshan expects AI to enhance online collaboration, for example, and to take educational gaming to new levels. This will not only enhance students' learning experience, she says, but will also help teachers understand what precisely their students are learning from it. AI also assists learning by monitoring how students engage with online reading materials or videos, recommending other content that may be better suited to their comprehension levels. It can also recommend personalised tasks for students based on their interaction with online course materials or test performances.

Different types of biometrics are now being used in schools in parts of the US, Europe (including the UK) and Asia. Current applications include confirming attendance and payment for school catering. In the near future, the combination of biometrics and Internet-of-Things (IoT) technologies will help teachers regulate elements of the classroom environment such as lighting and ventilation, which can affect students' concentration levels. Ms Kurshan foresees the use of facial recognition (although not without controversy due to privacy concerns) to help teachers assess whether and how students are engaging online.

While many of today's technology advances focus on enhancing learning, Ms Kurshan expects assessment to become a growth area soon. For example, AI and advanced data analytics will, she believes, change how universities assess in-bound applicants and how teachers assess their students' in-class performance.

Is TVET ready for the future?

In the niche it occupies in the education sector, technical and vocational education and training (TVET) can often be a trailblazer. In some respects, says Jan Otero, Human Capital Development Expert with the European Training Institute, an EU agency, TVET institutions are ahead of most universities in digitalisation. An example is teachers' use of advanced technologies such as VR to train students in digital workplace skills, as well as their training in robotics, IoT applications and other technologies. At the same time, TVET struggles with the same digitalisation challenges faced by universities–particularly deficiencies in teachers' own digital skills.

Different TVET models–work-based systems with apprenticeships, as in Germany, and school-based systems prevalent elsewhere–face some of their own unique challenges. Work-based TVET, for example, has been at a particular disadvantage during the pandemic as students placed with companies that shut or curtailed operations could not train at all. According to Mr Otero, however, both systems face the common challenge of reinventing themselves as work and education environments change around them.

Aside from accelerating their digitalisation, TVET institutions everywhere need to re-think the skills they are providing, says Mr Otero. For example, more training is needed in sustainability-related disciplines, as companies in Europe and beyond now actively pursue new business initiatives to combat climate change. More importantly, he says, "We must provide TVET graduates with the skills needed to learn how to learn and to progress in their fields."

Germany has long been recognised as a world leader in TVET, but Mr Otero sees the impetus for change in this field of education coming from elsewhere. "Germany's approach to TVET modernisation is to focus on learning, curricula and teacher training, which is undoubtedly vital. But look to innovators in Brazil, Canada, Spain or China who are trying to redefine what TVET actually is." This is likely to involve, Mr Otero says, expanding entrepreneurship training to include business incubation. TVET institutions are also likely to take on a direct role in science and R&D, similar to that played by many universities today. "Vocational education can also be a producer of knowledge," he says.

Flies in the ointment

Most of the above, along with other advanced education technologies, are bandwidth- and data-intensive, requiring robust broadband infrastructure to deliver the desired results. This is far from a given for universities and schools, even in the world's most developed economies. "For me, the biggest barrier to universities' ability to master hybrid learning is connectivity," says Ms John. She claims that governments and telecoms companies play the major roles in upgrading broadband infrastructure where institutions operate, but the latter can do much to help themselves: "What universities can do is develop a digital strategy. They must make a conscious choice to invest in digital, not just in terms of infrastructure, but also in training their teachers, administrators and students in the digital skills to use the infrastructure effectively."

Teachers' limited digital skill levels are another roadblock to institutions' transformation. This is especially the case in higher education, says Ms Kurshan, who notes that, unlike in primary and secondary (K-12) education, university faculty have received comparatively little professional development in digital teaching and assessment. "Universities have to address how they're going to bring faculty up to speed to be able to teach online," she says.

Who will pay for the investments in infrastructure and other technology that educational institutions so badly need? Even in developed countries, government education budgets are under severe pressure from myriad competing demands for pandemic recovery spending. Privately financed universities are also struggling from declines in tuition revenue (see "New directions in international student mobility" in the previous section). As the World Bank points out, the situation is all the more dire in less-developed countries.[15] Donor funding from international institutions and developed-country governments is urgently needed to assist education digitalisation in the developing world, lest the world's existing education divides widen further.

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Section 03

The role of EdTech

03

The role of EdTech

The education technology market can be subdivided into three segments: hardware, services and solutions.

When it comes to higher education, hardware is currently the largest segment, consisting of interactive whiteboards, projectors, printers, PCs, laptops, tablets and smartphones.[16] However, the solutions segment is expected to exhibit rapid growth in the coming years. Consisting of learning management systems, campus management, student response systems and other types of software, it is where the expanding legions of EdTech companies, including MOOCs, are making their influence felt.

A high-growth segment

Global spending on education technology is expanding from a small base. Total digital spending worldwide in 2020 was US$227bn, accounting for just 3.6% of total expenditure on education and training, according to education data provider HolonIQ. The firm expects the share of digital spend to grow by just over 12% over the next five years, reaching US$404bn in 2025.[17] Among the advanced technologies discussed

in the previous section, spend on AR/VR is expected to grow the fastest, amounting to around US$13bn globally in 2025, with AI spend amounting to US$6bn and robotics US$3bn.[18]

EdTech providers will be major beneficiaries of this growth in spending. There were just over 3,200 EdTech companies in the world in 2020, according to market research firm Censuswide, of which by far the largest share (43%) were based in the US. India, Brazil, the UK and China accounted for most of the rest (Figure 4). The segment has attracted a surge in venture capital (VC) investment, increasing from US$1.8bn in 2014 to just over US$16bn in 2020 (Figure 5). Chinese EdTech firms have attracted the lion's share of global VC investment in this area, partly reflecting the growth and performance of major players in that market, such as TAL, New Oriental, Yuanfudao and Zuoyebang, as well as other unicorns, such as VIPKid and Zhangmen.[19]

Figure 4: Global EdTech population: *Number of EdTech companies: top five countries, 2019*
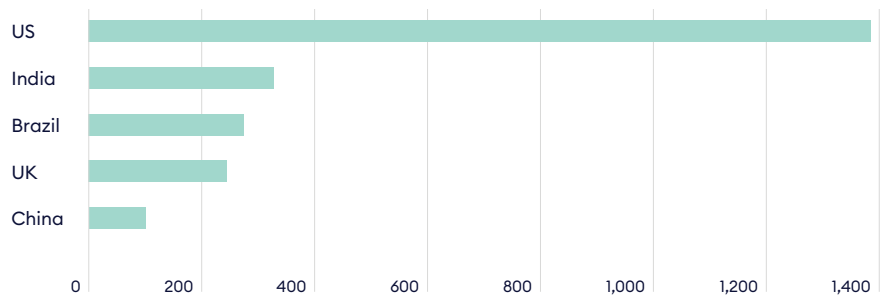
Source: The EdTech Report, 2019/20

Figure 5: EdTech boom: *Global Venture Capital (VC) investment in EdTech, 2015-2020 (US$bn)*
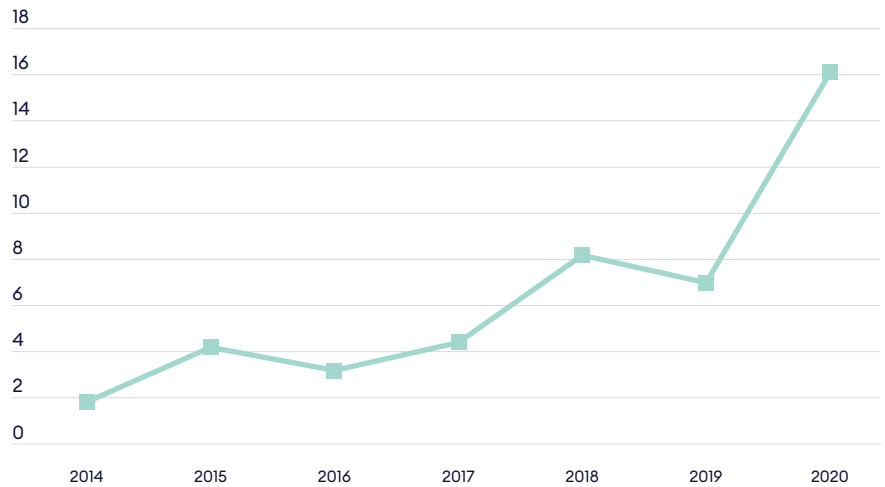
Source: HolonIQ, May 2021

In the past year, a considerable focus for new start-ups has been to challenge the current dominance of Zoom and other multi-purpose communication platforms.

Mike Michalec sees change taking shape in EdTech market leadership, however, at least in Asia. "For the past several years, China has been ground zero for global EdTech in terms of innovation, growth and sheer market size," he says. "But there are clear signs of a changing of the guard from China to India, at least in terms of market growth potential." He points as an example to Byju's, the Bangalore-headquartered EdTech unicorn that ranks as the world's second largest, with a market valuation of US$13bn (at US$15.5bn, Yuanfudao is the largest by valuation).[20] It has attracted a considerable volume of new investment in recent months and is benefitting from the rapid growth of online learning in India.

Test-preparation firm Unacademy is another Indian Edtech unicorn that attracted considerable VC funding in recent months.

The main activities of the aforementioned Chinese and Indian EdTech leaders revolve around student tutoring, reflecting the importance students and institutions in Asia place on preparation for exams. In the past year, a considerable focus for new start-ups has been to challenge the current dominance of Zoom and other multi-purpose communication platforms. For example, the founder of Coursera, Daphne Koller, launched a Silicon Valley-based firm, Engageli, that provides a learning platform specific to the needs of university classes.

UK perspective: The EdTech boom

The UK boasts one of the world's fastest-growing EdTech sectors. In 2020, its market size expanded by 71.5%, according to recruitment firm Robert Walters, as the nation's students shifted en masse to online platforms due to the pandemic.[21] The country's growing ranks of EdTech companies (which numbered close to 250 in 2019 – see Figure 4) have been well-placed to benefit from the accelerated flight to digital and increases in technology spending by British universities and schools. But they are also serving markets further afield: the country's EdTech exports are expected to approach £300m (US$414.5m) in 2021.[22]

Britain's EdTech firms are well-funded: VC investment in the sector increased more than fourfold between 2014 and 2019, according to dealroom.co, a start-up research platform. The country attracted nearly 40% of all European EdTech investment in 2019.[23] London-based companies have been a particular magnet for investment, attracting over 60% of the UK total. London is the largest EdTech hub in Europe and boasts the world's third-largest deal count in this category, behind San Francisco and New York.[24] It is also home to Europe's only EdTech unicorn, Learning Technologies Group (LTG), a workplace learning and talent development company that provides services mainly to businesses.

Figure 6: Leading the way: *European VC investment in EdTech since 2014 (US$bn)*
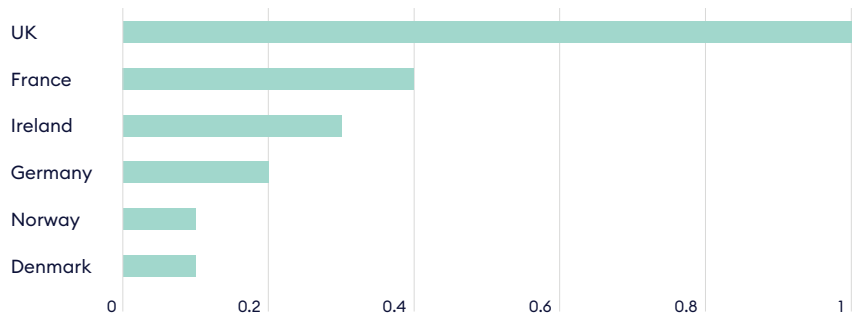
Source: dealroom.co, London & Partners, September 2020

UK companies are also prominent players in other EdTech sub-sectors. FutureLearn, established in 2013 by the Open University and 11 other universities, is a major MOOC platform, with over 12 million registered users worldwide as of mid-2020.[25] London-based Pi-Top operates in the field of STEM (science, technology, engineering and mathematics), providing training in coding, robotics, computer vision and AI. Twinkl, founded by a teacher and her husband in Sheffield in 2010, provides learning, planning and assessment materials to teachers working in primary and secondary education. Memrise, also established in 2010, is a language-learning platform with around 50 million users in 190 countries.[26] Multiverse, a slightly younger start-up (founded 2016) that has recently rebranded from its original name of White Hat, specialises in arranging apprenticeships for young people in digital fields. It recently secured US$44m in Series B funding for the purpose of expanding into the US market.[27]

There are numerous other company examples which suggest that, although dwarfed in size by a few other countries in terms of market size and funding, the UK's EdTech sector is likely to be among the world's most vibrant for the foreseeable future.

No room for complacency

For all of EdTech's impressive recent growth, there remain factors that could hem the sector in. One of them, particularly for companies providing technology and services to institutions, is strapped education budgets, as governments strain to finance post-pandemic recovery and universities face pressure to cap or reduce tuition fees. Another is the lack, in some places, of the high-quality broadband infrastructure needed to support more advanced forms of online learning (see discussion of both factors in Section 2).

In some regions, EdTech companies' cross-border ambitions could be thwarted by barriers to market entry. Mr Michalec points out, for example, that some large EdTech companies have been discouraged from entering Southeast Asian markets by the high cost of localisation, or adaptation of the content to the local market, particularly in K-12 education. This, he says, applies less to administrative processes and more to learning and teaching, approaches to which differ widely across the region and its diverse cultures. Localisation can be costly and time consuming even for similar subjects in the same language, says Mr Michalec. Companies may experience challenges, for example, with differences in teaching objectives and guidance, preferences for use of data, or even user readiness.

EdTech providers also need to address the concerns of students, teachers and institutions (and in many cases, regulators) that their data is being adequately protected. As in other fields of technology, the business models of many EdTech firms rely on the systematic extraction and analysis of user data. Growth in the use of technologies such as AI and facial recognition are likely to bring increased scrutiny of EdTech firms' data privacy practices and commitments. This is particularly the case for firms providing services in Europe and parts of the US where new consumer data privacy legislation has come into force in recent years. Rules such as the European Union's General Data Protection Regulation (GDPR) have some unique implications for education providers, such as the need to obtain consent from students' parents for certain types of data use. And while it is often schools that bear the main burden of ensuring protection of students' data, any failure to do so would likely have an impact on technology providers.[28]

Arguably the biggest limit on EdTech growth is teachers' lack of readiness to embrace digital forms of learning. Not long ago, many teachers (in the UK, for example) were unwilling to use digital technologies in the classroom environment.[29] That is far less likely to be the case today given the experience of lockdowns, but anecdotal evidence suggests that many teachers' ability to use the technology tools at their disposal remains limited.[30] As a UK parliamentary group heard in the "Lessons from Lockdown" report it commissioned in September 2020, digital skills training must be made a core part of teachers' continuing professional development (CPD) to "equip them with the knowledge and confidence to source and deploy effective EdTech solutions" that support teaching and learning.[31]

Companies may experience challenges, for example, with differences in teaching objectives and guidance, preferences for use of data, or even user readiness.

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Department for International Trade

The UK's Department for International Trade (DIT) has overall responsibility for promoting UK trade across the world and attracting foreign investment to our economy. We are a specialised government department with responsibility for negotiating international trade policy, supporting business, as well as delivering an outward looking trade diplomacy strategy.

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