
INDUSTRY OVERVIEW

The information and statistics set out in this section and other sections of this document were extracted from the report prepared by Frost & Sullivan, which was commissioned by us, and different official government publications and other publicly available publications. In addition, we engaged Frost & Sullivan for preparing the Frost & Sullivan Report, an independent industry report in respect of the [REDACTED]. The information from government official sources has not been independently verified by us, the Joint Sponsors, [REDACTED] and any of the [REDACTED], any of their respective directors and advisors, or any other persons involved in the [REDACTED] and no representation is given as to its accuracy.

SOURCE OF INFORMATION

We commissioned Frost & Sullivan, an independent market research consulting firm which is engaged in the provision of market research consultancy services, to conduct a detailed analysis of the education market, and specifically the smart learning device service market in China. Frost & Sullivan is an independent global consulting company founded in 1961 in New York. It provides professional industry consulting services across multiple industries. Frost & Sullivan’s services include, among others, industry market consulting services, commercial due diligence and strategic consulting. We have agreed to pay a fee of RMB750,000 to Frost & Sullivan for preparing the Frost & Sullivan Report. We have extracted certain information from the Frost & Sullivan Report in this section and elsewhere in this document to provide our potential [REDACTED] with a more comprehensive presentation of the industries in which we operate.

During the preparation of the Frost & Sullivan Report, Frost & Sullivan performed both primary research, which was conducted through discussion with leading industry participants and industry experts, and secondary research, which involved reviewing company reports, independent research reports and data based on Frost & Sullivan’s own research database. The Frost & Sullivan Report contains a variety of market projections produced with the following assumptions: (i) China’s economy is likely to maintain steady growth in the next decade; (ii) China’s social, economic, and political environment is likely to remain stable in the forecast period; (iii) market drivers like Chinese families’ great attention to education and relaxation of “one-child policy” are likely to expand China’s smart learning device market.

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Based on and subject to the foregoing, our Directors believe that the disclosure of future projections and industry data in this section is not biased or misleading. Our Directors have no reason to believe that such information is false or misleading or that any material fact has been omitted that would render such information false or misleading. After taking reasonable care, our Directors confirm that there has been no adverse change in the market information since the date of the Frost & Sullivan Report up to the Latest Practicable Date which may qualify, contradict or have an impact on the information in this section.

SMART LEARNING DEVICE SERVICE MARKET IN CHINA

Overview

China’s smart learning device service plays an important role for students, including kindergarten, primary and middle school, and high school students, in a sense that various smart learning devices help them to learn more effectively and efficiently. Smart learning device service market refers the hardware device market aims to provide education service to students. The most important feature of smart leaning device is the application of smart technology during the delivery of education service, such as optical character recognition, or OCR, technology, artificial intelligence, or AI, application and 4G/5G information technology, to offer the students and their parents/teacher a more friendly education experience.

From the perspective of the application scenarios, the market could be classified into two main segments, namely (i) the To-C-based learning market which mainly serves personal end users, and (ii) the To-B-based learning market which mainly refers to digital in-school teaching solutions. The To-C-based learning market further includes two groups of players sorting by their core education value delivered, which are contents-oriented and tool-oriented. The critical difference between contents-oriented and tool-oriented is the independent delivery of systematic education or not. The content-oriented smart learning devices include education tablets, pre-school education boxes, point-reading suites, kids smart watches, smart lamps and smart education robotics. These products have the specific education resources to fulfill the students’ education need and quality enhancement requirement. On the other hand, the tool-oriented smart learning devices mainly include translation suites and pocket printer. These products take the supplementary roles to enhance the education efficiency rather than contents delivery. The To-B-based learning market mainly refers the digital in-school teaching solutions, including the classroom-based interactive solution, school-based integrated teaching management platform and corresponding hardware set. The Company’s smart classroom solution is a typical and current mainstream product in the To-B-based learning market. The To-B-based learning market also covers the smart education robotics market as well.

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Market Drivers

The development of China’s smart learning device service market is driven primarily by the following four factors:

Development of Digital Education Technologies. With the continuous development of digital education technologies, such as the continuous upgrading of intelligent hardware and the improvement of software services, education technologies have greatly promoted the development of education as well as the intelligent upgrading of traditional offline education market. Smart learning devices have played a profound and positive role in solving the imbalance of educational resources in China. Moreover, the continuously improved digital education technologies provide great learning experience with respect to smart education for more and more students, and also provide convenience in teaching for teachers and schools, including homework distribution and revision, intelligent classroom Q&A session, teacher-student interactions, and so on.

Increasing Affluence. With the increase in disposable income of Chinese families and the improvement of living conditions in China, Chinese parents have become more willing to increase their spending on children’s education, which sustains the growing demand for smart learning device services. The disposable income per capita in China has reached RMB35.1 thousand in 2021, representing the CAGR of 7.8% from 2017 to 2021.

Strong Awareness Towards Investment in Education. China has the long-standing social cultural value on education. Chinese people believe that education is an important way to improve personal value and promote personal career and social status. Many parents choose smart learning device services to help their children to better enhance their learning capabilities and understanding of the course content provided by formal school education.

Implementation of “Two-child Policy” and “Third-child Policy”. Due to the low crude birth rates in the past consecutive years, China’s total population has experienced a slow growth and the total population of K-12 students is expected to experience a slight decrease from 232.2 million in 2021 to 224.3 million persons in 2026. However, with the development of social economy and the growing demand of better education for children from the parents, more education efforts and investments are expected, which will offset the impact from the insignificant decrease in total K-12 student population and ensure the overall smart learning device service market’s solid growth in the future. On the other hand, the continuous implementation of the “two-child policy” in 2016 and the recently announced “three-child policy” in 2021 by the central government would also boost the long-term population growth and improve the country’s population structure. However, in 2021, China’s birth rate remained at a relatively low level.

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Favorable Policies

China Education Modernization 2035 (《中國教育現代化2035》). In 2019, the PRC government released the China Education Modernization 2035. The document requires that China speed up the educational reform under the informatization background, build smart campuses, and realize the goals of intelligent teaching, intelligent management and integration of intelligent services.

13th 5-Year-Plan in Education Industry (《教育產業十三五規劃》). In 2017, the 13th 5-Year-Plan in Education Industry has been issued, which has outlined the target and the guidance of development. The document emphasizes to promote and regulate the development of private education industry. It encourages social and private capitals to participate in education industry through various methods, so as to offer diverse educational products and services. It also promotes digital education, realizing the new business model of “Internet + education.” In addition, education industry shall dedicate all efforts to emphasizing the communication and collaboration between Chinese and overseas educational institutions, optimizing the liberal education mechanism and participating in the global education governance.

Opinions on Further Reducing the Burdens of Compulsory Education Students’ Homework and After-school Training (《關於進一步減輕義務教育階段學生作業負擔和校外培訓負擔的意見》). China’s public expenditure, i.e. the government’s investments, on education increased from RMB3,420.8 billion in 2017 to RMB4,290.8 billion in 2020, representing a CAGR of 7.8%. Public expenditure on education is expected to reach RMB6,671.3 billion in 2026, representing a CAGR of 7.6% from 2020 to 2026. Chinese central government has shown a strong determination to promote the development of the education system. Going forward, it is expected that the government is likely to further strengthen its investment in education. In July 2021, the general office of the State Council issued the Opinions on Further Reducing the Burdens of Compulsory Education Students’ Homework and After-school Tutoring, which reaffirm the government’s political strategies to promote the quality of compulsory in-school education and increase the diversity of educational services provided by schools. According to the Opinions, after-school tutoring industry will be subject to more stringent regulatory restrictions while in-school education will receive more investments and play a more significant role for China’s primary and secondary school students.

Guidance of the Ministry of Education on Strengthening the Application of “Three Classrooms” (《教育部關於加強“三個課堂”應用的指導意見》). In March 2020, the Ministry of Education released the Guidance on Strengthening the Application of “Three Classrooms” (the “Guidance”) which emphasizes the practical needs for the promotion of fair education and the improvement the quality of education. The Guidance strengthens the application of “Three Classrooms,” namely classrooms in remote regions, classrooms by famous teachers, and classrooms from famous schools. To be specific, the Guidance promotes to deliver high quality educational resources to remote regions where resources are limited by leveraging the internet,

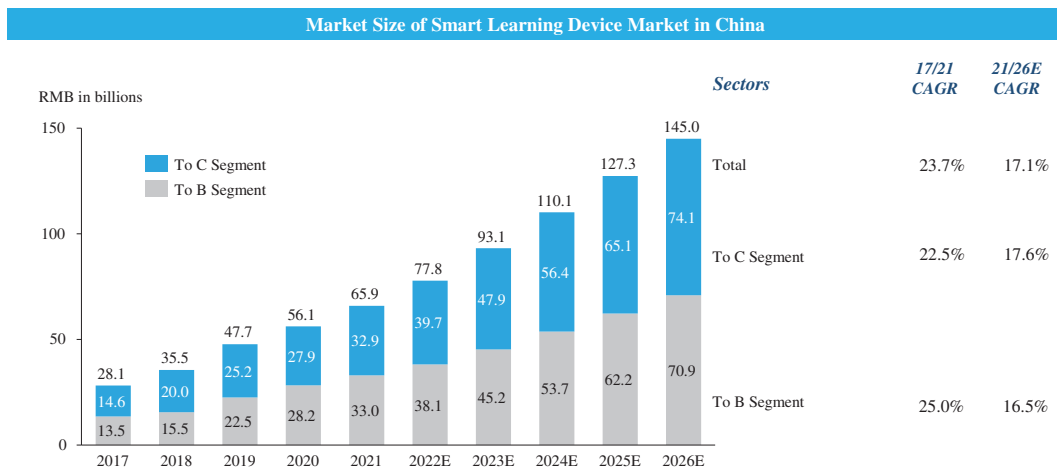
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to increase the teaching expertise and skills by learning from famous teachers through the internet, and to meet the needs students for high quality education by promoting online classes given by famous schools. The Guidance requests to achieve the goal of “Three Classrooms” by 2022.

Subsequent to the release of a series of new policies on reducing the burdens of students’ homework and after-school training, in January 2022, Frost & Sullivan conducted an online survey with 1,000 students and parents across the country. According to the survey, Frost & Sullivan concluded that, among others, (a) there are a number of factors the students and parents may consider when making the purchasing decision, and the variety and quality of question bank and pre-installed educational materials provided by the smart learning devices are among the top considerations, while the inclusion of live-streaming classes or not is not a major concern, (b) an overwhelming majority of students and parents who responded to the relevant questions expressed the willingness to continue to use smart learning devices which discontinue to offer live streaming classes, and (c) a majority of the students and parents who responded to the relevant questions selected smart learning devices with educational content over private tutoring as a supplementary education resource after the recent regulatory changes in 2021. As such, it is believed that the popularity and the customer demand for smart learning devices in China remain strong which are not materially adversely affected by the regulatory changes since late 2021 and the discontinuity of the form of live streaming classes available on the smart learning devices, if any.

Market Size

The following diagram illustrates the market size of smart learning device service market of China:

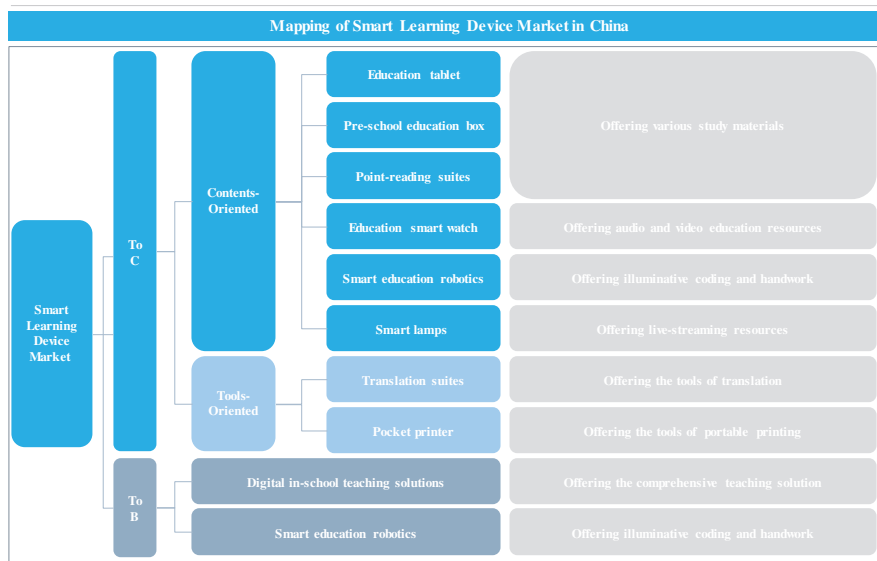


Source: Frost & Sullivan

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The To-C-based learning market generally has the larger market size than the To-B-based learning market in China due to its large targeting population. In 2021, the total market size of smart learning device in China reaches RMB65.9 billion and the market size of the To-C-based segment amounted to RMB32.9 billion. During 2017 to 2021, the To-B-based segment experienced a higher growth due to government’s support to and investments in in-school digitization and smart classrooms upgrades. With the great and continuous supplementary education needs, the To-C-based segment would continue to have a more robust growth in the further. In 2026, the total market size of smart learning device in China would be RMB145.0 billion, representing a CAGR of 17.1% from 2021 to 2026, while the market size of the To-C-based segment would be RMB74.1 billion in 2026, representing a CAGR of 17.6% from 2021 to 2026.

The following diagram illustrates the general mapping of the smart device service market in China:



Source: Frost & Sullivan

Development Trends

Increasing Investment in Intelligent Devices. Currently, education enterprises mainly consider the development and upgrades of software as their direction of development. Along with the increasing demand for learning experience of students in the future, pure software services will not be able to fully address the needs of students. Without the hardware devices, the functionality and using experience of the software have been challenged. Future education industry players shall increase their investments in the research and development of intelligent devices, which facilitates the realization of a greater innovation of digital education from the perspective of integration between software and hardware.

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Immersive Learning Experience. With the development of virtual, augmented, and mixed reality, voice recognition and other technologies, learning devices with multi-sensory and more interactive functions are being designed for engaging experiences that maintain and increase student interest.

Health Management. Increasing usage of digital devices has resulted in more screen time, in particular, causing eye strain of students due to a large amount of reading. More health management related product designs have been introduced by education service providers. Health management would be another core trend for education technology industry.

Coverage of STEAM. With the increasing understanding of the importance of STEAM (science, technology, engineering, arts, and mathematics), STEAM education will play a more significant role in the enlightenment education for children. In the future, the educational content surrounding STEAM will significantly improve the children’s observation, logical thinking, abstract thinking, and practical ability.

IMPACTS OF COVID-19 ON THE SMART LEARNING DEVICE SERVICE MARKET

Generally speaking, the outbreak of COVID-19 in 2020 has brought the impressive market opportunities to the smart learning device service market. With respect to the education resources, the smart learning device service providers satisfy the students’ education needs when offline activities being significantly restricted during COVID-19 outbreak in China. On the other hand, smart learning devices have become the essential learning tools to set up an active and engaging education environment serving various participants, including the students and their parents, teachers and the schools.

In long-run perspective, the prolonged impacts of the COVID-19 has cultivated the great public knowledge, education and acceptance of online study mode. More students and parents will get used to smart learning devices as they provide more convenient and flexible education schedules, compared to traditional offline in-school study mode. Moreover, more schools would also apply online classroom solutions as they could enable various innovative and interactive teaching scenarios, such as remote teaching and study, online grading and education contents distributions.

Major smart learning device service providers, such as Readboy, who have well developed device portfolio with digital educational resource offerings and established distribution channels, are expected to be better positioned to capture the growth opportunities. In addition, first movers who have established business relationships with primary and secondary schools are expected to take great advantage of the opportunities arising from the smart classroom solution market.

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TO-C-BASED SEGMENT OF SMART LEARNING DEVICE SERVICE MARKET

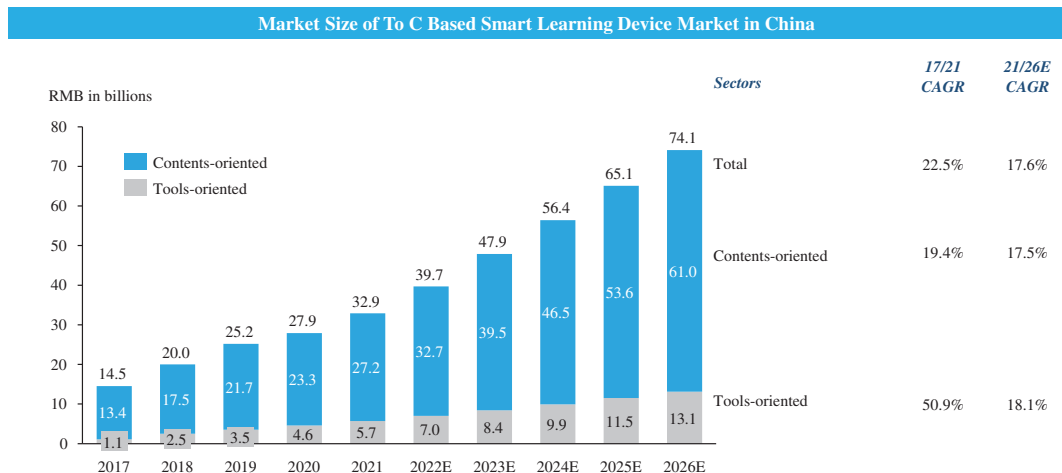
Overview and market size

As an important sub-segment of smart learning device service market, the To-C-based segment mainly meets the enlightenment education needs of young students by providing education devices empowered by educational content. The To-C-based segment of smart learning device service providers inspire the interest and passion of young children by using scientific methods, which serves as a solid foundation for future education.

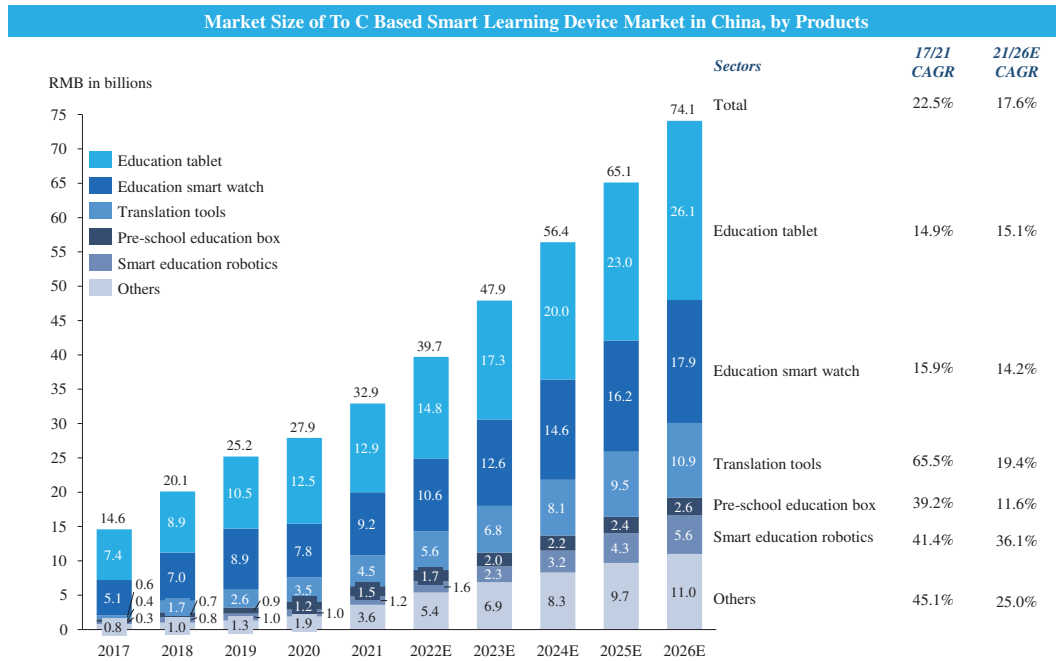
China’s To-C-based segment of smart learning device service market has reached RMB32.9 billion in 2021, and education tablet is the largest category due to its comprehensive functions. With the continuous focus of Chinese parents onto their children’s enlightenment education and the steady growth of the economy, China’s To-C-based segment of smart learning device service market is expected to reach RMB74.1 billion in 2026, representing the CAGR of 17.6% from 2021 to 2026.

Compared with learning through educational APPs on general personal tablets, our personal student tablets offer a more personalized, comfortable and efficient study experience to students. In particular, leveraging our in-depth knowledge of student learning behavior and performance data, we developed AI systems that are able to identify each individual user’s learning performance and learning progress, and generate personalized study reports and learning recommendation accordingly. For example, we developed AI tutor system based on expert system technology to monitor and collect an individual user’s learning preferences and feedbacks, such as homework results, and provide personalized learning advices. In addition, different from general personal tablets, our personal student tablets focus on offering educational content, which exclude game apps from our app store and provide access to various pre-recorded video educational resources. Furthermore, our personal student tablets also have specialized functions designed for students that deliver a comfortable and efficient learning experience, such as eye-protection and parental control features, which allow the parents to conveniently track and review the students’ learning progress.

The following diagrams illustrate the market size of the To-C-based segment of smart learning device service market by functions and by products, respectively:



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Source: Frost & Sullivan

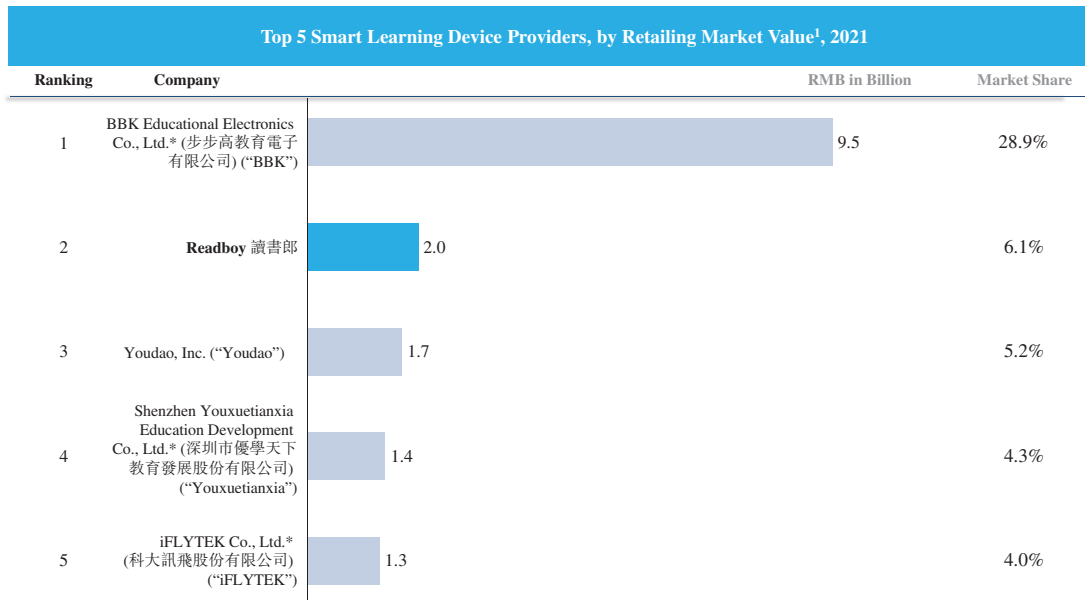
Competitive Landscape

As a major player, from the perspective of retailing market value, the Company ranked second among China’s smart learning device service providers with a market share of 6.1%; in terms of device shipment, the Company ranked fifth among China’s smart learning device service providers.

While the overall smart learning device service market is fragmentary, the To-C-based segment is relatively concentrated. In 2021, top five market players accounted for close to 50% of total market in terms of retailing market value. But except for the largest player, each of the remaining players occupied a market share less than 10%. Educational tablets remain to be the core sub-sector of China’s the To-C-based segment. From the perspective of retailing market value, four out of top five leading players introduce educational tablets as their core product offering.

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The following diagrams illustrate the ranking of China’s smart learning device service providers in terms of retailing market value and total device shipment, respectively, in 2021:



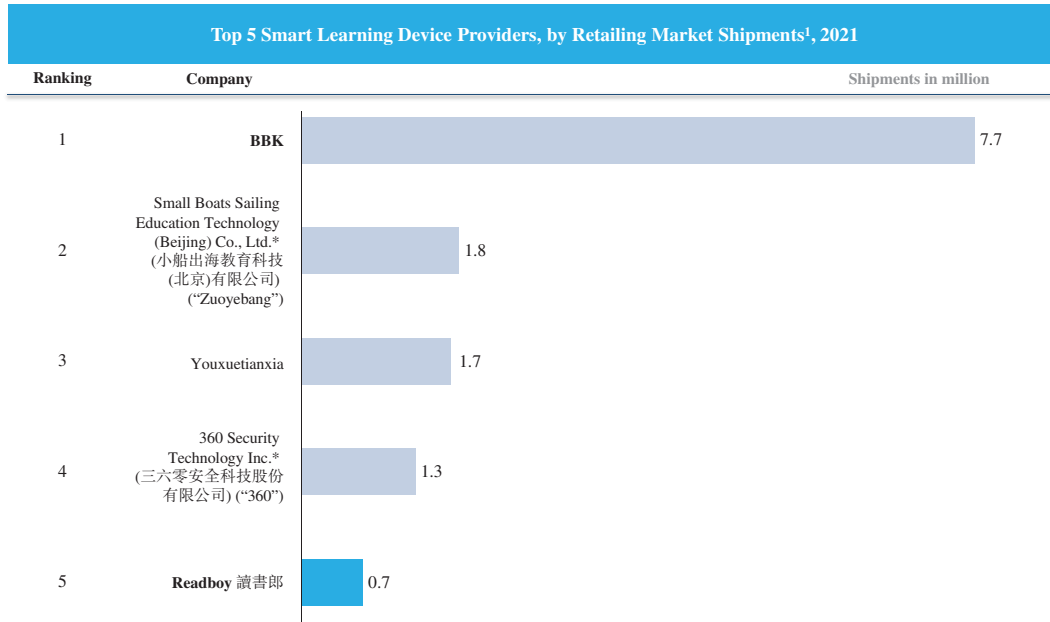
Note:

1 retailing market value = retailing shipments * retailing price

* For identification purposes only

Source: Frost & Sullivan, based on company public information and independent research of Frost & Sullivan

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Note:

1 retailing market shipments refers the device sales aims to retailing market

* For identification purposes only

Source: Frost & Sullivan, based on company public information and independent research of Frost & Sullivan

The following table sets forth the retailing value growth rate and retail prices of smart learning devices of top five China’s smart learning device service providers in terms of retailing market value or total device shipment:

Company	Retailing value growth (2020 - 2021)	Retail prices of major smart learning devices
BBK ¹	8%	<ul style="list-style-type: none"> Education tablets: RMB1,800 – 5,000 Education smart watches: RMB300 – 2,000 Translation tools: RMB800 – 1,000
Readboy 讀書郎	5%	<ul style="list-style-type: none"> Education tablets: RMB2,000 – 5,000 Education smart watches: RMB390 – 1,000
Youdao ²	70%	<ul style="list-style-type: none"> Translation tools: RMB500 – 1,300
Youxuetianxia ³	-7%	<ul style="list-style-type: none"> Education tablets: RMB1,500 – 5,000
iFLYTEK ⁴	86%	<ul style="list-style-type: none"> Education tablets: RMB2,000 – 5,000 Translation tools: RMB900 – 1,200
Zuoyebang ⁵	25%	<ul style="list-style-type: none"> Smart printer: RMB150-1,000
360 ⁶	25%	<ul style="list-style-type: none"> Education smart watches: RMB200 – 1,000

Notes:

1 BBK is a private company founded in 1995, which primarily provides education tablets, translation pens, smart watches and other smart devices.

2 Youdao is a publicly traded company listed on the New York Stock Exchange with a total net revenue of over RMB4.0 billion in 2021 and was founded in 2006, which primarily provides learning services and tools, smart devices and education digitalization solutions to users of all ages.

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- 3 Youxuetianxia is a private company founded in 2011, which primarily provides learning devices such as education tablets and dictionary pens, and intelligent learning solutions to teachers, students and parents.
- 4 iFLYTEK is a publicly traded company listed on Shenzhen Stock Exchange with a total revenue of approximately RMB20.0 billion in 2021 and was founded in 1999, which primarily provides various intelligent products and services for multiple industries including education, healthcare, manufacturing, commercial services and public services.
- 5 Zuoyebang is a private company founded in 2015, which primarily provides online education services and smart devices such as smart printers.
- 6 360 is a publicly traded company listed on Shanghai Stock Exchange with a total revenue of over RMB10.0 billion in 2021 and was founded in 2005, which primarily provides internet advertising services and value-added services, smart devices and cybersecurity related products and services.

In 2021, we recorded a retailing value growth of 5%. In the same year, the growth rate of retailing market value of BBK, Youdao, iFLYTEK, Zuoyebang and 360 was 8%, 70%, 86%, 25% and 25%, respectively, and Youxuetianxia experienced a decrease in retailing market value of 7%. According to the Frost & Sullivan Report, a major portion of retailing value of BBK is contributed by their sale of smart wearable devices. Benefiting from the relatively higher growth of smart wearable devices market in 2021, BBK recorded a faster retailing value growth. According to the Frost & Sullivan Report, the smart learning devices offered by Youdao are primarily translation pens, which market is still emerging. Benefiting from the higher growth of translation pens market, Youdao recorded a relatively higher growth in retailing value in 2021. According to the Frost & Sullivan Report, Youxuetianxia primarily sells education tablets through their offline channels. Due to the impact of COVID-19 pandemic on offline store operations, Youxuetianxia experienced a decrease in their sales and therefore recorded a decreased retailing value. According to the Frost & Sullivan Report, the retailing value growth of iFLYTEK in 2021 was primarily resulting from their initiatives on online marketing and sales channels in selling smart learning devices, which helped them to rapidly expand their customer base. According to the Frost & Sullivan Report, the smart learning devices offered by Zuoyebang are primarily smart printers, which market is still emerging. Benefiting from the higher growth of smart printer market, Zuoyebang recorded a relatively higher growth in retailing value in 2021. According to the Frost & Sullivan Report, a major portion of retailing value of 360 is contributed by their sale of smart wearable devices. Benefiting from the relatively higher growth of smart wearable devices market in 2021, 360 recorded a faster retailing value growth.

Entry barrier

Product Design and Technical Barrier. The design and production of intelligent learning devices require systematic and professional technical support, involving hardware development, network communication, software engineering, system integration, and other aspects depending on the type of devices. In addition, companies also need to have in-depth knowledge of education and optimized application of AI technologies. Therefore, other enterprises must accumulate relevant technical experience in software and hardware development, data analysis and maintenance, and cross-sector talents to provide customers with systematic, professional, and personalized services.

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Educational Resources. Contents-oriented smarting learning device service combines the smart hardware devices with the various digital educational content. Leveraging educational resources, the industry players are more capable of introducing a welcoming device service to the students and their teachers and parents.

Capital Investments. The cost of research and development of intelligent learning devices can be relatively high due to costs in connection with hardware components, labor costs, artificial intelligence training, algorithm optimization, and long product development cycle. There are also costs associated with advertising, marketing, and promotion. In addition, enterprises need to continuously invest in technology development to roll out better products to be competitive. This market requires a large amount of capital for initial investment and companies may not be profitable initially as most capital is spent on research and development.

TO-B-BASED SEGMENT OF SMART LEARNING DEVICE SERVICE MARKET

Overview and market size

The To-B-based segment of smart learning device service market generally includes two sub-sectors, namely digital in-school teaching solutions and smart education robotics. Digital in-school teaching solutions have always been the major portion of the To-B-based segment, which accounted for approximately 86.4% of the total To-B-based segment in 2021. Digital in-school teaching solutions consist of hardware devices, software applications, and digital services that are used for class preparation and delivery, homework management, academic assessment and/or other routine teaching activities. Major participants of digital in-school teaching solutions include school administrators, teachers, students, and parents.

In 2021, the market size of the To-B-based segment amounted to RMB33.0 billion. During 2017 to 2021, the To-B-based segment experienced a higher growth due to government’s support to and investments in in-school digitization and smart classrooms upgrades. In 2026, the market size of the To-B-based segment is expected to reach RMB70.9 billion in 2026, representing a CAGR of 16.5% from 2021 to 2026.

Entry barrier

Accumulation of School-teaching Expertise. The accumulation of school-teaching and management expertise needs long-term efforts to understand the teachers and schools’ needs and pain points in daily workflows. In addition, expertise would also need the massive empirical practice to prove the solution’s efficiency, which constitutes significant entry barriers to the new entrants. In general, the leading smart learning device providers with abundant industry knowhow have a clear advantage in providing best-in-class and tailored solutions to address varying demand from school clients.

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Brand Awareness and Reputation. The digital solution deployment involves massive data operation which is business confidential and in the high cybersecurity. Generally speaking, the high-reputation branded education technology companies would be more likely invited to collaborate with the school clients and form the long-term smart education offering relationships to minimize the data leakage risks, which lead to the enhanced client stickiness as well.

Mature Business Network. Existing smart learning device service providers have established the mature business networks and had extensive business connections with school clients and other value chain players. The mature business network provides good approaches to realize the cross-selling of invocative products and explore other potential monetization opportunities.

PRICES OF UPSTREAM COMPONENTS AND RAW MATERIALS

The major components of learning devices include displayers, internal memories, and integrated circuit boards. Together with the continuous product upgrades since 2018, demand for components with higher functionality has also increased. Average purchase prices of displayers, internal memories, and integrated circuit boards increased by approximately 15-20% annually since 2018 to 2020. In 2020, the average purchase price range of displayer related products, internal memory and related products, and integrated circuit and related products was approximate RMB350 to RMB450 per unit, RMB180 to RMB200 per unit, and RMB100 to RMB120 per unit, respectively.