

Education technology. Coronavirus and beyond



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Foreword



Education is the most powerful weapon which you can use to change the world.

Nelson Mandela



At Credit Suisse, our ambition is to surface and give visibility to topical issues of relevance to our clients, colleagues and communities. In many cases, this will be simply to inform and stimulate thought and debate. In other cases, as with our Credit Suisse ‘Supertrends’ research, the purpose is to highlight themes that we expect to drive economies and business transformation over the coming decades and that serve to underpin investment opportunities where we see value creation taking place over the intermediate to longer-term horizon.

“Technology at the Service of Humans” has been a featured Credit Suisse Supertrend for several years now as we have seen the power of technology completely transform whole industries as well as the way we live, work and interact with each other. Additionally, in the developing markets, technology has helped bridge inequalities by lifting people out of poverty, granting access to quality goods and services and materially upgrading health outcomes and saving lives. But in the current crisis brought on by the Coronavirus pandemic, there is no starker example of the transformative effects of “Technology at the Service of Humans” than in the field of education.

As global lockdowns have closed schools across the world and all of us have had to grapple with new ways of learning remotely from our homes, we all intuitively know how critical on-line learning has been to fill the gaps. However, I suspect that despite this general awareness, many of the statistics contained in this report will surprise you, if not shock you, in terms of just how quickly and profoundly, the entire field of education has been changed.

As identified by the UN Sustainable Development Goal #4 - ‘Quality Education for All’, perhaps this is also a moment for the world to think about the virus-induced rapid transformation of education to accelerate the ability to achieve this SDG.

On behalf of my partners at Credit Suisse and the many impressive contributors who researched and authored this report, we hope you find this piece to be informative and thought provoking. We hope you also find our report instructive for the future direction of education as we emerge from the pandemic having tested and embraced effective new models for technology-enabled learning systems.

Marisa Drew
CEO, Impact Advisory and Finance Department
Credit Suisse



Introduction

Education technology, or EdTech, is one of the most exciting sectors in the economy, with the potential to impact billions of lives.



We are on the verge of a revolution in the adoption of these technologies, forced on us by Coronavirus. More than 90% of the world's school and university students have been undertaking classes from home through digital tools – many for the first time – and educators have shifted to digital delivery of education literally overnight.

The process to online education has not been seamless. Educators, schools, and university systems have not been trained to use these technologies, and many have tried to replicate the classroom through videoconferencing and sending homework via email. The crisis has exposed a digital divide, in both developed and developing countries. The gap between students with fast broadband, their own laptop and a supportive home learning environment, and those without, is painfully clear. But the Coronavirus pandemic, while causing so much tragedy and loss of life, has also planted the seeds of a new type of learning model for coming decades – one that will be very different from that which has been operating largely unchanged for thousands of years.

Access to quality education is the fourth of 17 UN Sustainable Development Goals (SDGs), and it focuses on ensuring inclusive and equitable education and promoting lifelong learning opportunities. The benefits of a good education are obvious – opens up work opportunities and career paths and links to higher wages, better health, and general life satisfaction. Education also supports economic development – it's no surprise that there is a strong, positive association between the average number of years in schools and a country's GDP.¹

1. Hanushek E.A., Wößmann L., Education and Economic Growth, Elsevier Ltd., 2010.

“
The whole purpose of education is to turn mirrors into windows.”

Sydney J. Harris

When this crisis hit, we recognised that this was going to be a game changer for EdTech. It would mean that these technologies, which hold so much promise, could finally receive the attention and investment they need to enhance both the efficacy and accessibility of education, including in the most remote regions of the world and at a fraction of the cost of traditional teaching and learning methods. The promise of EdTech is to make high-quality education affordable and accessible to people everywhere.

Credit Suisse has a long-term commitment to the education theme. As this sector grows, we expect there will be many more investment opportunities for clients who would like to seek out returns in businesses that are not only delivering financially, but also delivering positive impact through innovation in education.

In this report, we explore why the education sector is ready for disruption, the forces driving EdTech and the potential impact of Coronavirus on the sector.

This report was co-authored by



James Gifford

Dr. James Gifford
Head of Impact Advisory,
Credit Suisse



Kirill Pyshkin

Dr. Kirill Pyshkin
Senior Fund Manager,
Credit Suisse
Asset Management

Executive summary



Education Technology (EdTech) has existed for two decades and promised great things. However, it is only recently starting to live up to that promise. While education has been a passport to prosperity for billions of people, the primary method of delivery hasn't fundamentally changed in thousands of years and the sector has been slow to adopt new technology.

However, things are starting to change. In recent years, governments and innovators have invested billions of dollars into the education sector, and EdTech has gained traction. Online learning apps, for example, now have hundreds of millions of users. Other forms of EdTech, such as curriculum management software, e-textbooks, communications and administration platforms have become more effective, while the costs of devices and internet data required to use them have plummeted. Gamification and the use of adaptive learning are creating engaging and personalized learning journeys for students. Classrooms are starting to adopt these technologies, and teachers and students are increasingly able and willing to make use of them.

Pre Coronavirus, EdTech expenditure was forecast to grow at 15% CAGR 2019-2025 and reach USD 400bn+ by 2025.² And then Coronavirus hit.

It forced the world's school and university students and educators to switch to remote learning overnight. We have seen an unprecedented experiment in the rapid adoption of online learning, and an enormous investment in hardware, software, content and training to implement these digital learning environments.

The Coronavirus crisis has exposed the digital divide, both in developed and developing countries. It has become painfully clear that many low-income students not only lack the devices and internet access required to participate in online learning programs, but also lack a suitable home environment. Governments, educational institutions, telecom companies and EdTech providers have scrambled to ensure these students are able to participate online alongside their classmates. The crisis is likely to drive major expenditures in hardware and internet access to support online learning as we address this digital divide.

There are tremendous opportunities to invest into EdTech, with strong growth in both venture capital and listed equity. The Coronavirus pandemic will accelerate investment, with many EdTech companies bringing forward investments into new functionalities. This investment will only continue, as educators and administrators recognise that many of these applications are more effective than traditional learning models. To support modern teaching methods these applications should be integrated into the classroom and university seminar room when students return in person.

This crisis will also accelerate the pace of change of an already fast-changing economy. Lifelong learning and upskilling will become a vital part of creating an adaptable workforce, and EdTech will need to play a major role in that, given many of the jobs of the future do not exist now, and workers will not be able to rely only on traditional educational models.

EdTech offers entrepreneurs and investors opportunities to deliver strong financial returns, and delivers technologies that dramatically enhance the learning experience of billions of students at lower cost.

In summary, this crisis will rapidly drive the growth of a sector that was already starting to develop, and dramatically increase investment into the space. With the extra resources, and a vast population of educators and students who are now much more open to digital learning, EdTech will transform education as we knew it.

2. HolonIQ, Credit Suisse AG

The time for disruption

Pedagogy, the science of how people learn, is changing fast. Our 'digital natives' are an internet generation who live a life that is not yet replicated inside the classroom.

Modern students need to be able to find, analyze and apply knowledge rather than simply memorize content. Many skills relevant to the highly-changing future workplace have not traditionally been a focus of our education system.

Up to 60% of the jobs of the future do not yet exist, and modern teaching approaches need to reflect this need for adaptability and life-long learning. Social and economic theorists³ argue that civilization's next industrial revolution can only take shape if the formal education system undergoes a massive overhaul, embracing lateral learning and interdisciplinary teaching; a distributive and collaborative model that mirrors the way we share information, ideas, and experiences on the internet through forums, social media, open encyclopaedias, and blogs.

Yet while education has been the passport to prosperity for billions, and is a core enabler of modern economies, it has been one of the last industries to embrace digital innovation. Penetration of digital technologies is just 2%-3%,⁴ compared to at least 10% to 20% for most other sectors of the global economy. For example, in the hospitality sector, rental platforms have already significantly disrupted hotel operators. In the media sector, video streaming has overtaken traditional cable or satellite pay-TV operators. In the retail sector, online shopping has severely disrupted traditional high-street retailers.

What is EdTech?

EdTech – education technology – covers not only online learning, but also the whole suite of software, hardware and digital tools and services that can help deliver education.

It includes:

- Desktop and mobile learning apps
- Curriculum management software
- Communications platforms for students, teachers and parents
- Online program management software
- E-Textbooks
- Learning management systems
- Digital content
- Online and cloud-based platforms
- Content delivery systems

3. https://www.vice.com/en_us/article/8qpdgz/impact-why-we-need-an-updated-education-system-now-more-than-ever
<https://www.fhi.ox.ac.uk/team/carl-frey/>

4. Thematic Investing – Let's Get Smart – Global Education Primer, BoAML 2016, p214

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We are now at a Netflix moment for education – the point where the traditional education system is about to be disrupted.

Dr. Kirill Pyshkin, Senior Fund Manager, Credit Suisse Asset Management

Traditional education
Classroom-based, teacher-centered

New approach
EdTech



Innovative services
Disruption in the service model: education delivery anytime and anywhere, thus improving access to education and training.



Digital content
Disruption in content: from standard to customized, from analogue/print to digital and beyond (e.g. virtual reality/augmented reality).



Systems and tools
Disruption in tools: reduction in costs through digitalization, reduction in labor intensity and better scalability.

The promise of EdTech

Practical benefits of EdTech

Virtual education is:



Cost-efficient

It reduces costs providing access to quality education on a global scale to people with limited resources, geographical restrictions and physical disabilities.



Flexible

Students can get assistance on demand in order to fit their individual pace and needs.



Effective

Different digital formats can improve learning outcomes and increase students' engagement by applying a multi-sense approach.

Source: Credit Suisse

There is no doubt that digital innovation can transform education. The idea that technologies can dramatically enhance the effectiveness and efficiency of traditional teaching approaches is a compelling proposition.

The EdTech market has been around for more than 15 years, and has inspired teachers, administrators and governments, but, arguably, it has yet to live up to its potential. Over that period, in most contexts, online learning has operated on the fringes of the offline offerings, complementing the traditional learning process or substituting live after-school tutors, particularly in Asia.

In the 2000s, Massive Open Online Courses (MOOCs), promising unlimited participation and open online access, gained significant attention. Yet the MOOCs' low completion rates demonstrated that the model was not ready to replace traditional university courses. Similarly, the 'One Laptop per Child' non-profit initiative, established to transform education in developing countries through low-cost laptops with educational software installed, failed to take off.⁵ At the other end of the income scale, EdTech implementations using iPads in higher income schools have resulted in distracted students,⁶ and media reports that IT executives were sending their children to schools with restricted technology access.⁷

A lack of government focus and expenditure on education technology, together with weak skills and training on the part of teachers, students and parents – and too much focus on the latest hardware – have all contributed to EdTech's limited adoption. A lack of ubiquitous broadband and a digital divide across the globe have resulted in a slow take up. Moreover, habits take time to change: students have preferred print textbooks, but this is changing. As of 2019, only one in four students – 26% – preferred a strictly print textbook.⁸

5. This project catalyzed the development of low-cost "netbooks" by Intel and Asus, smaller laptop computers for less than USD 200 - USD 400.

6. <https://www.smh.com.au/education/major-distraction-school-dumps-ipads-returns-to-paper-textbooks-20190329-p5191r.html>

7. <https://www.businessinsider.com/silicon-valley-parents-raising-their-kids-tech-free-red-flag-2018-2?r=US&IR=T>

8. <http://www.nacs.org/advocacynewsmedia/pressreleases/tabid/1579/ArticleID/867/Student-Spending-on-Course-Materials-Declines.aspx>

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There is no doubt that digital innovation can transform education.”



EdTech on the move

Even before Coronavirus, EdTech was primed to transform education, based on a number of technological and structural enablers. The question was how long it would take?

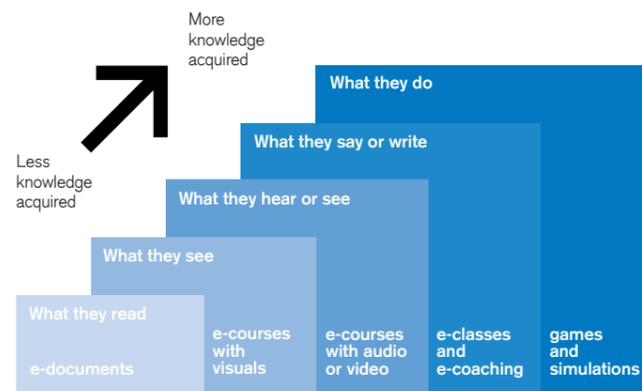
Reduced costs of devices and data

Mobile penetration and cheap devices will be a game-changer in delivering and supporting learning, and driving growth in the sector. US, Europe and the Commonwealth States lead in internet and mobile penetration, while substantial growth is expected across emerging markets, with mobile a catalyst for delivering and supporting learning. Broadband penetration soared from almost zero a decade ago, to over 90% in the US and 98% in China in 2020. The price of mobile phones, tablets and computers has come down considerably. For applications requiring larger screens and keyboards, tablets are now less than USD 100, and netbooks (small laptops) are less than USD 200. Smartphone penetration and cheap data plans in developing countries have allowed app-based learning to flourish. In India, for example, data costs are down 95% since 2013.⁹

New functionality

Developments in e-textbooks and devices have ensured EdTech is cheaper while offering a superior learning experience. New tech functionalities enhance learning through offering keyword lookups, easily accessible glossaries, reading aloud, notetaking, search functions, embedded audio and video and links to external websites. Learning management systems such as Blackboard, Canvas and Moodle can integrate content that can entirely replace paper textbooks, often with significantly reduced costs per student.

Better engagement improves the learning process



Based on Van Dam N.H.M., The E-Learning Fieldbook, McGraw-Hill, 2003.

Integration into classrooms

With 79% of teachers in developed countries using at least some technology in almost every lesson, schools are now integrating technology in a systematic way.¹⁰ This compares with ten years ago, when just 1 in 5 teachers were regularly using technology to teach. Integration into classrooms is not only about the learning content. Digital monitoring is also helping with teacher absenteeism, a major problem in developing countries such as India, where one study showed that teachers in government schools attend around 65% of classes.¹¹

Gamification and edutainment

A major impediment to EdTech's growth is self-motivation by students. Gamification, together with compelling and interesting learning environments, are succeeding in engaging students without teachers' direct involvement. "Edutainment" brings the solutions, content, system, and tools from the world of digital media and entertainment into the educational setting. Duolingo, Ruangguru and Byju's are all examples of successful edutainment gaming applications for online learning.

Interview: The emergence of "edutainment"

Dr. Kirill Pyshkin is Senior Fund Manager at Credit Suisse Asset Management, where he manages the largest equity fund in the world focusing on EdTech. He explains the drivers behind the growth in edutainment.

What is edutainment?

Edutainment is the subset of EdTech that involves combining education with entertainment, and all the services, content, systems and tools that enable it. Numerous studies have shown that students' involvement increases the retention of learnt material. By bringing an entertainment component into the learning process, edutainment helps increase students' engagement, making learning more effective - at a fraction of the cost of traditional teaching and learning methods.

In the era of automation, digitalization, virtualization and artificial intelligence, new forms of education delivery reduce costs and improve accessibility. Tech-savvy millennials are hungry for change - and they are a force to be reckoned with both politically and economically. A new, flexible approach to education enables learners to learn - anytime and anywhere - through highly engaging content.

What is the market potential for the edutainment theme?

We are at an early stage of a secular change in the education industry. Within the next 15 years, education spending could double. Today, only 2% of the global USD 5 trillion education market is digital. The growth potential of the digital education sector is very strong, and content that is highly engaging, and blurs the lines between education and entertainment, will succeed.

AI, adaptive learning and data analysis

Artificial Intelligence (AI) allows the development of adaptive learning applications that tailor the learning to a student's personal speed and learning style. For example, some students prefer audio or video, others prefer to read text. Students have different attention spans and can respond to different learning approaches. Adaptive learning systems can quickly identify student's type of learning and customize the learning experience in real time.

To improve the learning experience, huge volumes of data relating to a student's technological interaction is collected and analysed. The data analysis can improve e-textbook, and identify which students are falling behind and areas that need extra attention.

Many new innovative adaptive learning apps are gaining traction; using facial recognition to track whether students are paying attention and notifying teachers (or the algorithm itself) if they are losing their audience.

Mindspark, an Indian maths app, can accurately assess learning levels and dynamically personalize the learning process to a student's level and rate of progress. Results show a 38% improvement in pupil performance within five months.¹² DreamBox is a K-8 (US schools with students from kindergarten (age 5-6) to 8th grade (up to age 14)), online math application with 3.5 million users. It leverages AI to provide more than 160,000 educators with real-time insights into students' learning and enables teachers to create targeted activities. DreamBox dynamically adapts to the learner, providing personalized instruction and continuous formative assessment in and between lessons, using rich visuals, sound design, and interactivity to support deep math comprehension, and monitoring growth and use to ensure strong implementation.¹³

9. McKinsey Digital Report, Digital India: Technology to Transform a Connected Nation, March 2019.

10. RS Components Survey: State of EdTech 2019 report

11. <https://www.povertyactionlab.org/evaluation/encouraging-teacher-attendance-through-monitoring-cameras-rural-udaipur-india>

12. <https://www.weforum.org/agenda/2019/05/technology-health-education-developing-countries/>

13. <https://www.dreambox.com>

EdTech and Coronavirus

At the peak of the Coronavirus crisis, more than 90% of the world's schools and most colleges and universities closed with teaching undertaken online, using a mix of workplace and education technologies including Zoom, Google Classrooms and Microsoft Teams. By late April 2020, approximately 1.7 billion students were studying remotely. According to UNESCO monitoring, 191 countries implemented nationwide closures, affecting around 98% of the world's student population.¹⁴

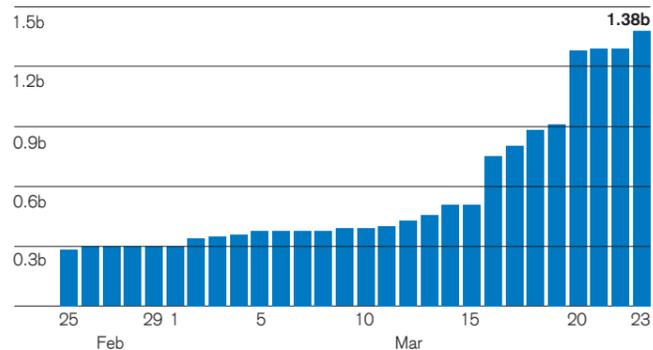
Coronavirus thrust EdTech into the spotlight. Schools and education systems around the world had no choice but to quickly adapt to delivery of classes using EdTech tools to support teaching. A wave of educational apps, software and hardware solutions all aimed at supporting remote learning, rapidly gained new users.

Seesaw, which allows students to build a digital portfolio of work to share with parents or teachers, increased its reach tenfold within a month when schools began to shut down in March 2020.¹⁵ Google Classrooms, which allows teachers to send lessons and materials to students, doubled its users to 100 million in March 2020.¹⁶ Byju's, the Indian online learning app, added six million new users the same month.¹⁷ In China - Koolearn, GSX and YouDao – the three pure online after-school tutoring services, each had over 10 million enrolments in free courses during this period. In Brazil, Estacio registered 55% growth in pure online distance-learning student enrolments during Q1 2020.

In the US, Chegg saw a 35% increase in subscriptions to its online learning services. Newsela, an app providing engaging digital content and learning resources, signed up thousands of US schools within just a few weeks. The company is also addressing the digital divide by providing a print out and mailing service for students without home internet access, and has developed a remote learning toolkit for teachers, tips on running a flipped classroom and guidance for parents on how to support remote learning.

According to language learning app Duolingo, traffic typically spiked 3 to 5 days after the introduction of lockdowns. Traffic doubled first in China, then Korea, and then increased by 135% in Spain, 100% in Italy and 90% in US. There were two main types of users: students assigned online learning material by teachers, and adult learners stuck at home taking courses. Coursera saw a fivefold increase in new learner enrolments, with personal development courses seeing the highest interest and a 10-fold increase in overall enrollments.¹⁸

Coronavirus's staggering impact on global education
Number of learners impacted by national school closures worldwide



Figures refer to learners enrolled at pre-primary, primary, lower-secondary, and upper-secondary levels of education, as well as tertiary education levels.

Source: UNESCO

During the pandemic, some EdTech companies took on important roles in their communities. For example, Afya Educational in Brazil (see box), opened its online Medcel training platform for all medical interns across the country. It also developed a specialist course "Conducts for emergencies in Coronavirus", which is offered online for free on its website. Even before Coronavirus, Afya worked with the government under "Mais Medicos" program that specifically targets shortage of doctors in rural Brazil.

Case study

Afya Educational¹⁹

Afya is a leading medical education group in Brazil, delivering an end-to-end physician-centric ecosystem that serves and empowers students to be lifelong medical learners. When the virus hit, Afya moved non-practical on-site classes to its online platform and then opened the platform to other medical institutions without cost for the period of the lockdown. Over 9,000 medical students from 30 public and private schools have accessed Afya's platform.

Afya then created a free course on medical procedures around Coronavirus for hospitals, medical associations, medical schools and students. The course focuses on mechanical ventilation, respiratory emergencies and imaging diagnosis.

14. <https://en.unesco.org/covid19/educationresponse>

15. <https://www.theguardian.com/technology/2020/apr/24/remote-learning-classroom-technology-coronavirus>

16. <https://www.bloomberg.com/news/articles/2020-04-09/google-widens-lead-in-education-market-as-students-rush-online>

17. <https://www.businessinsider.in/business/startups/news/byjus-adds-6-million-new-students-in-a-month-after-the-nation-goes-into-a-complete-lockdown/articleshow/75009408.cms>

18. GSV Virtual Summit Series (Program 1 – Wednesday, April 1st)

19. www.pewresearch.org

Interview: Fast tracking digital infrastructure

We spoke to Brian Grey, Chief Executive Officer at Remind, a messaging and educational content delivery platform for students, teachers and parents.

What does Remind do?

We're a two-way communication platform for teachers, students, parents, and administrators, and we integrate with other curriculum delivery platforms such as Google Classroom, Canvas and other online learning apps – similar to Slack but for education. Our free version is for teachers to communicate directly with students and parents. Schools, districts, and other education organizations use our enterprise version, which integrates with school information systems to support the delivery of important information such as attendance and other updates that support student success.

How has Coronavirus affected your business?

Literally overnight in early March 2020, we became one of the most essential distance learning tools in the US. We added 6 million active users in just one month. We've updated our roadmap to include elements that enhance Remind as a distance-learning platform. The influx of usage has created a systemic shift in the way schools and districts think about communication – we likely won't see a return to previous usage. Even as kids go back to school, technology will be there, both inside and outside the classroom.

The other eye-opener has been how parents have engaged in this crisis. We have nearly 30 million active users, with more than 2 million educators and the balance split amongst students and parents. This has been a powerful channel for educators to stay connected to parents as well as students. We've been able to facilitate essential communication about how to help students at home.

How have you dealt with access and the digital divide?

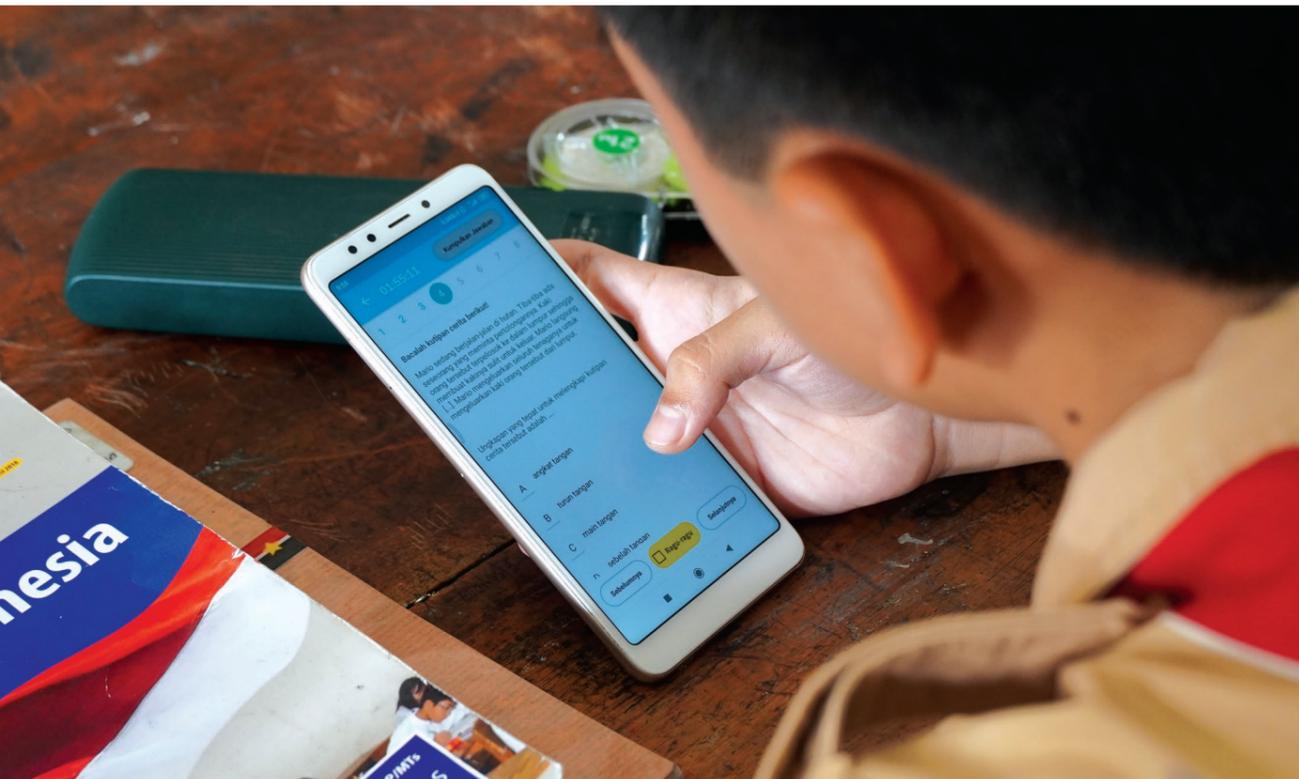
We still live in a world where not everyone has a device and decent internet access. But as a communication platform for teachers, students and parents, it is important that we offer the most accessible technology possible. We support users of all devices, data plans, and home broadband connectivity; in fact, nearly 50% of our users use SMS to communicate through our platform.

Overcoming the digital divide

As the reliance on EdTech increases, a primary concern is the limitation on broadband access and device ownership in developed as well as developing countries. This has highlighted the digital divide between those with access to information and communications technology and those without, and inequalities in access to opportunities, knowledge, services and goods.

More than four billion people worldwide now have access to the internet, but broadband access is unevenly distributed and cost can be prohibitive. While the digital divide is closing as devices and data reduce in price, and reliable 4G and 5G data coverage extends globally, people in developed countries are still more than four times more likely to have mobile broadband subscriptions than those in least developed countries.²⁰

Most African schoolchildren do not have devices or connectivity. In Ghana, less than half of the population has mobile phone internet access. Even in developed countries, digital access is not ubiquitous. Only two-thirds of rural Americans report a home broadband connection.²¹ Roughly 3/10 adults with household incomes below USD 30,000 a year (29%) do not own a smartphone. More than 4/10 do not have home broadband services (44%) or a traditional computer (46%). In the UK, in low-income areas, an estimated 15% of pupils do not have access to an electronic device for learning from home.²²



Interview: Transforming education in Indonesia

Ruangguru (Teacher's Room) is Southeast Asia's largest EdTech company, based in Indonesia, with more than 17 million subscribers. Ruangguru provides app-based online learning materials, including access to hundreds of thousands of teachers, which mirrors Indonesia's K-12 curriculum. We spoke to Arman Wiratmoko, Vice President of Corporate Strategy and Finance.

How has Ruangguru responded to Coronavirus?

To respond to Coronavirus, where schools are closed and students are studying from home, Ruangguru launched a free online learning service called Ruangguru Online School. Through the app, we stream online teaching of all school subjects from grades 1 to 12 (both general and vocational tracks), every weekday from 8am until 12 noon simultaneously across 15 channels. Every hour, students can learn different subjects, mirroring the experience of a normal school. Since we launched the program in mid-March 2020, more than seven million students have studied through the Ruangguru Online School.

Additionally, we provide a free online teacher training. Teachers can access 260 high-quality training videos, modules, flashcards, and quizzes on areas such as learning strategies, curriculum planning, educational knowledge, and more.

How has this crisis sped things up?

When the crisis hit, there was no other choice but for students to learn through online learning, so this accelerated the adoption of the technology. For us, the number of users and downloads of our app increased significantly after we launched the free Ruangguru Online School program. More than 1.5 million students accessed our app on the day the program launched. We were #1 on both Google Play Store and Apple App Store in Indonesia, surpassing more popular apps such as

WhatsApp and TikTok. Based on our survey, 9 out of 10 of our users indicated that they are able to learn better through our service.

However, given the speed of the transition, people still need time to adjust. This is especially true for parents and teachers who must quickly learn how to use online education platforms effectively.

How about the digital divide? Are low-income people getting access to EdTech?

The Ruangguru Online School is accessible free for everyone in the country through a mobile phone. However, we also understand that the costs of access can be prohibitive for many people. Therefore, we partnered with Indonesia's biggest internet and telecommunication providers to provide free data packages for students to access our app. We optimize our videos and content for data efficiency.

What change in your strategy has the crisis catalyzed?

We understand that to have an effective online learning experience, it requires active participation from parents and teachers as well. Students alone are not enough. Now we are increasing focus on teacher and parent support, and helping them use our tools effectively. For the students, the focus remains the same: ensuring their engagement with our platform and ability to learn effectively.

What about adult education?

We launched Skill Academy last year, our product for lifelong learners to increase and strengthen 21st century skills, catering to millennials and young professionals. During the Coronavirus crisis, we also offered Skill Academy free online courses for a two-week period. In today's fast paced and ever-changing world, we believe that it is important for people to continuously learn and upskill themselves so they can compete and succeed.

20. <https://www.itu.int/en/ITU-D/Statistics/Documents/facts/FactsFigures2019.pdf>

21. <https://www.cnbc.com/2020/04/03/how-nyc-public-schools-are-shifting-online-during-the-coronavirus.html>

22. <https://www.suttontrust.com/wp-content/uploads/2020/04/COVID-19-Impact-Brief-School-Shutdown.pdf>

Overcoming the digital divide

“
We cannot underestimate the value of free online educational resources and tools at a time when incomes are squeezed and jobs are lost.”

Governments, schools and telcos step up
In an effort to cut through the procurement red tape and deliver much-needed support quickly, governments, schools, telecom companies and online education providers around the world have fast-tracked financial, software, data access and hardware resources to students, parents and teachers.

We cannot underestimate the value of free online educational resources and tools at a time when incomes are squeezed and jobs are lost. In the UK, the BBC launched a major online education program to support the education of “every child” in the country. In the US, telecom provider Comcast provided free broadband internet for low-income households. Its *Internet Essentials* program also offers low-cost computers for USD 150 – lower than many smart phones.²³ New York delivered 300,000 devices to students in its school districts.²⁴

Major Chinese telecommunications companies including China Mobile, China Unicom and China Telecom, combined efforts with tech giants Baidu, Alibaba and Huawei to bolster the digital learning network with 7,000 dedicated servers and 90 terabytes of bandwidth. In Indonesia, Telkomsel offered free 30GB per month for users of K-12 learning app Ruangguru, and delivered 500,000 devices to students. In Singapore, the Ministry of Education lent 3,300 devices to low-income students, and telecom operator Starhub offered free broadband subscriptions to students in need.²⁵ In some African countries, governments directed TV and radio stations to broadcast school lessons²⁶. In Paraguay, the government signed an agreement with Microsoft to cover e-learning for 60,000 teachers and 1.2 million students at zero cost.²⁷ In Russia, Mail.ru provided access to its platform for online learning, Yandex offered video classes for schoolchildren, and GeekBrains gave free access to its programming courses.²⁸

23. <https://www.internetessentials.com/>

24. <https://www.nytimes.com/2020/03/26/nyregion/new-york-homeless-students-Coronavirus.html>

25. <https://www.straitstimes.com/politics/3300-devices-loaned-by-moe-to-students-who-need-them-for-home-based-learning-amid-covid-19>

26. <https://weetracker.com/2020/03/30/Covid-19-provides-EdTech-test-in-africa/>

27. <https://reliefweb.int/report/austria/how-countries-are-using-EdTech-including-online-learning-radio-television-texting>

28. <https://reliefweb.int/report/austria/how-countries-are-using-EdTech-including-online-learning-radio-television-texting>



Investing in EdTech in the era of Coronavirus

EdTech through venture capital

Interview with
Tory Patterson,
Managing Director
at Owl Ventures



Q. How do you see the Coronavirus crisis affecting EdTech?

The EdTech market was a rising tide before the pandemic but Coronavirus has been a tidal wave that has accelerated the adoption of technology and we expect it will remain at higher levels after Coronavirus passes.

In the US nearly 55 million students have been dismissed from K-12 (from kindergarten to 12th grade) schools. There are reasonable speculations about the impact the virus could have on the 2020-2021 academic school year. Given existing research on the impacts of missing school (due to absenteeism, regular summer breaks, and school closures) on learning, having the capabilities for serving students in a remote learning environment is no longer optional. We're migrating towards a digital curriculum and web-based communication tools and all these distance-learning tools will become normal. We are inevitably in a situation where a significant percentage of the student population from pre-kindergarten through graduate school are pursuing their academic goals remotely and will likely continue to do so in the upcoming academic year as education institutions explore online and blended learning models.

Q. What has been the effect of Coronavirus on Owl's portfolio companies and your strategy overall?

The bulk of our portfolio is comprised of companies built to support digital and subsequently remote education, and traffic and engagement metrics have spiked dramatically alongside the school closures. We believe the effect of Coronavirus will be a defining moment

for the industry and we feel that our portfolio and firm are well positioned to emerge even stronger. Due to Coronavirus, EdTech start-ups have experienced explosive demand from existing and new customers. K-12 districts, universities, and workplaces are all rushing to implement comprehensive remote learning technology, and many of Owl's companies are mission-critical elements of continued learning.

An overwhelming majority of EdTech start-ups have also stepped in with offers to serve new customers with their premium products, free of charge through the end of the school year, as an effort to cut through the procurement red tape and deliver much-needed assistance to the market as quickly as possible.

Because of this uptake, we are finding that inbound inquiries, user growth/engagement, and customer pipelines have all dramatically spiked across the portfolio. Our portfolio company examples experiencing this growth include Remind, which operates the world's largest student/teacher/admin/parent communication platform; Hazel Health, a leader in school-based telemedicine; Noodle Partners, a rapidly growing online program manager for universities; and Degreed, a skills platform that allows enterprises to benchmark employee skill sets and subsequently manage professional development to align with corporate objectives.

Q. How do you see the challenge of digital access?

There's a clear digital divide in the US and globally, and we need to solve it because we live in a time where internet access is a necessity. On the optimistic side, there has been a lot of progress to make this a reality across the world - since 2013, the cost of school broadband in the US has decreased by 85%, Chromebooks are now available at affordable price points of USD 100 and it is estimated that by 2020, all 250 million Chinese students will have broadband access.

Even during the pandemic, there are signs of promise: there is federal funding available to buy

kids' devices, internet providers are offering free Wi-Fi services, and in developing countries such as India, the government is using television and radio to disseminate lessons.

At Owl Ventures, we work closely with our portfolio companies to understand their customer profiles, to ensure that the products they are building do not lock out high-need communities. Many of our portfolio companies including Lele Ketang in China and SV Academy in the US focus on under-served student populations. BYJU's and Whitehat Jr. in India serve millions of students with low cost, mobile and desktop-based products. Quizlet (a free flashcard learning app) serves approximately 70 million users across 130 countries and Newsela offers an "offline mode" in its mobile student product so learners can complete reading and assignments without the internet.

Q. How do you see EdTech developing?

We believe that technology adoption will remain a priority across the education landscape both domestically and globally, and adoption will accelerate due to a few different factors:

1. Structural obstacles that previously impeded technological adoption in K-12 classrooms are being removed, such as lack of internet connectivity, entrenched incumbents, top-down sales versus teacher and school-led adoption of technology
2. Higher education institutions are eager to serve more students without having to invest on physical infrastructure and career professionals are increasingly looking to digital offerings to upskill in a dynamic labor market that is transforming faster than ever before.
3. Coronavirus marks a profound turning point in the market, as educational institutions will need to be prepared and ready to deploy technology at scale, especially since many experts predict future periods where schools and businesses will again need to be remote.

4. We believe there will likely be more adoption of solutions with online offerings that can seamlessly switch between in-person and virtual contexts, across categories of online curriculum, communication and collaboration tools, telehealth, etc.

Coronavirus will see changes in models of learning: we're entering a time where the flipped classroom – where students are introduced to compelling content via digital channels by themselves and then do the "homework" with teachers in class – is will be more prevalent. There will be an increasing need to rethink some fundamentals of education such as 'time in seat', synchronous vs asynchronous learning, access to courses, student data privacy laws and screen time.



Finally, we think attention to product development and implementation will be key. Customers of EdTech products, especially schools and universities, will rely on turnkey solutions that a) are easy to implement, b) provide ongoing professional development and support to its users, and c) have product efficacy. EdTech solutions that do not meet these criteria will have a harder time with sales and renewals given the new need and flexibility of remote implementation in this post-Coronavirus reality.

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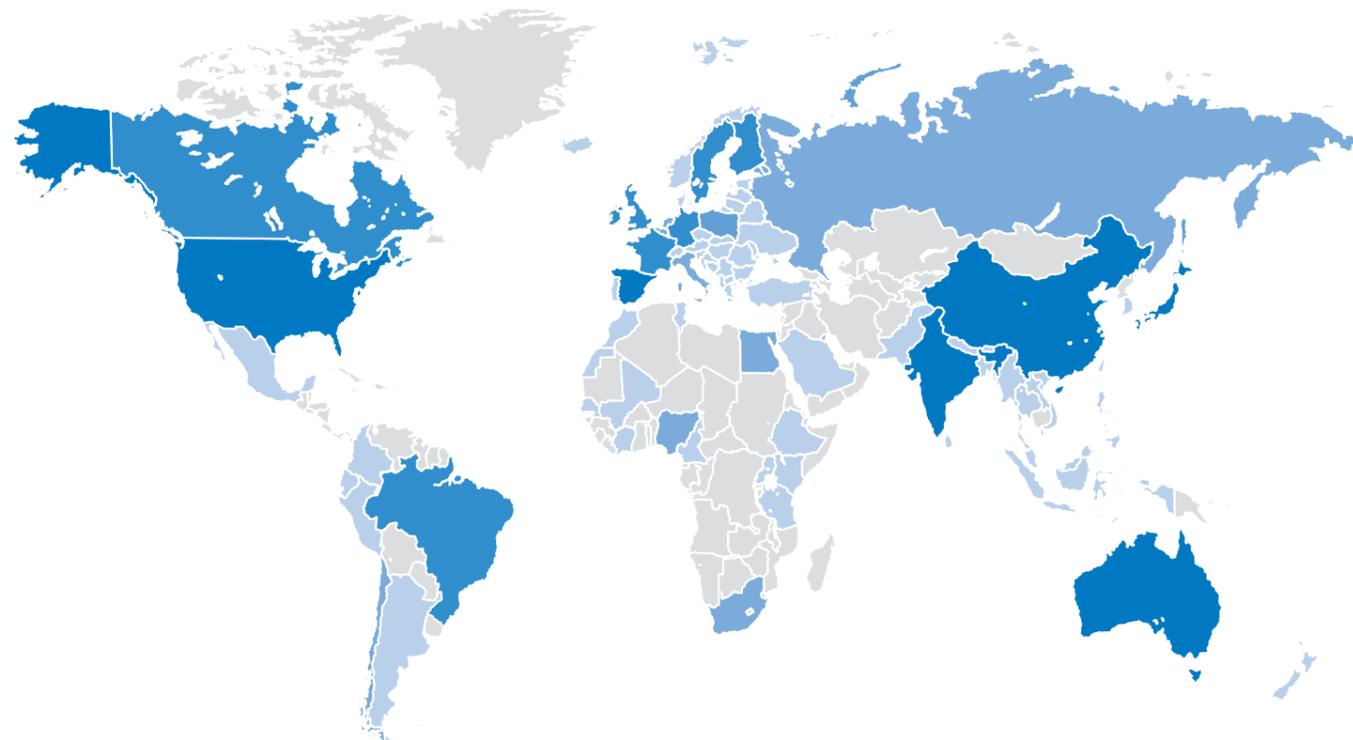
Investing in EdTech in the era of Coronavirus

State of the market pre Coronavirus

Pre Coronavirus, EdTech expenditure was forecast to grow at 15% CAGR 2019-2025 and reach USD 400bn+ by 2025.²⁹ The US set the trend and pace of the EdTech market, but emerging markets – and Asia in particular – have experienced the fastest growth in investment into the sector. Europe remains an under-invested and fragmented market, though it is seeing growth.³⁰

However, the majority of EdTech enterprises are in the US, which accounts for 1,385 or 43% of all EdTech company headquarters. The country's population size, large economy, and tech and innovation hubs all contribute to its success. Other countries with the most EdTech start-ups include India (327), Brazil (275), United Kingdom (245) and China (101). In terms of EdTech companies valued at over USD 1bn, China has eight, the US has five and India has one.³¹

Global breakdown of EdTech companies³²



Number of EdTech companies: 1, 1400. No data.

Most investors in the EdTech sector are specialist or generalist venture capital funds, with only a few funds dedicated to public equity, as most EdTech companies are private and the industry is still at an early stage of development and adoption. There are also a number of non-profit impact investors operating at early stages of companies' lifecycles.

US venture capital (VC) investments in EdTech companies rose fourfold from 2bn in 2014 to more than 8bn in 2019. EdTech started the new decade with USD 3bn of venture capital investment in Q1 2020 as Coronavirus thrust Education Technology onto the global stage, supporting the rapid transformation of the way the world learns.³³ US VC deals in recent years include TPG Rise into Everfi, and Owl into Dreambox and Byju's. Investment forecasts indicate USD 87bn over the next 10 years in EdTech VCs representing almost triple the investment of the prior decade.

By the end of 2019, just under one third (31%) of EdTech companies had successfully attracted VC funding, with 1,019 enterprises in the industry attracting a total of USD 14bn. In 2018, half of the total VC investments in EdTech went to China, which is more than the US received and much more than Europe received. Looking at average amount of funding for EdTech companies, China leads the way with an average of USD 43.9mn invested into individual EdTech companies.

Many of the larger VC-funded private companies are at the point where the VCs and corporate owners are starting to look for an exit, and those companies are big enough for public markets. An increasing number of IPOs are EdTech companies listed by VCs or spun out by their corporate owners. This is where there is a need for public equity investors. The publicly-listed space should continue to expand as the EdTech sector matures and digital penetration grows.

Unsurprisingly, the publicly listed space follows the geographic allocation patterns of VC investments. The EdTech investment universe of publicly listed companies has a relatively larger exposure to China and emerging markets than expected from a general global equities fund. This goes along with a lower relative exposure to the US and even lower exposure to Europe.

Emerging Markets such as Africa, Latin America and Southeast Asia are growing rapidly and have large under-served populations looking to leapfrog traditional developed education systems to lower cost and improve access and outcomes, supporting learners, teachers and administrators with advanced technology. The latter half of the next decade may well see VC investment traction in large emerging markets, particularly Southeast Asia, India and Latin America, where multi-billion dollar funds are being set up to deploy capital into education and other impact sectors.

29. HolonIQ, Credit Suisse AG
 30. RS Components State of EdTech 2019 report
 31. HolonIQ, Credit Suisse AG
 32. RS Components State of EdTech 2019 report
 33. <https://www.holoniq.com/notes/3b-global-edtech-venture-capital-for-q1-2020/>

Investing in EdTech in the era of Coronavirus

EdTech investment in public equities and Coronavirus

China and other emerging markets were a large and important part of the listed EdTech investment universe, so when the first cases of Coronavirus emerged in China and schools shut down, forecasts included a large hit to the performance of the EdTech sector from its disproportionately large Chinese exposure. In reality, however, during the first months of 2020, Chinese and Asian EdTech companies made a disproportionately large positive contribution to the performance of the listed EdTech sector.

In the midst of falling global equity markets, some Chinese EdTech companies were up almost 100% year to date by the end of February 2020. EdTech stocks have fared far better than the general market during the recent downturn. A number of Chinese EdTech stocks have traded at all-time highs, likely driven by the rising appeal of online education models and China's investment of USD 174 bn into its markets in February 2020 in an attempt to stimulate its business environment and equities prices.

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A number of Chinese EdTech stocks have traded at all-time highs, likely driven by the rising appeal of online education models.

Pure online after-school tutoring companies in China have fared particularly well. Before this crisis, the penetration of online tutoring in China was between 15% and 25%. Chinese families were spending over RMB 60bn on these services, projected to grow at an annual rate of 65% for the next few years. The market for China's online after-school tutoring was RMB 20bn (USD 2.8bn) in 2019 and is expecting a CAGR of 30% to 40% over the next five years.³⁴ Following China's lockdown, online tutoring companies opened their online courses for free and new user numbers increased by a factor of ten. It is too early to tell how many of those will stay on as paying subscribers. However, even if the conversion rate of free trial customers into paying customers is half what it was in the past, that would still mean at least doubling of the paying user base.

Education app downloads in China have soared to 127 million - almost double the pre-crisis figure.³⁵ There has also been a surge in sales of iPads in China as schools moved online, resulting in shortages.³⁶ A look at the top three players in the industry suggests that the free classes offered to students during the Coronavirus period resulted in a customer acquisition cost reduction of 95%.³⁷ In other words, these companies could get a huge boost in revenue with a simultaneous uplift in margins, which may justify their outstanding share performance.

Standout performers include China Online Education Group (51Talk), Koolearn and GSX Techedu, which were up 162%, 82% and 83% respectively by the end of Q1 2020. However, as always, equity markets are forward looking and price in all new information quickly, so many Chinese companies have struggled to perform since.

From about the middle of March, China has slowly been easing the lock down restrictions. In the meantime, the US has become the epicenter of the pandemic. And with this, US listed EdTech companies outperformed their Chinese counterparts and their local equity index.

There was also one clear laggard group among the EdTech companies - and they were the corporate learning providers. Their fortunes are directly linked to corporate budgets, which are under pressure. As the possibility of global recession loomed larger, those companies sold off. In some cases, their share prices were down over 50% between the beginning of 2020 and the middle of March.

Even in comparison with that group, there were laggards; companies operating in industries that were the worst hit - such as training pilots, as most airlines grounded and those operating in resource-dependent countries most impacted by the rout in the oil market - such as Canada or Brazil.

34. <https://www.brinknews.com/online-education-companies-in-china-see-a-huge-spike-in-demand-caused-by-covid-19/>

35. <https://global.chinadaily.com.cn/a/202004/06/WS5e8a6f3aa310128217284886.html>

36. <https://asia.nikkei.com/Spotlight/Coronavirus/China-demand-for-e-learning-bites-into-Apple-s-iPad-supply>

37. <https://www.brinknews.com/online-education-companies-in-china-see-a-huge-spike-in-demand-caused-by-covid-19/>

Case Study

Youdao (Bloomberg: DAO US Equity)

Youdao serves the digital learning needs of children, college students, and adults. Over a decade ago, the company launched what became the #1 language app in China - the flagship *Youdao Dictionary*, with nearly 52 million Monthly Average Users (MAU) in 2019. From these roots, Youdao leveraged its brand to create a collection of popular writing and translation apps, which are now driving traffic to its most lucrative business: interactive online courses. Since 2017, Premium Course student enrolments have doubled to 800,000, while company revenues have tripled to USD 1.3bn RMB at the end of 2019.

Fresh out of the gate from its 2019 IPO, Youdao was growing quickly, investing in customers - and then Coronavirus appeared. Youdao offered free digital courses for the lockdown period. "We have a social responsibility to assist in any way we can," stated CEO and Director Dr. Feng Zhou on the most recent earnings conference call on February 27, 2020.

He also outlined the impact of the pandemic on the enterprise, and industry at large: "The outbreak significantly raises the awareness of online education. So business-wise, it's very positive for our courses. We are doing several things. We are offering free courses to our users and most of the result... is actually branding awareness. As a lot of users try these free courses, they get to know Youdao and get to know online education for the first time... there have been over 10 million free students, free course enrollments, since we launched the campaign on January 24, 2020.

The second thing we're doing is offering low cost trial courses... what we are seeing is... much lower user acquisition cost over the period of time and also better conversion rates... We are spending more on marketing... most of that is actually on the low cost trial courses... and this enables us to ramp up the business faster."

If Youdao's investment in low-cost trial courses during Coronavirus pays off, a small conversion rate of the 10 million new users to Premium Course customers would be significant. Every 1% conversion rate equates to 100,000 new users, compared to the 260,000 Premium Course student enrolments Youdao reported in the quarter to December 2019.

When Youdao reports its latest figures, investors will be curious to hear how these initiatives to capture customers at lower cost are bearing fruit. However, as premium course student enrolments is growing quickly - up 68% in quarter December 2019 - the Coronavirus boost for Youdao may well be more evolutionary than revolutionary.

Investing in EdTech in the era of Coronavirus

Case Study

2U (Bloomberg: TWOU US Equity)

2U offers turnkey platforms for online learning at top universities. With a mission to narrow the skills gap by widening access to quality education, 2U builds and powers online graduate and undergraduate degree platforms for partners that include UCL, Oxford, Yale and 70 other institutions. In addition to constructing a digital backbone for student learning, 2U equips individual instructors with training and services to optimize success in the virtual classroom. Its short-term “BootCamps” are targeted, in-person courses aimed at building skills in high-demand professions such as coding, cyber security and fintech.

When Coronavirus hit the US in early March 2020, the company moved all its BootCamps online. To support professors at partner universities (many online instruction first-timers), 2U offered free best practice training in digital instruction. It also rolled out Studio in a Box, an easy-to-use toolkit enabling professors to produce courses and film content from home.

At 2U’s April 30, 2020 Earnings Conference call, CEO and Founder Chip Paucek stated: “We all witnessed how Coronavirus created an urgent need for every university to move their programs online. This rush to remote learning happened almost overnight... We now believe that this forced transition online will substantially increase the demand from universities for our core product offerings and new solutions ... The need to deliver truly high-quality online programs, not just remote live lectures, at a time when universities are facing unprecedented financial constraints and challenges makes our ... model even more compelling and valuable.”

Student demand will also likely increase. Paucek continued, “As online learning becomes the norm, now and into the fall, we believe the prospective students will increasingly view online programs as attractive alternatives to campus-based programs. Quality will matter here. And when done right ... online can be as good as or even better than the campus.”

Conclusion

EdTech’s time has come. The combination of compelling, gamified content, plus plummeting costs of data and devices, and integration into classrooms and the emergence of adaptive learning had put EdTech on a solid growth trajectory.

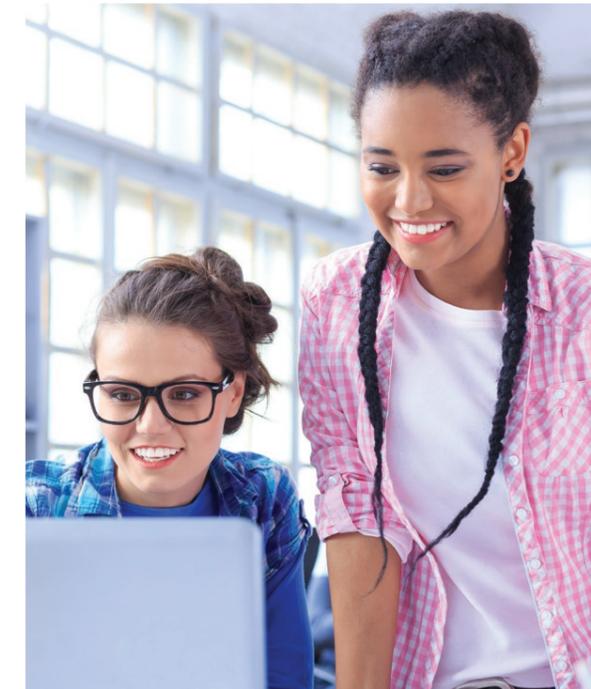
Coronavirus has put EdTech on the fast track. It has propelled EdTech into the mainstream and into the spotlight, which will be a huge catalyst for the education sector. This will only increase as investment flows into the sector and the content improves, and educators and administrators learn how to implement these new tools.

Across both developed and emerging markets, millions of students and teachers have signed up to free versions of EdTech learning apps, and are experimenting with different formats and technologies. Once the world’s students return to the classroom, it is likely that they will continue to use the most engaging subset of these apps.

This crisis has also highlighted the issue of equity and accessibility, and it is likely that there will be considerable pressure on governments and schools to narrow the digital divide and ensure all low-income students have access to a device and data plan to ensure they can benefit from the same technologies as their classmates.

We know that Coronavirus has accelerated the blended learning model, which empowers, not replaces the educator. EdTech will not only transform education in the developed world, but over time may also fulfil its promise of delivering high quality, low-cost education to the world’s poor. It will also likely play a key role in retraining people who have lost jobs or need to reskill to meet the needs of a fast-changing and disrupted economy.

Whether EdTech will ultimately fulfil its promise is yet to be seen. Nevertheless, what is certain is that Coronavirus has dramatically enhanced the role of technology in education, and the learning experience for students and teachers is forever changed.



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