

Scaling Access & Impact

Realizing the Power of EdTech

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Acknowledgements

This series of reports was produced by Omidyar Network's Education initiative, whose mission is to unlock human potential through learning by catalyzing people, ideas, and systems – so every individual thrives and contributes in a changing and interdependent world. The Omidyar Network team included Eliza Erikson, Erin Simmons, Rebecca Hankin, and Eshanthi Ranasinghe.

This report was prepared by RTI International with Omidyar Network. The lead author was Sarah Pouezevara (RTI), and case study authors were RTI consultants Ignacio Jara Valdivia (Chile), Mike Michalec (China), Talitha Amalia (Indonesia), and Sybille Fleischmann (USA). Additional technical writing and analysis were contributed by Carmen Strigel, Kang Chang, and Luis Crouch.

The data underpinning this report come from interviews, surveys, site visits, and desk research by a team of researchers and EdTech practitioners led by RTI International, drawing on local expertise in each of the case study countries. The team conducted more than 100 interviews with teachers, school principals, education administrators, policymakers, and EdTech experts and entrepreneurs throughout September–December 2018. A separately available country report for each case study country provides further detail on the findings and data sources for each country snapshot below, in addition to the comprehensive descriptions found in the executive summary and full global synthesis report.

To receive the executive summary and detailed global and country reports, please email EdTech@omidyar.com.

About Omidyar Network

Omidyar Network is a philanthropic investment firm that invests in and helps scale innovative organizations to catalyze economic and social change. Established in 2004 by eBay founder Pierre Omidyar and his wife Pam, the organization has committed more than \$1.3 billion to for-profit companies and nonprofit organizations across multiple initiatives, including: Digital Identity, Education, Emerging Tech, Financial Inclusion, Governance & Citizen Engagement, and Property Rights.

To learn more, visit www.omidyar.com, and follow on Twitter [@omidyarnetwork](https://twitter.com/omidyarnetwork) #PositiveReturns.

Acronyms and Abbreviations

AI	artificial intelligence
B2C	business to consumer
B2G	business to government
CETS	China Education Technology Standards
EdTech	education technology
GDP	gross domestic product
GSMA	Global System for Mobile Communications Association
ICT	information and communication technology
MOOC	massive open online course
NBS	National Bureau of Statistics
NGO	non-governmental organization
RMB	renminbi
STEAM	science, technology, engineering, arts, and math
STEM	science, technology, engineering, and mathematics
TAL	Tomorrow Advancing Life
USD	United States dollars

Executive Summary

About this Series: Scaling Access & Impact: Realizing the Power of EdTech

There are 250 million learners around the world who have finished their schooling – yet aren't able to read or write well and lack the skills they will need to succeed in the 21st century. Additionally, around the globe are classrooms with tens of thousands of teachers struggling to close that educational gap – but lacking the access to tools and resources that will enable *them* to succeed.

The Brookings Institute described a 100-year gapⁱ, the century it will take for the world's poor children to achieve educational parity with the wealthy at today's pace. Neither our world nor those learners can wait that long: We must find ways to close that gap quickly and efficiently, to allow all learners, educators, and educational systems to realize their full potential.

In pursuit of this goal, Omidyar Network's Education initiative began in 2009 to invest in innovations in education with such "leapfrog" potential and in 2014, specifically focused some of our investments on innovations powered by technology. Omidyar Network has since invested more than USD 150 million in promising global innovations in education across four continents.

Our efforts have been inspired by bold entrepreneurs as well as public, private, and social sector education leaders who are unleashing the human potential of a generation of learners through "Equitable EdTech." Omidyar Network defines Equitable EdTech as the promise of technology to be a great equalizer in improving quality education for learners in need. We have witnessed that Equitable EdTech models can bring students from several years behind to on grade level, while also shifting the norm from teacher-centered instruction to student-centered learning. We are therefore hopeful that the power of technology, when thoughtfully employed, can serve as a great equalizer in delivering quality education.

By enabling ubiquitous access and personalization, Equitable EdTech can close the gap for students while also empowering teachers to be more effective, especially when there is lack of access to high-quality schools, high-quality teacher training, rigorous curriculum, or appropriate interventions. Additionally, recent evidence demonstrates that these models can be both highly impactful and cost-effectiveⁱⁱ.

However, our experience has also taught us that scaling and sustaining Equitable EdTech requires much more than eager learners and motivated educators. It demands the alignment of multiple actors across sectors in local ecosystems. This report examines such ecosystems and how they combine the efforts of government and education leaders, investors and philanthropists, and innovators and entrepreneurs.

Specifically, we sought to:

- > **Identify the events, actions, and initiatives across public, private, and social sectors that have contributed to the equitable scaling of EdTech in these countries; and**
- > **Inform a public policy and investing agenda by identifying the highest-impact interventions that might contribute to EdTech scaling in other countries.**

Our hope is that the country-system examples we examined, including Chile, China, Indonesia, and the United States, will inspire these interdependent actors to collaborate on creating the enabling conditions for equitable impact of technology at scale in their regions. We also hope that the ecosystem model presented in this report will spark debate as well as attract new partners.

There are six reports in the *Scaling Access & Impact: Realizing the Power of EdTech* series, including:

- > **Executive Summary**
- > **Global Report**
- > **Country Report: Chile**
- > **Country Report: China**
- > **Country Report: Indonesia**
- > **Country Report: United States**

This report is the case study report for China. A separately available country report for each other case study country and a full global synthesis report are also being published

China Country Report

A variety of factors in China are driving the exponential growth of education technology (EdTech). They include the value that the growing middle class places on education attainment and their increasing ability to pay for education services. Most parents see investments in education as critical for their children to secure reputable and gainful employment and are, therefore, willing to spend a significant percentage of their income on supplementary education services. More common still today, older parents attempt to choose the best-quality face-to-face academic tutoring and test preparation services within their local community; however, this trend is shifting as younger digital-native parents accept online learning as a substitute. These younger parents also value and understand the importance of technology and 21st century skills and are beginning to drive demand for services such as computational thinking and coding. Younger generations of parents are not only more willing to pay for online services, but they also expect to do so. EdTech can scale quickly in sectors where there is high demand for the subject matter and too few qualified teachers. This is particularly the case for English-language learning.

The Gaokao, the Chinese National College Entrance Exam, is arguably the most-influential driver of the United States dollars (USD) 50 billion Chinese afterschool tutoring and test preparation industry. Both the Gaokao and the Zhongkao, the high school admission exam equivalent, foster a competitive enrollment environment that drives considerable parental spending on supplementary test preparation courses. National policy initially dictated the adoption of EdTech in public sector education during the post-Mao era until the early 2000s, when more widespread information and communication technology (ICT)-enhanced pedagogy and resources began to penetrate Chinese classrooms. Since then, the government has implemented a series of large-scale initiatives to address issues of access and equity.

Despite these efforts, China remains a business-to-consumer (B2C) market; EdTech entrepreneurs who expand into the public school sector rely on large workforces to directly engage schools in EdTech adoption. For example, EdTech entrepreneurs may sponsor capacity building workshops or regional conferences to engage teachers and teacher groups in the use of their product. However, more effort is needed to ensure adoption by school officials, who are more risk averse and have little incentive to adopt new innovations. Leadership building at the local level aimed at improving the understanding of EdTech’s benefits will drive the use of state budget allocated for this purpose, as will clear signals of support for EdTech from high-ranking education officials.

Exhibit 1 summarizes the key takeaways from the China country study and **Exhibit 2** presents a snapshot of China’s EdTech ecosystem.

Exhibit 1: Key Takeaways

Inspiring Proofpoint	Practice for Replication	Practice for Further Exploration
There are business models for EdTech entrepreneurs that leverage widespread access to mobile internet and performance pressure generated by cultural values and government standards.	Reaching rural and ethnic minority schools with equal access to high quality lessons through virtual teaching and blended models of instruction.	How to move beyond use of technology for test preparation and ensure that the power of EdTech—especially livestreaming, artificial intelligence and machine learning—can create socially and emotionally equivalent, or superior, learning experiences as the classroom.

Exhibit 2: China EdTech Country Snapshot

Ecosystem Profile

EDTECH SUPPLY AND BUSINESS MODEL

Private investment in EdTech is strong, surpassing \$4.4 billion in 2018. Many parents are willing to spend a significant percentage of their income on supplemental education services.

ENABLING INFRASTRUCTURE

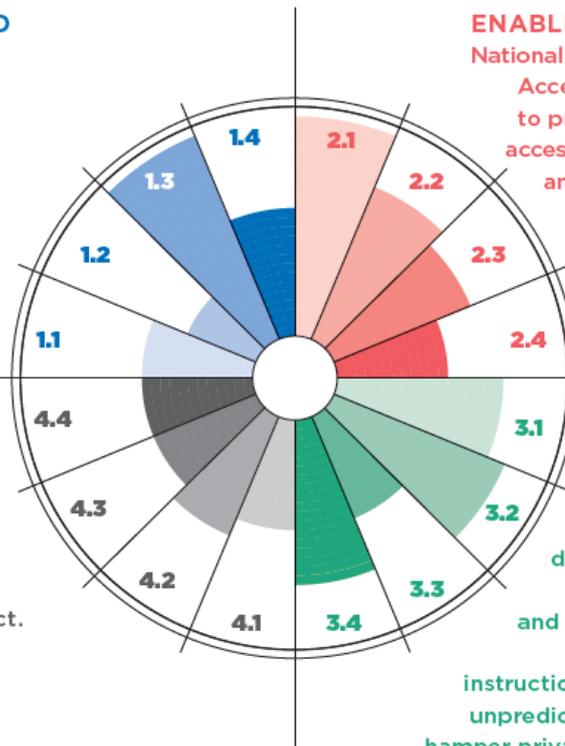
National programs—Three Universal Access and Two Platforms—aim to provide universal broadband access, online learning resources, and a site for education data. Advanced mobile payment infrastructure allows for the rapid adoption of mobile online learning services.

HUMAN CAPACITY

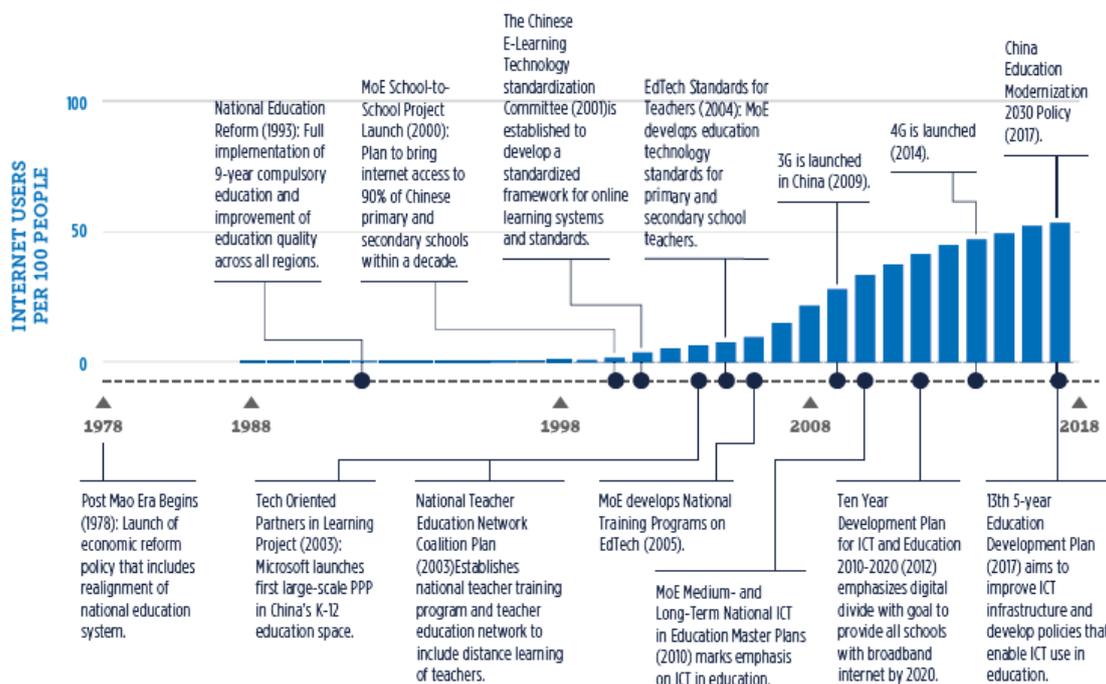
Several government initiatives are focused on teacher training, including the National Teacher Training Project. However, urban/rural inequities in teacher capabilities remain.

EDUCATION POLICY AND STRATEGY

Over the past two decades, the focus has been on education access and equity, including enhanced use of technology-enabled instruction. However, restrictive and unpredictable regulations will likely hamper private participation in EdTech.



Timeline



Country Background

Society

The People's Republic of China has experienced tremendous social and economic growth in the post-Mao era as it has engaged in industrial transformation. Key indicators, such as life expectancy and gross domestic product (GDP) per capita, have increased consistently over the last two decades, with the average Chinese citizen now expected to live 10 years longer and earn 10 times more money than 20 years ago³. Modern Chinese society and its rapidly expanding middle class are currently reaping the benefits of progressive long-term policy that has enabled the modernization of infrastructure and enhanced workforce opportunities. Through its Belt and Road Initiative, China now seeks to play a larger role in the international community, implementing by linking markets and infrastructure with Europe, the Middle East, and Africa while investing heavily in emerging markets. China's population of 1.38 billion is spread across 23 diverse provinces, five autonomous regions, four municipalities (Beijing, Shanghai, Tianjin, and Chongqing; these cities are controlled directly by the central administration), and two special administrative regions (Hong Kong and Macau). Provinces, municipalities, and autonomous regions govern their own economic and social affairs within the context of the laws and regulations set by the central government. Autonomous regions are granted more legislative autonomy than other administrative units. The country's 613 major cities are also classified into categories—Tier 1 to 4—based on their GDP, political administration, and population. The four municipalities are “top tier” (Tier 1) cities. These categories are frequently used in literature describing EdTech markets. Some additional details about China's demographics are presented in **Exhibit 3**.

Exhibit 3: China's Demographics

World's 2nd largest economy

GDP (2010) US 10,161 billion

Population 1.38 billion

3.7 million square miles of territory

Education System

Demographics

China governs the largest K–12 education system in the world, with approximately 130 million students enrolled in primary and secondary public schools (**Exhibit 4**)⁴⁵. Within the primary education system alone, 167,009 public primary schools operate 2,683,706 classrooms⁶. The number of students enrolled in the country has fluctuated slightly over the past 20 years and now accounts for 9% of the total population. This predictable and consistent student population has largely been determined by the one-child policy initiated in the 1980s; however, a new policy introduced in 2015

allows two children per family. As a result, a gradual increase in the number of enrollments in the pre-K segment is expected in the early 2020s.

China has more than 15 million teachers working in more than half a million schools. Professional certification for K–12 teachers is exam based, with preparation and pre-service training programs of variable quality and duration available in addition to mainstream undergraduate teacher degree programs. Countrywide efforts to increase the cohesion and quality of teacher training programs such as the National Teacher Training Project have yielded less-than-optimal results. Teachers who have undergone adequate professional training are drawn to work in cities where there is potential for higher earning and career opportunities. As a result, teacher quality in many rural communities remains a major obstacle to ensuring equitable educational outcomes for all students.

Exhibit 4: Education in China

15 million teachers	More than half a million schools, including 167,009 public primary schools
130 million students (9% of total population)	Ranked 10 th in science (PISA 2015)
USD 2,415 per student expenditure	4.1% of GDP spent on education

Funding

National expenditure on education has consistently increased over the past decade because of a policy that earmarks roughly 4% of GDP to be spent on education annually. Public spending on education in 2017 surpassed USD 675 billion, an increase of 9% over the previous year, according to the National Bureau of Statistics (NBS)⁷. Of that amount, the largest increase in funding was targeted to pre-K.

Public education funding per student is variable and largely determined by residence, with students living in wealthier cities receiving more financial resources. The allocation of funds in the top-tier cities of Beijing and Shanghai currently averages USD 7,278 per year per student, significantly more than the national average of USD 2,110 per year per student⁸.

Government expenditure per student in rural areas is considerably lower; however, selected communities in western provinces are eligible for additional funding.

Education policy in the post-Mao era has been instrumental in reducing educational inequality among rural and urban populations, primarily in access, gender disparity, and total years of schooling. In the 1980s, less than a third of the total number of students enrolled in secondary school in China were female; this increased to 96% in 2013⁹. This significant increase is primarily attributable to a policy implemented in 1986 that mandates compulsory education for both boys and girls through year 9. There is no obligation to attend secondary school, but most students remain enrolled through year 12. Education is highly competitive after middle school as students vie for entrance into top-tier secondary schools and universities. The Gaokao, taken by nearly 10 million secondary students each year, determines entry into China's limited-capacity public higher education system.

The gradual increase in education spending in the post-Mao era has provided schools with improved infrastructure and teaching, resulting in dramatic improvements in literacy rates. Despite this widespread progress, disparities in student academic performance, high school dropout rates, teacher quality, and school resources persist, particularly among rural and marginalized populations.

Infrastructure

Total Internet penetration in China currently amounts to approximately 802 million users, 98% of whom are mobile Internet users.¹⁰ Yet there is significant room for growth as that figure represents only 58% of the total population. Government-supported infrastructure initiatives and low subscription costs have enabled consistent increases in users in recent years and will continue to do so. To date, approximately 98% of the population has network coverage¹¹. The rising popularity of online and mobile learning, including massive open online courses (MOOCs), in China is partly driven by improved bandwidth, making live-streaming technology and online courses more accessible.

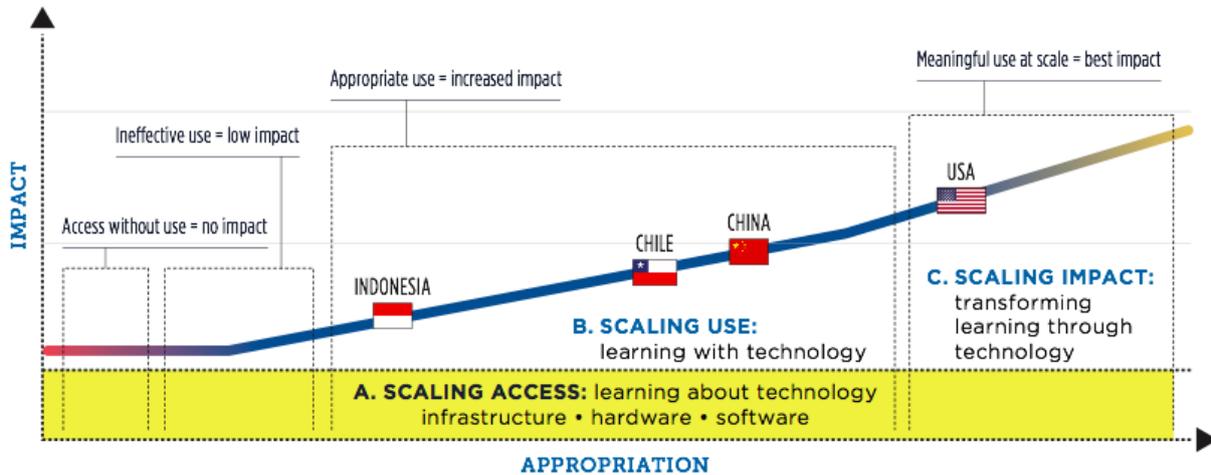
As of 2016, school-level Internet penetration was 45% for primary schools, 69% for middle schools, and 87% for high schools. Although schools may have connectivity, use depends on school leadership policy, and many ban personal mobile devices in schools or reserve Internet use for teachers. Connectivity decreases along the city–urban–rural school continuum, with the largest disparity occurring between urban primary (77% Internet penetration) and rural primary (26%)¹².

EdTech in China

This section looks at the evolution of EdTech scaling in China across three main phases of change—access, use, and impact—as illustrated in **Exhibit 5** (for a more comprehensive discussion of the Ecosystem Change Model, see the Global Report). A common error in EdTech is assuming that scaling a product will naturally result in its appropriate use. Scaling access (or even ‘opportunity to access’) does not equal use, nor does opportunity to use mean that the product will be used in a way that results in impact on learning outcomes at scale. The outcome of a strong EdTech ecosystem should be a steeper slope, indicating a more rapid transition to transformative use of technology.

This section describes several Chinese examples of EdTech with a measure of success in scaling and identifies the factors that enabled this success.

Exhibit 5: Ecosystem Change Model



Scaling Access

Scaling access means there are EdTech products in the market, and users have the ability to adopt them because they have the technology (e.g., hardware, connectivity) to do so.

Connected Society

Students in China have access to a wide variety of both **school- and individual consumer-based** EdTech solutions obtained through business-to-government (B2G) sales and B2C sales, respectively. Several industry leaders interviewed for the study noted that the use of these products depends strongly on perceptions and mindsets, particularly among parents who are deeply involved in their children’s education. Parents are willing to invest in learning opportunities that are perceived to improve test scores, and digital alternatives are attractive because of their potential to save money and time (e.g., by reducing commuting time to and from school or a tutor). EdTech products priced with a one-time fee of less than USD 10 are easily purchased by students and parents at scale throughout China. Because students residing outside of major cities have less disposable income, they are less likely to have access to quality offline supplemental learning (such as tutoring). However, given the increasing connectivity in rural areas across China, students in these areas can adopt online EdTech products at affordable price points. Online platforms have, therefore, helped create equitable access to certain learning opportunities that were previously only available in large cities. Demand for online learning has been increasing steadily since 2010, reaching 144 million online learners in 2018, with an estimated 70% of these learners paying for their coursework^{13,14}.

China’s advanced **mobile payments infrastructure** has also contributed to the rapid adoption of mobile-based online learning services. The transition to a partially cashless society via the use of the world’s largest mobile payment platforms, Alipay and WeChat pay, has contributed to a 100-fold increase in the number of mobile payment transactions over the last 5 years. In 2017, total Chinese payment transactions via mobile amounted to USD 12.8 trillion¹⁵. The widespread use of mobile devices and social media also helps products scale as users download educational apps through WeChat. Overall, the current status of infrastructure in China is well suited to drive large-scale

adoption of B2C EdTech solutions, with any remaining school-level accessibility gaps being addressed through government initiatives.

However, device use among primary school students is increasingly becoming a concern among parents as they monitor screen time and online behavior at this developmental stage. Thus, parent perceptions of the value proposition of mobile-based EdTech are as important as their purchasing power. In contrast, secondary school students have more autonomy to use and purchase EdTech products, but EdTech integration in school depends on the mindset of teachers and school administration who continue to ban technology use in schools.

Policy and Regulatory Environment

Over time, the increased use of technology in schools has eventually led to the development of a national technology in education framework that establishes key performance indicators for teachers, administrators, and technology coordinators. During the post-Mao era until the early 2000s, China's national policy dictated the adoption of EdTech in public sector education, driving the use of more-widespread, ICT-enhanced pedagogy and resources in Chinese classrooms. Since that time, the government has launched a series of large initiatives to address issues of access and equity, such as the 5- and 10-Year Education Plans. The most recent 5-Year Education Plan went into effect in 2017 and calls for improvement in ICT infrastructure and enhanced use of technology in education, especially learning management systems. These policies incentivize and legitimize EdTech content development.

To achieve equitable access to EdTech in public schools, the government has made significant progress on enabling core infrastructure and allocating funding for software and hardware that varies with geographic location; however, some rural communities remain underserved. To provide every public school in China with Internet by 2020, the current 10-Year Education Plan intends to provide all urban schools with access to 100-Mb broadband and all rural schools with at least 10-Mb broadband. This vision is implemented through the Three Universal Accesses and Two Platforms initiative (see text box). One component of the Three Universal Accesses is an ambitious, top-down school hardware initiative, which currently attempts to equip all classrooms with digital multi-media equipment and all students (6:1 student-to-computer ratio) and teachers (1:1 teacher-to-computer ratio) with online learning services. Under the Two Platforms program, the government seeks to establish an education information platform that provides a basic database for students, teachers, and institutions to aggregate and house relevant data on tests, enrollment, study, and employment. Once complete (expected in early 2020s), these initiatives will profoundly impact equitable access to information and resources that can be leveraged for improving teaching and learning. However, it should be noted that the massive centralization of student- and school-level data may also raise concerns about student privacy and ethical use of data.

Three Universal Accesses:

- > Universal access to broadband for all schools
- > Universal access to quality resources for all classrooms
- > Universal access to online learning spaces for all students and teachers

Two platforms

- > An educational service platform and marketplace for digital resources
- > An education information management platform to capture data on all students and facilities

For more information see UNESCO (2015)¹⁶.

The Chinese EdTech market is also largely influenced by frequently evolving regulations and laws with the potential to quickly create or limit commercial opportunity. Importantly, online providers of EdTech content must acquire a series of licenses before releasing content to the public in or out of school; failure to abide by this requirement has resulted in the prompt removal of content from online platforms. Examples of Internet operating licenses include (1) value-added telecommunication licenses, (2) online audio-visual dissemination licenses, (3) online publishing licenses, and (4) online culture licenses.

Purchasing power in the government domain increases at each later phase of education. Therefore, primary schools have the least purchasing discretion, whereas middle schools and high schools have more, but still minimal, buying power. Notably, the designated top-tier schools in major cities have complete autonomy. These top-tier schools are high-performing schools that often yield top Gaokao scores and, thus, have high college admission rates. Most large EdTech purchasing decisions are conducted at the district level, although smaller transactions of roughly USD 7,200 or less can be made by individual schools; this amount varies across provinces. Schools may also decide how to integrate live-streamed “dual teacher” lessons. For large policy-driven purchases in government schools (e.g., electronic white boards), decisions are made at the district level. Other B2G sales rely on representatives of EdTech entrepreneurs selling to schools directly, as discussed further in the next section.

Scaling Use

‘Scaling use’ is distinguished from ‘scaling access’ by emphasizing that just because one *can* access a product does not mean that one *will* do so. Progress toward EdTech use is considered observable when products show evidence of an active user base (e.g., subscriptions), and are facilitated for use in classrooms by trained educators, among others. There are also different levels of use, from basic to transformative, which depend on effective capacity building for EdTech integration.

In China, EdTech use in the B2C market is driven by performance pressure and high demand for key subject areas with employment potential. Parents actively engage with the products that their children use and will pay for more for higher quality products (e.g., those that include live, personalized engagement); however, this requires a level of awareness and digital literacy that is not distributed equally among all urban tiers and rural areas. EdTech use in schools is expanding because of top-down requirements and teachers capacity building programs, coupled with direct outreach by EdTech entrepreneurs.

Capacity Building

Teacher demand for EdTech products is greatly influenced by their capacity to understand and use technology-enabled pedagogy. Several of the policy initiatives referred to above have directly impacted teacher training on the use of EdTech, including a course developed in 2004 introducing the **China Education Technology Standards (CETS)**. Completion of the CETS course is now a mandatory pre-requisite to obtain the national teaching certificate. In-service training under the CETS initiative has helped teachers establish core technology-related competencies, such as online search, content evaluation, and data privacy and security, in addition to enhanced awareness of and attitudes toward EdTech.

The long-term national strategy for EdTech integration is aligned with recent national and municipal curriculum reform emphasizing coding; science, technology, engineering, arts, and math (STEAM); and artificial intelligence (AI)-related content in public schools. These top-down priorities will require teachers to upgrade their own content knowledge in these subject areas and integrate the subjects in the curriculum. In Chile and the United States, national ICT competency standards were a driving force for the initial scaling of hardware and software in schools, paving the way for more transformative use of EdTech later on (see Country Reports). In China, the equivalent ‘trojan horse’ for EdTech use in school may be the country’s ambitions to be a global leader in AI and other high-tech fields, pressuring schools to introduce digital literacy and coding earlier.¹⁷

Direct Sales and Licensing Strategies

Several of the most widely used commercial EdTech solutions in China’s K–12 market—Onion Math,¹⁸ Knowbox,¹⁹ and Zuoyebang²⁰—**are free platforms for homework management and assessment**, suggesting that teachers find value in productivity tools (e.g., reduced workload, data for meaningful feedback) and supplemental content for subject areas where they are weakest (e.g., science, technology, engineering, and mathematics [STEM]; English language). **Exhibit 5** presents information about the companies behind some of the largest EdTech products.²¹ Teachers were introduced to these platforms (and convinced of their value) by the companies themselves, who deploy large numbers of teacher-engagement representatives who meet with teachers, typically on site, on a monthly basis. School administrations often grant teachers the flexibility to use freemium-based platforms at their discretion and encourage their students to do the same. Direct sales to schools via teacher-engagement representatives has enabled Onion Math to acquire a user base of 500,000 middle school math teachers and Knowbox to grow their registered user base to more than 20 million teachers, students, and parents. Conversion rates to paid subscriptions are quite low but are often in the form of additional content offerings (developed in-house or by third party publishers). Additional monetization for these companies is through tutoring services; for example, Onion Math offers a “Gold Medal Tutor Course” ranging from renminbi (RMB) 198 (US 30) for 3 months to RMB 488 (US 73) for a 1-year subscription.

Exhibit 6. Comparison of Major Chinese EdTech Companies

Company	Subscribers	Funding (Total Investments)
Onion Math 洋葱数学	500,000 middle school math teachers ^c 14 million registered users from 63,000 middle and primary schools in 419 cities and 34 provinces nationwide ^d	USD 19 million ^a
Zuoyebang 作业帮	Used by 113 educational organizations and 370,000 primary schools and high schools ^a	USD 585 million ^a
VIPKid	Connects more than 500,000 paying students with over 60,000 teachers in the United States and Canada ^a	USD 825 million ^a
17EdTech 一起作业	70 million registered students, teachers, and parents in 140,000 schools	USD 385 million ^e
KnowBox 作业盒子	Used by 27 million students and 2 million teachers, reaching nearly 70 thousand schools in China ^b One million daily active users ^a	USD 156 million ^a

Sources: ^aCrunchbase; ^bEdSurge, ^cEJ Insight, ^dMarbridge Consulting, ^eCompany interview

As with other middle- and high-income countries in Asia, parents in China invest a significant portion of their income in their children's education. The average **parental spending** over the duration of a child's K–12 schooling in China is currently USD 42,892.22. In general, Chinese parents' perception of success is highly correlated to education attainment, which drives the market for education products and services that help their children enter top-tier secondary schools and universities. According to several of the surveyed experts, demand for the B2C EdTech market is driven by parents' personal educational experiences in achieving testing success. Among younger parents, new values have emerged that emphasize collaboration, leadership, and problem-solving skills, which could encourage the development of new EdTech solutions beyond those solely focused on test preparation and university placement.

Scaling Impact

Finally, although EdTech products may be accessed and used—even in the most robust and transformational way—at scale, scaling *the impact* of EdTech is a function of how EdTech is adapted for use in different ways by different populations. As such, the impact on learning is what must be 'scaled' rather than just product use. This is the hardest phase of scaling to demonstrate, but specific efforts to evaluate and communicate impact, redesign and adapt products for different audiences, and establish mechanisms for choosing the right products for the right purposes are indicators that EdTech will be more likely to have equitable impact.

In China, for-profit and non-profit EdTech entrepreneurs such as those described above are helping to scale impact through packaged business models that combine product sales with training and

implementation support. Freemium models help these entrepreneurs reach a large user base more equitably but also earn revenue that they can reinvest in additional services.

Fit-for-Purpose Business Models

One of the most-notable examples of equitable scaling of K–12 EdTech in China is **Onion Math**, a middle school math video and question bank platform used by teachers to better instruct students (see text box below). This platform builds teaching capacity while improving student test scores and engagement. The company has scaled its product through direct online and offline engagement with middle school math teacher communities. According to the company's head of teacher engagement, of the 600,000 middle school math teachers certified in China, more than 500,000 are using the app. The company employs 20 full-time staff to conduct teacher training in areas of critical thinking, content knowledge, and pedagogy, primarily for teachers with little or no pre-service training who work in rural areas. As a result of the training, teacher quality has improved, and student test scores in math increase on average by 30% in classes where Onion Math's video content and questions are used.

ONION MATH: Onion Math began in 2011 as a non-governmental organization (NGO) that delivered tablets to rural schools. Subsequently, the company pivoted as it realized that hardware and software were readily available in their targeted communities, but the quality of educational content needed improvement. Onion Math's current business model is based on direct consumer (B2C) sales and sales to public schools (B2G). Onion Math allocates significant financial and human resources to teacher training and provides more than 50% of their content for free via their mobile app. A customized teacher version of the app is available for free, whereas students who wish to access content relevant to more-advanced math instruction pay an annual fee of RMB 488 (US 73/month). In contrast to many of the other Chinese EdTech companies that have scaled successfully by focusing on top-tier cities, more than half of Onion Math's 20 million users are located in areas of need, specifically third-tier cities and below. Company representatives believe that the high rates of teacher adoption may be attributed in part to the specific niche content and age group focus.

The Green Pepper Program is an example of how a business model that combines non-profit and for-profit capital through strategic public-private partnerships and financing can scale EdTech equitably.²³ This non-profit initiative improves teaching quality in rural schools at scale through a series of collaborative partnerships with key providers offering in-kind or discounted services in technology, content, program management, incentives for teachers, and corporate social responsibility funding. The program is actively engaged with local government at the provincial level to identify the most-in-need areas and gain access to individual schools. By partnering with technology providers, the program provides a dual teaching model, a method wherein one master teacher, typically in a top-tier city, livestreams instruction to multiple classrooms, and local teachers serve as facilitators. This method has enabled quality instruction to be delivered to areas that are most in need. Local recipient schools have the discretion to use the program as they choose to supplement, but not replace, their own teaching. The Green Pepper Program claims supporting research indicating that participation in the program has improved student scores and teacher capacity. Additional online teacher training is also a core component of the program, with more than 16,000 teachers currently participating and being monitored for success metrics measuring course completion, discussion

response quality, and overall engagement. A range of strategies based on public recognition of achievements, points, and promotion to higher levels in the training cohort incentivize teachers to participate. The program has been used by 4,489 schools and 34,071 teachers and has developed 206 specialized courses since its inception.

EdTech Innovation

Finally, in this B2C market, EdTech entrepreneurs themselves are driving the scale of impact through constant innovation to meet or exceed the expectations of traditional face-to-face classrooms. Advances in technology coupled with the evolving needs and capacities of digital-native students and their parents have influenced EdTech entrepreneurs to continually improve the design of products. This improvement includes making use of machine learning and big data in support of instructional quality; including more feedback loops between students, parents and teachers; facilitating content customization by teachers or driven by AI; designing products that optimize the use of student time (e.g., through shorter learning sessions); summarizing student learning in visual dashboards; and integrating a combination of self-directed and live-stream tutoring.

Another freemium-based K–12 solution with success at reaching both rural and urban communities is the homework platform **17EdTech** (also known as 17zuoye²⁴). In contrast to Onion Math’s approach of producing their own quality content, 17EdTech provides an AI-driven, personalized learning platform based on curated third party content with partners who provide supplementary textbooks, live-streaming coursework, and more. The platform enables teachers to assign and grade homework digitally. Selected content is aligned with Ministry of Education curriculum standards to encourage teacher adoption and is placed on the platform through partnership agreements. Half of 17EdTech’s 60 million registered student, teacher, and parent users are located at the rural, county, and smaller-city levels. The platform is active in more than 100,000 schools and is scaled through high-volume teacher engagement with local company representatives who regularly visit high-traction schools. As with the Onion Math teacher training program, 17EdTech uses large online social communities via WeChat to engage and onboard teachers to their platform.

Summary

Exhibit 7 summarizes specific characteristics of the ecosystem that are relevant to scaling maturity in China.

Exhibit 7: The Role of Existing Ecosystem Elements in EdTech Scaling in China

Category	Scaling Access	Scaling Use	Scaling Impact
Education policy and strategy	The strategy for connecting schools, digitizing curriculum, and creating public platforms for education management and content access is set in the national 10-Year Plan. Computer skills classes are part of the core curriculum. The	The Modernizing Chinese Education 2030 initiative promotes transformation and innovation in education, the implementation of teacher training initiatives, and the integration of EdTech into pre-service	Government policies influence the use of EdTech in schools by incentivizing innovation, research, and knowledge sharing.

	government supports the use of distance education, especially by rural schools.	programs. High-stakes tests and competitive access to higher education create performance pressure and drive use.	
Enabling infrastructure	A large B2C market for and the extracurricular use of EdTech are supported by widespread access to 4G networks, mobile devices, and mobile payment infrastructure outside of school.	Existing infrastructure meets the needs of urban, rural, and migrant children. The use of distance education models is widespread.	To meet the needs of rural, migrant, and minority populations, affordable infrastructure must be equitably and inclusively accessible.
Human Capacity	Private sector entities invest and are involved in educating the public about EdTech	Teachers' and students' mindsets and user readiness are being improved by their increased familiarity with technology and NGO interventions.	NGO interventions combine appropriate access with content and training. Research on EdTech is increasing, and think tanks are focused on discovering and sharing good practice.
EdTech Supply and Business Models	EdTech venture capital has shown enormous growth, and significant funding for developing products is available. China's local high-tech talent pool brings constant innovation to EdTech products.	Entrepreneurs in this field are leveraging social media outreach and the widespread use of mobile phones to increase awareness and new users.	Innovations in AI, big data, machine learning, and interactivity are improving the impact of products that address topics beyond test preparation and also helping to deliver personalized learning experiences.

According to the EdTech ecosystem change model shown in **Exhibit 5**, this analysis concludes that China remains at the stage of rapidly expanding access to and use of EdTech. This access pays off for many children who wish to access higher education, especially abroad. However, more attention needs to be paid to whether EdTech is providing equitable opportunities for basic education across all tiers of society.

The EdTech Scaling Ecosystem

EdTech Market

Private investment in the Chinese EdTech market in 2018 surpassed USD 4.4 billion, accounting for roughly two thirds of the overall capital invested in this sector globally. Increased interest from the private sector has led to the creation of several EdTech “unicorn” companies serving the K–12 market, including Zuoyebang (homework and tutoring), 17EdTech (homework), iTutor Group (language learning), and VIPKid (language learning).

The majority of China’s EdTech development takes place in either Beijing or Shanghai, with Shenzhen hosting several companies in the EdTech hardware space. Beijing is home to the largest number of EdTech companies in the world—more than 3,000—and is followed by Shanghai, with slightly more than 1,000. As a result, attracting and retaining the talent needed to implement quality EdTech solutions is extremely competitive. Indeed, EdTech developers must compete with China’s tech giants, including JD, Alibaba, and Tencent, to attract top technology talent from both China and overseas. Senior-level AI and big data professionals working in the Chinese EdTech sector are increasingly receiving higher salaries than their counterparts based in the United States and

European Union and often benefit from more lucrative stock options. However, these market dynamics do not lead to EdTech solutions that are focused on lower income and underserved students. Thus, there is an opportunity for the NGO and non-profit sectors to meet the needs of these segments.

Arguably, the Gaokao is the most influential driver of China's USD 50 billion afterschool tutoring and test preparation industry. Both the Gaokao and Zhongkao foster a competitive enrollment environment that drives considerable parental spending on supplementary test preparation courses. China's two largest education companies (Tomorrow Advancing Life [TAL], market cap: USD 16.2 billion; and New Oriental, market cap: USD 9.1 billion) both began as offline tutoring centers, eventually offering an online component to accommodate different services and price points and to scale to locations where they lacked a physical presence.

EdTech sales to the government remain highly dependent upon distribution intermediaries who retain direct relationships with schools and key administrators. However, in terms of B2C EdTech market penetration, China is a world leader with a well-developed EdTech ecosystem that not only drives innovation through top-tier talent but also supports awareness and adoption via centralized communication and payment platforms that facilitate both word-of-mouth and traditional marketing exposure. Centralized communication channels hosted by Tencent's WeChat enable rapid nationwide awareness campaigns and discussion with influencers who can quickly drive adoption. Key figures in the sector, including the CEOs of several Chinese EdTech unicorns, are active on social channels and frequently use online platforms to voice opinions and announce education-focused initiatives. The EdStars platform supported by TAL serves as a capacity building network of EdTech company founders who focus on not only individual commercial gains but also overall ecosystem growth and support. A group of former EdStars members founded the first EdTech venture capital fund, Blue Elephant Capital, in 2014. This fund has taken a leading role in supporting early-stage EdTech companies through typical incubation activities, such as seed funding and growth support. Although the tech sector is well developed and capable of supporting commercial EdTech solutions through EdStars and other instruments, the NGO sector remains nascent in the realm of EdTech.

EdTech Ecosystem Components

The study revealed several elements of the ecosystem in China that enable EdTech scaling; these elements have been integrated into the overall EdTech Scaling Ecosystem Model (see **Annex 1**). Below, these elements are presented in the context of the relevant components of the overall model.

3.2 Performance standards set high expectations that incentivize improved performance and legitimize EdTech content development.

- > Policy in place sets high standards and expectations for both teachers and learners. The need to outperform peers to gain entrance to highly competitive national top-tier higher education (and, to a lesser extent, secondary education) drives the development of many EdTech products.

<p><i>3.1 A clear vision and strategy for EdTech from the highest level of the education system serves as a collective roadmap.</i></p>	<ul style="list-style-type: none"> > Early national policy promoted the adoption of EdTech in public education. More recently, the Three Universal Access and Two Platforms programs aim to achieve universal access to broadband, quality resources, and online learning for all students and teachers.
<p><i>2.4 eGovernment (GovTech) initiatives connect schools through administrative platforms (i.e., EMIS, eProcurement) whose infrastructure can be harnessed for EdTech.</i></p>	<ul style="list-style-type: none"> > Under the Two Platforms program, the government seeks to establish an education information platform that provides a basic database for students, teachers, and institutions to aggregate and house relevant data on tests, enrollment, study, and employment.
<p><i>2.2 There is universal access to Internet throughout the population through wireless, wired, or other means.</i></p>	<ul style="list-style-type: none"> > A series of 5- and 10-year plans have contributed to top-down, equitable expansion of infrastructure and Internet access.
<p><i>1.1 Businesses have a cost-efficient marketing, sales, and distribution mechanism for reaching customers, whether B2G or B2C.</i></p> <p><i>2.1 Individuals are using personal devices and mobile services at home and in the community.</i></p>	<ul style="list-style-type: none"> > China’s advanced mobile payment infrastructure has led to the rapid adoption of mobile-based online learning services. > Social media use by digital natives (parents and learners alike) drives the adoption of consumer-based applications, particularly for homework help, test preparation, and language learning. > EdTech entrepreneurs grow quickly through marketing and distribution via mobile platforms.

Conclusions

Looking ahead, China’s EdTech ecosystem will likely continue to rapidly evolve over the next 10 years through the development of more-advanced technology driven by consumer demand and favorable capital markets. Increased budget allocation from the government is also likely, as the national agenda spreads eGovernment services in society and education. According to experts interviewed for the study, likely scenarios in the coming years include the following:

- > **The use and study of AI in K–12 classrooms will become more standardized and controversial as China pushes to become the global AI leader by 2030.** The Ministry of Education has recently begun piloting AI as a subject in select high schools and distributed its first AI textbook. The use of AI in assessment has also been tested in 60,000 schools to gauge the accuracy of testing software. Concern and ethical discussion around the use of AI

in student evaluation and grading will generate more public interest given the implications of its misuse and potential consequences for future opportunities.

- > **In this growing market for EdTech, a few companies will continue to dominate the overall market, but individual unicorns may emerge for each sub-sector (e.g., K–12, early childhood, afterschool).** The variety of online learning content will expand to accommodate different interests and needs through the development of other subject areas, including STEAM and 21st century skills development. As more niche-specific content is created, issues concerning the copyright and use of such content may warrant increased government regulation. Content delivery platforms for these subject areas will use their data more efficiently to enable higher degrees of personalization, and policies and standards impacting the use of such data will become more prevalent.
- > **The ongoing trend of restrictive and unexpected government regulation will continue, creating potential challenges in for-profit investment.** Specific segments of commercial education, such as kindergartens, private schools, private tertiary institutions, and EdTech providers, will all experience increased government intervention and control. Several recent examples of actions include a new regulation that requires additional licensing for gamified EdTech products, which forced several providers to temporarily remove paid products from their platforms, and a new law that requires all online course instructors teaching core K–12 subject areas to possess a valid national teaching certificate.
- > **Several of domestically focused large Chinese EdTech companies will begin to seek expansion into other regional markets.** As the number of Chinese EdTech providers that are publicly listed companies increases, and the national market becomes more saturated, these providers will begin to look elsewhere to achieve their financial return goals. Larger companies will begin to acquire smaller market players and launch localized versions of existing product throughout the region. This process is already being followed by TAL, which has more than a dozen investments outside of China, including their recent acquisition of kids coding platform provider Code Monkey for USD 20 million in late 2018.

The education market in China will expand and will have to contend with the different needs and interests of private and public sector providers. Clearly, a huge appetite exists for convenient and affordable supplemental tutoring, especially in subject areas where qualified Chinese teachers are lacking. However, strongly held traditional beliefs in the value of the face-to-face and social learning provided in schools, especially in the early years, persist. Shaping the mindsets of parents, teachers, and school administrations, coupled with the government's central vision and guidance, will influence whether EdTech will continue to exist primarily in a B2C, afterschool market or whether the innovations in AI, machine learning, big data, multimedia streaming, and interactive content can be integrated into public education in ways that benefit all children, regardless of where they live.

Annex 1. The EdTech Scaling Ecosystem Model

EDTECH SUPPLY AND BUSINESS MODELS

1.4 Mutually beneficial, cross-industry, public and private sector partnerships support access to, use of, and impact of EdTech products and services.

1.3 EdTech entrepreneurs have access to capital through appropriate business models, allowing them to survive and thrive.

1.2 There is an objective and simple way for users to select products that meet their needs.

1.1 Businesses have a cost-efficient marketing, sales, and distribution mechanism for reaching customers, whether business to government (B2G) or business to consumer (B2C).

4.4 There are multiple and varied ways of communicating product effectiveness research, evaluation, and user experience.

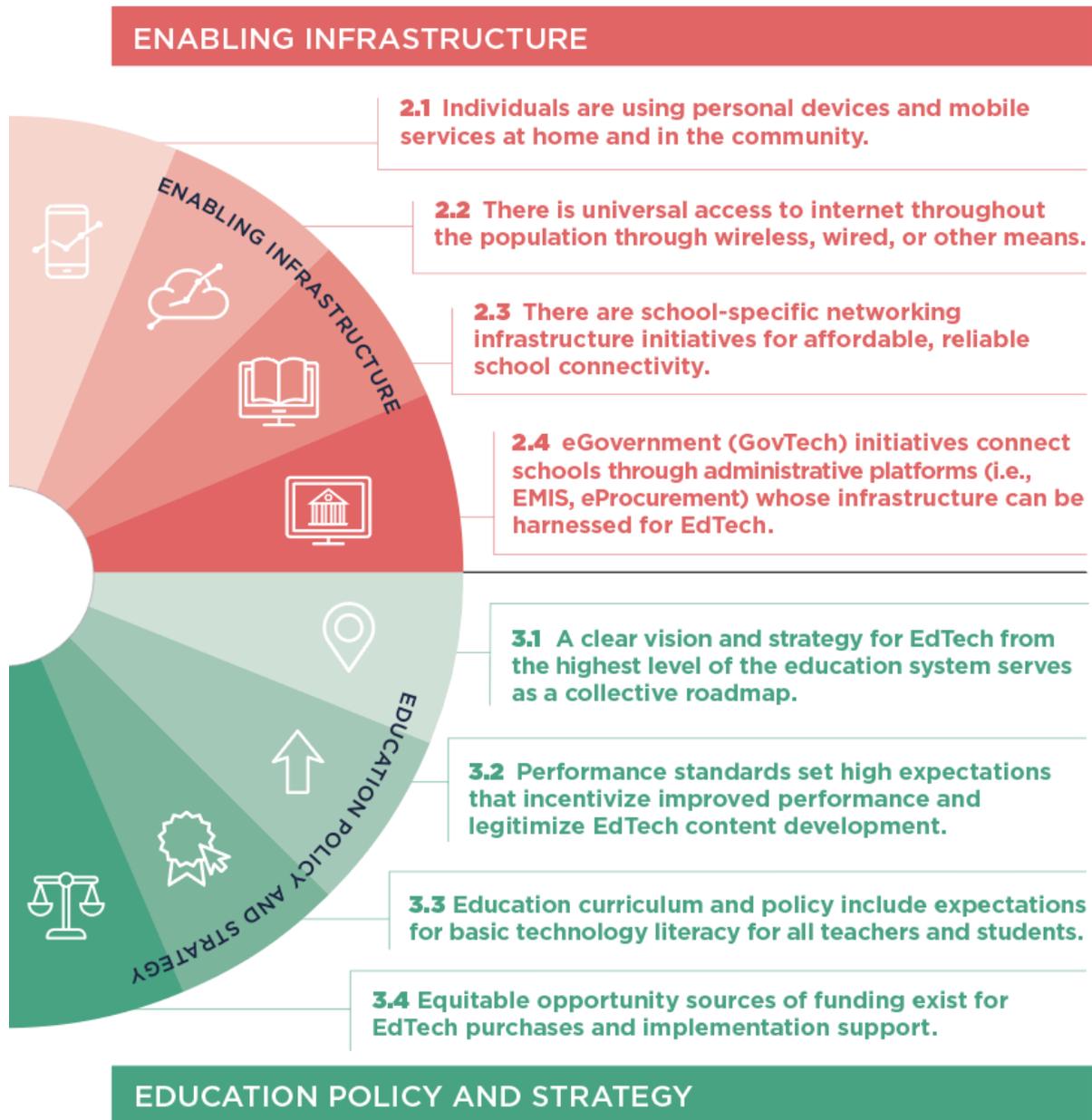
4.3 Nongovernment coalitions and advocacy groups support quality EdTech scale-up.

4.2 There are sufficient ongoing and equitable opportunities for stakeholder capacity building.

4.1 Local visionary leaders emerge to coalesce stakeholders around a bold common goal.



HUMAN CAPACITY



Endnotes

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