



Education Technology

Across all sectors, the COVID-19 pandemic has accelerated digital transformation

MarketLine Case Study

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1. Overview

1.1. Catalyst

Across all sectors, the COVID-19 pandemic has accelerated digital transformation. It has changed education, with schools, higher education, corporate training, and lifelong learning forced to shift online at a pace at odds with the typical feet-dragging. For all education providers, online teaching is now a crucial part of their tuition mix.

1.2. Summary

From the start of the edtech revolution, the driving forces have been start-ups and private companies in China, India, and the US. Investors have heavily backed China's after-school tuition companies, but their incessant advertising and spiraling prices have prompted political action few could have foreseen.

The Chinese government's new regulations require tutoring companies to be non-profit, effectively barring foreign investment. The impact ends the immediate IPO ambitions of companies like Tencent-backed Yuanfudao and VIPKid and Alibaba-backed Zuoyebang. It has also wrecked the market capitalizations of Chinese education players listed in the US. The likely outcome is that foreign investment will switch to India, where Byju's –the most valuable edtech start-up worldwide – will IPO within 18 months. Byju's has already made nine acquisitions to date in 2021.

In the US, the higher education sector is changing. The June 2021 announcement that edX, the massive open online course (MOOC) created by Harvard and MIT, was being sold for \$800m to 2U, a software as a service (SaaS) platform that helps run online universities, rocked Big Ed. The ructions will continue for some time amid a continued digital transformation drive.

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2. Technology allowing new education options

2.1. Edtech is having its heyday

Few good things have come out of the pandemic, but greater adoption of technology for education purposes by schools, higher education institutions, and individuals may well be one.

As the virus's severity became apparent, governments worldwide had to enforce lockdowns that severely limited learners' ability to meet in indoor spaces. For schools, higher education institutions, businesses, and lifelong learners, COVID-19 and its social and economic implications necessitated new approaches to education.

Edtech has helped re-establish engagement between teachers and lecturers and their students. The pandemic has acted as a catalyst for education providers' greater adoption of hardware, software, and services.

Over a few weeks from March 2020, millions of students switched to online learning, showcasing the sector's possibilities to new users and investors. Edtech is having its heyday, and its future is bright. It is almost inconceivable that the edtech market will not continue to grow extensively over the next decade, especially as the trend in education is towards blended learning, a mix of online and offline services.

2.2. Fundamental principles encompass creating collaborative learning environments

Edtech, a portmanteau of the phrase education technology, refers to technology that helps facilitate learning.

Edtech has disrupted traditional education and teaching methods. It offers teachers the ability to teach and students to learn in an environment that uses devices such as smartphones, laptops, and tablets. Its range broadly encompasses hardware, software (delivered as apps), and online learning environments such as massive open online courses (MOOCs).

By adopting edtech, educators can create digital, interactive textbooks, gamify lessons, take attendance, assign homework, mark assignments, hold quizzes and tests, and get real-time results related to teaching material, style, and format. They can also use the data generated by online learning systems to spot students who may be falling behind the rest of their class or cohort and address their issues.

Edtech can also enable one learner, hundreds, or even thousands, to take the same classes as each other. Its fundamental principles encompass creating collaborative learning environments where peers coach, tutor, and inspire one another.

The primary goal for technology in education is learning. There is a need to respect the implications of pedagogy (the method and practice of teaching) on system or tool selection, bandwidth, data security and privacy, access to networks and data, and choice and individual needs. The goal when using the technology must be delivering the teaching. That said, in some instances, software applications and hardware may be designed for purposes other than learning or developed by people with little understanding of the concepts of effective pedagogy.

Recent technology developments such as artificial intelligence (AI), augmented reality (AR), virtual reality (VR), and 5G are all potential game-changers for edtech. However, edtech itself is not an innovation in the true sense of the word. For centuries, teachers have been devising new ways to help students understand ideas. Yet, the pandemic has made edtech adoption a hot issue and a magnet for investment. So, the question for companies, both those with technology tools to offer and others with M&A strategies in mind, might be: if you're not doing something in edtech, then why not?

2.3. Edtech's key technologies are VR, video and cloud services

The technologies that comprise edtech include AI, which aids content creation, the customization of learning processes, evaluating performances, ensuring real-time communication, and automating grading. VR and AR create appealing environments for students by introducing virtual elements and situations. This helps both teachers and students perform tasks virtually rather than trying to visualize theoretical concepts.

2.3.1. VR headsets to experience learning from places students cannot physically visit

One of the main benefits of VR headsets is their ability to immerse students in environments that they cannot physically visit. For instance, creating simulations of the ocean floor, hazardous locations, foreign countries, and even outer space can allow students to experience these locations without leaving their classrooms or homes. When students read about something, they often want to experience it. VR goes beyond written descriptions or illustrations, allowing them to explore the subject and see how things fit together. VR can enhance students' understanding and improve their ability to recall important information. Mendel Grammar School in the Czech city of Opava used VR to help students in biology classes learn about the anatomy of the eye. The team working on this project employed Leap Motion controllers and specially-adapted Oculus Rift headsets to provide an innovative way of learning anatomy.

2.3.2. Cloud digital libraries of shared resources

The connectivity and collaboration enabled by cloud computing and cloud-delivered apps allow edtech companies and educational institutions to customize and share their files, apps, and media inventory. Cloud also impacts education by bringing together digital libraries of shared resources. For example, video lecture creators, educators, and teachers can use cloud computing to index and store necessary materials like video-content notes, ebooks, and other resources. Robotics can be used to keep students interested and support new teaching methods. As well as being used for practicing languages and reinforcing new skills, robots can also act as interactive storytellers, both one-on-one and with larger audiences.

Within the education sector, blockchain is viewed as providing a more viable and ecological alternative to paper copies of a diploma. Blockchain can also allow graduates to send potential employers a link that will enable them to review the candidate's qualifications. In 2017, both the University of Melbourne and the Massachusetts Institute of Technology (MIT) began issuing digital, blockchain-stored diplomas to graduates as a way of combatting the growing problem of people submitting fake degrees to potential employers.

2.3.3. Ebooks allowing better notes and records

Ebooks can include many interactive features that allow students to make notes, highlight content, bookmark pages, or change fonts. In addition, adding music, videos, animations, and audio explanations to the learning module can make the experience more engaging while giving students the ability to pause, go back, and review. In 2014, the US federal government released a 70-page guide for schools, the Digital Textbook Playbook, which was intended as a roadmap for educators to accelerate the transition to digital textbooks.

2.3.4. Video-assisted learning can enhance educational offerings

Video assisted learning is the process of acquiring knowledge and skills using audio-visual aids as instructional learning resources. Video-assisted learning uses video content to improve a student's comprehension, cognitive ability, or social-emotional skills. Generally, videos are aides for learning, rather than being the primary method or practice of learning. Video-assisted learning encompasses simply watching a documentary at the end of a lesson and more complex and complete forms like video modeling. Video modeling is a visual teaching method that involves watching a video of someone demonstrating a specific behavior or skill and then imitating that behavior or skill.

One of the rising video trends in edtech is the gamification of learning using interactive video, where viewers make choices in different scenarios using their remote controls. Bear Grylls' *You vs. Wild* TV series on Netflix is an example of this interactive approach in practice.

Video-based learning is popular among younger generations. YouTube is likely to be the preferred education medium for Generation Z, followed by TikTok. ViewSonic, TeacherTube, and BrainPop are popular sites that provide support for teachers attempting to produce and host video content.

2.3.5. Gaming software can provide good motivation

Can increase students' motivation and engagement, enhance visual skills, and improve students' interaction and collaboration with their peers. For both adults and children, playing computer games can improve concentration and requires coordination. In addition, reward-based gamification, which incorporates points systems, leaderboards, and achievement badges, can actively engage students as they work, especially when a teacher or course leader isn't present. Personal devices like tablets and smartphones are excellent for consuming information and navigating content. However, research has shown that when teachers have access to new technologies, their instinct is to use them to extend their existing teaching methods. While tablets can engage pupils, technology needs to complement and enhance learning. Schools that fail to articulate the connection between tablets and learning typically fail to make the most of their investments in mobile devices.

Educational institutions use tablets to make trips and experiments more engaging through apps such as Pic Collage and PicLab. Tablets and smartphones also allow students to create interactive notes incorporating images, maps, and web links. Listening to foreign radio channels through apps like Tunein Radio can help with language learning. Tablets can also be used to access apps like Seesaw, enabling students to record their learning. Although wearable tech has potential as an edtech tool, there is little detailed evidence of how teachers or students currently use it. Wearable tech's adoption in education has been more in limiting the impact of the COVID-19 pandemic. That includes maintaining social distance between students. In Beijing, smart bracelets were used to measure the body temperature of students returning to class following lockdowns.

3. Edtech's place in the education market

Despite its increased adoption since global lockdowns began, edtech only accounts for a fraction, around 3.3%, of the global education market in 2021. However, it will grow to 6.2% by 2025, according to GlobalData forecasts.

Edtech companies are helping educational institutions and businesses reshape the learning process. Digital alternatives are making the learning experience smoother and more personal. Learners can now learn anytime, anywhere at their own pace with tools such as gamified content and micro-learning courses. AI-based individualized learning tools will allow students to get tailored help depending on their strengths and weaknesses. Thanks to algorithms and data analysis, learning platforms will provide tailor-made training. Next-generation communications will expand distance learning, VR, and robotics capabilities, while AR and VR will enhance online courses.

3.1. The role of technology in education delivery

In countries where education is a challenge in terms of quality and affordability, edtech can help create the foundations of education for all. Technological solutions such as mobile apps can compensate for the lack of laptops in classrooms, potentially narrowing the digital gap between rural and urban schools. For those who cannot afford a computer, smartphones remain the best choice for learning online cheaply.

In many countries, governments and mobile network operators have worked together to minimize learning loss during the pandemic by moving schools and universities online. Online learning makes education available to those in remote areas and makes it easier to share curriculum across borders. For example, where some syllabi and their content are intentionally used cross-border, e.g., cross-country curricula for schools (such as the International Baccalaureate); the International General Certificate of Secondary Education (IGCSE); language tests (e.g., Test of English as a Foreign Language (TOEFL)); and computer skills (the International Certification of Digital Literacy, or ICDL). In such cases, edtech could change the future of education for millions of students, especially if digital access to technology can be provided effectively and securely.

There is no single edtech solution that will achieve the same results everywhere. Schools differ in how pupils and teachers relate to technology, while the systems differ school by school. The availability and quality of materials and technologies also vary. Nevertheless, there are four potential benefits of edtech that can help accelerate student learning.

3.2. Edtech and lifelong learning

As well as schools and colleges, an important constituency served by edtech is lifelong learners. Lifelong learning is the self-motivated pursuit of knowledge for professional or personal reasons. That might be to advance someone's career, prepare for a new career, or expand their horizons by taking an evening class, pursuing a new degree, or learning a new language.

Lifelong learning also includes corporate training.

Online content and classes that can be viewed anywhere and at any time are of high importance to lifelong learners who typically need educational opportunities centered around them and not the other way around. They need efficient lessons and purposeful assignments because they are generally time-poor, juggling their learning alongside family, work, and social commitments.

The likelihood is that the millions of jobs lost by people due to the COVID-19 pandemic will spur an acceleration in online learning for adults as they look to reskill or upskill. Edtech will help provide support for self-paced online learning that is both effective and affordable.

3.3. The challenges of teaching with technology

The pandemic has forced teachers to become more technologically adept. According to a report published in April 2020 by the Oxford University Press (OUP), before COVID hit, fewer than two-thirds of UK teachers (65%) felt confident about using digital learning; a year on, the figure is 92%.

Most teachers now see the potential. A survey of over 15,000 public school teachers by East China Normal University found that over 60% of teachers found teaching online difficult, but nearly 80% said they were still willing to incorporate online teaching methods into regular teaching activities. Technology will not replace traditional methods of learning but will enhance them. Most global education experts think that digital learning will be central to teaching in the coming years. According to the OUP survey, 98% of respondents expect a hybrid model to become the norm, combining digital and traditional teaching and learning methods.

4. Key upcoming trends in the edtech market

AI is the hottest trend in the edtech market, with both teachers and students benefiting from it. Teachers use it to automate the grading of multiple-choice and fill-in-the-blank questions, while students could get help from AI tutors when teachers are too busy to take care of everyone. When schools and higher education institutions make edtech choices, those new technical infrastructures add cost and value.

4.1. Coordinating AI development

AI is the hottest trend in the edtech market, with both teachers and students benefiting from it. Teachers use it to automate the grading of multiple-choice and fill-in-the-blank questions, while students could get help from AI tutors when teachers are too busy to take care of everyone. In addition, schools use AI systems to monitor student progress and alert teachers when there might be an issue. AI is also a necessary defensive measure in cybersecurity, with education organizations now being targeted by hackers. The focus on AI within education has prompted Jisc, a UK not-for-profit organization that supports higher education institutions, to launch a national AI center to coordinate AI development in education. The center will assess AI solutions on the market by testing whether they improve colleges and universities' learning and teaching experience and provide practical, tailored advice and support.

4.2. Learning from data for better insights

The COVID-19 pandemic has spurred a greater appreciation of the value of using data to support students. Without their usual face-to-face interactions, teachers and lecturers have had to rely on data to identify which students are struggling. Feedback and communication tools built into learning management systems coupled with learning analytics allow teachers and lecturers to measure and report student learning and better understand and optimize the impact of that learning. For example, teachers can see what type of information, such as text, images, infographics, or videos, students enjoy using most. They can also spot what aspects of the curriculum weren't effectively delivered and identify students with academic or behavioral challenges.

4.3. Blended learning, using a range of teaching aid to improve learning

Blended learning, which combines online educational materials and interaction with traditional classroom methods, will become the new standard across all courses in higher education. Its adoption will also ensure that higher education institutions are prepared for any potential future disruption. Blended learning can also deliver the flexibility that today's students have come to expect. Blended learning enables students to access materials from anywhere at any time while enjoying the benefits of face-to-face support and instruction. That means an end to large in-person courses with more than a hundred students in an auditorium and an increase in the availability of smaller online courses.

4.4. Software for special educational needs

Distance learning hasn't worked for everyone. Despite efforts to address the different needs of students during the pandemic, many have struggled to keep up. A February 2021 report by the UK's Chartered College of Teaching found that 66% of special educational needs and disability (SEND) students had not engaged with online learning since classrooms

closed in March 2020. Some of the key issues for respondents were the lack of routine and the need to self-organize and self-motivate. The report also highlighted that a lack of access to external services such as speech and language therapy and teachers' inability to sit close to children to support them with their work presented additional difficulties and put SEND pupils at a disadvantage during school closures. That is at odds with pre-COVID studies that suggested that online education could improve access to learning for students with a range of disabilities. Policymakers working with technology providers on distance learning for schools, colleges, and universities must ensure that bespoke software platforms are available to SEND learners to reintegrate this group with class lessons.

4.5. Online safety is difficult to ensure

The transition to remote and online learning has revealed stark vulnerabilities in schools' cybersecurity strategies. This is especially concerning because schools have become a popular target for cybercriminals. One of the key issues when adopting edtech is the threat of hackers disrupting learning activities by launching cyberattacks. In the US, publicly disclosed cybersecurity incidents at US schools rose 18% over the past pandemic-affected year to hit a record number of breaches, ransomware outbreaks, and more, according to a K12 Security Information Exchange report. The group said there were 408 such incidents in 2020, more than two each school day. According to the UK government, secondary schools, further, and higher education institutions are much more likely to have identified cybersecurity breaches or attacks in the last 12 months than the typical business. Another issue is that students are increasingly using personal devices to connect to school networks. These are more likely to compromise systems by creating multiple entry points through which hackers can gain access.

4.6. Cybersecurity learning can modernize education

Despite the risk of cyberattacks disrupting online learning, edtech has improved the process of learning about cybersecurity. Instead of entering a building to attend a cyber lab with fellow students, instructors have used routers and Wi-Fi hotspots to virtualize classes with the help of edtech tools. For example, browser-based cyber range labs have helped instructors teach the subject from a distance and enabled students to get hands-on-keyboard, practical learning around cybersecurity concepts. Tools like this have paved the way for cyber instructors to create dynamic and interactive learning environments for students. Although keeping students focused during remote learning can be challenging, edtech tools often help spark the engagement students need to sustain their attention and interest.

4.7. New courses and learning experiences are available

COVID-19 will have a long-term impact on how higher education lecturers design new lessons and materials. According to the online learning platform Coursera, building a fully online course can take an experienced online instructional designer around six months. There is a possibility that natural sciences and medicine, currently taught mainly in a knowledge-centric and lab-based format, could shift towards more experiential forms of learning using VR and AR. This could transform the learning experience for students, giving them more opportunities to experiment as they learn. For example, medical students could operate on and interact with virtual patients. As greater use of technology precludes the need to convene, courses can be rolled out to more students at a lower marginal cost. Students will be much more discerning in the future about the educational experience they are paying for in a virtual environment.

4.8. Cost-durability in edtech can add cost and value to different areas

When schools and higher education institutions make edtech choices, those new technical infrastructures add cost and value. Such costs include maintaining the technology and ensuring equitable access to it. Support systems, training, upgrades, and new functional requirements (including databases, cloud services, support systems, and apps) only add to the budget. For organizations, being able to manage such costs is critical. Although long-term projections concerning technologies, finances, and innovations can be difficult to make, sustainability for programs, hardware, or new processes can be planned, and risk factors analyzed. Multi-purpose products and services can be created to encourage departments and education and training providers to share costs.

5. Appendix

5.1. Further reading

Digitization of education: Lucrative business opportunities abound in race to classroom of the future (2018) MarketLine Case Study

The Future of 5G: Technology could advance global economy and society after COVID-19 (2019) MarketLine Case Study

The Future of Work: COVID-19 is accelerating technological and employment changes that were underway (2020) MarketLine Case Study

6. Ask the analyst

We hope that the data and analysis in this case study will help you make informed and imaginative business decisions. If you have any questions or further requirements, MarketLine's research team may be able to help you. The MarketLine Research team can be contacted at ReachUs@MarketLine.com.

7. About MarketLine

At MarketLine, we deliver accurate, up-to-date insights on over 100,000 companies, 3,500 industries, 215 countries, and 3,000 cities as well as the latest news and financial deal information from within your market and across the globe.

Established in 1997 when the Internet was in its infancy, we recognized the need for a convenient and reliable data service to help our clients understand local and global markets and the companies operating within them.

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