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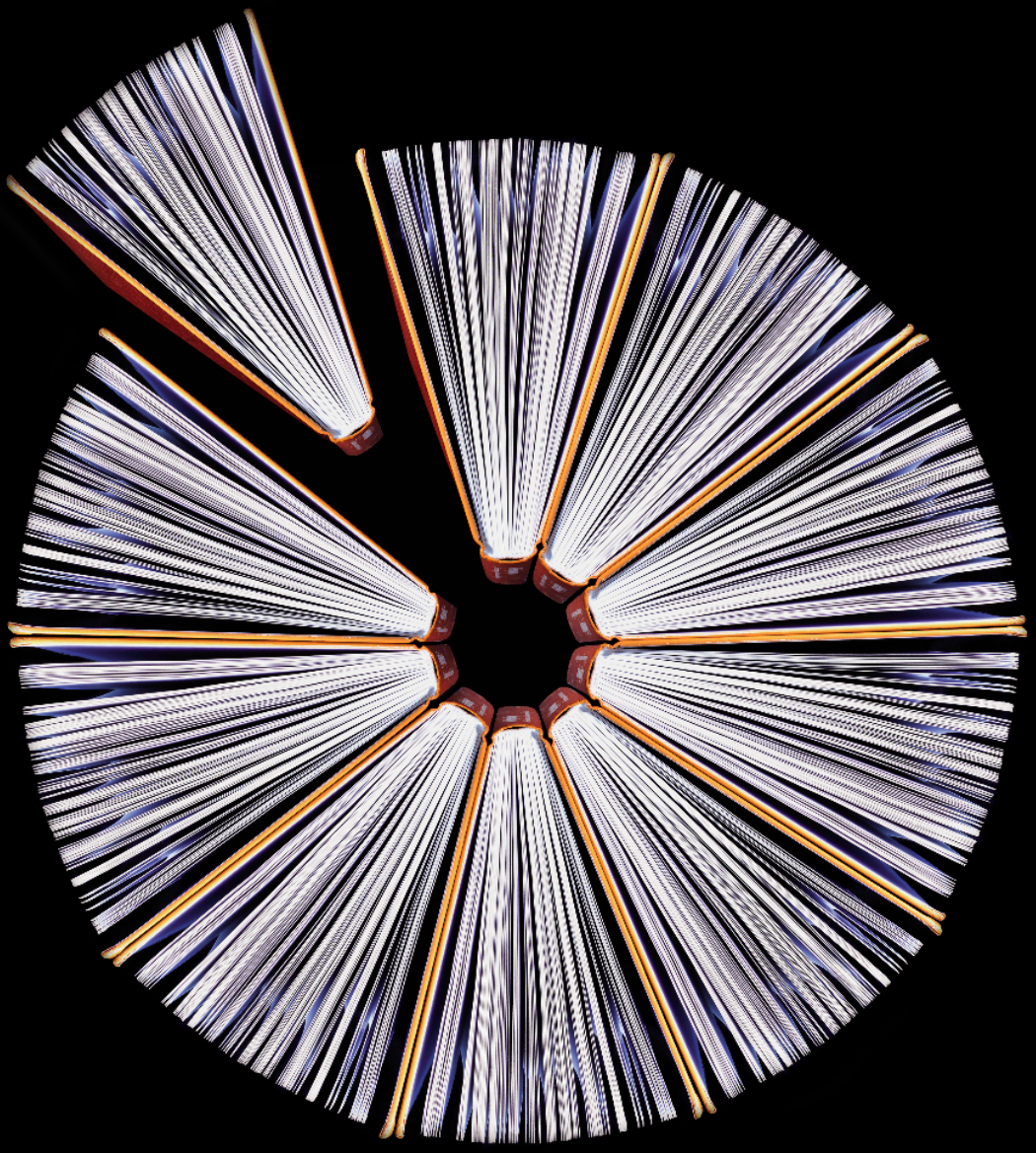


Revitalizing Education

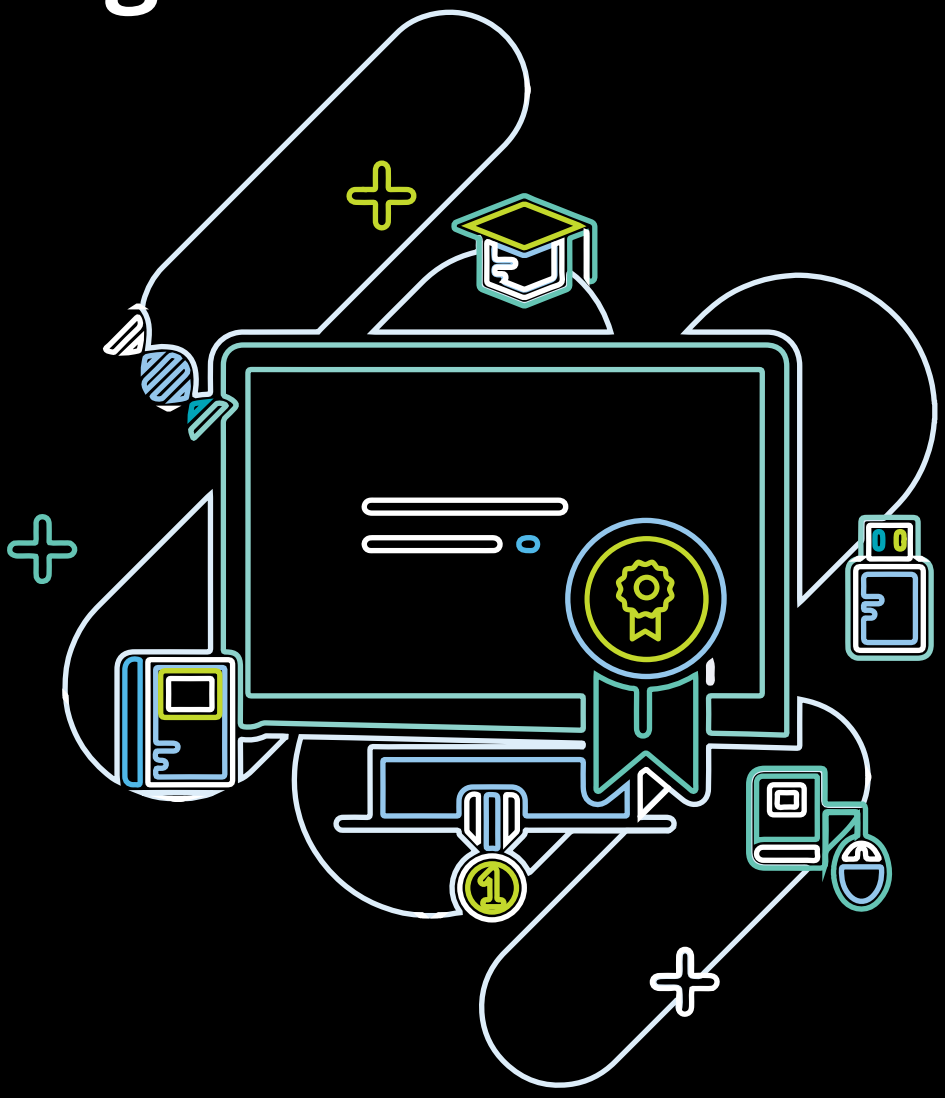
Opportunities in dynamics

November 2019
Deloitte China

MAKING AN IMPACT THAT MATTERS since 1845

Contents

1. The Education sector is heavily guided by policies and regulations

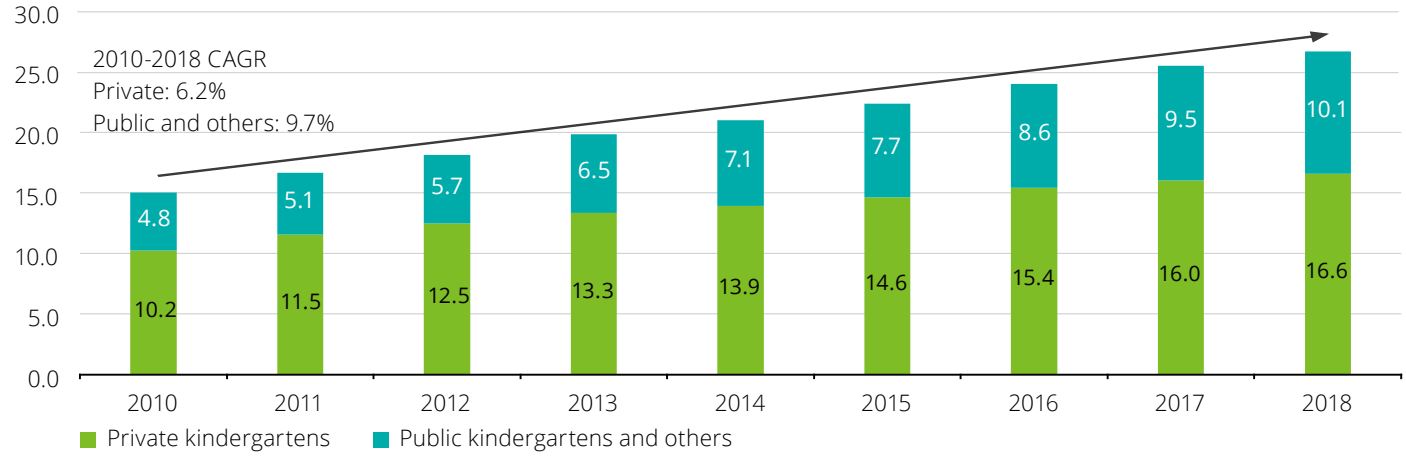


1.1 Redefining the preschool education market

Heavy investment is still required to build kindergartens in China

In 2018, China already had 267,000 kindergartens, 62% of which were private and 38% of which were public or other school types. As the government makes changes to policies on kindergartens, the coverage of inclusive kindergartens[1] will rise sharply in 2020 to more than 80%. However, statistics show that despite their increasing numbers, there were only 16.66 million students in these public kindergartens in 2017. In contrast there were 3.62 million students in collectively-run kindergartens and others and a further 25.72 million children studying in private kindergartens. Insufficient state financial investment means that private capital must play a role in the preschool education sector.

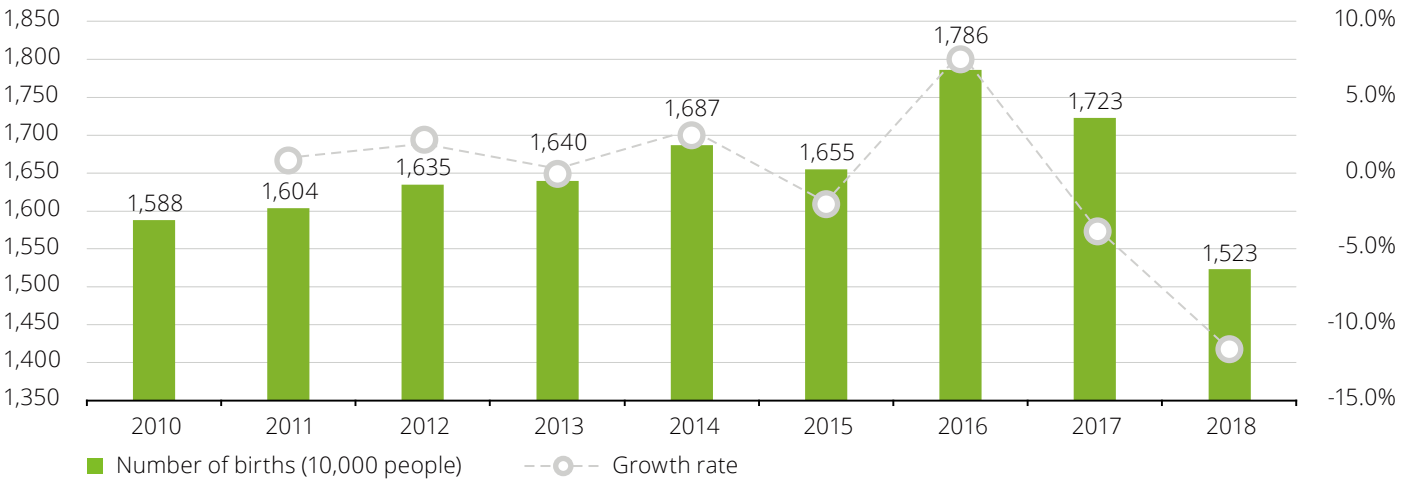
Figure 1: Number of kindergartens in China (10,000 kindergartens)



Source: wind, Deloitte Research

The early education sector faces a number of challenges. Commercial rents in China are increasing at a rate of over 5% a year (with rent rises a particularly pressing issue in Tier-1 and 2 cities). Furthermore, there is a lack of skilled workers with preschool teaching qualifications. Low salaries for kindergarten teachers has led to higher staff turnover. Though the decreasing birth rate in the future will mitigate the shortage of kindergartens nationally, kindergartens in large cities and quality resources will still be in short supply. As a result, more investment in building public kindergartens is required both for the short and long term development of China's kindergarten education.

Figure 2: Number of births in China from 2010 to 2018 (10,000 births)



Source: wind, Deloitte Research

1. Inclusive kindergartens are affordable low-cost or affordable kindergartens

The preschool education market witnessing an increasingly regulated administration

On 15 November 2018, the State Council published *Opinions on Deepening Reform to Regulate the Development of Preschool Education*, encouraging the development of affordable inclusive kindergarten system by proposing that "the kindergarten enrolment rate in three-year preschool education will reach 85% and the coverage of inclusive kindergartens will be 80% by 2020". The report argues for "building a kindergarten system oriented towards inclusive resources, developing public kindergartens to increase the proportion of kindergarten students in public kindergartens to 50% in China by 2020 in principle, and supporting private kindergartens in providing inclusive services".

Furthermore, the *Opinions* set rules on private kindergartens by specifying that "private capital should not control kindergartens run by state-owned assets or collective assets and non-profit kindergartens through M&A, entrusted operation, franchising, variable interest entities or protocol control". It adds that, "Private kindergartens should not go public separately or as a part of assets, and listed companies should not invest in for-profit kindergartens by financing from stock markets, nor purchase for-profit kindergarten assets by issuing shares or paying in cash."

On 22 January 2019, the *Circular of the General Office of the State Council on Initiating the Rectification of Kindergartens Affiliated to Residential Communities in Urban Areas* was released. In it, the state Council emphasized again the inclusiveness of kindergartens affiliated to residential communities, designed a timetable for rectification and clarified the responsibilities of various sector participants. Meanwhile, the nature of public resources and regional monopolies has driven these kindergartens into policy focus. This will inevitably impact these for-profit kindergartens if they have irregular operations.

Although policies have stressed that kindergartens affiliated to residential communities should be built as inclusive kindergartens, a certain number of kindergartens affiliated to residential communities across China are privately run for-profit. These for-profit kindergartens affiliated to residential communities with irregular operations have two choices: increasing inclusiveness by adding more inclusive classes, lowering fees and gaining state funding, or relocating to business zones to run for-profit kindergartens. The first choice means a partial change in operating model whereas the latter means higher costs in rents and student recruitment.

Listed companies or those going public need to refine their transitions

The *Opinions on Deepening Reform to Regulate the Development of Preschool Education* report has heightened market concerns about stricter education policies, which will lead to some restriction of the education sector in the short term. In the long run, policies will push listed private kindergartens to coordinate with government to implement reforms and transformations.

- For listed companies, their main strategic responses should include making changes based on government requirements, adding more inclusive classes, exploring a multi-level model and planning expansions to other education market segments and acquisitions.

- Companies with kindergarten assets going public, meanwhile, need to divest these assets and adjust their business models to continue to go public. Small- and mid-sized private kindergartens need to adapt themselves to inclusive policies and consider different models of kindergarten operation.

- Lastly, investment funds oriented towards preschool education need to change direction early as their listing plans will be blocked, challenging their future funding and expansion.

Chinese kindergartens will need multi-level, inclusive growth models

When considering China's increasingly regulated kindergarten sector, it is useful to compare it with the development model of kindergartens in developed countries.

Japan's Ministry of Education, Culture, Sports, Science and Technology has decided to waive all child care fees for three- to five-year-old children in kindergartens, child daycare centers and designated kindergartens, funded by an increased consumption tax from 1 October 2019. Starting from the 2019 fall semester, France has included preschool learning into its compulsory education system and lowered the school starting age to three-years-old. In most other overseas school systems, three-year-old preschool education is provided through their inclusive systems led by governments, who provide the bulk of financial input into the sector.

In China, amid accelerating urbanization and the accompanying concentration of the population in large cities, urban kindergartens are in short supply. China should therefore ease access to kindergarten education focusing on diversified models of running kindergartens while increasing public expenditure to ensure it attains the 80% enrolment rate set out in its development aims.

In recent years, many regions have explored small and micro kindergartens that may benefit from favorable policies.

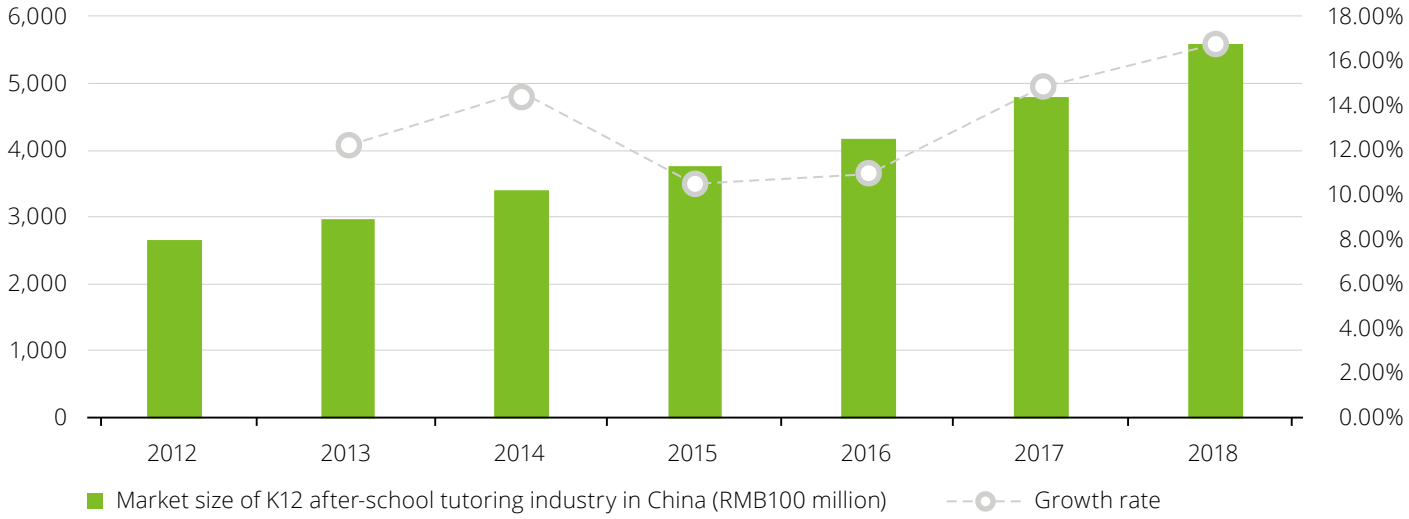
The preschool education sector is characterized by diversified and fragmented business formats. Small, micro, lifestyle and community-based kindergartens are ahead of the mainstream in the global preschool sector. In China, small and micro kindergartens can effectively relieve the stress caused by a limited number of urban kindergarten places, providing convenience to parents and attractive teaching conditions. Some Taiwan-based brands have already entered this sector in the Chinese Mainland. With the replacement of the one-child policy by the two-child-policy further exacerbating kindergarten shortages, the model of small and micro kindergartens is expected to be applied in more cities.

1.2 K12 after-school education compliance as top priority

K12 after-school tutoring market maintains growth under regulations

With the market increasingly regulated, China's K12 after-school education market continued to grow in 2018, reaching RMB560 billion and a growth rate of 17%, according to a Frost & Sullivan report.

Figure 3: Market size of K12 after-school tutoring industry in China (RMB100 million)



Source: Frost & Sullivan, Deloitte Research

The FY18 revenues of the sector leaders New Oriental and Tomorrow Advancing Life (TAL) reached RMB15.7 billion and RMB10.9 billion, respectively, with growth rates of 36% and 64%. TAL's net earnings grew by nearly 70%, further indicating the immense potential of the K12 after-school tutoring sector. New Oriental and TAL have concentrated their learning centres in Tier-1 and Tier-2 cities; in contrast, their penetration rates in Tier-3 cities and below is less than 1%. Both education providers are focusing on dual-teacher teaching (where there is a local and remote teacher) and AI technology to compete for new market benefits in Tier-3 cities and below.

Table 1: Revenue comparison of key players in K12 after-school tutoring market

Listed company	FY2018 revenue (RMB100 million)	YoY growth (percent)
New Oriental	157.0	36.0
TAL	108.6	64.4
Unigroup Xue (Xueda Education)	28.9	2.9
OneSmart Education	28.6	39.1
Only Education	21.0	21.6
Beststudy Education	14.8	28.7

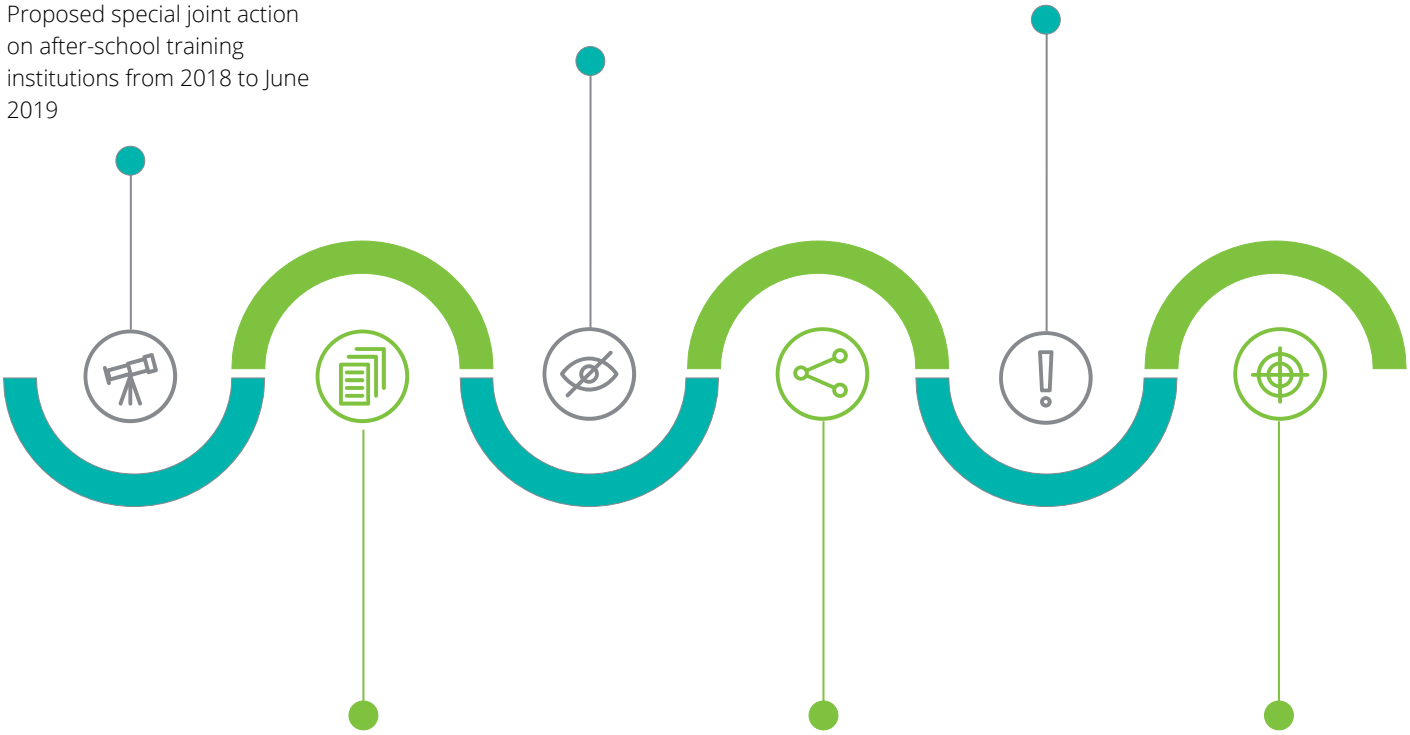
Source: wind, Deloitte Research

Figure 4: Regulatory policies on the K12 after-school tutoring industry

Circular on Effectively Reducing the After-school Learning Burdens of Students in Primary and Middle Schools and Carrying out Special Rectification on After-school Training Institutions **introduced in February 2018**
Proposed special joint action on after-school training institutions from 2018 to June 2019

Circular on Improving the Working Mechanism for Special Rectification of After-school Training Institutions **released in November 2018**
Improved the working mechanism for rectification in all regions

Circular on Keeping Harmful APPs away from Primary and Middle Schools **released in January 2019**
Started investigation of harmful APPs



Opinions on Regulating the Development of After-school Training Institutions **introduced in August 2018**
Requiring further regulation of registration, training content and sites of subject-oriented training institutions

Circular on Study Load Reduction Measures for Students in Primary and Middle Schools **released in December 2018**
Implemented the reform of education models, developing quality-oriented education, regulating the development of after-school training institutions with a focus on regulation of online and offline training

Implementing Opinions on Regulating After-school Online Training **released in July 2019**
Proposed stricter regulation of online trainings

Source: Ministry of Education, Deloitte Research

Regulation of China's after-school tutoring market has been rolled out since the No.3 order *Circular on Effectively Reducing the After-school Learning Burdens of Students in Primary and Middle Schools and Carrying out Special Rectification on After-school Training Institutions* was published by the Ministry of Education on 13 February 2018. Later, in August 2018, the State Council released *Opinions on Regulating the Development of After-school Training Institutions*, requiring further regulation of the registration, training content and sites of subject-oriented training institutions. This has had a strong impact on small, medium-sized and non-standard training institutions, but was necessary to regulate the after-school tutoring market.

Regulations should be imposed on online education and offline training institutions

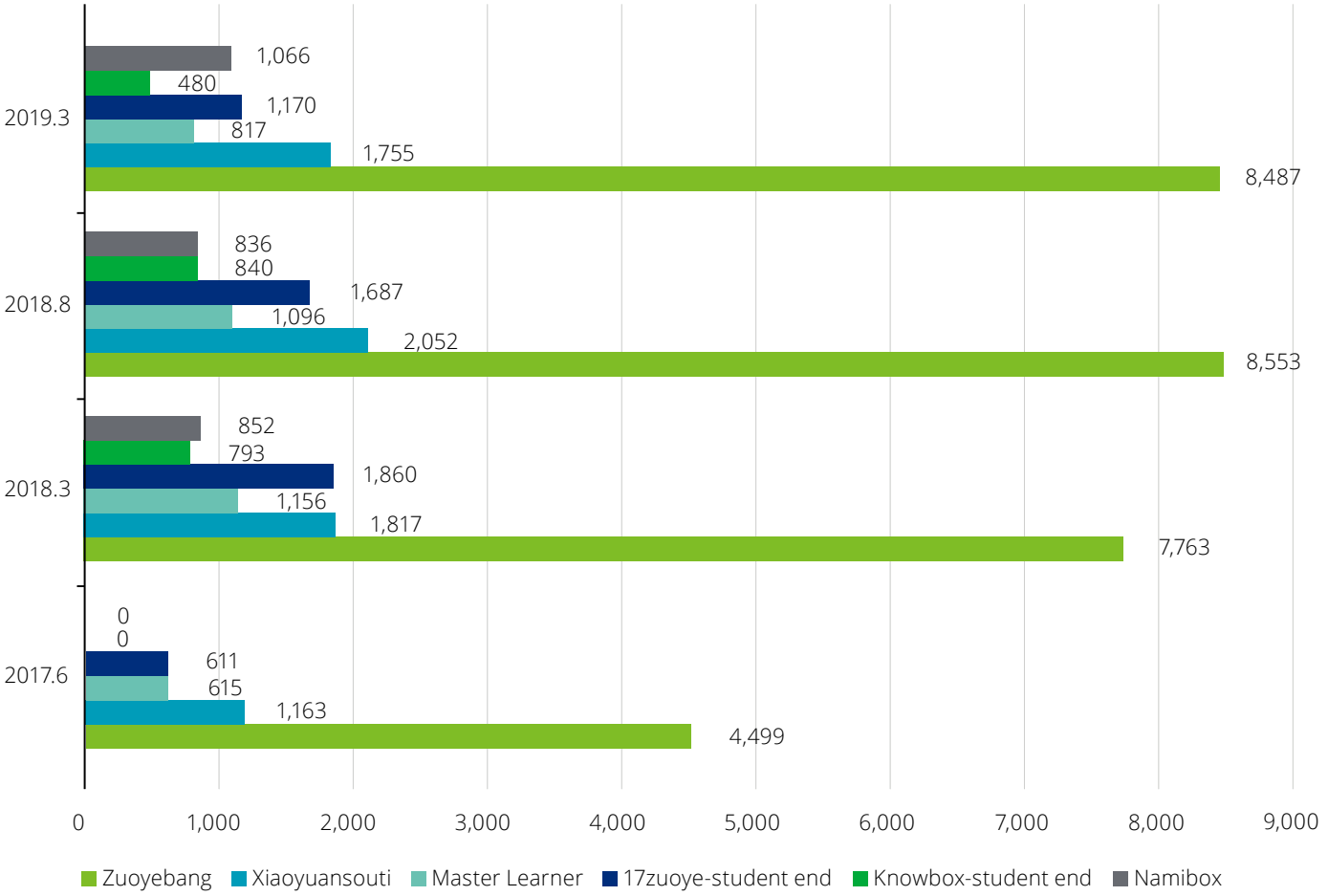
Online education in K12 after-school tutoring services has two parts. One is online training platforms similar to offline training institutions, providing course-focused teaching. The other is online tools to assist studying, focusing on homework and question banks. The State Council and Ministry of Education have introduced several policies, including the *Circular on Improving the Working Mechanism for Special Rectification of After-school Training Institutions and Circular on Study Load Reduction Measures for Students in Primary and Middle Schools* since late 2018, to supervise the teacher qualifications and course content of online tutoring service websites based on the same standards as offline training institutions. Six ministries, including the Ministry of Education, released the Implementing Opinions on Regulating After-school Online Training on 15 July 2019 to impose stricter regulation on "subject-oriented online training for students in primary and middle school through internet technologies".

Homework and question banks tutoring services, that provide services via mobile APPs, enjoy larger user bases and a greater number of active users due to the routine nature of homework. Informed by the features of these APPs, government departments introduced the *Implementing Plan for Comprehensively Preventing and Controlling Myopia Progression in Children and Adolescents and the Circular on Keeping Harmful APPs away from Primary and Middle Schools*, and started to investigate harmful APPs from early 2019, issuing a response on official websites in February specifying that teachers should not assign homework via WeChat or QQ or require parents to check homework.

In the short term, the policies of the Ministry of Education on preventing and controlling myopia and reducing study load have had limited adverse effects on learning-oriented APPs, especially question banks and homework-oriented APPs, as the number of monthly active users (MAU) rebounded quickly after a dip in August. But in the long term, the Ministry of Education will introduce a mix of regulatory policies to control the use of learning-oriented APPs in homes and schools, leading to a sharp drop in APP MAUs.

Facing these tight regulatory policies, some homework-oriented APPs will no longer be useful, regardless of whether they are designed for teachers to assign homework, for students' homework or entertainment, or for parents to automatically check homework. The MAUs of various kinds of K12 learning-oriented APPs will have shrunk in 2019.

Figure 5: MAUs of K12 learning APPs (10,000 people)



Source: BigData, Deloitte Research

K12 learning-oriented APPs need to refine their development strategies along the lines of those of leading players

All learning-oriented APPs rectified their offerings quickly after the introduction of strict regulations, including by shutting down substandard sections and adding additional learning content. But future is uncertain. APPs oriented towards searching for exam questions face tighter restrictions on contents. For instance, they cannot provide mathematical Olympiad questions beyond the teaching syllabus. Because of this restriction, competition between apps is increasingly focusing on technology rather than differentiated content. Yuanfudao and Zuoyebang, for example, are actively innovating to increase the use of AI in their products.

Teaching and training-oriented APPs, including language training and online courses, have rectified their offerings by removing courses that were not compliant with syllabuses. Furthermore, they are adding more courses that focus on quality-oriented education, aligning with current hot topics such as programming and art. There has, furthermore, been a transform towards technology-oriented offerings. Lower technical requirements for implementing sophisticated AI will enable language training-oriented APPs to gain technological momentum. TAL's ABC Reading APP, for example, applied self-developed speech testing technology and big data in an upgrade in 2018.

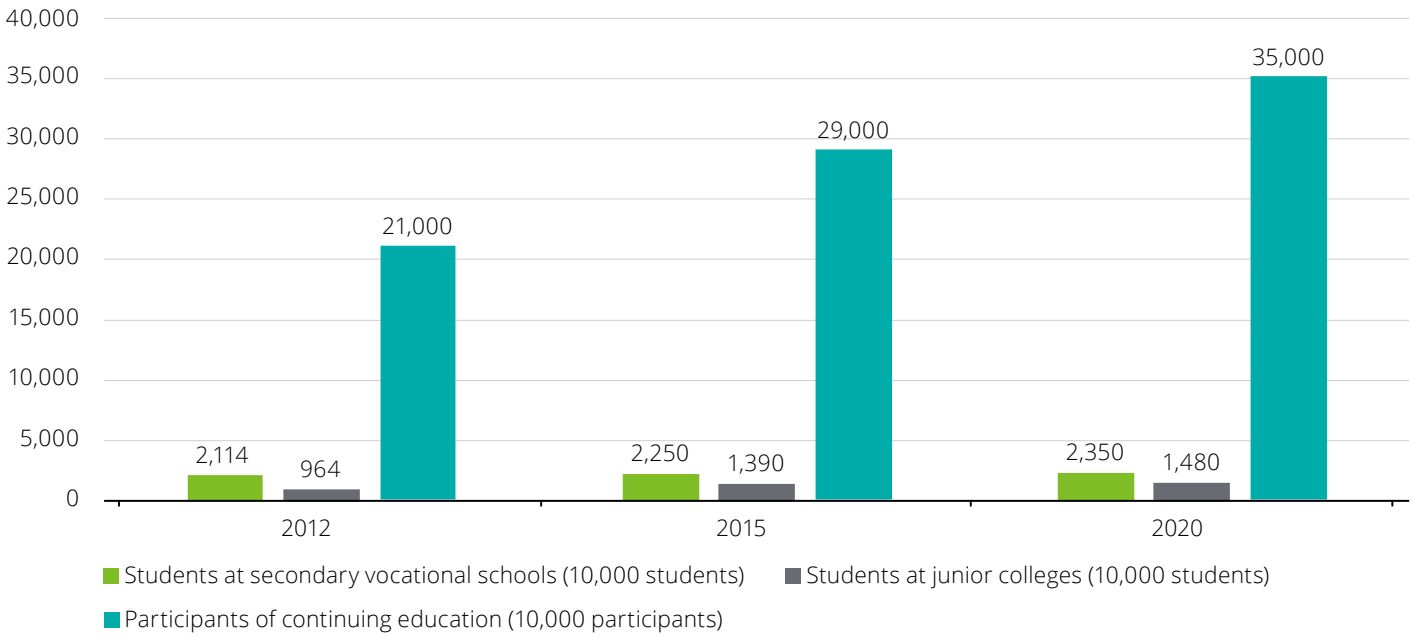
1.3 Boom in vocational education fuelled by government incentives

Favourable policies for vocational education have been frequently introduced and fueled fast market growth

Despite steady growth in revenues and the number of trained people in China's vocational education sector, experienced technicians are still in short supply in the labor market.

Made in China 2025 proposes that, in order to achieve the strategic goal of becoming a manufacturing powerhouse, new requirements are needed for different forms of education, especially vocational education. There needs to be a deeper interrogation between Industry- and teaching institutions. Education, talent, industry and innovation chains must be connected. The State Council published the Implementing Plan for National Vocational Education Reform on 24 January 2019 and introduced the Plan for the Pilot Program on Enforcing Academic Certificates and Multiple Vocational Skill Level Certificates System in April of the same year. In general, over the coming years, the vocational education sector is expected to boom.

Figure 6: Vocational education demand in China



Source: wind, Deloitte Research

Private vocational education companies are seeking IPOs

With the implementation of reforming policies in the vocational education sector, and increasing demand for professionals spurred by industrial development, more private capital is expected to pour into the sector to expand the quality of educational assets. Of the nine education companies to list on the market in the first half of 2019, four are involved in vocational education; of these, three went public directly and one undertook a back door listing[2].

China East Education Holdings went public in June 2019, becoming the largest vocational training company among HK-listed education companies. The group owns three branded schools: New East Culinary Education, Xinhua Education and Wontone Automotive Education. China Kepei Education is a private higher education provider in South China running two schools, the Guangdong Polytechnic College established in 2005 and Zhaoqing Science and Technology Secondary Vocational School, which offers majors such as auto services and e-commerce. China Gingko Education is a private provider of higher education services and hotel management, operating one independent college, Yinxing Hotel Management College of Chengdu University of Information Technology. OFFCN Education Technology went public on the A-share market through the back door. The renaming of Yaxia Auto as OFFCN on 21 February 2019 marked the successful back-door listing of OFFCN Education Technology with a market value of more than RMB50 billion. OFFCN Education Technology mainly provides training for the recruitment of civil servants, public institution personnel and teachers, as well as teaching qualifications.

2. A back door listing is when a private company goes public by acquiring an already listed company.

Table 2: Listings of vocational education players in 1H 2019

Company	Location	Exchange	Issuance date	Funds raised (HKD million)
China East Education	Hefei, Anhui Province	HKEx	12 June 2019	4,902
China Kepei Education	Zhaoqing, Guangdong Province	HKEx	25 January 2019	876
China Gingko Education	Chengdu, Sichuan Province	HKEx	18 January 2019	180

Source: CVSource, Deloitte Research

Building a modern vocational education system requires targeted market segments

The Implementing Plan for the National Vocational Education Reform, released in 2019, impacts vocational education in three ways: first, vocational education will not only focus on students' academic educations, but also on their vocational skills; second, it should emphasize cooperation between companies and schools to train relevant talent based on economic needs and the development of society and industries; and third, it will enhance the capabilities and quality of teachers while improving students' proficiency.

Vocational education in China is less developed than the rest of the nation's education system. Consequently, national policies are focused on building a model vocational education system. As the vocational education market rapidly expands and vocational training is increasingly segmented, training for civil service exams and information technology have plenty of room to grow, as do segments related to robotics and finance.

1.4 Education sector reshaped by AI

Education informatization deepening and upgrading: creating a bright future for AI+education

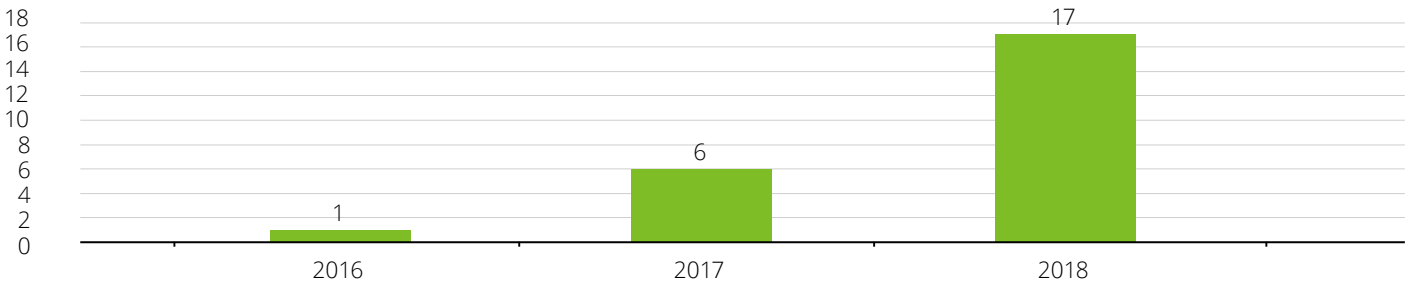
On 22 February 2019, the General Office of the Ministry of Education published the *Circular on the 2019 Key Tasks on Educational Informatization and Cybersecurity*. These key tasks included the implementation of the *Education Informatization 2.0 Action Plan*, publishing guiding opinions on enhancing the application of the "three classrooms" concept, drafting the *Development Plan for China's Intelligent Education* and organizing international AI and education conferences. It also requires that digital resource services be promoted, higher and vocational education repositories be built, and the application of online learning be enhanced.

Education informatization is a long-term trend in developing China's education sector through new technologies. Key features of education Informatization 2.0 are AI, big data and cloud computing. Driven by favourable policies and increasingly mature technologies, AI+education is becoming a focus of education company's investments and the capital market has an optimistic outlook on the sector. As technologies are not yet thoroughly applied, education companies are expected to continue to increase their tech investments and obtain dividends therefrom.

AI+education attracts investor attention

From 2016 to Q1 2019, 26 investment deals were completed in AI-based education informatization. In 2018, investment and financing in education informatization increased substantially, accounting for 65% of total investment deals from 2015 to 2018. In terms of the rounds of investment, 57.7% of investments during these four years were in the early stage, including seed-round and the angel-round investments.

Figure 7: Number of investment deals in AI+education informatization



Source: Deloitte Research

Currently, the combination of AI and education is predominant in four segments of the education sector: K12, education informatization, quality-oriented education, and foreign language training. Their use of AI can be classified into the following main areas: academic affairs administration, including intelligent class scheduling, attendance, and testing; online education with intelligent emotion recognition systems enabled by deep learning-based facial recognition technology; photo-based question and answer platforms for K12 homework, supported by image recognition technology; and education start-ups entering the market directly with adaptive learning platforms.

AI+education will reshape the education sector

AI will reshape the education sector ecosystem. Based on AI technology, education companies can provide users with AI+education content, tools and related services. They can collect, analyse and give feedback on user data, then apply this into five processes: teaching, learning, evaluating, testing and practicing, before finally developing customized solutions and effective feedback. This will restructure the relationships among participants in the education sector ecosystem, improve students' learning efficiency and redefine the education sector. With learning experience being reshaped by AI and the gradual formation of a new education system, China's education sector is moving towards an intelligent era.

1.5 Challenges and opportunities in a changing market

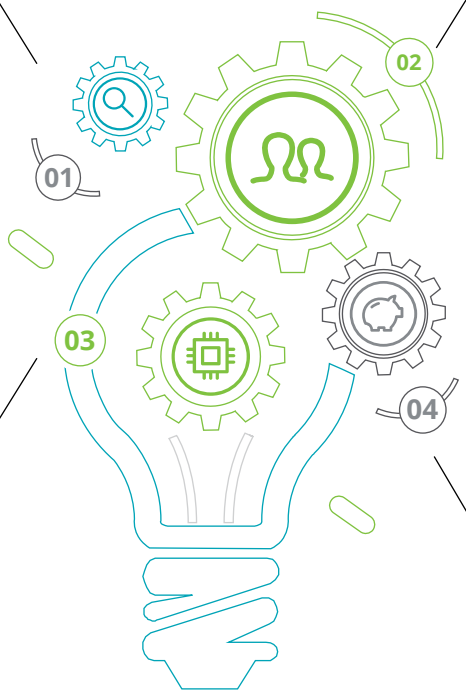
More change has emerged in the education market since 2018 in the following aspects:

Stricter regulations

from 2018 to 2019 China's education market has been increasingly regulated and under stricter policy supervision. As market structure adjusts to these new changes, the overall management of the education market will be improved substantially, helping companies with compliant operations build a stronger brand in the industry.

Stronger technological drivers

AI+education will permit more diversified education scenarios. This, combined with the upcoming 5G era and other technological advancements, mean the cost of fair quality education will be lower.



Changing user demands

Consumers in Tier-1 and Tier-2 cities are seeking higher quality educational resources. As per capita disposable income increases, parents in Tier-3, -4 and -5 cities also require quality education service providers. Sustained growth is driving many education companies and education internet companies to go deeper, with some companies that have developed businesses in Tier-1 and -2 cities expanding their presence to Tier-3, -4, and -5 cities. Moreover, a slumping labour market has made vocational education oriented towards improving professional skills wildly popular.

More prudent capital investment

Investments and M&A deals reached new highs in 2018 but are likely to have slowed gradually in 2019. Affected by new capital management policies, investors will have become more cautious.

Market changes present more challenges for education companies:

Uneven road to online-offline integration

Finding the appropriate way to grow as part of the internet wave is a major challenge for companies in the education sector. Mobile internet is bringing unprecedented change to the education sector. Some traditional offline educational institutions are transitioning to online models, while other online education institutions are looking to focus on offline, resulting in an increasingly integrated online and offline education system.

Several traditional offline educational institutions that posted strong growth and stepped into online education early, for instance Longwen Education and Xueda Education, are still suffering from losses. Other companies, such as New Oriental and TAL, have gained popularity in the capital market by effectively integrating educational technology with the internet. Some online institutions have been unable to make profits through platform operations and eventually close down, whereas others have thrived by making better use of the internet, utilising more business models and expanding their presence to the offline market. With deep internet penetration, whether online or offline delivery is in the ascendant is no longer the education sector's central issue. Instead, the industry is becoming more about the complexity of application methods on the internet and companies' growth strategies.

Education model should be redefined

Amid technological advances and higher user demand, how to satisfy that demand and reshape business models is another challenge for education companies. Among the various market segments, greater demand for language training should provide opportunities for many companies for some time to come; the K12 after-school tutoring sector is attaining a leading position through its good performance in capital markets; and quality-oriented education and vocational training are growing remarkably, and are therefore likely to become a popular sector. From an education model perspective, the one-on-one model that once dominated the market has recently given way to the two-teacher and livestreaming models. Once a certain segment or model becomes popular, a large numbers of companies will step in and split the market leading to fierce competition. In such conditions, companies need to consider how to follow or even lead education sector trends and give full play to their distinctive advantages in competition.

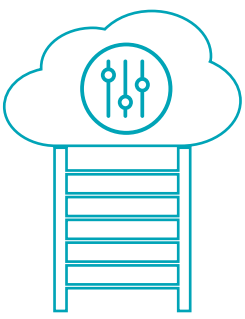
Self-regulation driven by tighter policies

Due to the special importance of education, China has introduced many regulatory policies that could have a substantial short-term impact on education companies. Companies need to comply with these policies, restructure their businesses and transform if necessary to minimize any adverse effect on their growth. They should also re-focus on their mission to educate and regulate themselves.

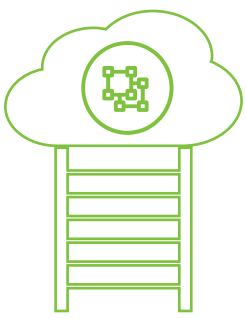
The education market still has opportunities to grow amid all this change:

- **Tech-driven education.** The AI-enabled online education market is a segment to be reckoned with. AI can create individualized teaching at low cost per user. As current users have become more used to mobile internet, especially with the growth of 5G, the application of intelligent learning scenarios will expand. This includes platforms or tool-oriented products that provide services for the online education sector.

- **Services related to K12 education and entrance exams.** Consumers' pressing demand for quality educational resources is driving the popularization of learning-oriented products.

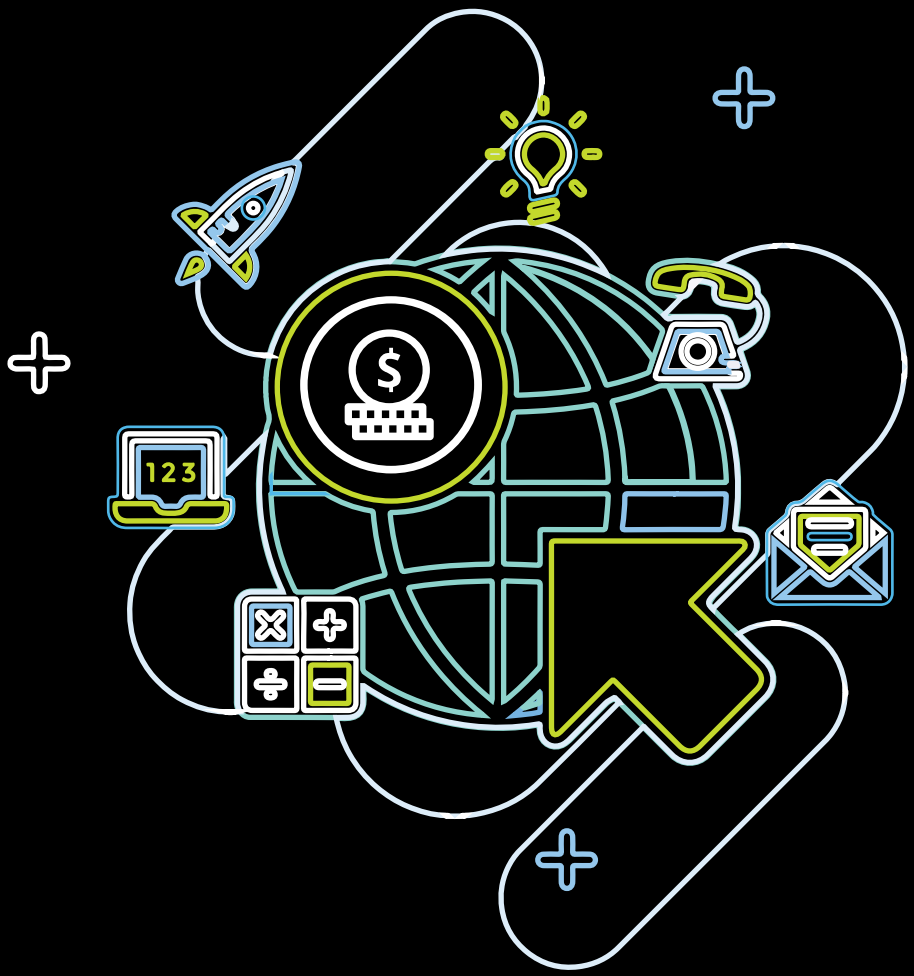


- **Emerging vocational education market.** Driven by favourable policies, the vocational education market has a bright future. However, as industry and education become more deeply integrated, vocational education institutions whose development is out of step with industry needs will find it hard to survive. Vocational education will fragment further and areas of the market that satisfy a new range of needs will prevail.



- **Quality-oriented market.** Quality-oriented education is highly important in education reform. Product areas including camp-based, art and science education–which caught investor attention in 2018–remained vibrant in 2019.

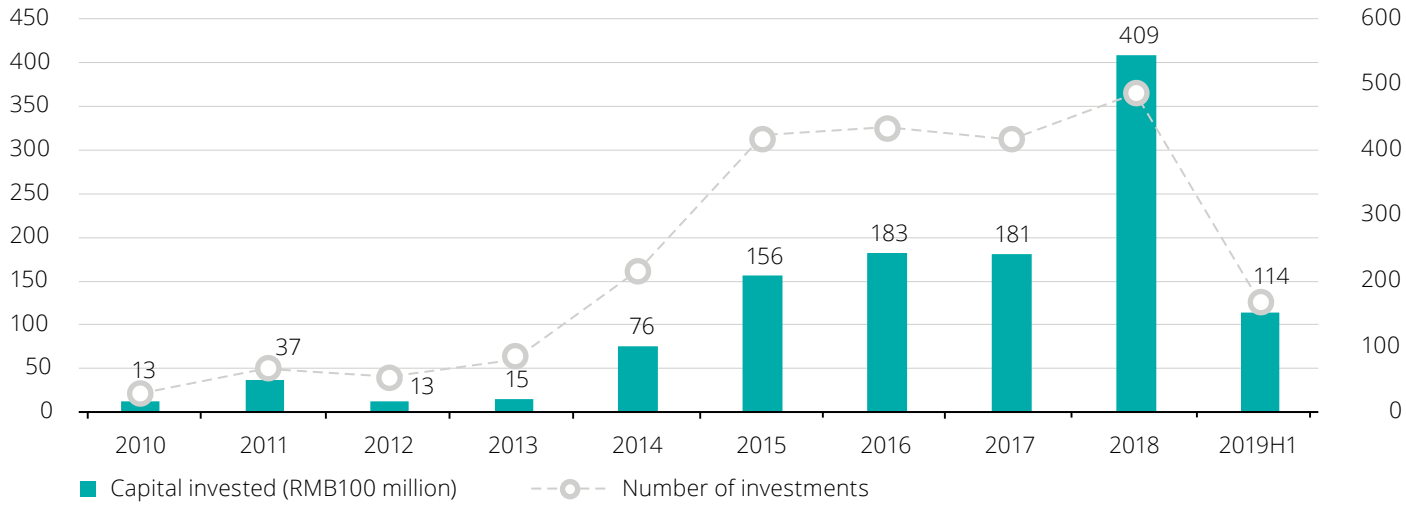
2. The education sector in capital markets



2.1 Language, quality and vocational education are key investment areas for VC/PEs

From a capital markets perspective, the number and value of investments in the education sector have increased since 2010. In 2018, the amount of investments in education companies surged to a record high of RMB40.9 billion across 486 deals. In the first half (1H) of 2019, the number of VC/PE financings reached 167 with a total value of RMB11.4 billion. Despite its decline, the education sector is not yet saturated or mature, and there are still new entrants.

Figure 8: Number and value of investments in the education industry from 2010 to 1H 2019



Source: Data from ocn.com.cn, Deloitte Research

Looking at the ten biggest deals by value in 1H 2019, five were in K12 education, accounting for the largest proportion, followed by three in language training and one each in quality-oriented and preschool education.

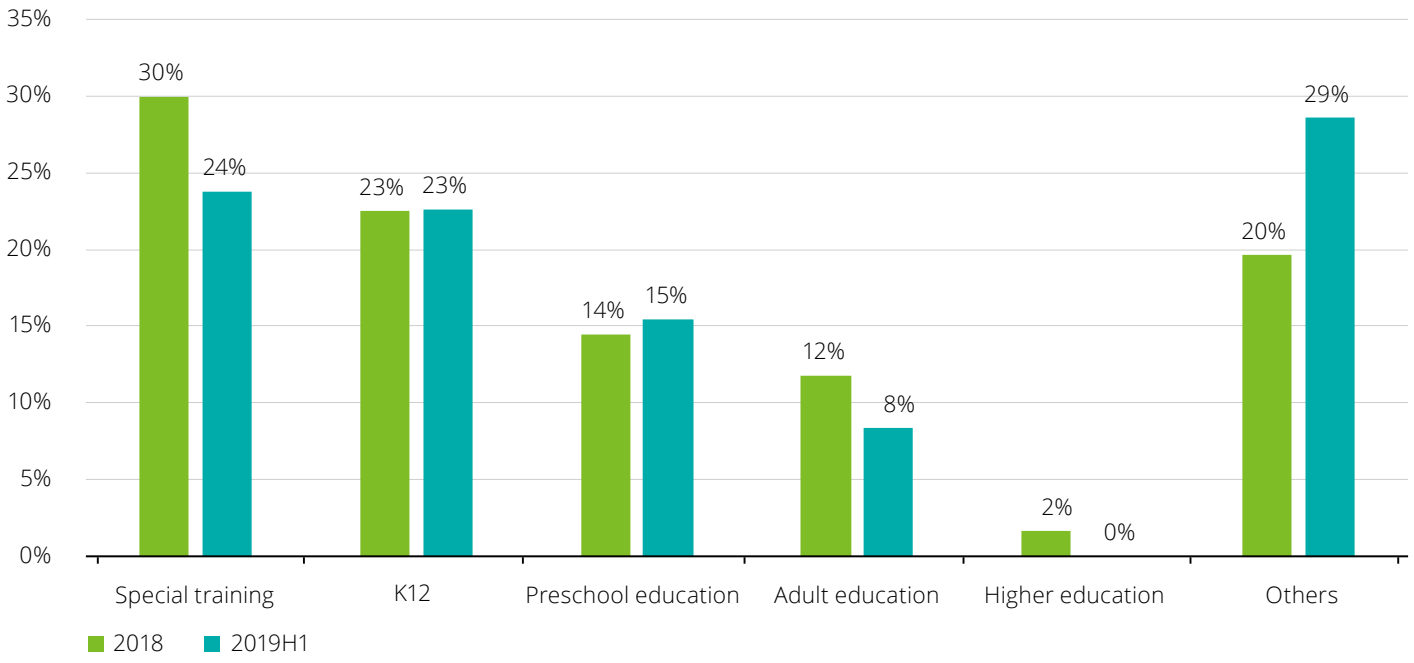
Table 3: Top 10 financing deals from 2018 to 1H 2019

Company name	Market segment	Transaction amount (RMB100 million)	Transaction date	Investor/s
Zuoyebang	K12	34	2 October 2018	SoftBank Group
Dami Technology	Language training	34	21 June 2018	Yunfeng Capital, Sequoia Capital China, and others
Zhangmen	K12	24	19 February 2019	CMC Capital, CICC ALPHA, and others
Zhenguanyu Science and Technology	K12	21	25 December 2018	Tencent Technology, Warburg Pincus, IDG Capital
Wall Street English	Language training	21	16 March 2018	CITIC Capital, Baring Asia
DaDaABC	Language training	18	16 January 2019	Warburg Pincus, Yonghua Capital, TAL
Better Sun Education	Preschool education	17	31 August 2018	Legend Holdings
17zuoye	K12	17	20 March 2018	CITICPE, Shunwei Capital, Temasek
Knowbox	K12	10	30 May 2019	Alibaba
VIP Peilian	Quality-oriented education	10	2 November 2018	Tiger Fund, Tencent Technology, and others.

Source: CVSource, Deloitte Research

From 2018 to 1H 2019, by number of investments, special training education had the largest number of deals, with K12 and preschool education remaining highly attractive to investors.

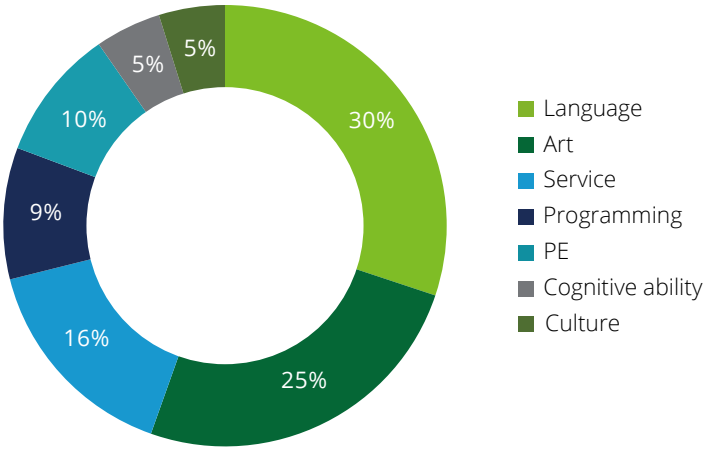
Figure 9: Segment investments by VC/PE from 2018 to 1H 2019



Source: Data from ocn.com.cn, Deloitte Research
Note: Adult education includes education and related services for adults such as vocational training, post-graduate entrance exams and other entrance exams.

Special training has been one of key market segments for investment and financing in recent years. There are a variety of categories in the special training sector, including training for programming, cognitive ability, PE, culture, arts, language and related services. Language training and arts training account for the highest proportion (30% and 25% respectively).

Figure 10: Distribution of financing deals across special training categories in 1H 2019



Source: CVSource data, Deloitte Research

More specifically, capital markets have focused on three segments of special training:

1. Language training
Language training has long been a favored segment. Despite there being a host of large, established leading companies in this space, growing demand for personalized language training should mean it maintains its strong position in the investment and financing markets in some time to come. For example, in January 2019, DaDaABC completed an USD2.55 billion series D financing round in this competitive segment.

2. Quality-oriented education
In recent years, quality-oriented education has become a trend in the education sector, driven by changes in education concepts and the policy environment. Accordingly, quality-oriented education, including training in art, programming, PE, cognitive ability and culture, stands out in the investment and financing market. In 1H 2019, related deals accounted for nearly half of the total (46%) of education deals.

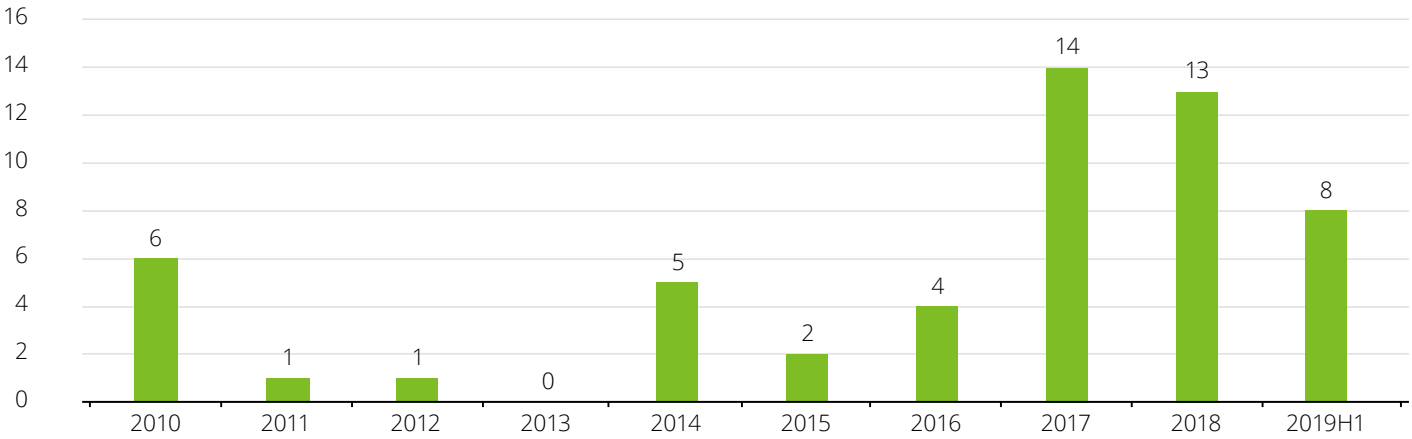
3. Vocational education
Although vocational training has received only a moderate amount of financing, it should be an area of emphasis for investors. Driven by several favourable policies, such as the *Implementing Plan for the Vocational Education Reform* released in February 2019, vocational training is likely to perform better in capital markets from late 2019 and beyond.

Funding amounts have also been strong in recent years, with art training companies such as 61Draw.com and Meishubao funded with millions of dollars and VIP Peilian raising RMB1 billion since 2014. All of which indicates a bright future for the art training segment in the capital market. Furthermore, with the development of technologies such as AI and the growing trend of programming education for younger children, this segment is gaining popularity and will become an area of focus for investment and financing.

2.2 Potential decline in IPO activity

From 2017 to 1H 2019, 35 companies in the education sector completed IPOs. Koolearn and Genshuixue went public in the US market or Hong Kong, while VIP Peilian annouced this July it planned to list in the coming year, starting the second boom in education company listings. China East Education, Hope Education and Koolearn raised HKD4.4 billion, HKD3.2 billion and HKD1.7 billion respectively. Education companies mainly go public in Hong Kong and the US. Although IPOs stayed at a high level in the education sector from 2018 to 1H 2019, the current global economic downturn may lead to a reduced number of IPOs in the short term, and some leading companies will wait for better market opportunities to list.

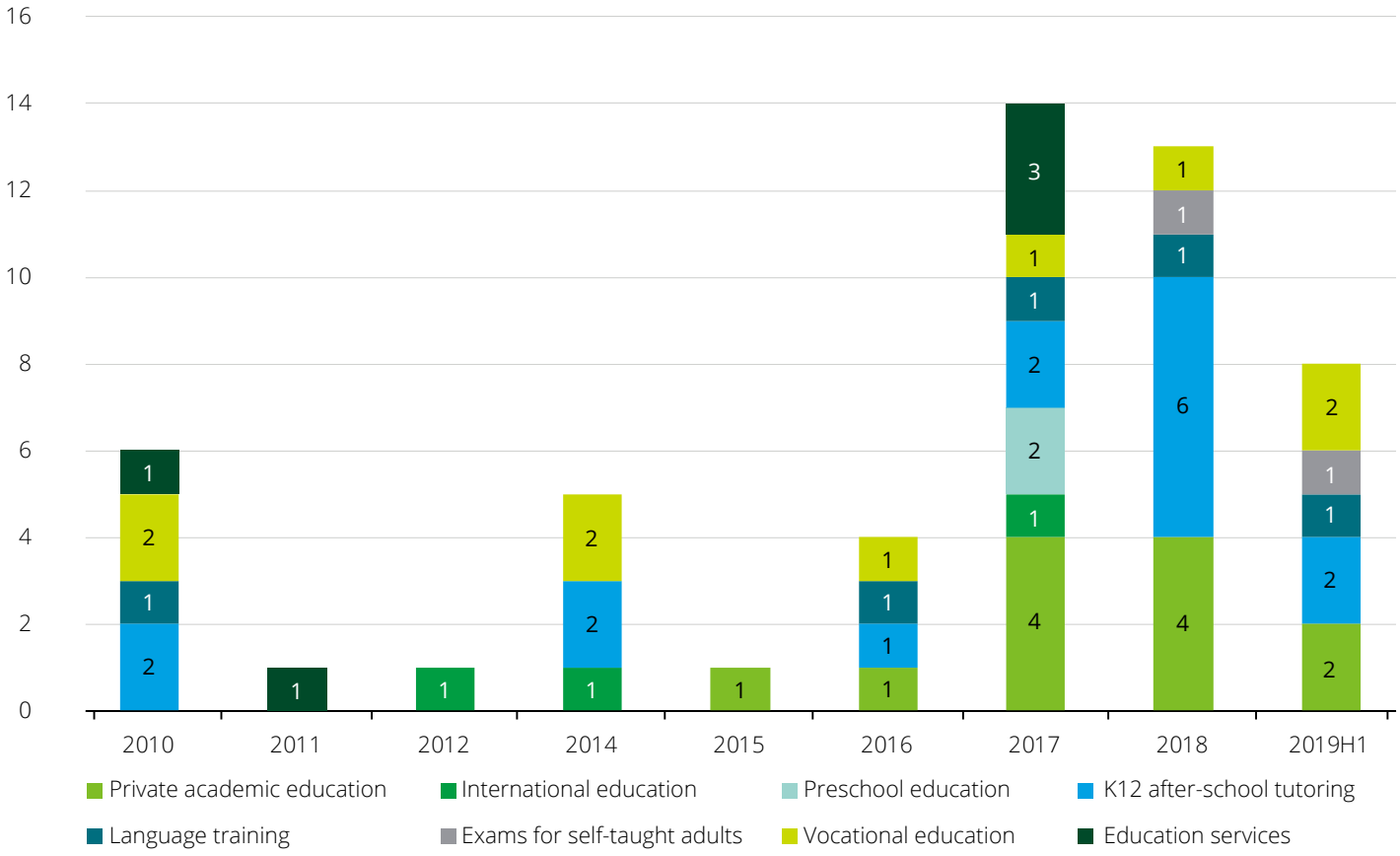
Figure 11: Number of IPOs in China's education sector



Source: Data from ocn.com.cn, Deloitte Research

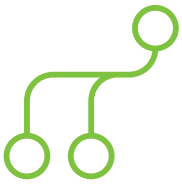
In terms of the segments in which education companies have completed IPOs over the years, four categories stand out by number of deals. Firstly, amid a policy trend of schools being run by private capital, encouraged by the *Law on the Promotion of Private Education*, the number of listed companies engaged in private academic education and K12 after-school tutoring services is growing quickly. Secondly, the stable need for language training will keep the number of listed companies from this segment steady for some time; they should maintain strong growth enabled by new technologies such as AI and big data. Finally, with vocational education companies expected to keep seeking IPOs, they are expected to see better opportunities in the capital market, driven by the implementation of plans for vocational education reform in 2019.

Figure 12: Listed education company segments



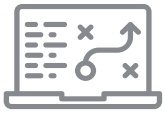
Source data: Deloitte Research

Similar trends have emerged in IPOs in 1H 2019.



1. The agglomeration effect of IPOs has emerged in South China.
Among the eight education companies that have completed IPOs in 1H 2019 are China Kepei and Scholar, regional offline education giants in South China that went public in Hong Kong. Combined with Zhuoyue Education (which went public at the end of 2018), South China's enormous population and education demand have cultivated many education institutions with strong market power. The education landscape in this region is thus increasingly established.

2. Many private education companies in the Central and Western regions have completed IPOs.
China East Education, JH Educational Technology and Gingko Education are typical private education groups in the Chinese Mainland, having started out and developed in the populous and education-rich provinces of Anhui, Henan, Zhejiang and Sichuan respectively. Other private education groups in the Chinese Mainland that are developing on similar trajectories are likely to embark on their journeys to IPOs.



3. The market is optimistic about the online education sector.
Among the eight companies to list, Genshuixue, Wah Fu Education and Koolearn are online education companies with internet DNA. There successful listings indicate online education has a promising future.

The Language training and K12 after-school tutoring segments are growing steadily, while vocational education is developing quickly. According to the Hurun Greater China Unicorn Index 2019 Q1, among unicorns with high valuations in Q1 2019, eight are in the education sector, including four engaged in K12 after-school tutoring, two in language training and two in vocational education. This represents great progress from 2017.

Table 5: List of education unicorns with high valuations in Q1 2019

Company name	Valuation range (RMB100 million)	Market segment
VIPKID	200	Language training
Yuanfudao	200	K12 after-school tutoring
Zuoyebang	200	K12 after-school tutoring
Golden Education	100	Vocational education
DaDaABC	70	Language training
Huike Education	70	Vocational education
17zuoye	70	K12 after-school tutoring
Zhangmen	70	K12 after-school tutoring

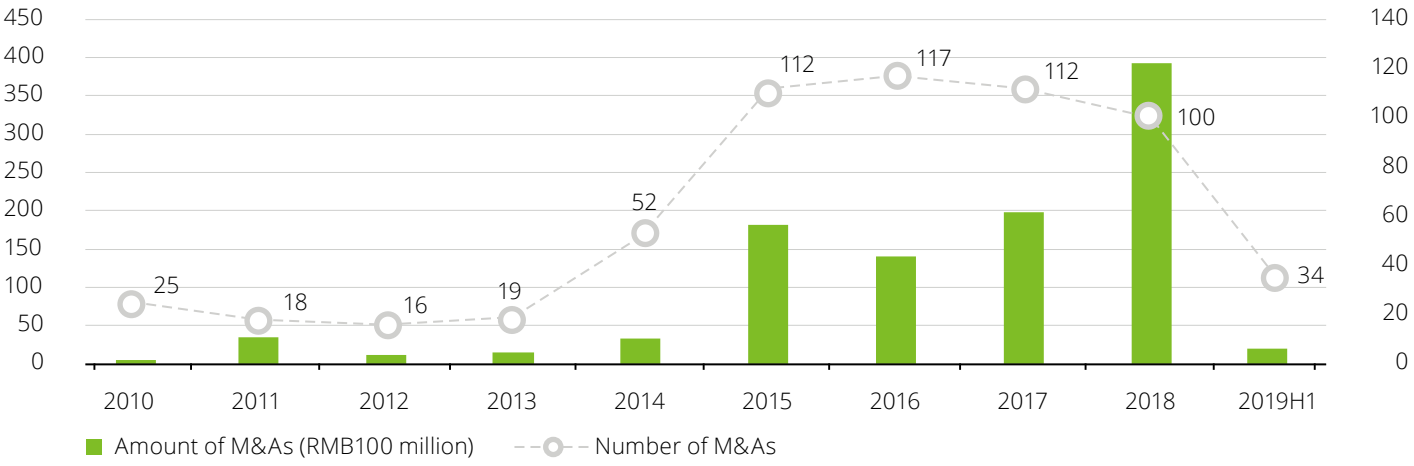
Source: Hurun Research Institute, Deloitte Research

Though many education companies are likely to go public as unicorns, the capital market is weakening: many listed education companies have seen their stock prices go down and education policies increasing regulation at all levels of education. Therefore, education companies should seize the right moment to list based on actual conditions.

2.3 Slowing trend in M&A

M&A in China's education market has been unstable. The number of M&A deals has decreased since 2016; however, despite a decreasing number of M&A deals and transaction, value peaked at RMB39.2 billion in 2018. The largest transaction was Yaxia Auto's acquisition of a 100% stake in OFFCN Education for RMB18.5 billion (the back-door listing of OFFCN Education). The number of M&A deals is expected to continue to decline.

Figure 13: Value and volume of education sector M&A from 2010 to 1H 2019



Source: Data from ocn.com.cn, Deloitte Research

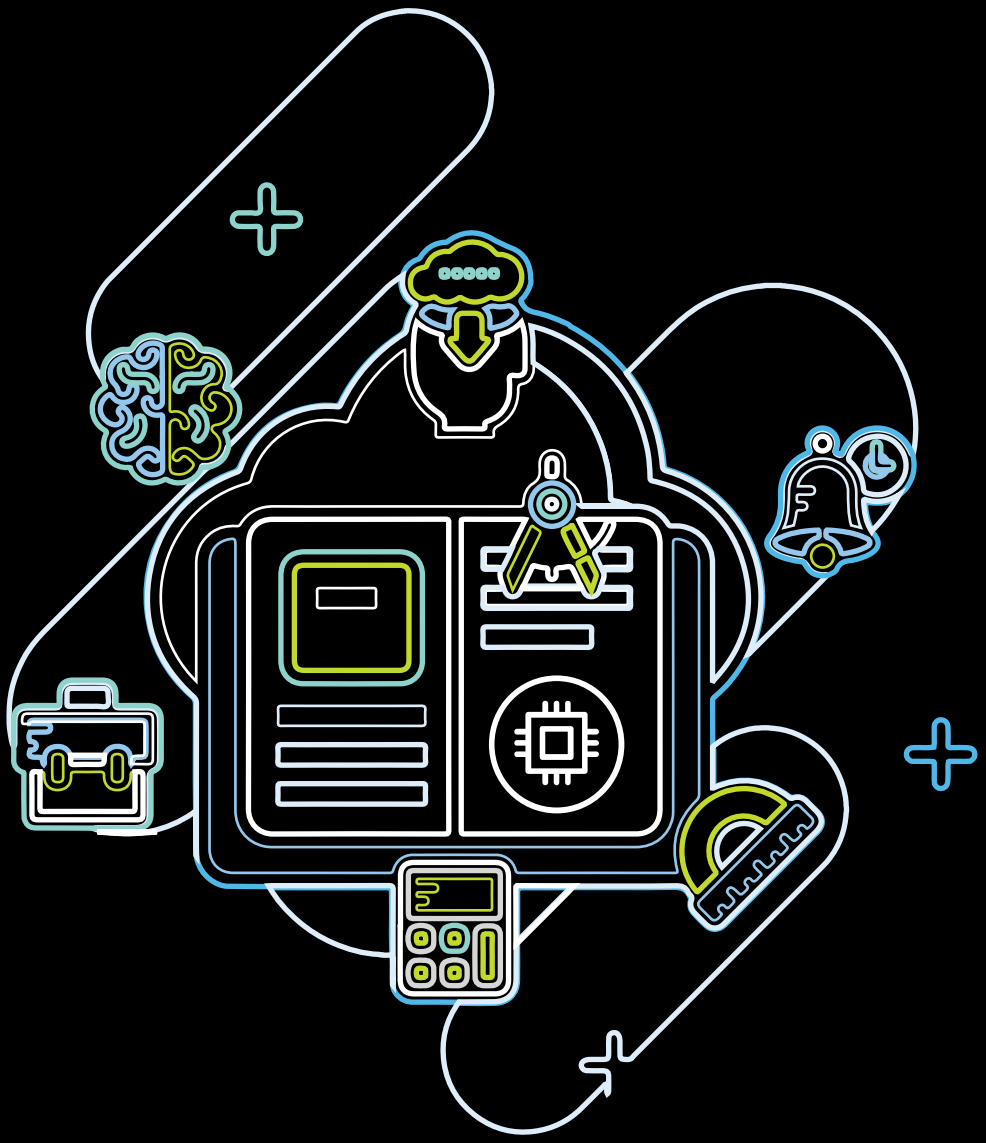
Among the top 10 M&A deals by transaction value from 2018 to 1H 2019, K12 and vocational education accounted for 30% each, followed by preschool education and language training. The preschool education market is expected to see some M&A deals as the new preschool policies reduce the fervour of the primary market for investing in the education sector, and the overall valuation of educational assets in the primary market reduces. This is good for institutions that specialize in investing in education as they can obtain quality assets through reasonable valuations, while some speculative PE/VCs are likely to opt out of market competition.

Table 6: Top 10 M&A deals by transaction amount from 2018 to 1H 2019

Company name	Segment	Transaction amount (RMB100 million)	Transaction date	Acquirer
OFFCN Education	Vocational education	185.0	December 2018	Yaxia Auto
Qixing Education	K12 education	36.9	10 November 2018	Digital China
My Gym Education	Preschool education	33.0	28 November 2018	Qixingweilai
Emerald Education	Vocational education	15.8	27 March 2018	Great Wall Of Culture
Red Riding Hood Education	Preschool education	10.0	16 October 2018	Matt
SJW International	Language training	9.4	31 January 2018	China First Capital Group
Shuren Education	K12 education	8.6	13 March 2018	China Education Group
Future Education	K12 education	7.0	5 November 2018	Lanxum
Sky Plumage	Vocational education	7.0	12 December 2018	Hainan Airlines Holding
Xitie Education Consulting	Other	5.8	13 March 2018	China Education Group

Source: CVSource, Deloitte Research

3. AI to empower the education sector



3.1 Increasing activity in AI+education

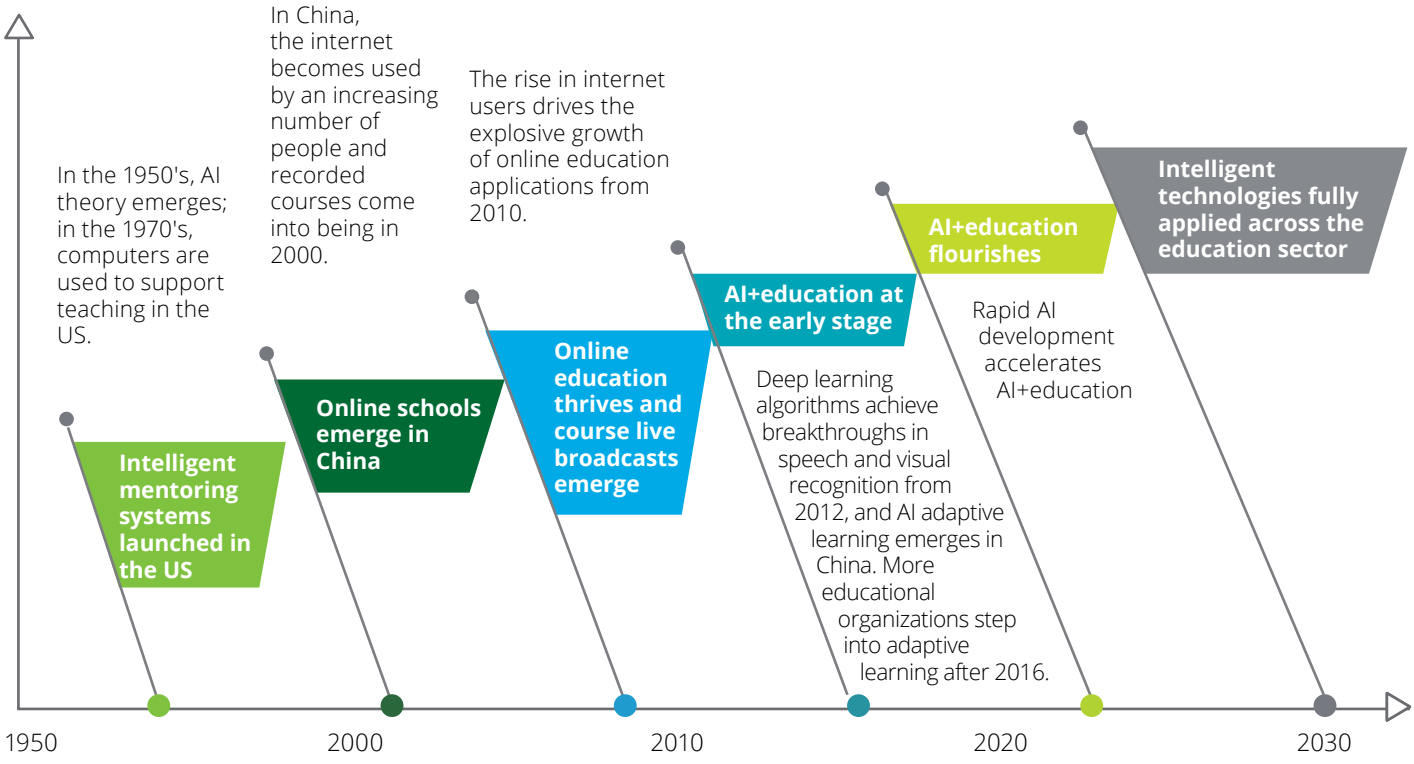
AI+education is flourishing worldwide

The global education market is expected to reach RMB20 trillion by 2020, with AI+education taking a RMB7 trillion share of this. With a growing market share, AI+education is likely to encourage prosperous development across the world. There are almost 3,000 AI+education companies, most of them from the US (more than 1,000), followed by China (over 600). In Australia, online AI+education systems are used by teachers at many universities. In India, established adaptive learning platforms are providing services for over 6 million users.

Although AI is much discussed, the implementation of the technology in education takes time. At the initial stage of AI development and application, the focus was on AI+education planning and research. For example, the US established intelligent teaching systems, using computers to support teaching, in the 1970s. The new AI+education model was not extensively used at the early stage, restricted by data shortages, immature algorithms and low market acceptance.

With resources increasing and the technology improving in US AI+education, AI+education there has been developing rapidly, with the emergence of star companies such as Knewton, Dreambox Learning, Grammarly, Duolingo and Civitas Learning. As of Q1 2019, the top 30 AI+education companies in the US have raised USD1.2 billion in total, of which the biggest individual contribution was USD180 million; funds have been invested in various areas including adaptive learning, higher education and K12, covering more than 50 million monthly active users and at least 27 languages across the world.

Figure 14: Comparison of China and US in AI+education development history

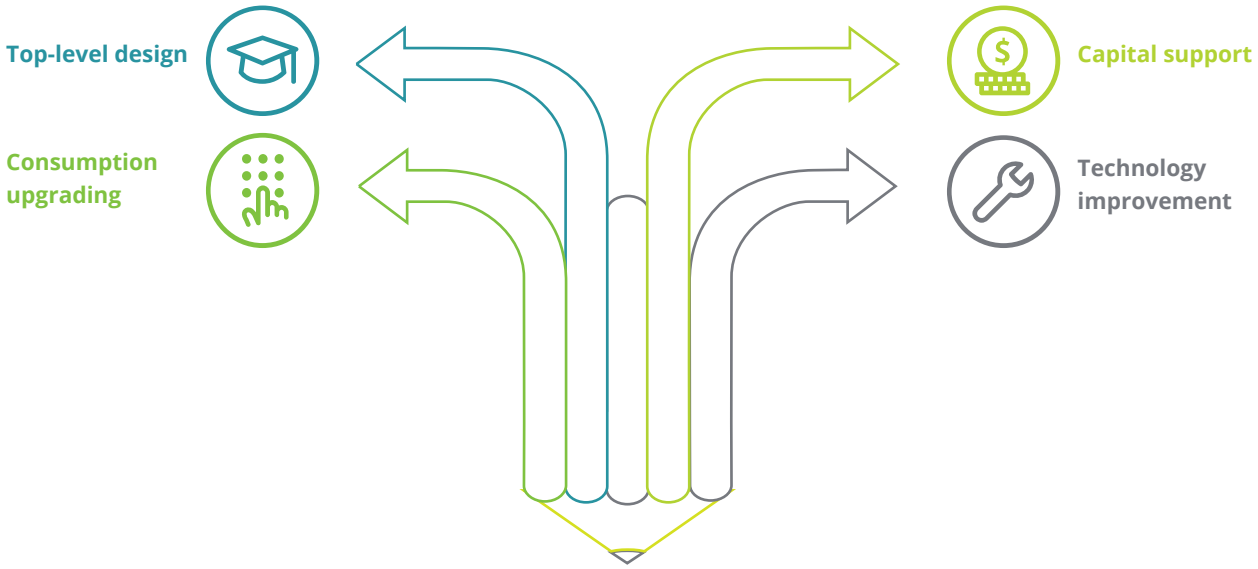


Source: Deloitte Research

Despite a relatively late start, AI+education has developed rapidly in China, taking only 10 years to move from internet popularization to a prosperous online education segment. Adaptive education companies and the early development of AI+education started to emerge in 2012. An increasing number of established educational organizations are stepping into AI+education since 2016, accelerating the application of intelligent technologies in education.

Different factors including policy, capital, technology and consumption are driving the development of AI+education

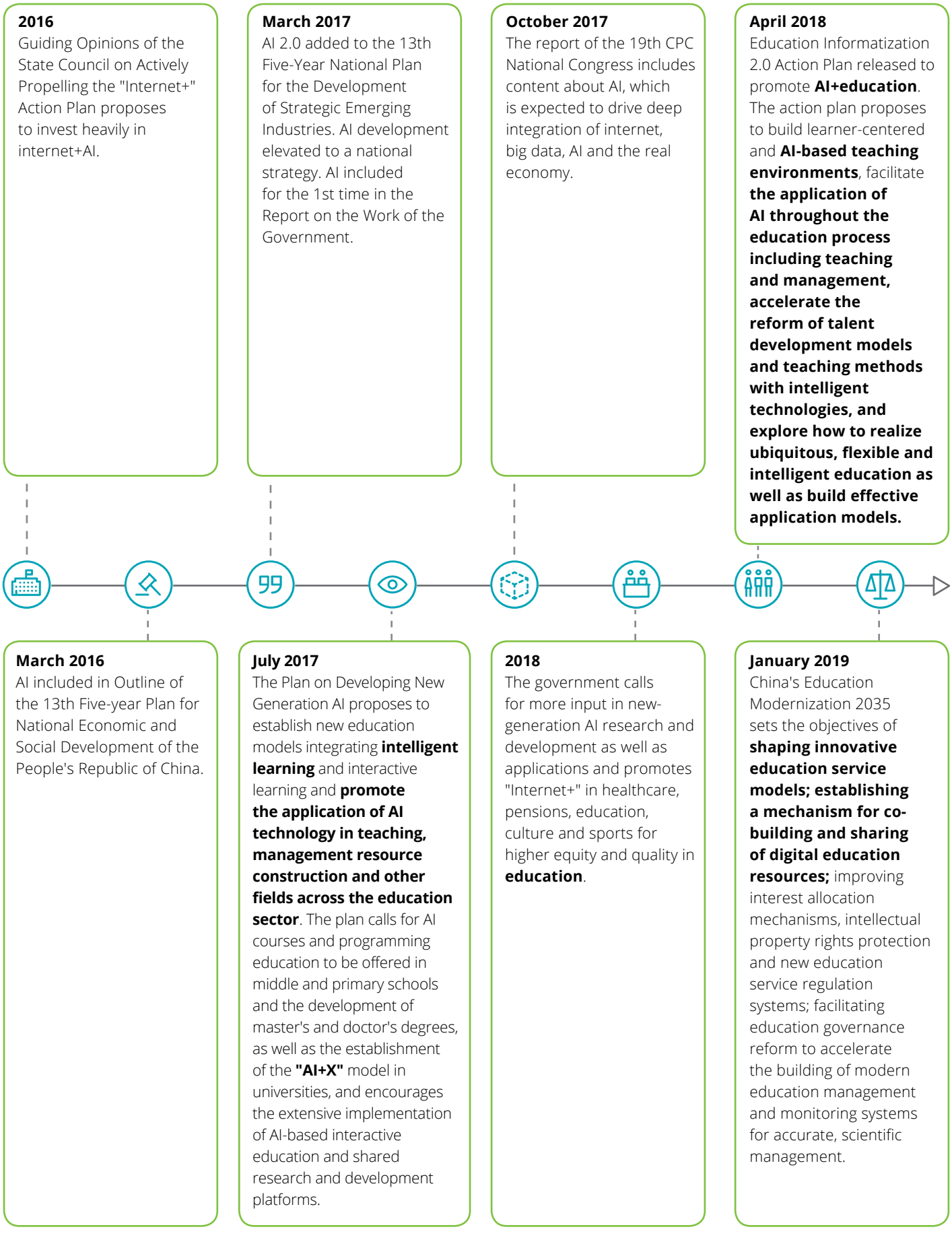
The government plays an important role in supporting the development of AI+education, by providing favorable policies. The other three key drivers–capital, technology and consumption–are facilitating the implementation and development of AI+education applications.



In terms of top-level design, the Chinese government has released policies concerning the development of AI and the application of intelligent technologies in education. The government has been promoting "Internet+" in various sectors including education, to enhance the equity and quality of the sector. They have issued a number of relevant policies, including the Plan on *Developing the New-generation AI* by the State Council in 2017 concerning the initiative to drive next-generation AI research and development. Applications of AI have further been considered in *the Report on the Work of the Government* in 2018.

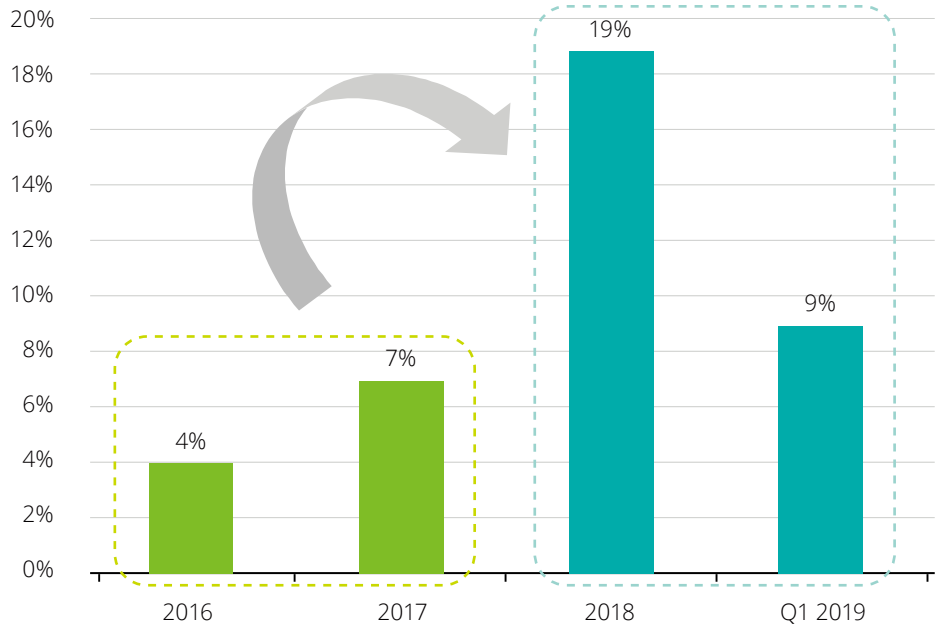
In 2018, the *Education Informatization 2.0 Action Plan* was released to support the development of AI+education. The plan encourages student-centered intelligent teaching, AI applications across the education sector (including in teaching and management), and the application of intelligent technologies to improve talent development and teaching methods. China's *Education Modernization 2035* study issued by the Central Committee of the Communist Party of China and the State Council in 2019, highlights how to teach students in accordance with their aptitude and clarifies approaches to education modernization. Adaptive AI+education systems can help to achieve the strategic goal of tailoring teaching to the ability of individuals.

Figure 15: Policies influencing the development of AI+education



AI start-ups are growing rapidly and attracting capital investment. AI+education companies in Tier-1 cities, including Beijing, Shanghai and Guangzhou, lead the ranking in proceeds raised. Investors' preference for AI applications in education suggests this segment has optimistic development prospects. Since 2016 AI+education has been raising an increasing amount of funds. The segment accounted for 4% and 7% education-related investments in China in 2016 and 2017 respectively. In 2018, this figure surged to 19%. There were as many investments in just Q1 2019 as there were in H1 2018. Based on this trend, the number of investments in 2019 is likely to exceed that in 2018.

Figure 16: Share of AI+ in education-related financing deals



Source: Deloitte Research

At least 44 investment companies invested in AI+education in 2018[3]. Around 80% of investments in AI+education raised more than RMB100 million, most of which reached RMB100-500 million. 15 companies raised an aggregate of RMB3.7 billion.

Data, algorithms and chips are the three basic elements for the development of AI technologies. AI+education mainly relies on technology such as adaptive learning, natural language processing, virtual assistants and facial recognition. Some of the large adaptive education companies in China have over 2.2 million registered users. Based on feedback on active users, these platforms have accumulated a large volume of user data.

Adaptive learning systems design personalized learning methods by analysing users' knowledge deficiencies. Specifically, adaptive learning systems use Bayesian networks to identify the connections between different knowledge and capability points, enabling users to have a full picture of their knowledge and improve their capabilities more efficiently.

In the algorithm space, deep learning, which simulate human neural networks, is disrupting the traditional algorithm design model in applications. By training computers to perform more human-like tasks, deep learning is attempting to overcome the limitations of machine learning.

In hardware, special chips such as GPUs, NPUs and FPGAs are accelerating data processing. A combination of these chips with edge computing technology will lead to improved computing capabilities and speed in the AI+education segment.

In information environment construction, with the issuance of 5G licenses in China, the high speed and low latency of 5G business applications will attract more investment in online AI+education. Based on the 5G+VR/AR model, it will be possible to perform rapid analysis, record complex feedback data and enhance immersive learning experiences.

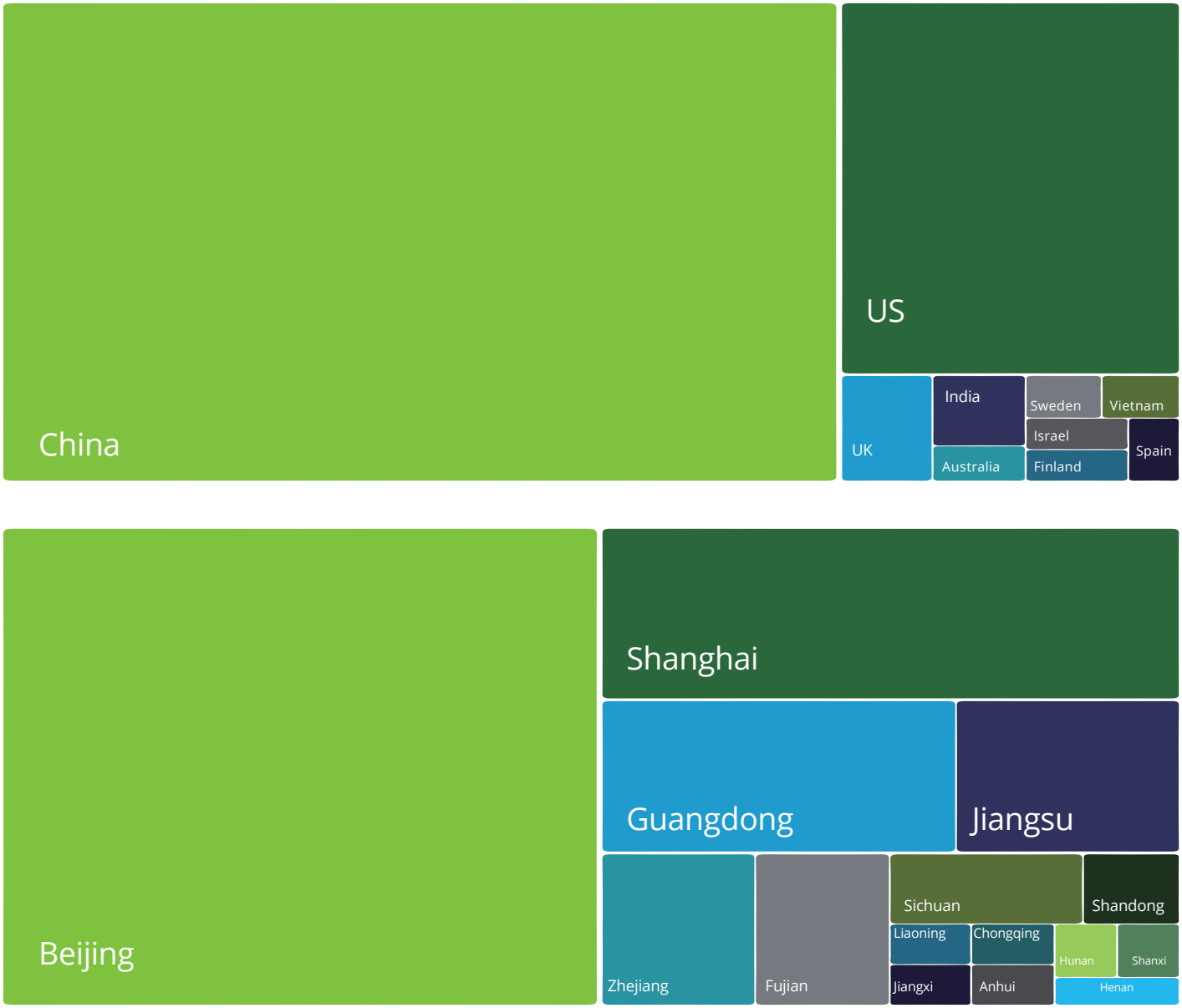
3. The statistics on investment numbers are incomplete

China is becoming the most active market worldwide in AI+education investment

Capital investment, as well as policy support and advances in technology, is a key factor for AI+education companies at the current stage. Globally, AI+education is becoming a hot investment target, and new AI start-ups are emerging. The US takes the lead here, with multiple personalized education companies having completed rounds of financing and M&A, including several unicorns that have completed eight rounds of financing since 2008. Related companies in other countries such as the UK, India, Australia and Sweden are developing good momentum and attracting investment.

In addition to traditional players, AI+education in emerging countries is also drawing increased attention from capital markets. In India, an established education technology company attracted a USD100 million investment from international private equity in 2018, having received investments from well-known venture capital and investment companies including multiple rounds from Tencent. With abundant capital support and nearly 10 million users, the company will expand to the US, UK and Australia.

Figure 17: Frequency of successful A-round financings of major AI+education companies worldwide from 2016 to Q1 2019 (incomplete statistics)



Source: Deloitte Research

Until 2011 China had not applied AI to education. Despite this late start, with the active application of the technology in recent years, China is developing rapidly into one of the most popular markets for AI+education investment, enjoying distinct market advantages, as well as frequent investment activity.

China's advanced after-school tutoring and teaching assistance markets benefit from a large consumer base to fuel demand. They have given rise to sophisticated application terminal companies including TAL, New Oriental and other education giants. Users have been increasingly willing to pay for online education in recent years, creating a favourable business environment for AI+education in China. While, in the US, AI+education is mainly oriented towards universities and colleges, in China AI+K12 education enjoys a robust consumer market and well-developed application terminals, with language education increasing in popularity.

Concepts and applications are the core pain points in China's education sector. Sharing quality education resources can help foster higher learning efficiency and more personalized education, and balance the relationship between quality-oriented and exam-oriented learning.

The important of tests in the Chinese education system creates rigid demand for exam-oriented education. AI-enabled education allows teachers to have an immediate, systematic understanding of whether students have mastered knowledge points, rather than having to go through the less efficient, less effective work of correcting students' exercises. It can empower students to learn in a more targeted way, focusing on areas that require more attention.

Despite a bleak capital market, AI+education companies successfully raised a significant amount of funding through a number of large deals in 2018, showing investors recognize the value of AI+education. China will continue to take a lead in AI+education investment and financing in the next few years. According to data from the National Bureau of Statistics, the Chinese government has been increasing expenditure on education since 2012 and is continuously releasing policies favourable to the development of AI. Education is taking an increasing proportion of consumption expenditure per capita. All these factors are contributing to investors' confidence in the future of AI+education.

Tier-1 cities lead AI+education investment

AI+education companies in Tier-1 provinces and cities attract the most investment, thanks to their leading technology capabilities and developed education sectors. Beijing was lead the ranks in successful financings of AI+education companies in 2018, followed by Shanghai and Guangdong. Due to their massive capital resources and the high acceptance of the AI+ concept in Tier-1 cities, many related companies have chosen to locate their headquarters in Beijing, Shanghai, Guangzhou and Shenzhen. Additionally, because many AI+education companies favor an education model combining high-quality offline teachers with online AI systems, Tier-1 cities, with their large number of highly-educated teachers, lead other cities in AI+education.

Unsurprisingly, the distribution of AI companies is closely related to AI+education investment. As of May 2019, 78% of China's AI companies are concentrated in Beijing, Shanghai, Shenzhen and Hangzhou. With quality education systems and support from AI technology, Tier-1 cities are set to develop smart campuses to provide more intelligent teaching and more efficient leaning.

In addition to Tier-1 cities, Yangtze River Delta regions outside Shanghai and Fujian, as well as parts of Central and Western China, are increasingly attractive to AI+education investors. This reflects the fact that AI+education resources are gradually flowing to Tier-2 and Tier-3 cities. One of the original intentions of AI+education is to improve education equality, including the vision of sharing the quality educational resources found in Tier-1 cities to enable students in Tier-2 and Tier-3 cities to study more efficiently.

K12 leads all educational sectors in AI+education investment

AI-related investment is flowing to diverse education segments, including K12, language education, teaching informatization and quality-oriented education. Among these, K12 is the most attractive segment for AI+education investors. Early childhood education and vocational education companies using AI technology have raised funds through financing, and the section is also drawing the attention of the capital market.

Among traditional education segments, K12 has always been popular in China. Consumers are more willing to pay for K12 services than other types of education. AI-based K12 includes children at the “critical starting line”, before they reach 12 years of age, providing education in accordance with their aptitude, meeting the market's core demand. The Ministry of *Education released the Education Informatization 2.0 Action Plan* in 2018, encouraging AI's application in education informatization practices such as online education and big data analysis of student profiles. This is creating considerable market opportunities. Foreign language and STEAM education are attracting extensive attention, with growing and steady demand for related services.

Figure 18: Financing of China's AI+education segment in 2018

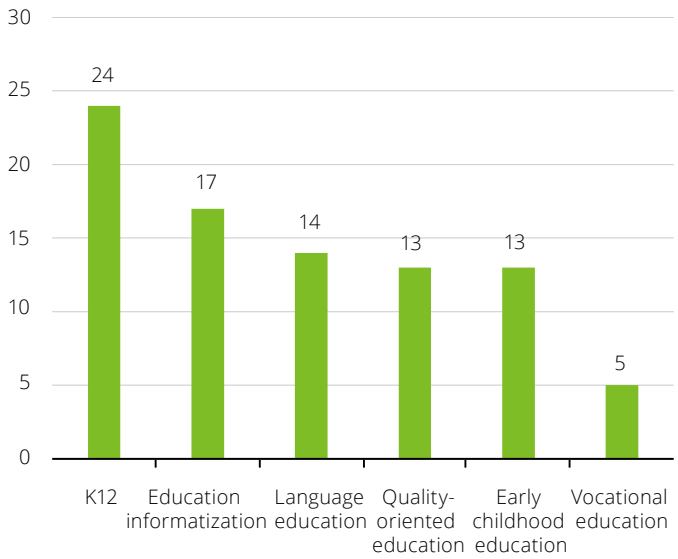
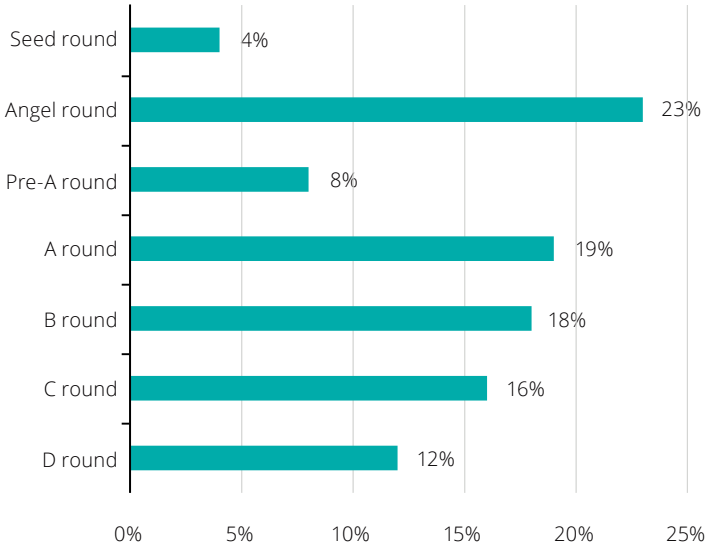


Figure 19: Representation of AI-based K12 education in financing rounds (2016-Q1 2019)



Source: Deloitte Research

Many AI+education start-ups (over 50%) have successfully held early financing rounds (seed, angel, pre-A round and A rounds). This suggests numerous players are competing for AI+education market share at the current stage.

Given the education sector's long growth cycle, it is difficult to review students' performance after a short learning period. It takes time for an education provider to establish a good reputation based on positive feedback. As the market is not saturated yet, capital will flow to start-ups to support their development. In addition, with substantial growth potential, the market is seeing early rounds of financing at low valuations. Investors optimistic about an industry often target a diverse range of participants in the early stages.

After this early stage competition for market share across different sectors, the capital market will pay more attention to the sustainable development and product optimization of companies. Profitability, application and scaling up will become the focus of middle and late stage investment, following early stage selection of concepts and models. These latter stages require substantial capital support.

Giants stepping into the AI+education market

Traditional education giants are investing heavily in AI+education companies, indicating their confidence in the market and strategic planning. The development of the AI+education segment depends on a deep understanding of education and well-established structures. Traditional education institutions are forward-looking, enjoy extensive experience, and have accumulated enormous amounts of user data.

TAL, for example, has not only invested in adaptive education companies and AI+education-related hardware and software companies, but has also established an AI lab to research machine learning and natural language processing to drive the innovation of its traditional education applications.

In addition to investment in AI-education companies, New Oriental has established an alliance to develop AI+education products and draw public attention to its breakthroughs in this field. The alliance shares data and technology with US universities and cooperates with investment funds in Silicon Valley, and is likely to attract more overseas capital.

Internet giants are also exploring the value of AI+education, with strategic investments, based on their technologies, research teams, relationships across the industrial chain and large user bases, bringing more capital to the market. BAT, Tencent and Alibaba are investing heavily in AI+education companies. Baidu is focused on developing its own business applying AI in education. The Tencent Collaboration Fund has invested in multiple AI+education companies. The Tencent Joint Laboratory for AI+education has helped many companies develop intelligent teaching solutions and launched multiple AI-enabled basic education products. Alibaba is also investing actively in domestic and overseas AI+education companies, making use of its strong capital and technology.

3.2 Development trends and prospect of AI+education

AI adaptive systems lead the new investment trend

Adaptive learning systems can provide personalized learning solutions in accordance with students' performance, including knowledge understanding diagnosis, capability evaluation and learning content recommendations. As students vary in their understanding of knowledge and learning capabilities, AI-based adaptive education systems can use big data and algorithms to develop efficient, standardised courses to address the students' specific needs. This helps students of different levels adapt to courses of different types. To support evaluation, testing and practice, these systems will identify and collect learner feedback and perform deep learning to evaluate results according to pre-set standards, predict learning behaviours and provide personalized questions to target learning problems. Adaptive learning systems create a closed loop of teaching, learning, evaluating, testing and practice, helping students improve learning efficiency and accuracy.

Table 7: Adaptive education systems support all five learning steps

Five learning steps	AI application methods	Major application technologies	Application complexities
Practice	• Design algorithms with big data to analyse learner behaviours • Design personalized questions to establish problems in knowledge understanding • Analyze answer data to produce targeted evaluation reports	• Adaptive learning systems	• High volume of data • Most immediate feedback • Least complex analysis
Testing	• Collect learning behaviour data for prediction • Develop learning plans based on testing data	• Adaptive learning systems • Image recognition products • Speech recognition products	• High volume of data • Simple and clear feedbacks • Low analysis complexity
Evaluation	• Leverage identification technology to identify results submitted by learners • Perform deep learning to evaluate results according to pre-set standards	• Adaptive learning systems	• Low identification accuracy of machines • Complex and massive testing results data
Learning	• Analyse learners' learning models in depth • Provide learning model adjustment advice for learners according to their conditions using scientific methods	• Adaptive learning systems • Speech recognition	• Low data frequency and data quantification difficulty • Complex learning model and analysis difficulty
Teaching	• Pre-collect preference data and increase feedback programs • Analyse original and feedback data to improve online teaching systems in a scientific way	• Adaptive learning systems	• Low data frequency and data quantification difficulty • AI application not enough to replace traditional teachers

Source: Deloitte Research

Research results show that AI applications have a substantial impact on improving learning performance. For example, a research paper published by a well-known international academic conference in 2018 found students using the adaptive system ALEKS are more likely to pass math tests, with 15% higher scores than those not using the system. Another research paper published in a top international academic journal indicates that adaptive systems can help students at middle and lower middle levels improve their performance in chemistry by at least one grade.

In the US, traditional education technology companies Knewton, Realizeit and ALEKS are developing adaptive education systems as core products, having raised substantial funds and realized mature system applications. They have established partnerships with different education groups and are providing products and services to schools and universities. Influenced by this trend, many traditional education organizations are undertaking transformation initiatives, developing adaptive education-related businesses. For example, MOOC platforms such as Coursera and language learning platforms are planning to shift to AI adaptive education.

Adaptive education systems can be applied in many scenarios. Based on the business application experiences of other countries, China is witnessing a growing number of excellent adaptive education systems emerge. Personalized education is essentially about aligning students' understanding with target knowledge maps and identifying the best alignment approach according to the results. Adaptive education supports this approach and will inevitably become the trend. Computing capability improvements, big data and Bayesian network algorithms have driven the rapid development of adaptive learning systems. As these systems can be used throughout the leaning process, adaptive learning products are widely used at different learning stages.

Domestic and overseas adaptive education companies are thriving

Table 8:

	Domestic	Overseas
Development background	Paid after-school tutoring is flourishing in China	Development across different sectors
Technology comparison	China is still at the initial stage of applying adaptive learning technology, lagging behind in the amount of data accumulated	Adaptive learning technology has been used in the US and Europe for more than 10 years, with over 100 million users across different age groups
Content application	Adaptive education companies tend to develop teaching content by themselves. As various textbooks are used in China, different testing content is developed accordingly. Knowledge points are usually detailed and exam-oriented	Mainly provided by schools and publishers, teaching content usually has clear intellectual property rights and complete systems
Application scenarios	K12 tutoring and English tutoring	K12+, higher education and vocational education
Representative companies	Yixue Education (Squirrel AI), New Oriental, Gold-Wood Learning, Langlib and TAL	Knewton, Dreambox Learning, Duolingo, Civitas Learning and Grammarly

Globally, an increasing number of companies are stepping into adaptive education. New adaptive education companies are emerging, higher valuations and more proceeds are being raised, internet education companies are transforming towards, or investing in, adaptive education, and traditional education giants likewise investing in or acquiring adaptive education companies.

Given paid after-school tutoring is flourishing in China, AI-based education is potentially a lucrative business. However, China is still at the initial stage in the application of adaptive learning technology, lagging behind in the accumulation of data. Adaptive education companies tend to develop teaching contents by themselves. Since various textbooks are used in China, different testing content are developed accordingly. Knowledge points are usually detailed and exam-oriented.

Exam-oriented tutoring has rigid demand in China. Personalized education and exam-oriented education should not be considered as incompatible. Instead, exam-oriented education should be integrated with personalized education, with AI technology serving as the medium.

In China's AI+education market, AI-based English education institutions such as VIPKID are developing rapidly. This is because English+AI can meet the requirements of exam-oriented education and improve students' foreign language quality in fun and educational ways. English vocabulary and grammar has detailed knowledge systems and specific rules to follow; making it suitable for AI technology to explore educational data and analyze learning. All this can help students analyze knowledge maps efficiently.

To improve concentration in learning, many applications are seeking to add interesting elements. Generally speaking, industry development has high vitality. Adaptive education companies are seeking partners at the B-end, while building brands through enhancing sales capabilities to develop C-end markets.

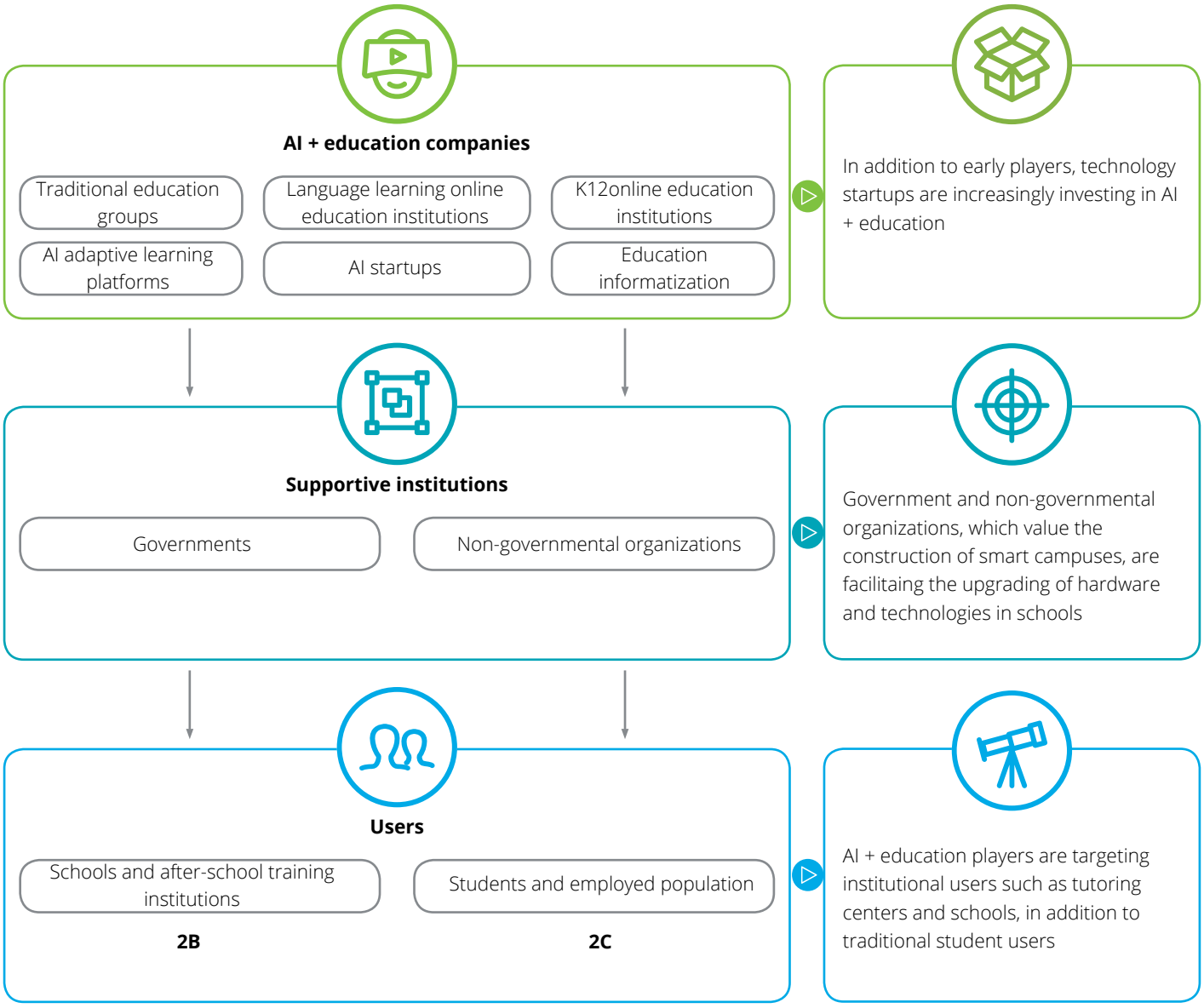
In the international AI+education market, students flow to various sectors, with higher education and vocational education taking a bigger share. Adaptive learning technology has been used in the US and Europe for more than 10 years, with over 100 million users across different age groups. Mainly provided by schools and publishers, teaching content usually has clear intellectual property attribution and complete systems. In this regard, domestic AI+education still has a long way to go in terms of content. It requires a common effort across different dimensions including the traditional education sector, policy and technology.

AI reshapes the role and responsibility of participants in the education ecosystem

With the rapid development of AI+education in China, the roles and responsibilities of participants in the education ecosystem are changing. In addition to early players, technology start-ups are investing more in AI+education, which explains its high percentage of early financing rounds. Traditional education institutions and comprehensive education groups are accumulating technologies, resources, data and talent through strategic investment, their own construction, and collaboration with other organizations, in order to develop AI+education business.

Other players include online education institutions using speech recognition technology and providing language education services, educational platforms using image recognition technology, AI-based adaptive learning platforms, and AI companies driving the application of smart products in schools.

Figure 20: Education ecosystem participants' involved in the AI application trend



Source: Deloitte Research

Under the influence of AI technology, institutions, including governments and non-governmental organizations, which value the construction of smart campuses, are facilitating hardware and technology upgrading in schools. Governments are providing educational funds to support the construction of smart campuses, which apply IT to teaching management systems and human-machine cooperation in classrooms. Furthermore, universities and research organizations are collaborating to establish academic communities to drive international communication and cooperation as well as technology breakthroughs.

Currently, AI+education products are mainly used in K12 education to support students' school performance. In addition to tutoring centers, student users will soon be important targets for AI-based education product providers, thanks to education informatization policy, which aims to ease the uneven distribution of education resources.

It is necessary to redefine the role of AI in education

To promote the development of AI+education (which will likely shape the future of the education sector), we need to redefine the role of AI and education in driving social development, and consider how AI can empower education.

AI has already reshaped learning experiences, driving the ongoing establishment of new education systems. But there are still substantial challenges to extensive AI application in education. The core of AI+education is data, algorithms and knowledge maps, and AI requires massive, accurate and marked data. AI+education companies in every education segment face data problems of different degrees. For example, they have not yet fully realized effective data-based evaluation, established closed learning data loops, or obtained certain important data such information about learning processes and knowledge point understanding. Therefore, there is still a gap between effective AI-based evaluation and facilitating learning improvement. With the support of advanced algorithms and data, AI+education is likely to reach the level of specialist-grade teachers, enhancing the efficiency of users in understanding knowledge.

Applying AI scenarios in traditional education system are a challenge in AI+education too. In traditional K12 education, for example, schools still largely use conservative learning models and students spend most of their time at school. AI+education requires the cooperation of schools, teachers, parents and students.

Educators and decision makers should take a step back to see the big picture of AI's use in education. From educators' perspective, AI+education is challenging traditional ways of teaching and reshaping the role of teachers.

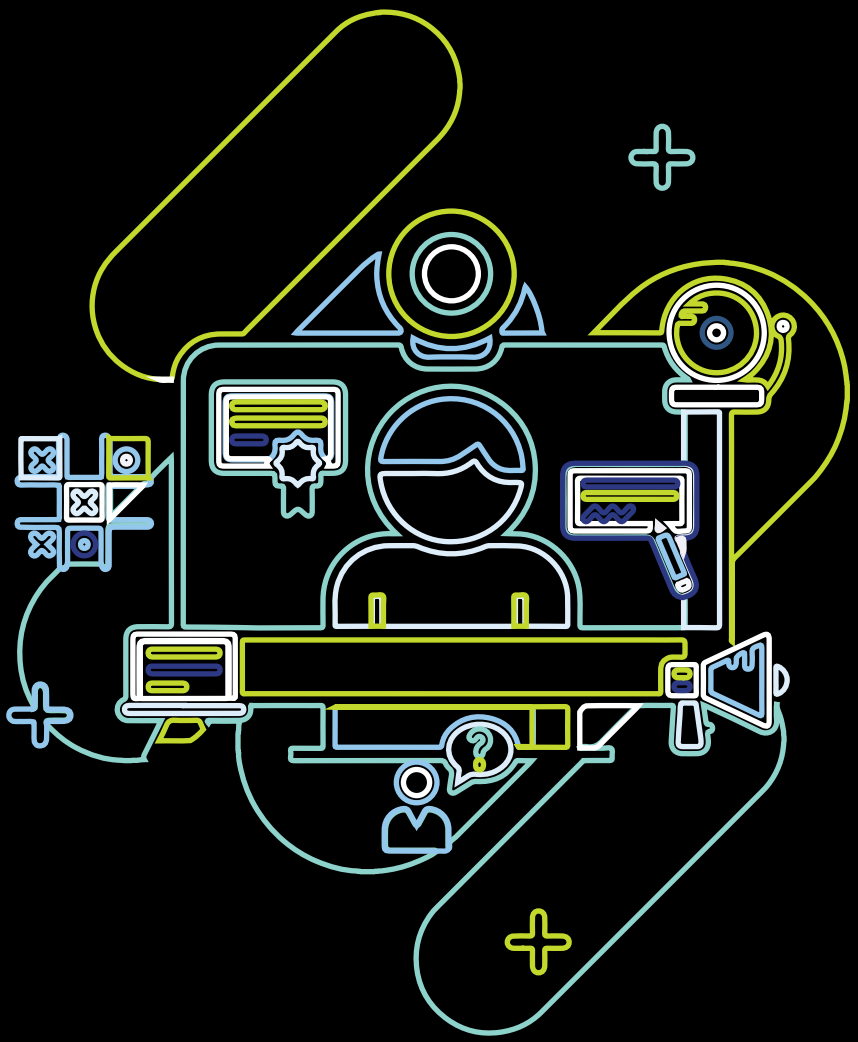
While AI could replace human teachers in imparting pure knowledge, but it cannot take the place of teachers in moral education. The job of teachers will shift from mere knowledge teaching to moral education and emotional communication.

In supporting people's livelihoods, and noting the function AI+education can play in promoting fair distribution of educational resources, governments and educational decision makers are launching new policies to support education informatization to drive the application of AI.

AI will play an increasingly important role in supporting social development and bring about fundamental changes to society. As with other scientific and technological developments, AI is advancing raises legal issues including the challenging development of new laws and regulations. Governments, communities and businesses need to strengthen intellectual property rights to AI-based teaching content as well as cooperate on the privacy and ethical issues related to facial and speech recognition.

It has been estimated that AI and machine learning will eliminate 1.8 million jobs and create 2.3 million new jobs by 2020. Human teachers are irreplaceable in some areas, even though AI may surpass human beings in it reserves of knowledge and transmission speed as well as teaching methods. Amid disruption by AI, teachers should be alert and build transformative mind-sets to explore how to develop capabilities exclusive to humans and strengthen their irreplaceability, as well as consider what the essence of education is and what types of talent it should foster. In this way teachers can convert the challenges from AI into opportunities for educational innovation through transformative approaches.

4. A new era for vocational education



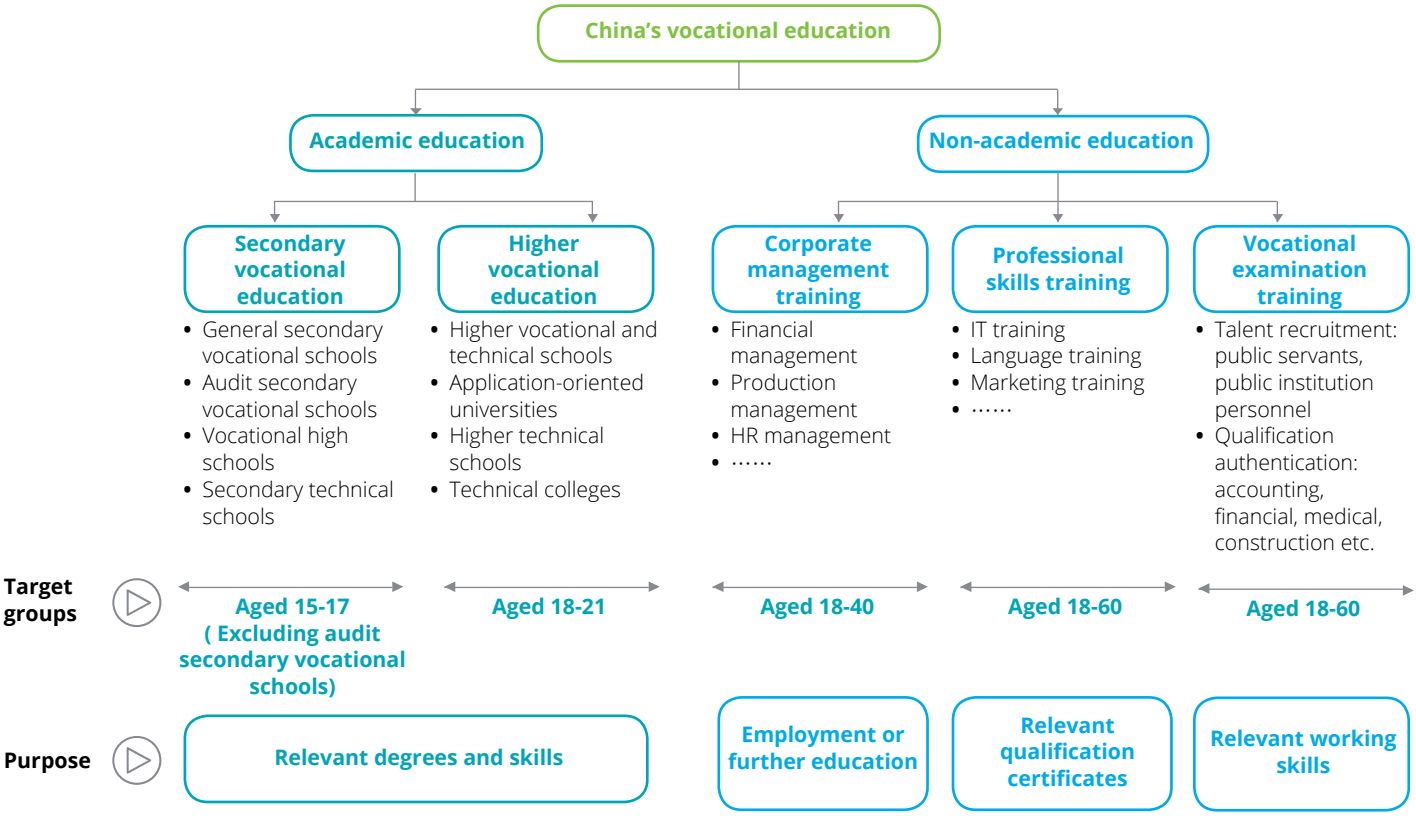
Driven by demand for talent, industry iteration and policy incentives, vocational education will evolve in scale, and play an increasingly important role in China's education system. From a talent perspective, retention periods in the workforce are shortening every year. According to LinkedIn's *2018 China Recruiting Trends* report, from 2014 to 2018 the average time a person serves one employer has reduced from 34 months to 22 months, and more talent is moving across sectors and regions. With a worsening talent supply-demand imbalance, and shorter time spent in one position, the demand for talent for greater professional skills will be the greatest motivation for advancing the development of vocational education.

Between the 10th (2001-2005) and 13th 5-year plans (2016-2020), the Chinese economy shifted focus from the raw materials, textiles, equipment manufacturing and construction industries to one driven by tech innovation and supported by talent supply. Industries are transforming from export-oriented growth to endogenous growth, and from labour-intensive to tech-intensive, which will force vocational education organizations to change how they cultivate talent. Moreover, in the *Decision of the State Council on Accelerating the Development of Modern Vocational Education* in 2012 to the *Implementing Plan for the National Vocational Education Reform* in 2019, the Chinese Government has emphasized the position of vocational education, sponsors of vocational education as well as the purpose of vocational education. Policy instructions and support will usher China's vocational education sector into a period of fast development.

4.1 The status quo of China's vocational education market

Unlike general education, vocational education aims to specifically increase employability and improve the sustainability of skills. Vocational education helps students meet employment and job requirements through systematic skill training or short-term knowledge teaching. It can be divided into academic vocational education and non-academic vocational education according to whether a degree is issued. Most academic vocational education organizations are publically-owned secondary and higher vocational schools. They operate with government financial support. Most non-academic vocational education organizations are privately-owned, with enterprises and individuals as key consumers. They can provide corporate, professional skills and professional exam training to meet different purposes.

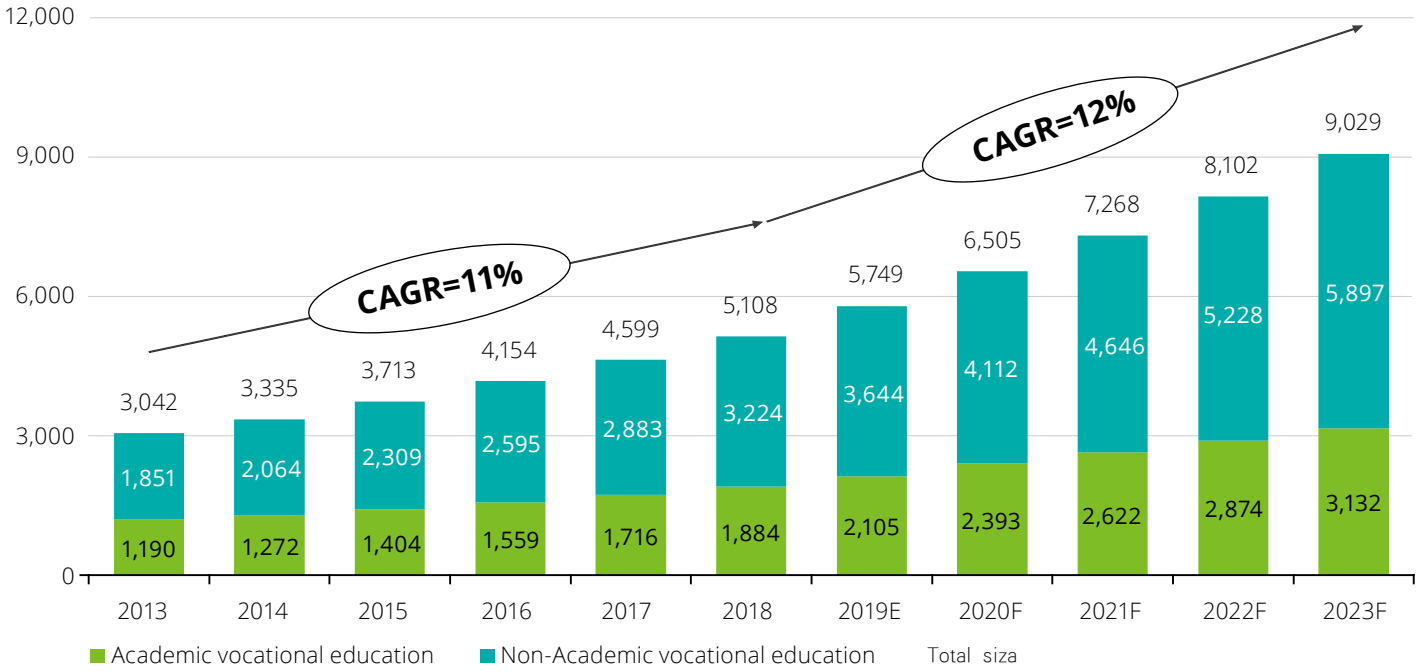
Figure 21: China's vocational education system framework



Source: Deloitte Research

Deloitte estimates the size of China's vocational education market based on the tuition fees paid by consumers (not including upstream or downstream derivative services in the education sector chain). In the past five years, China's vocational education market has achieved rapid development, with an annual CAGR of 11%. In 2018, its market exceeded RMB500 billion, of which academic and non-academic vocational training accounted for 37% and 63% respectively. In the coming five years, this industry will maintain a CAGR of 12%, and the market is expected to exceed RMB900 billion by 2023, with academic vocational education representing nearly RMB300 billion and non-academic vocational education more than RMB600 billion.

Figure 22: China's vocational education market size (2013-2023F)
Unit: RMB100 million



Source: Deloitte Research and analysis

The vocational education sector is driven by three main factors: a changing working environment, industry structure upgrading and adjustment, and policy support and incentives.

Changing working environment. Due to increasingly blurry boarders between industries and constant technology iteration, the validity period of knowledge is getting shorter. In 2016, two professors from Oxford University, Carl Benedict Frey and Michael A. Osborne, predicted that in China 77% of jobs will be replaced by AI within 20 years according to current AI technology achievements. If we calculate based on this assumption that there are 770 million working people aged 16-59, 600 million people will be forced to improve their capabilities or change jobs.

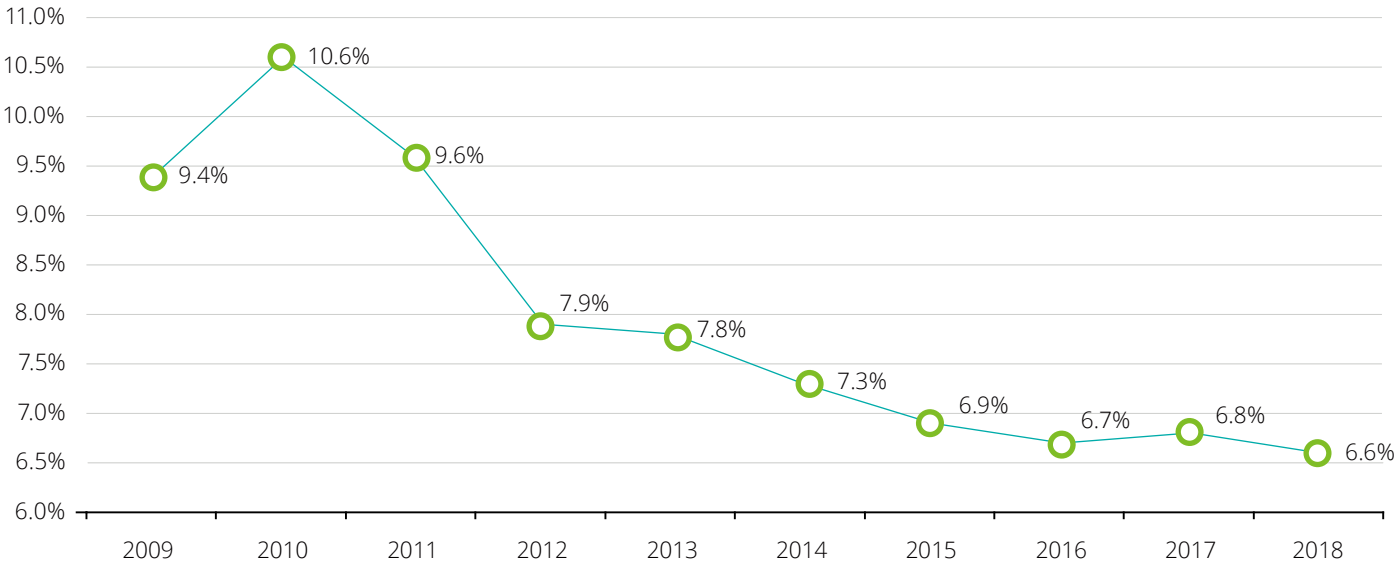
Meanwhile, the organizational structure of enterprises will be flatter and more professional. Outsourcing of non-core business will be the new normal and demand for single-skilled talent will decline, with increased demand for technical talent with strong project management capabilities and mathematical thinking, as well as comprehensive qualities like good communication, deduction and design capabilities. Moreover, the traditional career concept of working for one employer for a long time is already outdated. As life expectancy and working lives get longer, workers will pay more attention to continuous learning and diversified development opportunities.

Industry structure upgrading and adjustment.

China's economy is growing at a slower pace. GDP growth declined from 9.4% to 6.6% from 2009 to 2018, and the imbalance between industries and talent supply is increasingly obvious. The demographic-dividend-based growth model driven by exports and investments will gradually transform into a new model driven by technology and innovation. At the same time, urbanization and overcapacity will create high re-employment and job transfer demand. Looking at supply, skilled workers account for 21.3% of total employees, among which highly skilled talent occupies less than 6%. According to data provided by the Ministry of Human Resources and Social Security, the ratio of technician demand to technician supply has always been higher than 1.5 in recent years, rising to more than 2.0 for highly skilled talent. A higher ratio means larger demand, and talent demand exceeds supply. Moreover, China's technical talent shortage has expanded from coastal areas in the Eastern region to the Middle and Western regions, and changed from a seasonal phenomenon to constant one.

During the 12th 5-Year Plan period, 13.97 million people were in structural unemployment, and the number was expected to increase to 14.25 million during the 13th 5-Year Plan period. The 2017 *Guideline on Talent Development Planning in the Manufacturing Industry* published by the Ministry of Education, Ministry of Human Resources and Social Security, and the Ministry of Industry and Information Technology predicted that the manufacturing talent gap will reach 3 million by 2020. According to the statistics from the China Education and Examination Centre of the Ministry of Industry and Information Technology (CEIAEC), China's AI talent gap exceeds 5 million. As a result, industrial development will generate huge demand for professionals, especially highly-skilled talent.

Figure 23: China's GDP growth (2009-2018)
Unit: %



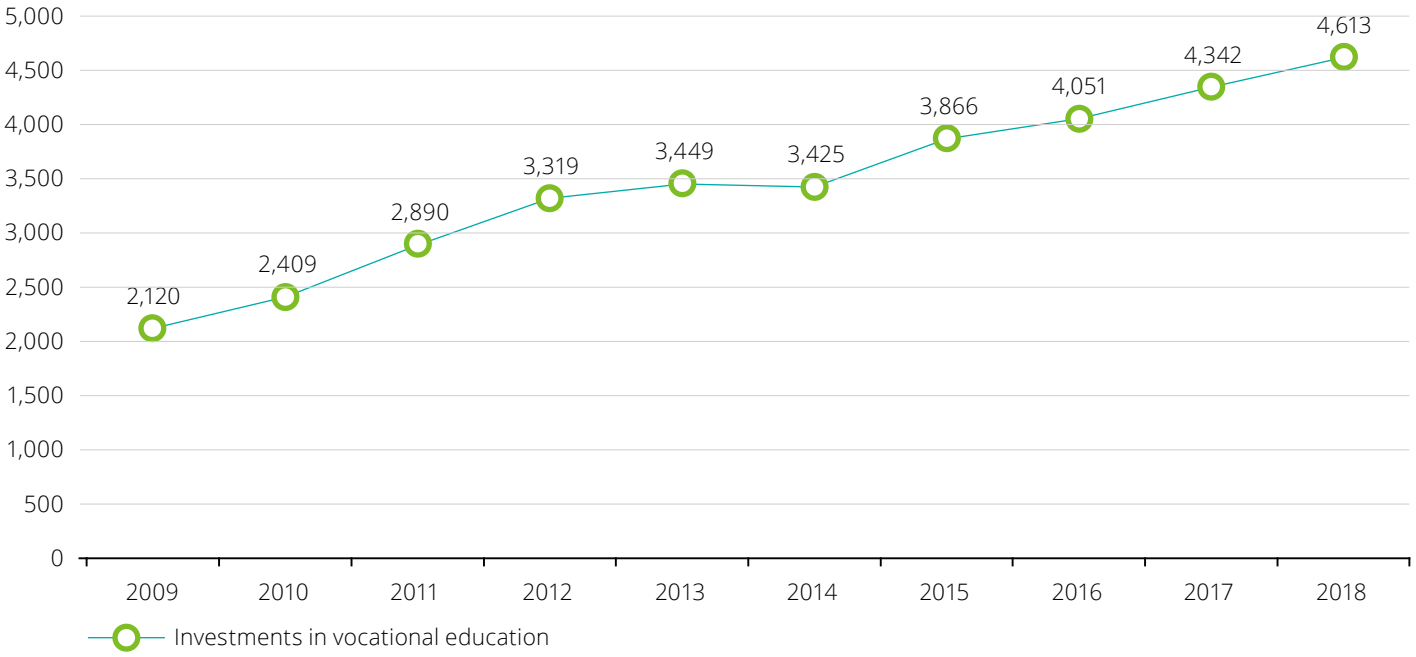
Source: The National Bureau of Statistics of China

Policy support and incentives. Addressing top-level design, the State Council agreed to establish the joint conference system on promoting vocational education affairs between central departments at the end of November 2018, with the aim of making talent supply satisfy market demand. The *Implementing Plan for National Vocational Education Reform* clarifies that vocational education and general education are equally as important. It also demonstrates the Chinese system's advantages: it borrows the dual-track approach to developing vocational education and general education from Germany and other developed countries and balances the development of general education and vocational education in terms of their social benefits and employment possibilities. Moreover, *Education Modernization 2035* made establishing a life-long education system an important national task. By learning from the experiences of developed countries, China can establish a national qualification framework to strengthen the vertical integration of vocational education and higher education.

For example, academic credit banks use a management model that simulates the characteristics of a bank to allow students to choose the content, time and place of their own learning. This changes the learning system from a fixed approach to a flexible one and enables the sharing of teaching resources between higher education institutions and other educational establishments. By connecting academic credit banks at different levels, a mutually connected platform for academic education and non-academic education can be built to promote the development of vocational education.

China's investment in vocational education increased from RMB212 billion to RMB461.3 billion between 2009 and 2018, growing at 8.1% a year. At a government conference in March 2019, Premier Li Keqiang approved higher vocational schools' recruitment of an additional million more students. On 30 April at the executive meeting of the State Council, RMB100 billion in unemployment insurance funds were approved to improve professional skills, enhance the quality of workers and stimulate employment and entrepreneurship. In May, the *Action Plan on Improving Professional Skills (2019-2021)* set a goal of providing professional skills training to 50 million people within three years with the support of government subsidies and training more than 1.5 million people in 2019 alone. By 2021, skilled workers will account for over 25% of the working population, within which more than 30% will be highly skilled. Academic vocational education and non-academic vocational education will receive more investment and support to cultivate talent to advance China's economic transformation and upgrading.

Figure 24: Vocational education investments (2009-2018)
Unit: RMB100 million



Source: The Ministry of Education

China's education authorities aim to encourage the integration of academic and non-academic education by exploring 1+X "degree certificate + multiple professional skills certificates" pilot schemes to improve the sustainable employability of students and relieve structural employment contradictions. At the same time, the government is encouraging talent cultivation cooperation between enterprises and schools and the management of schools by diversified social forces. It plans to establish 300 demonstrative vocational education groups by 2020. China is energetically recruiting teachers with theoretical knowledge and practical experience and has set a goal to build 100 training bases for these teachers. In addition, the *Trial Management Measures on Supervising Professional Skill Grading Certificates* issued this year clarify that enterprises should participate fully in professional standard cultivation and assessment system improvements to ensure students keep up with industry needs.

4.2 Status quo of academic vocational education

Academic vocational education in China can be classified as secondary vocational and higher vocational. There are 33.98 million students receiving an academic vocational education. Secondary vocational education has four sub-categories: general secondary technical education, vocational high school education, technical school education and adult secondary technical school education. General secondary technical schools, adult secondary technical schools and vocational high schools are overseen by the Ministry of Education. There were 12.54 million students in 2017 in these schools, making up 37% of students in academic vocational education schools. Secondary technical schools are governed by the Ministry of Human Resources and Social Security. Most secondary technical schools are publicly owned, providing free education for students.

Higher vocational education has four sub-categories: higher technical and vocational schools, application-oriented universities, higher technical schools and technical colleges. Higher technical and vocational schools and application-oriented universities are led by the Ministry of Education. These schools had about 18.04 million students in 2017, accounting for 53% of academic vocational education students. Higher technical schools and technical colleges are administered by the Ministry of Human Resources and Social Security. In 2017, the number of students in secondary technical schools, higher technical schools and technical colleges was 3.38 million, accounting for 10% of the total.

Table 9: Types of secondary vocational schools

Type	General secondary technical schools	Adult secondary technical schools	Vocational high schools	Secondary technical schools
Target group	• Junior high school graduates	• Adults with junior high school degrees (mainly in-service staff)	• Junior high school graduates	
Education duration	• 3 years	• 2-3 years	• 3 years	
Teaching target	• To train junior or intermediate technicians with certain professional skills	• To cultivate intermediate technicians that can better satisfy actual industry demand	• To develop talent with knowledge of technical theories, professional knowledge and practical skills who can take certain jobs (providing more theoretical knowledge but fewer practical skills than technical schools and secondary vocational schools)	• To train junior and intermediate technicians with practical skills
Responsible department	• Ministry of Education			• Ministry of Human Resources and Social Security
No. of schools in 2017	• 3,346	• 1,218	• 3,617	• 2,490 (total no. of technical schools)
Percentage of private schools in 2017 (%)	• 12.5 (across all private secondary vocational schools)			
No. of students in 2017 (10,000)	• 712.99	• 127.24	• 414.06	• 338.21 (students in technical schools)
Average tuition fees per student in 2017 (RMB/ year)	• Public: for free • Private: ~5,000			

Source: Essence Securities, TF Securities, the Ministry of Education

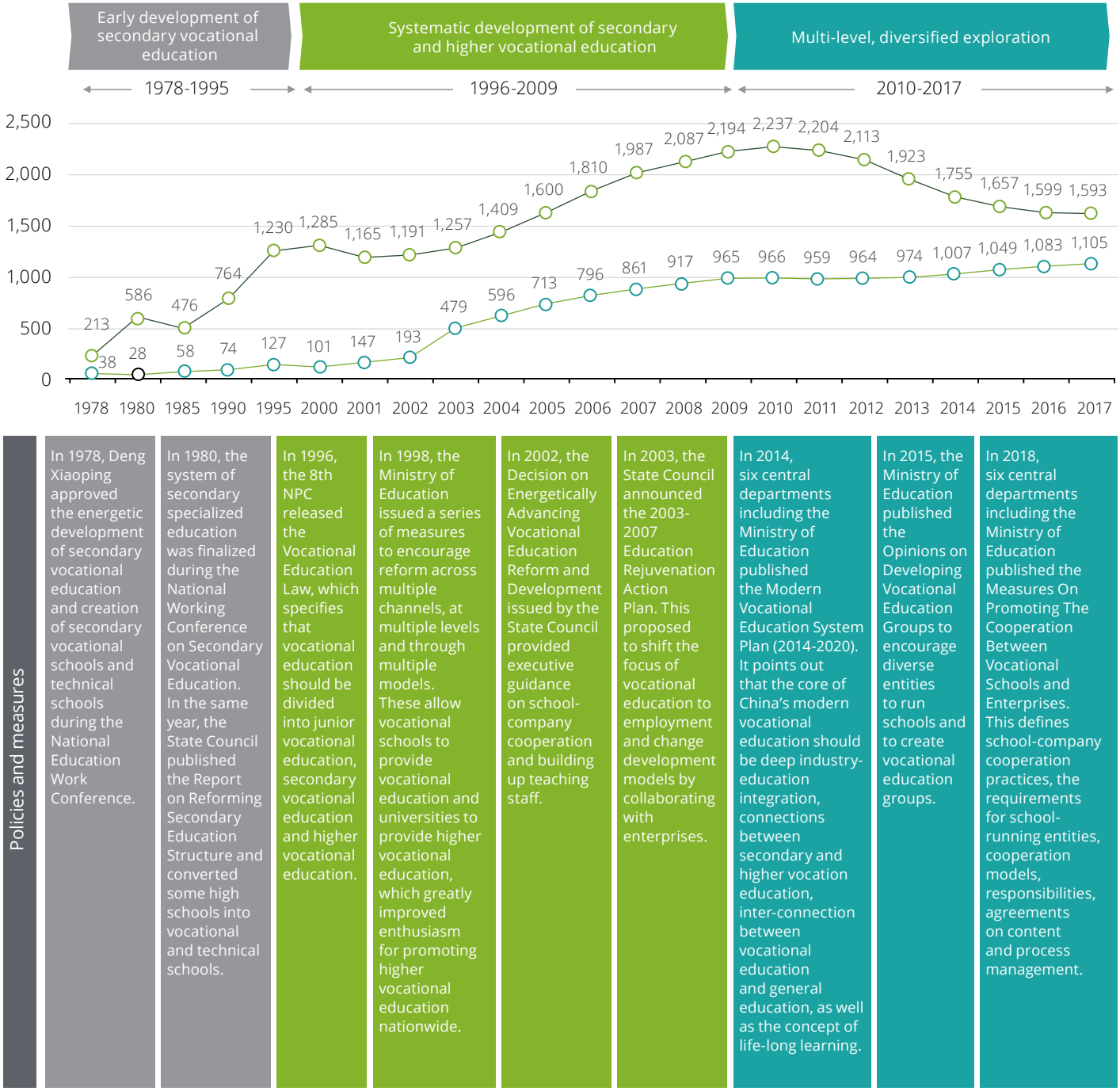
Table 10: Types of higher vocational schools

Type	Higher technical and vocational schools	Application-oriented universities	Higher technical schools	Technical colleges
Target group	• High school graduates	• High school graduates/junior college graduates	• Graduates majoring in related subjects from secondary vocational schools or high schools/junior school graduates	
Education duration	• Mostly 3 years	• 4 years	• 3 years (for secondary vocational school graduates or high school graduates) • 5 years (for junior school graduates)	• 3-4 years (for secondary vocational school graduates or high school graduates) • 5-6 years (for junior school graduates)
Teaching goals	• To cultivate talent with bachelor's degrees and certain professional technologies and skills	• Vocational education for undergraduates to train high-level and highly skilled, application-oriented talent • Postgraduate education for a professional degree, mainly cultivating high-level application-oriented talent and inter-disciplinary talent with the capacity to innovate	• To cultivate high-level technical talent	• These schools provide the highest level of technical education, they are developed from higher technical schools and graduates hold licences from provincial labour departments after assessment • To train front-line operators with practical abilities and high-level skills
Competent department	• Ministry of Education		• Ministry of Human Resources and Social Security	
No. of schools in 2017	• 1,388	• 15 (vocational education university pilots) • 300 (application-oriented university pilots)	• 2,490 (total number of technical schools)	• ~450
Percentage of private schools in 2017 (%))	• 22.3%	• NA		
No. of students in 2017 (10,000)	• 1,105	• ~700	• 338.21 (across all technical schools)	
Average tuition fee per student in 2017 (RMB/ year)	• Public: 5,000-6,600 • Private: >7,000	• ~8,500	• NA	

Source: Essence Securities, TF Securities, the Ministry of Education

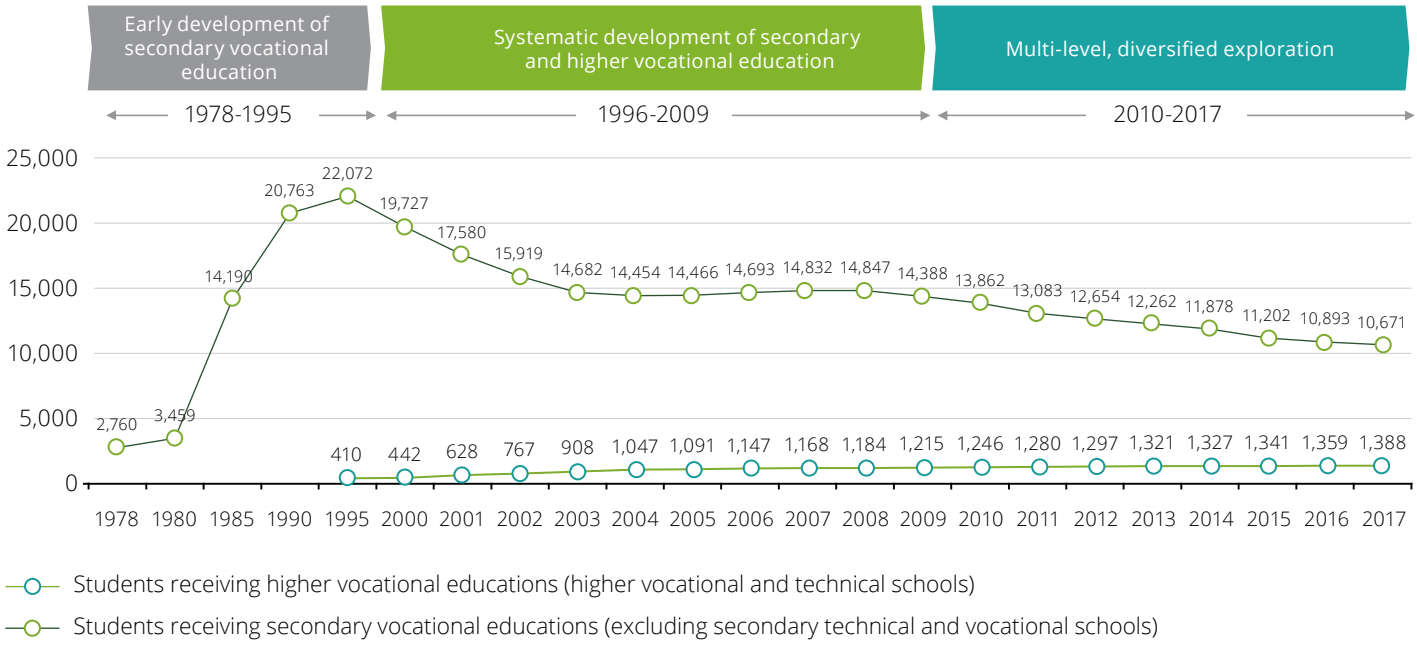
Since reform and opening-up, China's academic vocational education has gone through three phases: early development of secondary vocational education, systematic development of secondary and higher vocational education, and multi-level, diversified exploration to connect secondary and higher vocational education, stress life-long education and encourage industry-education integration.

Figure 25: The development history of academic vocational education in China (1978-2017)
Unit: 10,000 people



Source: the National Bureau of Statistics, Deloitte Research and analysis

Figure 26: Change in the number of Chinese vocational schools (1978-2017)



Source: the National Bureau of Statistics, Deloitte Research and analysis

Phase 1: Early development of secondary vocational education (1987-1995)

In 1978, Deng Xiaoping approved the energetic development of secondary vocational education and creation of secondary vocational and technical schools. From 1978 to 1995, the number of secondary vocational schools (not including secondary technical schools) increased from 2,760 to 22,072, with students numbers growing from 2.13 million to 12.3 million. The development of secondary vocational education helped China create an investment-driven economy through reform and opening-up and provided a large amount of skilled workers to develop a market-oriented economy, satisfying demand for huge amounts of workers from labour-intensive industries in the process of industrialization.

Phase 2: Systematic development of secondary and higher vocational education (1996-2009)

With the release and implementation of the Vocational Education Law in 1996, China began to support the development of higher vocational education, confirmed and clarified the position of higher vocational education and encouraged the development of higher vocational education across multiple channels and through multiple models.

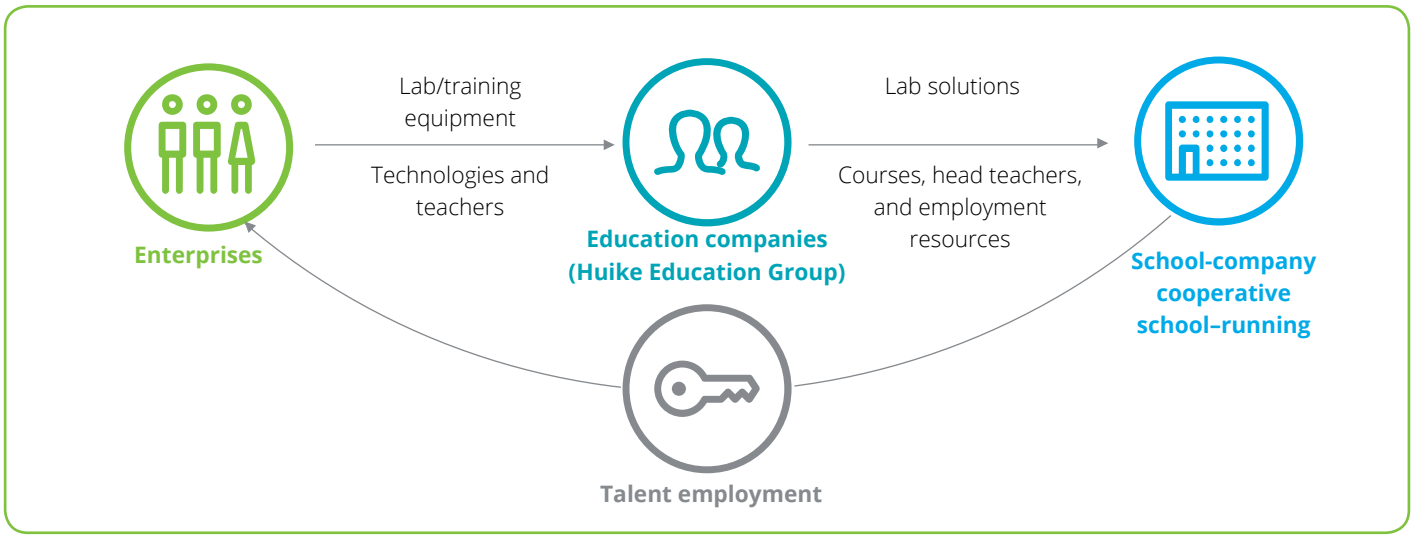
China established its first higher vocational school in 1994. From 1995 to 2010, the number of higher vocational schools increased from 410 to 1,246 and the number of students grew from 1.27 million to 9.66 million, a huge expansion of the scale of higher vocational education. However, as reform and opening-up deepened, industry upgraded and tertiary sectors became the new economic growth drivers, so secondary vocational education was increasingly unable to meet social development demands. Meanwhile, SOE reform and the three economic crises in the 1990s changed talent demand preferences; China began to train more people with urgently-needed skills, especially highly skilled talent, to satisfy demand from enterprises.

Phase 3: Multi-level and diversified exploration (2010-2017)

In this phase higher vocational schools began to enrol students who had graduated from secondary vocational schools. From 2010 to 2017, the number of students studying in secondary vocational schools (not including secondary vocational and technical schools) decreased from 22.37 million to 15.93 million, narrowing the gap between secondary and higher vocational schools. Moreover, because of an expansion in enrolment, the number of university students increased from 2.28 million to over 35 million from 1978 to 2017, lowering the status of vocational education. During this period, the government attempted reform, including the integration of in-service education and general education, life-long education, industry-education integration, school-company cooperation and allowing schools to be run by different social forces, but this met little success. Information asymmetry between vocational education and industries was a drawback. For example, most members of a vocational education and teaching steering committee founded to promote school-company cooperation were retired leaders and presidents of secondary and higher vocational schools. Their limited understanding of the demands of enterprises and related core interests reduced the efficiency of industry-education integration. On the other hand, a lack of communication on top-level design by the Ministry of Education and the Ministry of Human Resources and Social Security meant they developed different apprenticeship plans. The unclear separation and division of duties led to inefficient administration and inappropriate financial budgeting, which hindered apprenticeship system development.

Since 2018, as China's economy has entered a new normal, the pace of industry upgrading and economic structure adjustment has accelerated, boosting demand for technical talent and making vocational education more important. In particular, demands for talented graduates from emerging and specialized majors have promoted the fast development of school-company cooperation and higher vocational schools.

Trend 1: The rise of joint major construction and school-company cooperative school–running



Source: Deloitte Research and analysis

In 2018, the Ministry of Education proposed to optimize subject structures and develop new engineering, medial, agricultural and literature majors. Since they lacked a strong capability to develop majors, vocational schools needed the support of third parties to do so. Meanwhile, as enterprises had huge demand for these types of talent, they could find enough job vacancies in the industry ecosystem of large (RMB100 billion plus) revenue firms in the downstream.

Huike Education Group, for example, which is a leader in school-company cooperation, has developed a light asset-based model for running cooperative school-company institutions that integrates industries' and vocational schools' resources and advantages. It develops courses based on advanced technologies such as big data and cloud computing with leading enterprises like Alibaba, and designs development schemes independently according to Ministry of Education requirements. Meanwhile, it helps enterprises sell lab solutions to vocational schools for practical training. Moreover, Huike provides information on the upstream and downstream talent demands of leading enterprises and their partners to guarantee students' employment.

Huike teams up with vocational schools to receive some of the tuition fees paid by students. To ensure students effectively apply what they learn to their work, schools recruit teachers with working experience. A head teacher will be assigned to each program to increase the stickiness of schools and students. Furthermore, by implementing the "1+X" policy, schools will use their academic education capabilities to design eligible and recognizable qualifications and expand into non-academic education through online courses.

In summary, the success of Huike comes down to three main factors: building sales teams with channel resources and developing effective incentive mechanisms; developing core courses and IP; and encouraging deep cooperation with downstream industries to ensure employment.

First, education companies should build sales teams with distribution channels in local markets and develop cooperation with schools through their relationships. They should also establish effective incentive mechanisms for sales teams to help improve sales performance. Second, the development of the school-company cooperative model requires industry support. Teaching research teams need to collaborate with leading enterprises, integrate teaching research with the latest industry results, and develop core courses and IP to ensure leading market positions. Thirdly, they should utilize industry resources, including by launching deep cooperation with leading enterprises or through M&A to ensure students have jobs and thereby create a closed loop between education and industry.

Trend 2: Build high-quality higher vocational schools and design competitive, specialized majors

With the implementation of the OBR Initiative, many sectors including ports, railway, highways, pipelines and communication, and roles like project construction, construction and quality monitoring will require large amounts of highly-skilled, technical talent. At the same time, as continuous upgrading of traditional industries drives the development of smart manufacturing, China will need many highly skilled talent well-versed in core technologies and modern craftsmanship. Developing high-quality higher vocational schools, building specialized and emerging majors, and cultivating craftspeople proficient in modern technologies are key to implementing the OBR Initiative and realizing industry upgrades.

With abundant education resources, students in China's more developed coastal areas are less interested in higher vocational education. But in less developed areas, a shortage of education resources makes higher vocational education more attractive and promising.

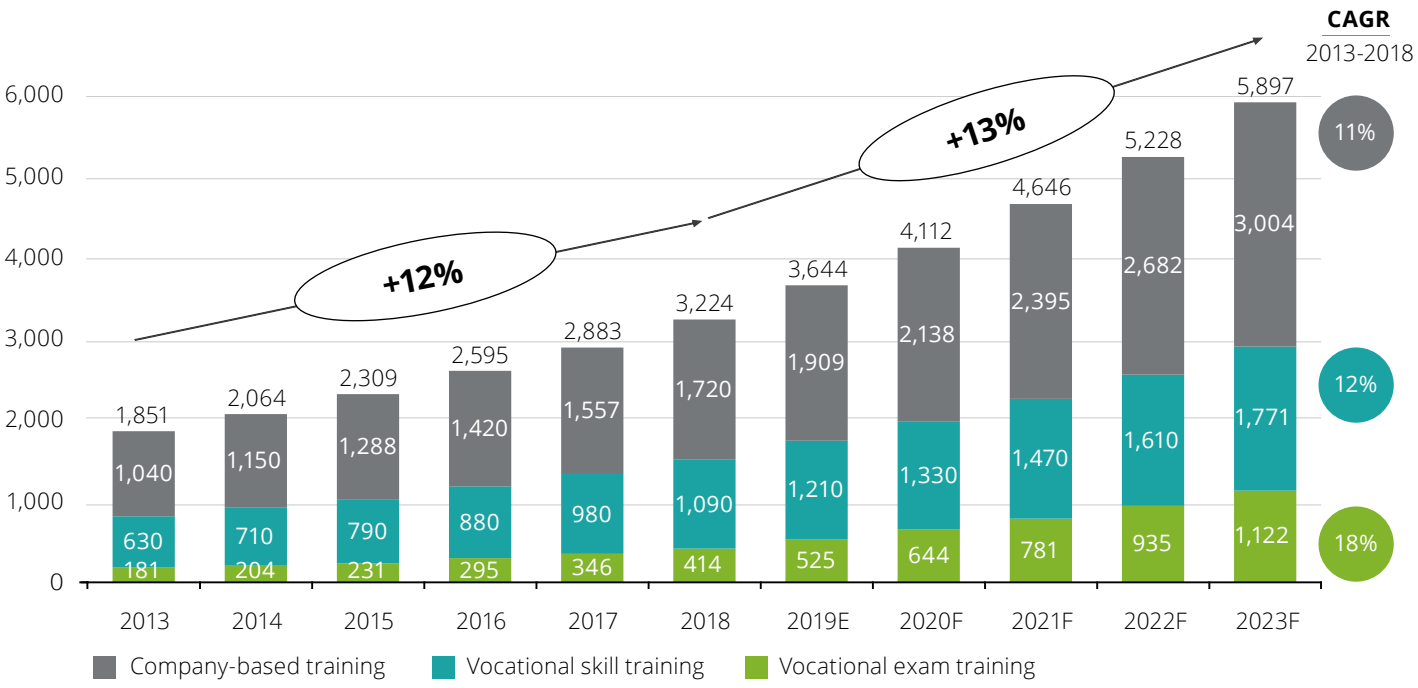
The Hunan SANY Polytechnic College is a leading example of advanced manufacturing development. It has 7,300 students and is focused on developing specialized majors such as machinery engineering, smart manufacturing and intelligent controls. By leveraging the industrial advantages of SANY Group, it has established over 90 training bases and more than 50 fieldwork bases, and entered partnerships with about 40 leading enterprises to provide employment guarantees for students. According to 2018 *Annual Report of Hunan Province on Higher Vocational Education*, 963 students graduated from the Hunan SANY Polytechnic College in 2017, and 951 students found jobs–a 98.75% employment rate. This is 5.99 percentage points higher than the provincial average, and 5.84 percentage points higher than the undergraduate employment rate, far ahead of other schools in Hunan Province.

The Jiangsu College of Engineering and Technology is another typical example of an institution that is advancing urbanization and the OBR Initiative. With Jiangsu's rail transport sector developing rapidly in recent years, the talent gap in the sector is expected to reach 30,000 people. To meet such fast growing demand, the Jiangsu College of Engineering and Technology established three new rail transportation majors. It also cooperates with several rail transportation companies in talent cultivation to ensure a high graduate employment rate. Through school-company cooperation, schools relieve companies' employment pressure and enterprises find suitable talent, and the talent gap in the rail transport sector is mitigated.

In conclusion, to build high-quality higher vocational schools with competitiveness in specialized majors, sector participants should design differentiated, specialized majors and establish professional talent cultivation systems based on market trends and industry developments.

4.3 Status quo of non-academic vocational education

Figure 27: Market size of China's non-academic vocational education (2013-2023F)
Unit: RMB100 million



Source: Guosheng Securities, Intelligence Research Group, Deloitte Research and analysis

Non-academic vocational education is mainly provided by private institutions, targeting enterprises and individuals. It falls into three categories based on training purpose: enterprise management training, vocational skills training and vocational exam training. In 2018, the non-academic vocational education market totalled RMB322.4 billion. Enterprise management training reached RMB172 billion (53% of the total), vocational skills training market hit RMB109 billion (34%) and vocational exam training reached RMB41.4 billion (13%).

The enterprise management training market grew from RMB104 billion in 2013 to RMB172 billion in 2018, with a compound annual growth rate of 11%. As industrial restructuring deepens, enterprises have become increasingly aware of the importance of–and dedicated more investment to–enterprise management training to support their transformation and upgrading. In addition, China's emphasis on entrepreneurship and innovation has led to the emergence of various start-ups, fuelling the expansion of enterprise management training education.

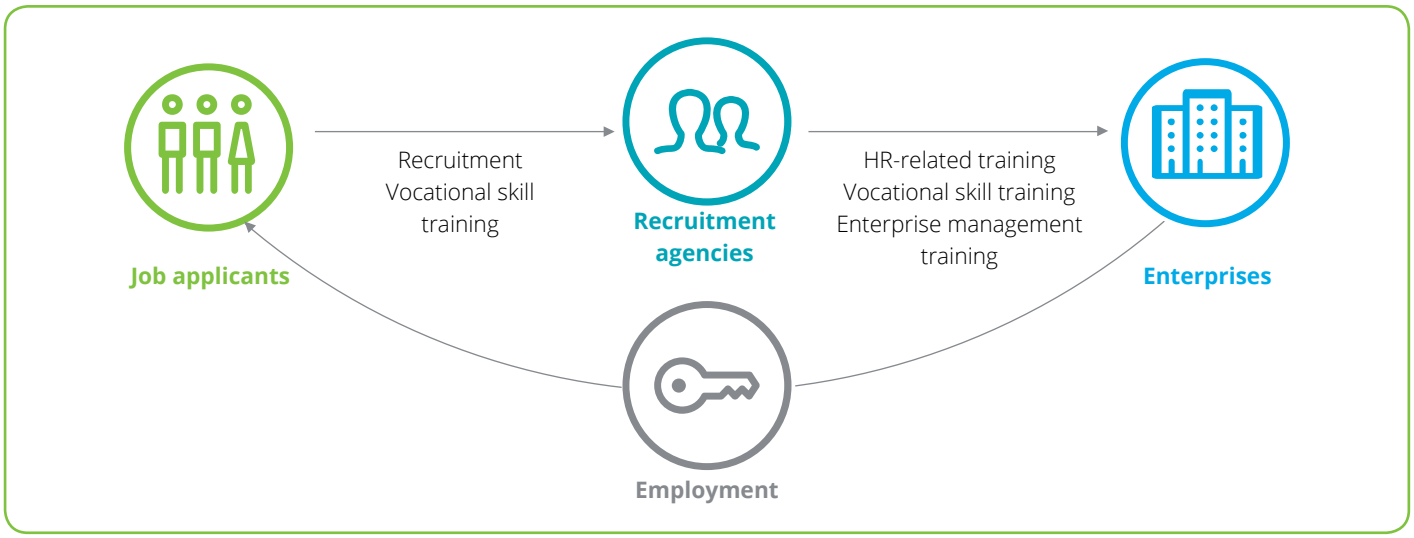
The vocational skills training market grew from RMB63 billion in 2013 to RMB109 billion in 2018, with a compound annual growth rate of 12%. Because of its high average transaction per customer and a training cycle encompassing a wider age range, vocational skills training has strong potential for sustained growth. Training related to IT, finance and accounting, marketing and management account for nearly 30% of the vocational skills training market.

The vocational exam training market grew from RMB18.1 billion in 2013 to RMB41.4 billion in 2018, with a compound annual growth rate of 18%. Training for teacher certification exams, post-graduate entrance exams, and finance-related exams grew fastest at 18%, 19% and 28% respectively.

Traditional non-academic training will remain in strong demand, with a focus on online-offline integration to help students improve the effectiveness and efficiency of their studies. Meanwhile, with more frequent job hopping, longer working lives, upgraded industrial structures and booming entrepreneurship, "recruitment + vocational education" and "entrepreneurship and innovation + vocational education" are emerging trends in non-academic training:

Trend 1: Recruitment + vocational education

The "recruitment + vocational education" model extends the range of recruitment by enhancing client's stickiness and lifecycles (C-end users) through vocational education, while providing employers (B-end users) with an improved product system spanning recruitment and training, making it easier for them to recruit talent.



Source: Deloitte Research and analysis

In 2014, zhaopin.com set up a talent development center to provide value-added training services for HR departments, offering courses on job interviewing, team management and high-efficiency operations via online and offline channels. In addition, it provides HR departments with internal training services. Apart from its organic growth model, zhaopin.com has also invested frequently in vocational education institutions to expand its vocational education businesses, driving inorganic growth. In 2016, it participated in angel round financing for zhiwen.me, a vocational training and advisory platform that provides one-stop services across career planning, employment counselling, and skills training for fresh graduates. The services offered by zhiwen.me include industry training camps and micro classes. In 2018, zhaopin.com invested in oxcoder.com, an assessment and training company focused on programmers.

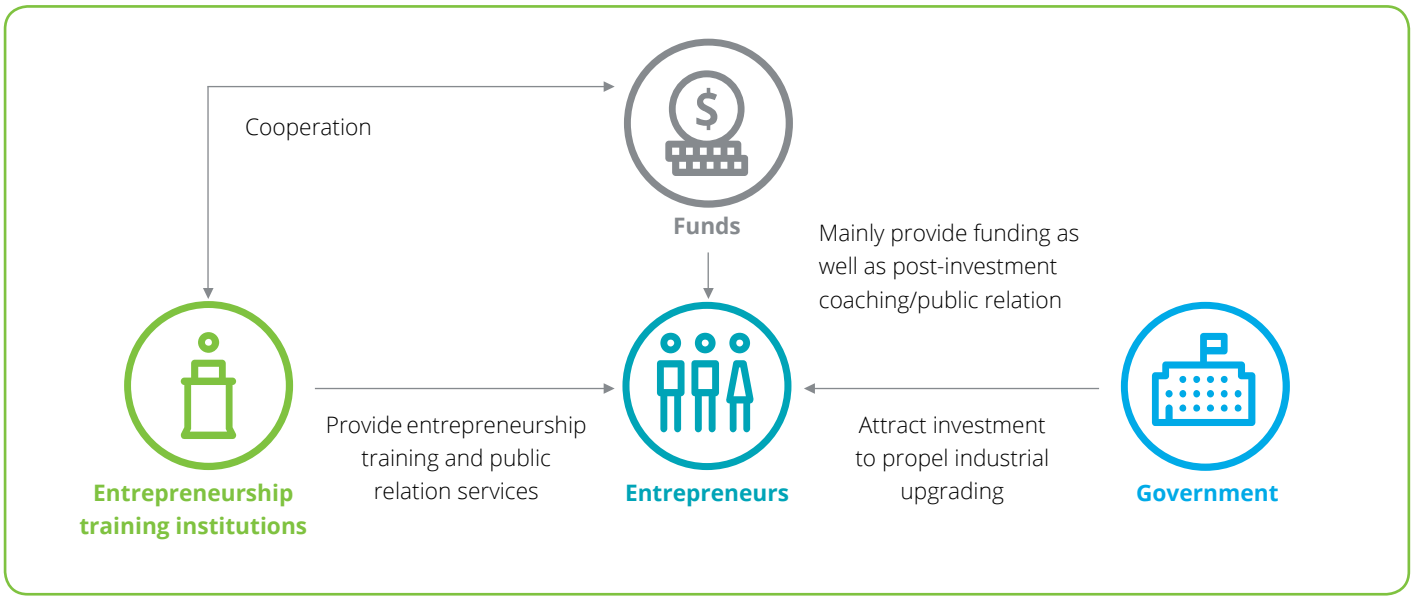
The world's largest professional network, LinkedIn, already has well-established vocational education services for B-end and C-end users. In May 2015, LinkedIn purchased Lynda.com, an online learning website, for USD1.5 billion, and integrated it into the LinkedIn learning segment under LinkedIn Talent Solutions in September 2016. This new segment displays the required skills for a certain job with recommended related training courses. It also offers customized courses for enterprises to help employees develop. The new segment focuses on recruitment and job hunting with vocational education as a key support service, forming a closed loop spanning job hunting and vocational training. On the one hand, this can help enterprises recruit suitable talent and continuously provide skills training to employees. On the other, it helps job applicants improve their competitiveness through online vocational training while leveraging the LinkedIn platform to connect with B-end users.

By leveraging vocational education, LinkedIn is able to better connect talent with enterprises through a complete employment service chain, setting a trend for future vocational education. An increasing number of recruitment agencies will expand their vocational education businesses to integrate these resources with network traffic.

Trend 2: Entrepreneurship and innovation + vocational education

In response to the idea of mass entrepreneurship and innovation espoused by Premier Li Keqiang in 2014, various government departments have issued policies to encourage start-ups. Due to the preferential policies facilitating an entrepreneurial environment, China has witnessed a boom in mass entrepreneurship in recent years. According the State Administration for Industry and Commerce, the number of newly founded companies in China surged to 6.7 million in 2018, with year-on-year growth of 10.31% and a 2014-18 annual growth rate of 16.39%. In addition, the launch of the Science and Technology Innovation Board in 2019 serves as a powerful engine for China to innovate and develop into a world-leading science and technology power. The 25 companies that debuted on the Science and Technology Innovation Board's 1st trading day surged 140% on average. Furthermore, China has issued various policies including the *Administrative Measures for the Registration of Initial Public Offerings on the Science and Technology Innovation Board (for Trial Implementation), Implementation Plan for the National Vocational Education Reform and Guiding Opinions on Promoting the Sound Development of Small and Medium-sized Enterprises* to propel industrial restructuring, promote sustainable economic development and drive scientific innovation and technological development, thereby paving the way for the growth of start-ups.

There is huge potential for entrepreneurship services and training in China's constantly easing entrepreneurial environment. The entrepreneurship ecosystem comprises of entrepreneurs, entrepreneurship training institutions, fund companies and the government. Entrepreneurs are increasingly looking to learn entrepreneurship theories and practices, resulting in the emergence of several training institutions to provide coaching services. Meanwhile, fund companies are also actively looking for high-quality start-ups to in order to accelerate their development, while the government is keen on attracting entrepreneurs to invest locally.



Source: Galaxy Securities, Deloitte Research and analysis

Take iheima.com as an example. Formerly a media company, iheima.com now positions itself as a "media + training" company, focusing on innovative start-ups. It has a well-established service system for entrepreneurs at various development stages. By integrating online and offline channels, it provides fee-based entrepreneurship training and industry exchange services for innovative start-ups. Online services are offered at a lower price to attract traffic and expand the customer base for offline, high-end courses. Most online courses use case sharing and cost an average of RMB380 a year. By contrast, offline entrepreneurship projects such as training camps and labs are offered at no less than RMB30,000, with successful entrepreneurs, investors and industry experts as tutors. To meet entrepreneurs' demands for project promotion and financing, iheima.com also provides media marketing services by building online and offline platforms that connect resources with entrepreneurs. Through offline activities and online communications, entrepreneurs can gain access to resources suited to their needs. By engaging brand enterprises and government institutions like industrial parks, iheima.com provides fee-based public relations services in the form of sponsorship and naming rights, to help entrepreneurs and famous enterprises explore resource and cooperation opportunities. In 2018, iheima.com achieved revenue of RMB335 million, of which 32% was from training services and 67% from marketing services.

As a comprehensive entrepreneurship service platform, integrating training, advisory and resource-matching, iheima.com can precisely match entrepreneurs with investors through its well-established entrepreneurship ecosystem, demonstrating the growth potential of "entrepreneurship service + vocational education" in non-academic vocational education.

Compared with the "media + training" model of iheima.com, Hundun University focuses more heavily on its online business school, reflecting the background of its founder and due to its innovative curricular system based on traditional MBA courses. The university helps professionals improve their comprehensive capabilities and expand their networks, especially top- and middle-level management and entrepreneurs. It provides comprehensive business courses through online membership and occasional offline activities. Online courses spanning management, marketing, products, philosophy, business, start-ups, strategy, finance and organization are offered at around RMB1,000 a year–far less than traditional business school courses. For example, the tuition fee for the Hundun training workshop is RMB1,198 per year (RMB1,098 for group purchases), while the tuition fee for the Hundun business school is RMB1,998 (RMB1,798 for group purchase).

Unlike iheima.com, which attracts online users at competitive prices and then directs them to offline camps, Hundun University attracts clients mainly by word of mouth. Leveraging its extensive business school resources, Hundun University has invited various business leaders and KOLs as lecturers to expand its customer base and increase its reputation among users. At the same time, its excellent user experience has contributed to an expanding user base and improved user retention rates. New users are often introduced by existing users. In addition, Hundun University has also adopted a point-based system called "yanzhi", which gives members who actively promote its courses extra points in exchange for curriculum resources. It has proven an effective incentive mechanism for attracting new members.

iheima.com and Hundun University are committed to improving user stickiness by developing online communities and enhancing users' sense of belonging through offline activities. This enables higher ARPU in the long term while providing senior business people with an enjoyable user experience.

Recent years have seen a boom in non-academic vocational education featuring flexible education mechanisms and market-oriented operations. These schools aim to complementing academic vocational education and align themselves better with industrial demand. There is steady demand for vocational exam training as it is closely related to professional qualifications; these training courses have therefore shown relatively fast growth. Online and offline integration has become a trend in non-academic vocational education, with offline lectures and online training on the rise. In recent years platforms connecting enterprises and cultivating talent, and business schools serving innovative start-ups, have emerged as a new force, with integrated resources to empower industrial development and solve business pain points.

4.4 Experiences drawn from overseas vocational education

Vocational education reform typically comes in tandem with national economic and industrial transformation. Developed countries have usually experienced many vocational education reforms as their economies have grown, which ultimately result in a relatively comprehensive and mature vocational education and training system. For example, it took Germany about 200 years to develop its dual vocational education system, while the UK's modern apprenticeship system, which combines work and study, originated from apprenticeships established during the industrial revolution in the 18th century to meet the demands of mechanized production. When it comes to establishing vocational education systems and integrating them with industries, China can learn from overseas countries to improve their flexibility, social recognition and enterprise engagement.

Vertical and horizontal integration in the development of vocational education

In 2011, China launched a series of pilot programs in which secondary vocational school students were admitted to higher vocational schools. Currently, the connection between secondary and higher vocational education is weak because higher vocational schools enrolment mainly focus on general high school students, with secondary vocational school students as a supplement. The percentage of secondary vocational school students admitted to higher vocational schools varies greatly by region, ranging from nearly 60% in Shanghai to less than 30% in many other provinces and municipalities.

For example, in Jiangsu Province the percentage of secondary vocational school students admitted to higher vocational schools rose from 18.6% at the end of the 11th 5-Year Plan to 31.4% at the end of the 12th 5-Year Plan. Guangdong Province plans to raise the percentage to 30% by 2022. However, in contrast, 56.23% of students who graduated from Shanghai secondary vocational schools were admitted to higher schools in 2017. The reason for the relatively low percentages elsewhere is that, despite connected education system and channels for further study, there are still large gaps in specialities, curriculums, teaching and management. This results in a discontinuity between the two types of schools as well as repeat courses. As a result, students become less motivated to move from secondary and higher vocational education reducing connectivity between them.

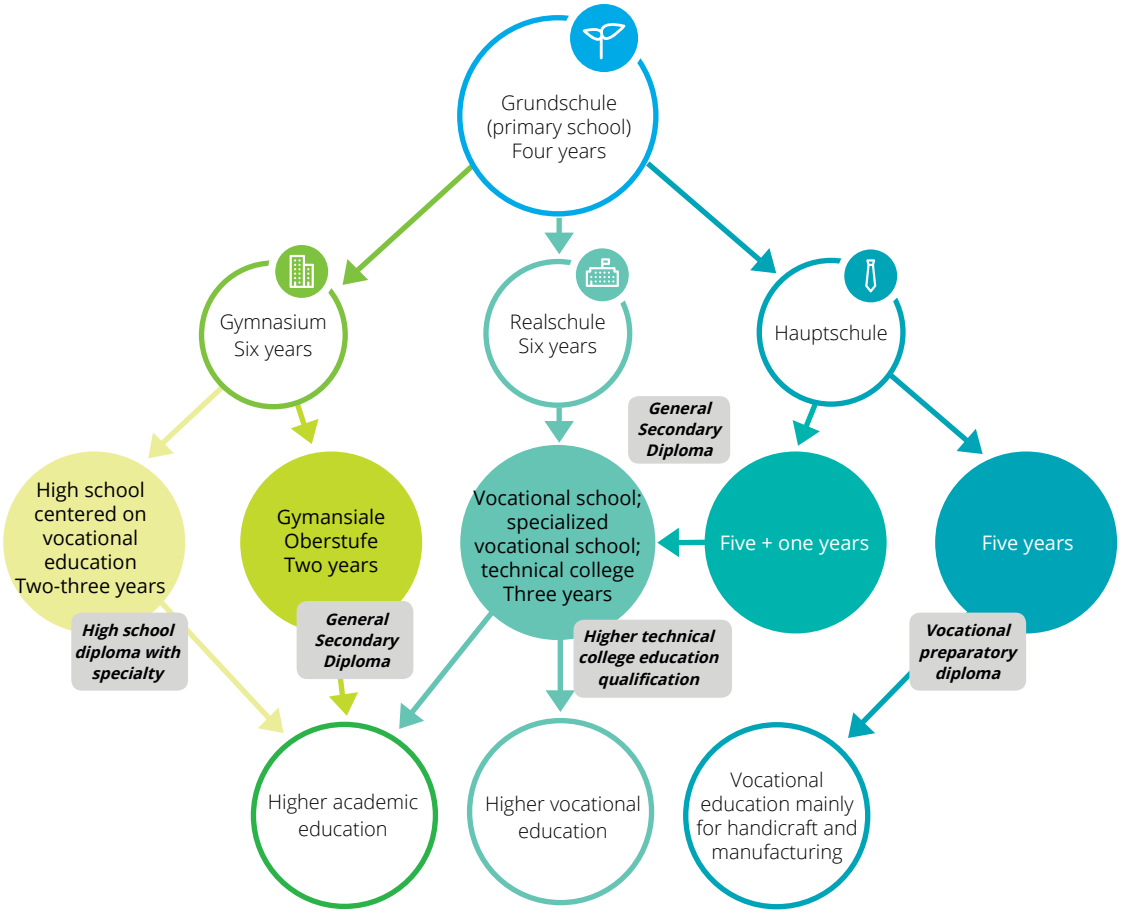
Comparatively speaking, Germany's dual education system has multiple student divisions across junior high, senior high and college levels. Germany's education system has three stages: primary, secondary and higher education. Under this system, students will experience three divisions. After four years of primary education, students in Germany face their first division in relation to the direction of their future development. After this division, students attend *gymnasium*, *realschule* or *hauptschule* lower secondaries, depending on their vocational targets and interests.

Hauptschule focus on practical vocational education. *Realschule* is designed to meet higher vocational requirements. After finishing their *realschule* educations, students may choose higher vocational development or go to higher academic institutions, such as comprehensive universities, technical colleges and science and technology universities.

After lower secondary level, students enter different streams of upper secondary level schools (equal to senior high schools in China) based on their interests and their schools' recommendations. Students can receive further general education at the higher level (*gymnasium*) or go to comprehensive universities after graduation. Most students choose the vocational education system, which provides them with the qualifications to go to specialized colleges where they receive dual-system vocational education. Students flow to different higher-education institutions after they finish *gymnasium* or dual system-based vocational education at the secondary level.

According to statistics, in 2016 among all graduates from *gymnasium*, *realschule* and *hauptschule* at the upper secondary level, about 60% choose dual system-based vocational educations. This has created a huge number of blue-collar technicians that support the country's manufacturing and economic development. Germany's vocational education system enables students to transfer between school types flexibly by providing multiple opportunities for division and choice across the lower secondary level, upper secondary level and higher education stages. This model successfully meets the vocational requirements of students, including those that want to enter the job market after their secondary educations and those who would like to receive further education.

Figure 28: The education system in Germany



Source: Sealand Securities, Deloitte Research and analysis

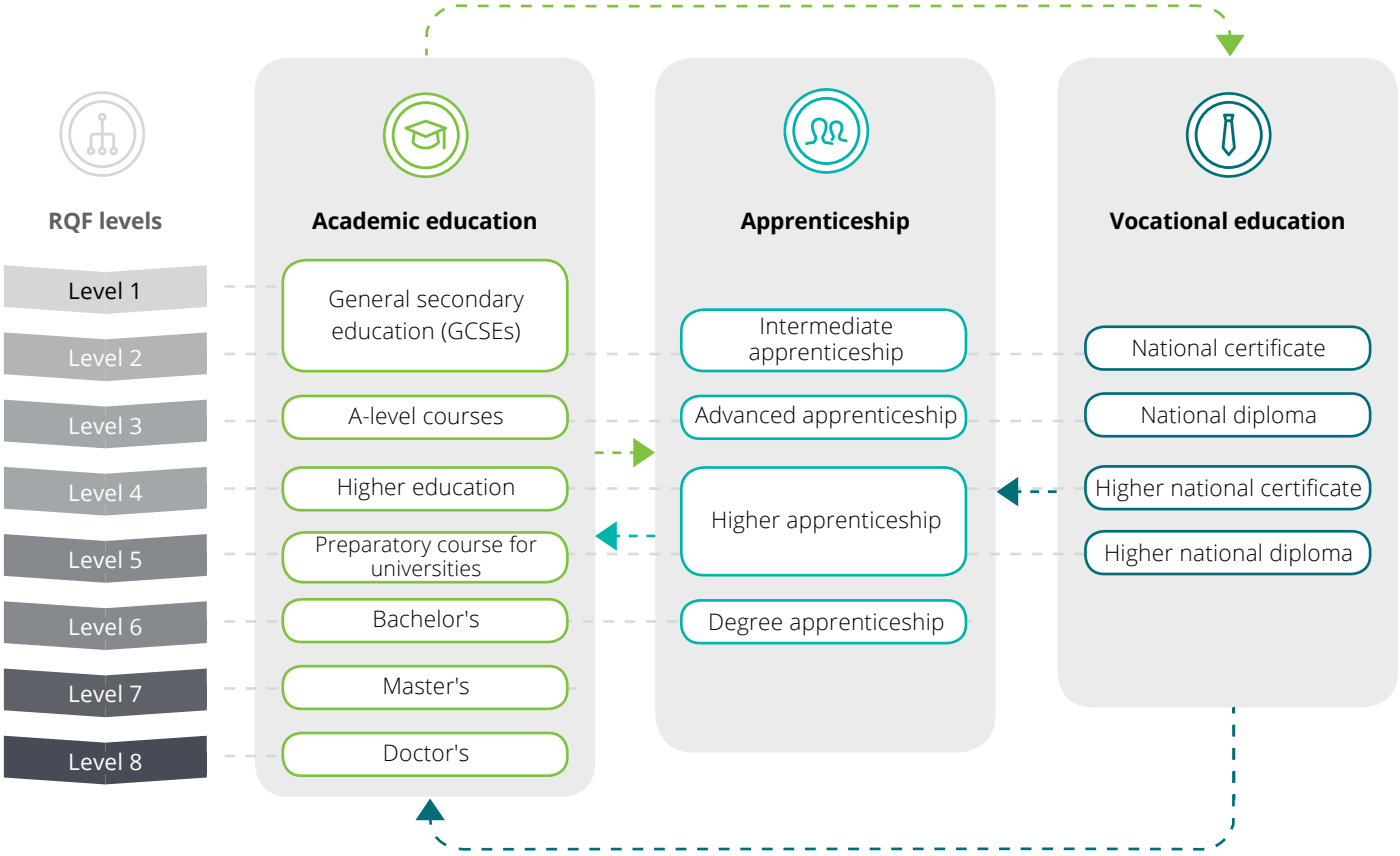
From a horizontal system perspective, secondary vocational school students in China who hope to receive a higher education need to pass the entrance exam for higher vocational colleges by taking exams that award three or more certificates (i.e. entrance exams for higher vocational classes at higher education schools for secondary vocational school graduates) or through independent recruitment, and then pass a university entrance exams to upgrade from colleges to universities. For example, only four universities in Guangzhou provide entrance exams for secondary vocational school students (three or more certificates); as of 2019 and they admitted 260 students in total. Yet 18,055 secondary vocational school students reached the threshold score to go to a university in 2019, indicating there is only a 0.01% change of proceeding to university. It is difficult and lengthy for these students to enter university. Furthermore, the professional certification system and existing framework lowers the mobility of skilled talent between different jobs and restricts the development of workers in various kinds of vocational education.

The UK was one of the first countries in the world to build a national vocational skills qualification framework. It covers nearly 1,800 different jobs at eight levels. The national qualification framework provides defined professional standards and flexible development paths for learners to transition between general and vocational education and for students at different levels.

The UK's Regulated Qualifications Framework (RQF) incorporates all general and vocational qualifications at all levels into a consistent framework and creates an alignment between general and vocational education, promoting the mutual recognition and transfer of certificates and the integration of general and vocational education.

General and vocational qualifications at the same level indicate equivalent competence, and therefore students can use their qualifications equally for further education. Moreover, academic credits for courses in general and vocational education can also be mutually recognized and transferred, which is an important mechanism for the integration of general and vocational education. The UK's RQF demonstrates the highly flexible transferability and connection of different learning mechanisms. This enables students to transfer and connect between general education, vocational education and apprenticeship based on their needs, helping satisfy students' knowledge requirements and future job aspirations. For example, students that complete secondary general education can join advanced apprenticeship projects in the apprenticeship mechanism. Similarly, students that complete the UK's A-level courses can also join higher apprenticeship projects based on their own needs.

Figure 29: The UK education system—Regulated Qualifications Framework (RQF)



Source: Deloitte Research and analysis

China can draw on the vertical and horizontal development framework of vocational education in Germany and the UK to focus more on content and courses vertically and connect general with vocational education horizontally. Therefore, China can build a diversified, life-long education system that can be entered, exited or transferred within at any time and can develop more quality and skilled talent.

Companies not deeply engaged in vocational education

Chinese companies are less active in school-company collaboration as they are uncertain about the inputs and outputs involved in developing talent. The absence of effective external incentives is another factor. For example, the steering committees for vocational education and teaching in industries that promote school-company collaboration are mainly led by school management or governmental officials. They do not pay much mind to companies' requirements for talent and related core interests. This leads to a mismatch between what's taught to students in most vocational schools and internship requirements, thereby making cooperation impractical for companies. There is low engagement by companies, especially in "practice while learning". Apprenticeship plans, for example, often do not meet the expectations of companies or apprentices, resulting in further intensification of the education-job mismatch and failure to achieve refined outputs for relevant jobs.

As the first country to achieve 100 % literacy in Asia, Japan can provide valuable instruction in vocational education development. It had already built a multi-level, diversified vocational education system: with publicly and privately run schools, academic curriculums, publicly funded professional training for qualifications and practical knowledge, corporate-based school operations, as well as vocational high schools, specialized training colleges, special schools, higher special schools and short-term colleges. Various types of talent are developed at different levels of vocational education institutions for pertinent industries.

Among the various types of training, company-based training is an important part of Japan's vocational education and indeed its whole education system. Vocational education within Japanese companies can be divided into worker, technician or leadership, and on-the-job or off-the-job education. To better integrate industry and education and deepen cooperation between companies and schools, Japan has institutionalized industry-education integration via legislation. Schools and companies share resources, such as having schools' \ teaching systems and resources be integrated with companies' equipment and advanced technologies to provide more hands-on experience while enhancing students' learning. This provides an opportunity for talent to be recognized by schools and companies. Learning from Japan, China should focus vocational education on the integrating schools, companies and society, orienting them towards social and market needs. School-based education and company-based training can reinforce each in vocational education.

German companies are also highly engaged in vocational education, helping shape an effective vocational education system. After years of growth, Germany's dual-system vocational education has built a teaching system led by companies, supported by schools and participated in by industry associations. Companies' high engagement makes learning content highly aligned with real position requirements. Furthermore, companies can recruit the right employees for the right positions and are more willing to engage in dual-system vocational education, creating a virtuous cycle. According to the *Report on Vocational Education and Training published* by the German Federal Government in 2018, German companies remain highly willing to engage in the vocational education system. In 2017, companies provided 556,300 jobs for vocational education school students, 10,100 more than in 2016. Of students who participated in the dual system and graduated, 68% work for the companies where they studied, the highest proportion so far this century.

In terms of legislation, Germany has also built a well-defined guiding framework to promote companies' effective engagement in vocational education. The Vocational Training Act (BBIG) is the fundamental law governing Germany's vocational education, and is supplemented by other laws and regulations, including the Crafts and Trades Regulation Code, Corporate Constitution and Continuing Education Promotion Act. Germany has 16 federal states with educational and cultural sovereignty that are mainly responsible for vocational education while competent authorities take charge of practical training within companies.

To align themselves with the overall education policies, states have adjusted education policies through the Conference of the Ministers of Education and Cultural Affairs, which includes the Vocational Education Commission composed of state ministries of education, companies, industry associations and government representatives. Germany also has many regional industry associations (e.g. the Chamber of Commerce and Industry and *Handwerkskammer*) and more than 900 cross-company training institutions, which are important participants and self-regulated institutions in Germany's vocational education system. In particular, industry associations build bridges between government, companies and trainers.

As the main investors in vocational education, companies bear all the training costs, including training facilities, equipment and student allowances. The teaching expenditure of vocational schools is split between the state and local governments. Statistics show that about 70% of overall expenditure on secondary vocational education is by companies and only 30% is by the federal and state governments.

Skills training teachers mostly hold bachelor degrees or above, and are required to have the titles of technicians or above with extensive working experience in companies. This further reinforces companies' impact on vocational education and better aligns the development of skills with industry needs, ensuring an effective vocational education system.

To drive the development of vocational education, China should improve related legal systems, strengthen the leading role of government bodies, and establish learning syllabus and content standards by learning from Germany, the UK, Japan and other developed countries' vocational education model. China should encourage the involvement of multiple parties in running schools, highlighting cooperation among schools, enterprises and communities. This means vocational education should be designed to meet social requirements.

It is also necessary to enhance the complementary relationship between school-based education and company-based training, encourage companies to play a key role in vocational education, drive companies to take the initiative to cooperate with schools, allow more parties to join schools in developing vocational education, ensure companies play a principal role in student cultivation, align teaching content with professional standards, and provide access to higher academic degrees for vocational education students.

China should also expand vocational education into a lifelong journey and establish platforms for communication between vocational education and other types of education to create a learning-oriented society. With the shift of investment focus from the real economy to the virtual economy and slower economic growth, China should learn from developed countries in developing vocational education multi-dimensionally and improve its vocational education system based on the actual situation, thereby creating a unique approach that integrates general education with vocational education and aligns education with production requirements.

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