INDEPENDENT MARKET RESEARCH ON CHINA'S TEACHING AND LEARNING INFORMATIZATION AND DIGITIZATION INDUSTRY IN HIGHER EDUCATION

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Frost & Sullivan

November 2025

Date : ________________

For and on behalf of
Frost & Sullivan (Beijing) Inc., Shanghai Branch Co.

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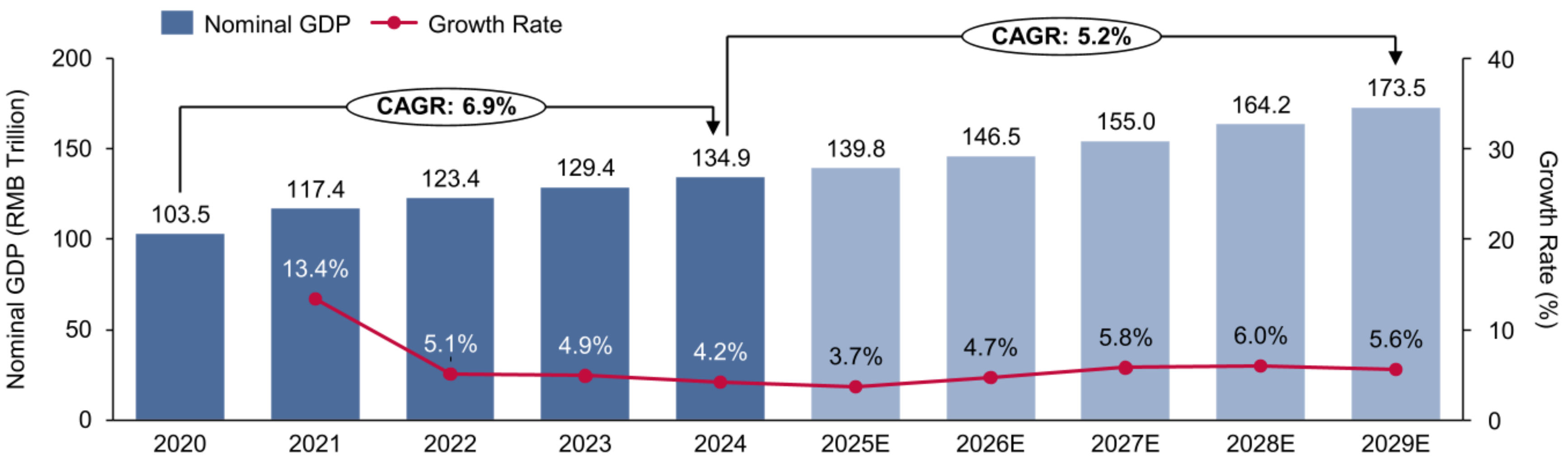
Name: Charles Lau
Title: Executive Director

Content

China's Macro Economy Overview

Nominal GDP of China

Nominal GDP (China), 2020-2029E



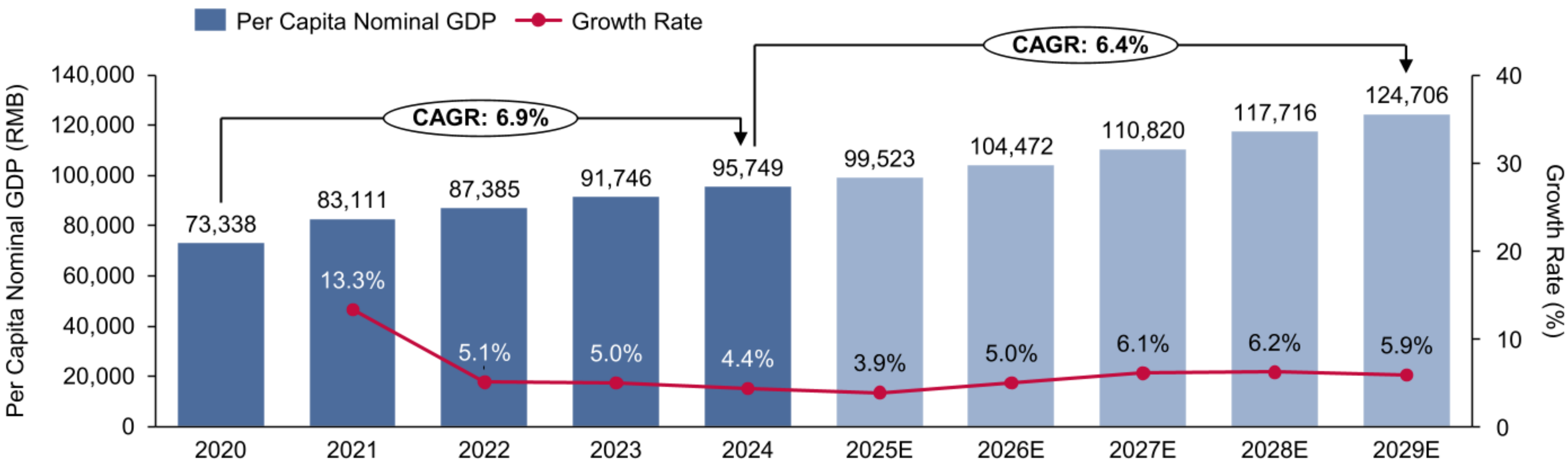
- Over the past years, the economy maintained its solid growth despite the outbreak of the pandemic of COVID-19. Due to the government's effective control of COVID-19, the economic performance of China remained positive in 2020 and further recovered in 2022. As a result, the nominal GDP grew at a CAGR of 6.9% from 2020 to 2024.
- Going forward, the Chinese authorities are likely to maintain the consistency and stability of macroeconomic policies so as to maintain macroeconomic stability. In the meantime, structural adjustment of the economy is predicted to be pushed forward strongly by the Chinese authorities to improve quality and efficiency of economic development. The Chinese economy is likely to transition from an investment-driven model to a consumption-driven model with the share of final consumption in GDP picking up. According to the International Monetary Fund (the "IMF") and Frost & Sullivan, the Chinese economy is forecasted to grow at a CAGR of 5.2% from 2024 to 2029.

Source: National Bureau of Statistics, IMF (April 2024), Frost & Sullivan

China's Macro Economy Overview

Per Capita Nominal GDP of China

Per Capita Nominal GDP (China), 2020-2029E

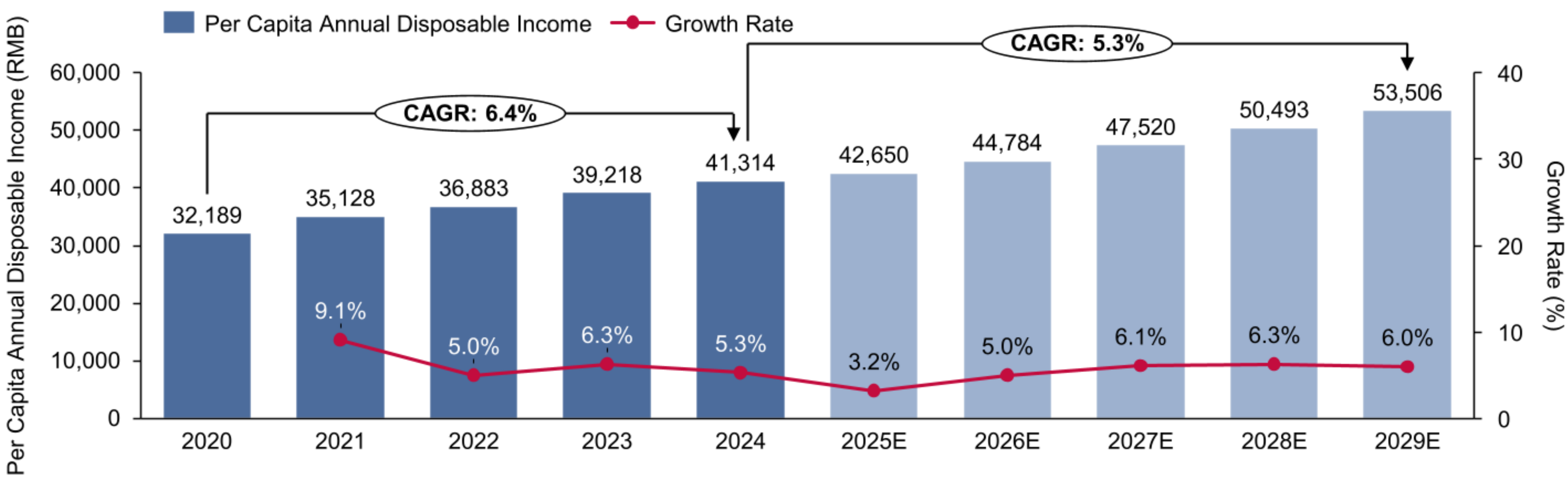


- China's total population is expected to remain relatively stable and hence the growth of per capita nominal GDP is in line with the continuously growing Chinese economy. Per capita nominal GDP maintained its solid growth, and reached RMB95,749 in 2024.
- In the future, due to the sound growth of the Chinese macro economy, per capita nominal GDP is also likely to maintain a steady growth. According to the IMF, the per capita nominal GDP in China is predicted to reach RMB124,706 in 2029, growing at a CAGR of 6.4% from 2024.

Source: National Bureau of Statistics, IMF (April 2024), Frost & Sullivan

China’s Macro Economy Overview
Per Capita Annual Disposable Income

Per Capita Annual Disposable Income (China), 2020-2029E



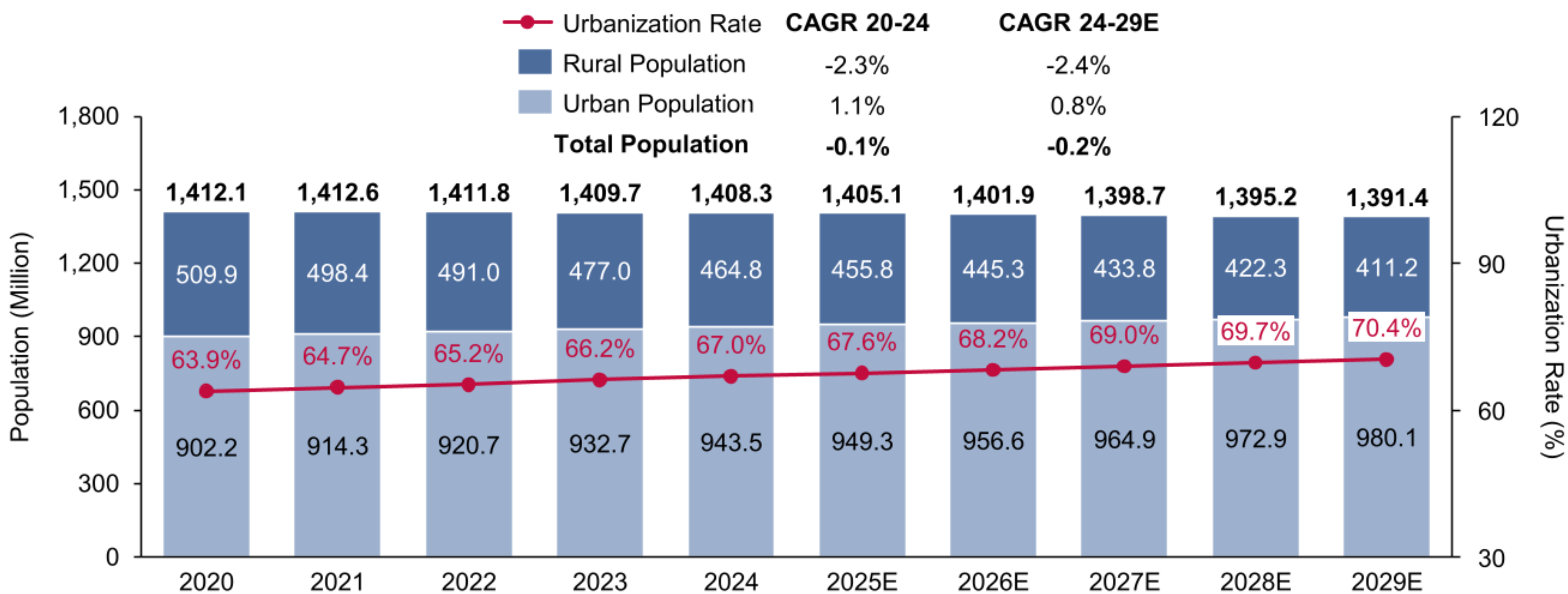
- Together with continuous growth in the economy and urbanization, the average income level of Chinese households has also increased continuously in recent years. In 2024, the per capita annual disposable income increase to RMB41,314 from RMB32,189 in 2020, representing a CAGR of 6.4%.
- The growing per capita disposable income has had a positive effect on Chinese residents’ purchasing power, further encouraging the development of secondary and tertiary industries. By 2029, the per capita annual disposable income is expected to increase to RMB53,506, with a CAGR of 5.3% from 2024.

Source: National Bureau of Statistics, IMF (April 2024), Frost & Sullivan

China's Macro Economy Overview

China's Population and Urbanization

Population and Urbanization (China), 2020-2029E

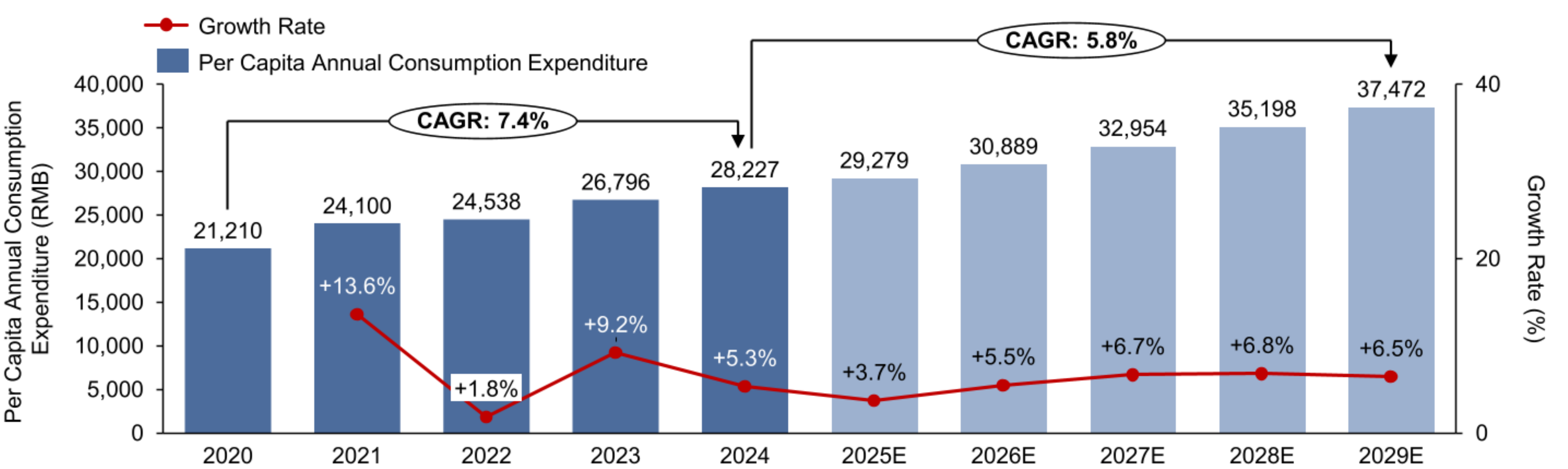


- China is the most populous nation in the world. In 2024, China's total population reached 1,408.3 million. In the future, total population of China is estimated to be on a downward trend, but maintain at a moderate level around 1,400 million, and reach 1,391.4 million in 2029.
- Due to rapid economic development and the influx of migrants from rural areas to developed areas, China's urban population has been steadily increasing. China's rapid economic growth has fueled the unprecedented urbanization of its population since the 1990s. From 2020 to 2024, the country's urban population has increased from 902.2 million to 943.5 million, with a CAGR of 1.1%. During the same period, the urbanization rate in China increased from 63.9% to 67.0%.
- With continuous urbanization, the urban population is expected to maintain a CAGR of 0.8% from 2024 to 2029. Under the "The Fourteenth Five-Year Plan for the National Economic and Social Development of the PRC and the Outline of Long-Term Goals for 2035 (Draft) *(《中華人民共和國國民經濟和社會發展第十四個五年規劃和2035年遠景目標綱要（草案）》)* raised in 2021, the urbanization rate is expected to increase to no less than 65.0% in 2025. Accordingly, Frost & Sullivan forecasts that China's urban population is expected to reach 980.1 million by 2029, and the urbanization rate is likely to increase gradually, reaching 70.4% in 2029.

Source: National Bureau of Statistics, IMF (April 2024), Frost & Sullivan

Per Capita Annual Consumption Expenditure

Per Capita Annual Consumption Expenditure (China), 2020-2029E



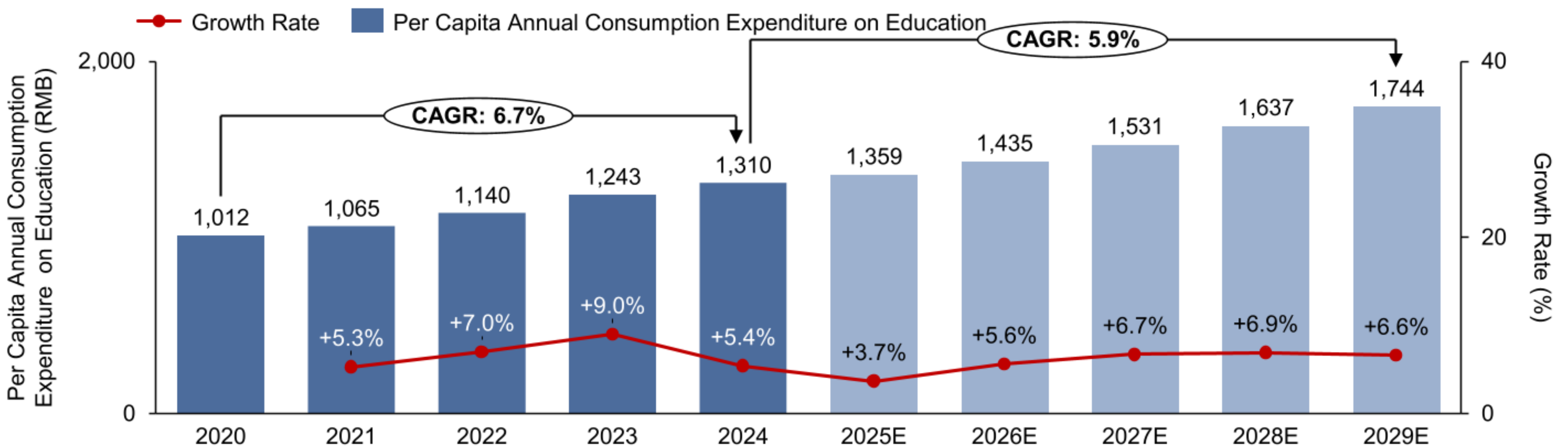
- Together with continuous growth in the economy and the disposable income of Chinese households, the per capital annual consumption expenditure in China has also increased continuously in recent years. In 2024, the per capital annual consumption expenditure increased to RMB28,227 from RMB21,210 in 2020, representing a CAGR of 7.4%.
- The growing per capita disposable income has had a positive effect on the per capital annual consumption expenditure. In the future, the per capita annual consumption expenditure is expected to continue to increase due to economic development and the increase in per capita annual disposable income. Frost & Sullivan estimates that by 2029, the per capital annual consumption expenditure is expected to increase to RMB37,472, with a CAGR of 5.8% from 2024.

Source: National Bureau of Statistics, Frost & Sullivan

China's Macro Economy Overview

Per Capita Annual Consumption Expenditure on Education

Per Capita Annual Consumption Expenditure on Education (China), 2020-2029E



- Together with continuous growth in the economy and the disposable income of Chinese households, the per capital annual consumption expenditure on education has also increased continuously in recent years. In 2024, the per capital annual consumption expenditure on education increased to RMB1,310 from RMB1,012 in 2020, representing a CAGR of 6.7%.
- The growing per capita disposable income has had a positive effect on the per capital annual consumption expenditure on education. In the future, the per capita annual consumption expenditure on education is expected to continue to increase due to economic development and increase of per capita annual disposable income. Frost & Sullivan estimates that by 2029, the per capital annual consumption expenditure on education is expected to increase to RMB1,744, with a CAGR of 5.9% from 2024.

Source: National Bureau of Statistics, Frost & Sullivan

China's Macro Economy Overview

China's City Level Classification

City Level Classification(China), 2023

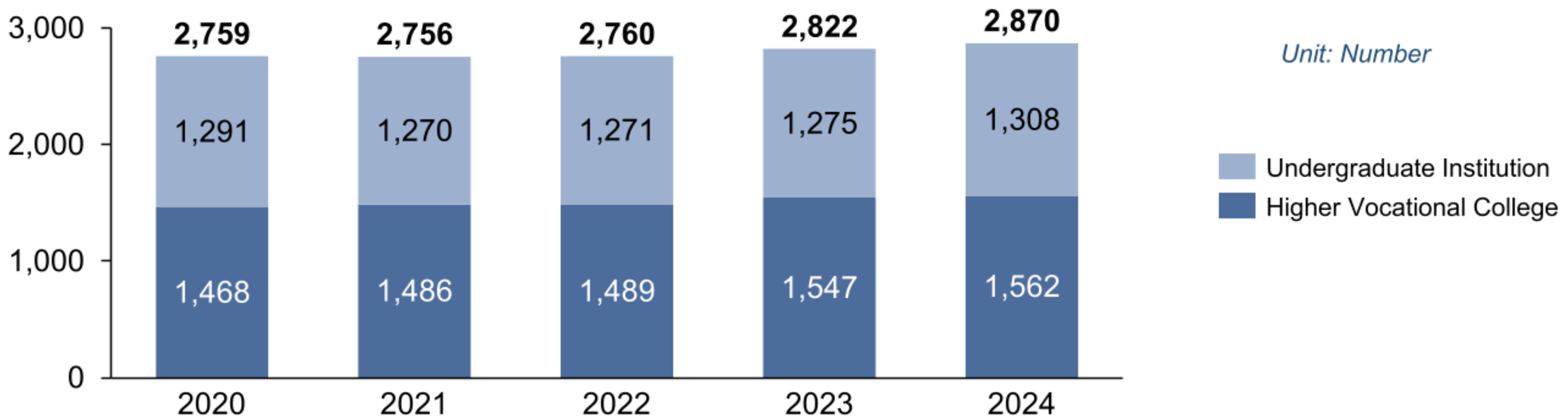
- According to the "*2023 City Business Charm Ranking*" (*《2023城市商業魅力排行榜》*) released by the New Tier 1 Cities Institute, a city data research project under China Business News ("CBN"), Chinese cities can be divided into Tier 1, New Tier 1, Tier 2, Tier 3, Tier 4 and Tier 5 cities.
- Of the 337 cities at prefecture level and above in Mainland China that were included in the list's assessment, there are a total of four first-tier cities, 15 new first-tier cities, 30 second-tier cities, 70 third-tier cities, 90 fourth-tier cities and 128 fifth-tier cities.

Source: China Business News, Frost & Sullivan

China’s Macro Economy Overview

Number of General Higher Education Institutions in China

Number of General Higher Education Institutions (China), 2020-2024



- Higher education in China includes short-cycle course education (zhuanke, offering non-degree programmes), undergraduate education (benke, offering programmes leading to the bachelor’s degrees) and postgraduate education (offering programmes leading the master's and doctor's degrees).
- Higher education institutions in China include universities and higher vocational colleges. The number of general higher education institutions in China has increased from 2,759 in 2020 to 2,870 in 2024. Of these, the number of undergraduate institutions decreased from 1,291 in 2020 to 1,308 in 2024; and the number of higher vocational colleges increased from 1,468 in 2020 to 1,562 in 2024. A total of 147 undergraduate universities have been selected for the “Double First Class Initiative”(《雙一流計劃》), accounting for 5.1% of the number of general higher education institutions in 2024.
- According to the “*Catalogue of Undergraduate Programmed in General Colleges of Higher Education”(《普通高等學校本科專業目錄》)* issued by the Ministry of Education of China in April 2023, China‘s higher general undergraduate education contains a total of 12 academic disciplines and 93 professional categories.

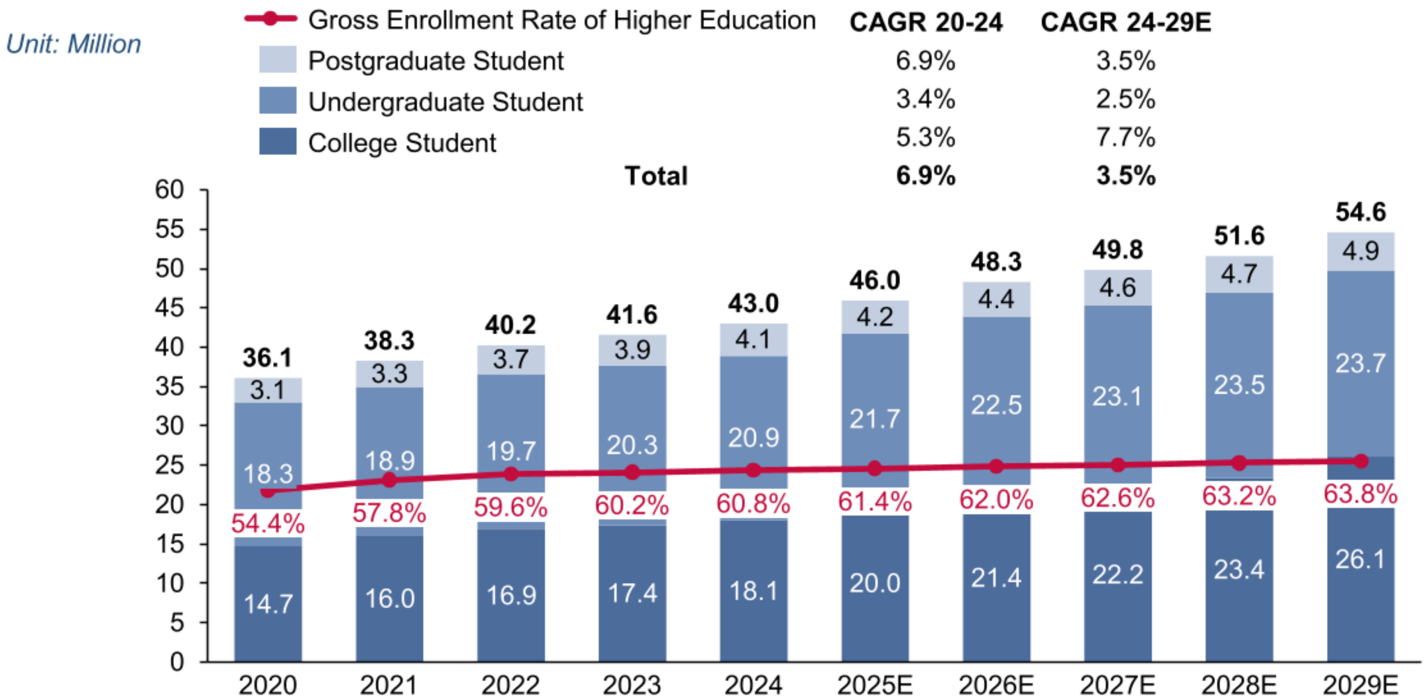
Note:
1. Independent colleges are not included in the undergraduate institutions.

Source: Ministry of Education of the PRC, Frost & Sullivan

China's Macro Economy Overview

Number of Student Enrollments of China's Higher Education

Number of Student Enrollments of Higher Education by Education Level (China), 2020-2029E

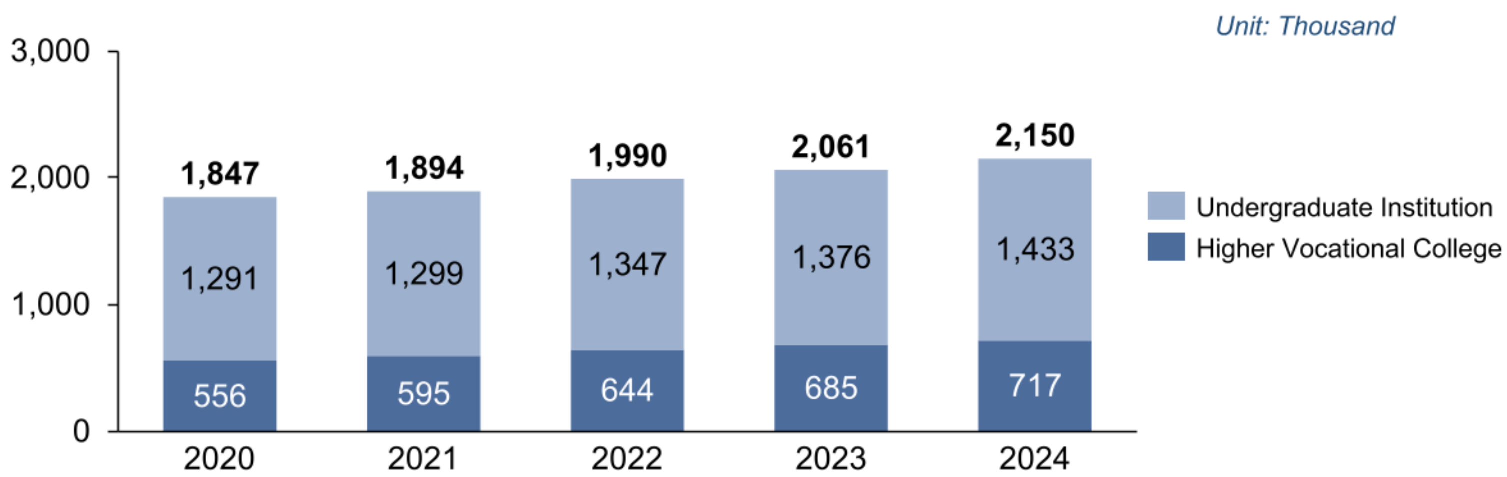


- According to the Ministry of Education of the PRC (the "MOE"), with the popularization and development of higher education in China, the gross enrollment rate of higher education in China has increased from 54.4% in 2020 to 60.8% in 2024, and the number of students enrolled in higher education has increased from 36.1 million in 2020 to 43.0 million in 2024, and is projected to further increase to 54.6 million in 2029.

Source: Ministry of Education of the PRC, Frost & Sullivan

Number of Teachers in General Higher Education Institutions in China

Number of Teachers in General Higher Education Institutions (China), 2020-2024



- From 2020 to 2024, the number of teachers in China's general higher education institutions grows from 1,847 thousand to 2,150 thousand. Of these, the number of teachers in undergraduate institutions grows from 1,291 thousand to 1,433 thousand; the number of teachers in higher vocational colleges grows from 556 thousand to 717 thousand.
- In 2024, the average number of students served per teacher in China's general institutions of higher education was 20.0, with 15.0 students served per teacher in undergraduate institutions and 24.6 students served per teacher in higher vocational colleges.

Source: Ministry of Education of the PRC, Frost & Sullivan

Content

Overview of China's Higher Education Informatization Market

Introduction to Education Informatization in China

Under the 'Digital China' strategy, China's digital economy has continued to grow at a high rate, significantly faster than GDP, and continues to play the role of economic 'stabilizer' and 'accelerator'. In 2023, the market size of China's digital economy reached RMB56.1 trillion, accounting for 46.6% of the GDP. The role of industrial digitalization as the main engine of digital economic growth has become more prominent, the enabling role of digital technologies such as the internet, big data and artificial intelligence has become more prominent, and the integration with the real economy has become deeper and more pragmatic. The digital economy has become the core engine of China's macroeconomic development in the future. With the booming digital economy in China, the education informatization market has also witnessed significant development.

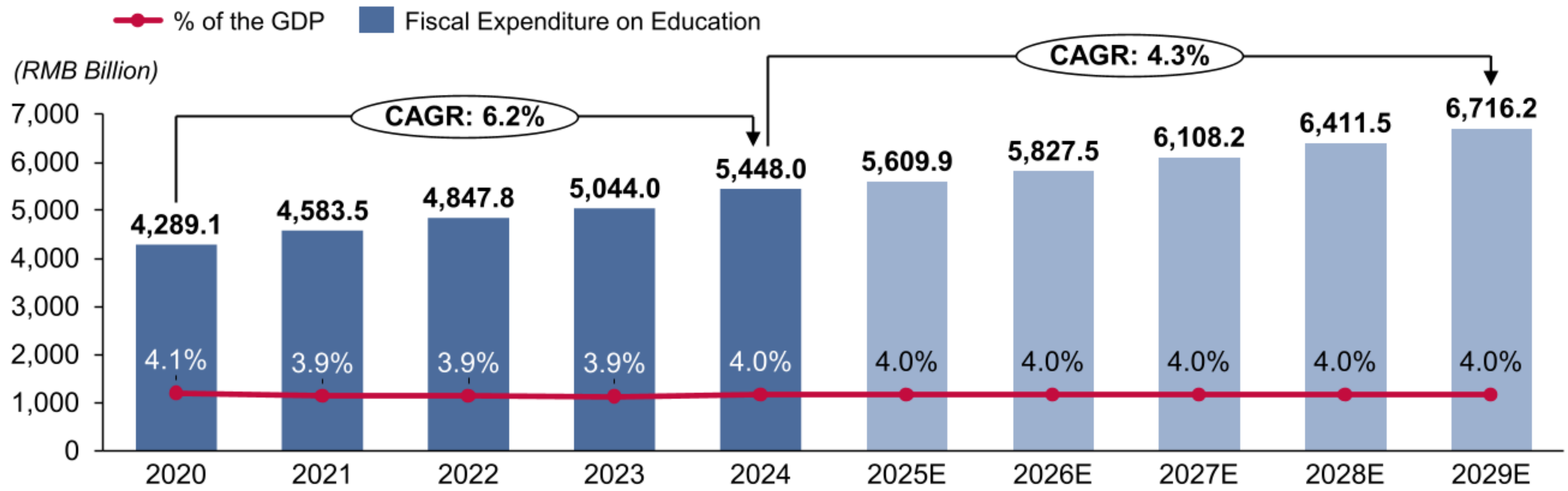
The informatization of education is an important part of the development of China's digital economy. The development of education informatization in China is actually an evolution from the birth of electrochemical education to the 2.0 era of education informatization. The early stage of China's educational informatization development was mainly a stage of vigorous development of educational infrastructure. Through the construction of various kinds of information systems, schools generated information from various kinds of campus activities, such as teaching and non-teaching activities, and compiled them into new data resources, thus laying a solid foundation for campus interoperability and further digital and intelligent development. At this stage, informatization software and hardware facilities in non-teaching areas with higher technological maturity have become the main development and construction direction. Since the new period of education informatization 2.0 in 2018, education informatization has entered a new development stage with digitalization as the core against the backdrop of rapid iteration of advanced technologies such as AI, cloud services, big data, etc., and the construction direction has shifted to the technology, product, platform and application side, and digital solutions in the teaching and learning process have become the top priority for current and future education informatization investment.

Source: Frost & Sullivan

Overview of China's Higher Education Informatization Market

Fiscal Expenditure on Education in China

Fiscal Expenditure on Education (China), 2020-2029E

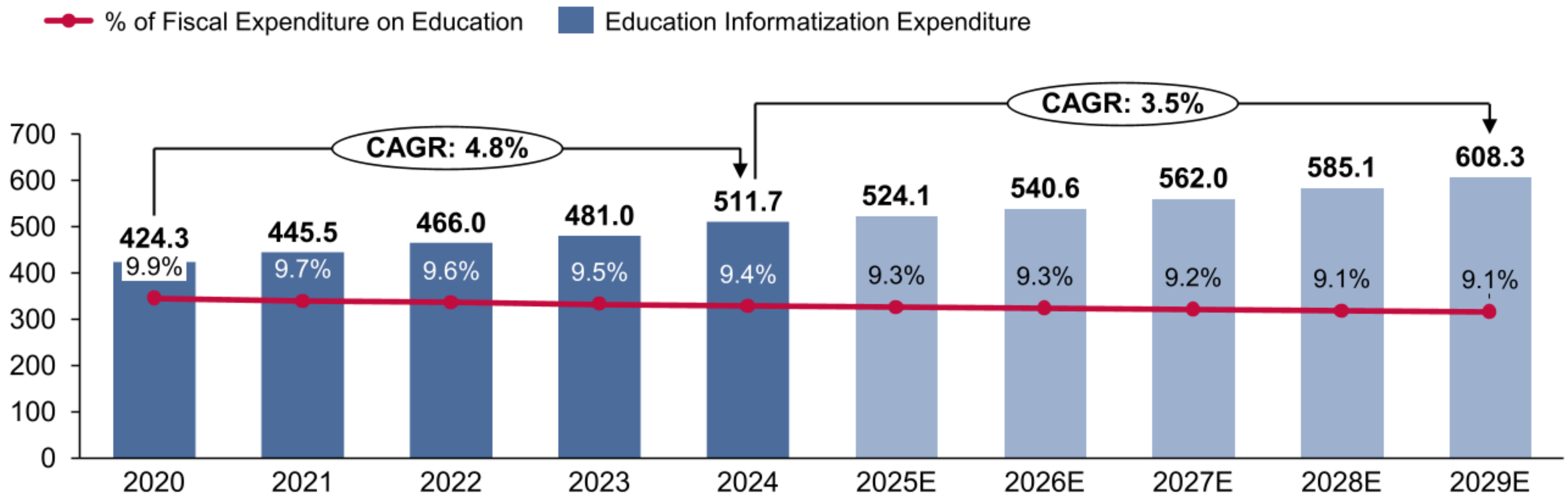


- The main source of funding for the education informatization market is the national fiscal expenditure on education. China's fiscal expenditure on education refers to the financial support provided by the government for the field of education. According to the explicit requirements of the Chinese government, the government fiscal expenditure on education should account for no less than 4% of the GDP. Over the past few decades, China's fiscal expenditure on education has been on the rise. In the future, China's fiscal expenditure on education will continue its growth trend, but it will pay more attention to quality, equity and innovation in order to meet the needs of socio-economic development and the modernization of education.
- In 2024, the fiscal expenditure on education in China reached RMB5,448.0 billion, with a CAGR of 6.2% from 2020 to 2024. In 2029, the fiscal expenditure on education in China is expected to reach RMB6,716.2 billion, with a CAGR of 4.3% from 2024 to 2029.

Source: Ministry of Education of the PRC (the 'MOE'), National Bureau of Statistics, Frost & Sullivan

Overview of China's Higher Education Informatization Market
Education Informatization Expenditure in China

Education Informatization Expenditure (China), 2020-2029E



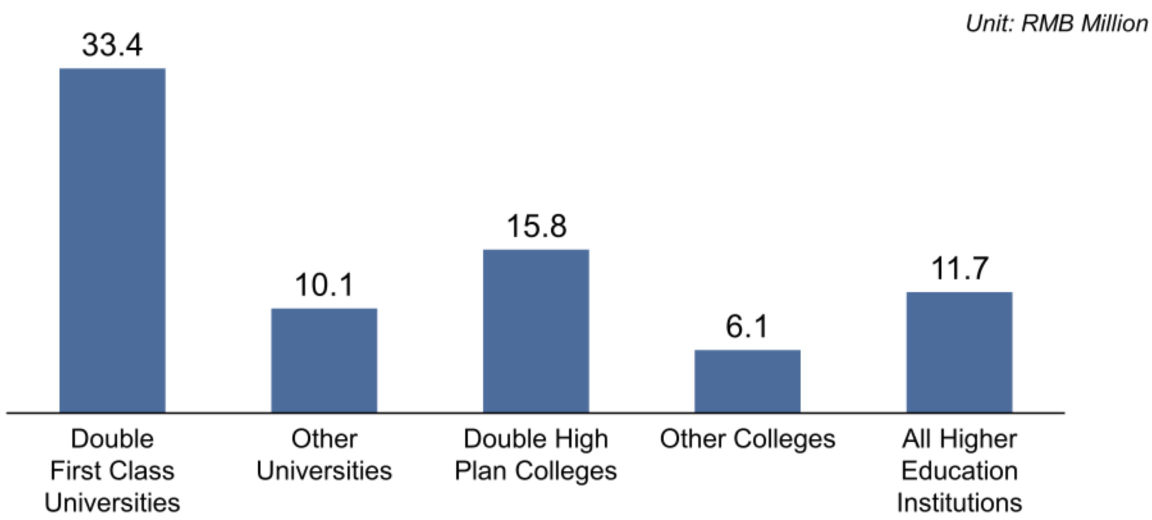
- Since 2011 the Ministry of Education has explicitly proposed that governments at all levels should allocate funding for education informatization at a rate of no less than 8% of the fiscal expenditure on education. The above-mentioned two explicit budget requirements for fiscal expenditure on education and education informatization support the stable and sustainable growth of the education informatization market.
- In 2024, the education informatization expenditure in China reached RMB511.7 billion, representing a CAGR of 4.8% during the period from 2020 to 2024. By 2029, the education informatization expenditure in China is expected to reach RMB608.3 billion, with a CAGR of 3.5% from 2024 to 2029.

Source: Ministry of Education of the PRC (the 'MOE'), National Bureau of Statistics, Frost & Sullivan

Overview of China’s Higher Education Informatization Market

Average Expenditure on Higher Education Informatization by Different Higher Education Institutions in China

Average Expenditure on Education Informatization by Different Higher Education Institutions (China), 2021



- According to the Ministry of Education of the PRC, the total expenditure on higher education informatization of “Double First Class” universities far exceeds that of other types of universities. In 2021, the average expenditure on higher education informatization per “Double First Class” university reached RMB33.4 million, about three to four times that of other ordinary universities. The per capita expenditure on higher education informatization of “Double High Plan” institutions ranked second, reaching RMB15.8 million, approximately two to three times that of other higher vocational colleges. In terms of informatization capabilities and willingness, leading institutions are significantly ahead of other domestic higher education institutions, playing a driving and exemplary role in the informatization construction of other higher education institutions.

Source: Ministry of Education of the PRC (the ‘MOE’), Frost & Sullivan

Definition and Segmentation of China's Higher Education Informatization Market

Definition

Higher Education Informatization *(高等教育信息化)* refers to the use of information technologies to carry out comprehensive, systematic and in-depth informatization transformation and upgrading of campus management, teaching and learning, and scientific research activities of higher education institutions. Higher education informatization aims to improve the quality, efficiency and effectiveness of higher education. China's higher education informatization can be divided into teaching and learning informatization, scientific research informatization, and campus service informatization by application scenario.

- **Teaching and Learning Informatization *(教學信息化)*** in higher education institutions mainly focuses on teaching and learning activities, including informatization of teaching and learning content, methods, resources, and evaluation. Related applications include, but are not limited to, online courses (such as MOOCs), virtual simulation courses, digital classrooms, teaching resource management platforms, knowledge graphs.
- **Scientific Research Informatization *(科研信息化)*** mainly focuses on scientific research activities, including the construction of research laboratories and the purchase and consumption of research-related equipment and consumables. Related applications include, but not limited to, database sharing, university instrument and equipment sharing systems.
- **Campus Service Informatization *(校園服務信息化)*** refers to the informatization solutions adopted by higher education institutions in the areas of operation, management and logistic services and the main applications include campus administration management system and library management system.

Higher Education Informatization（高等教育信息化）

- **Teaching and Learning Informatization（教學信息化）**

- **Scientific Research Informatization（科研信息化）**

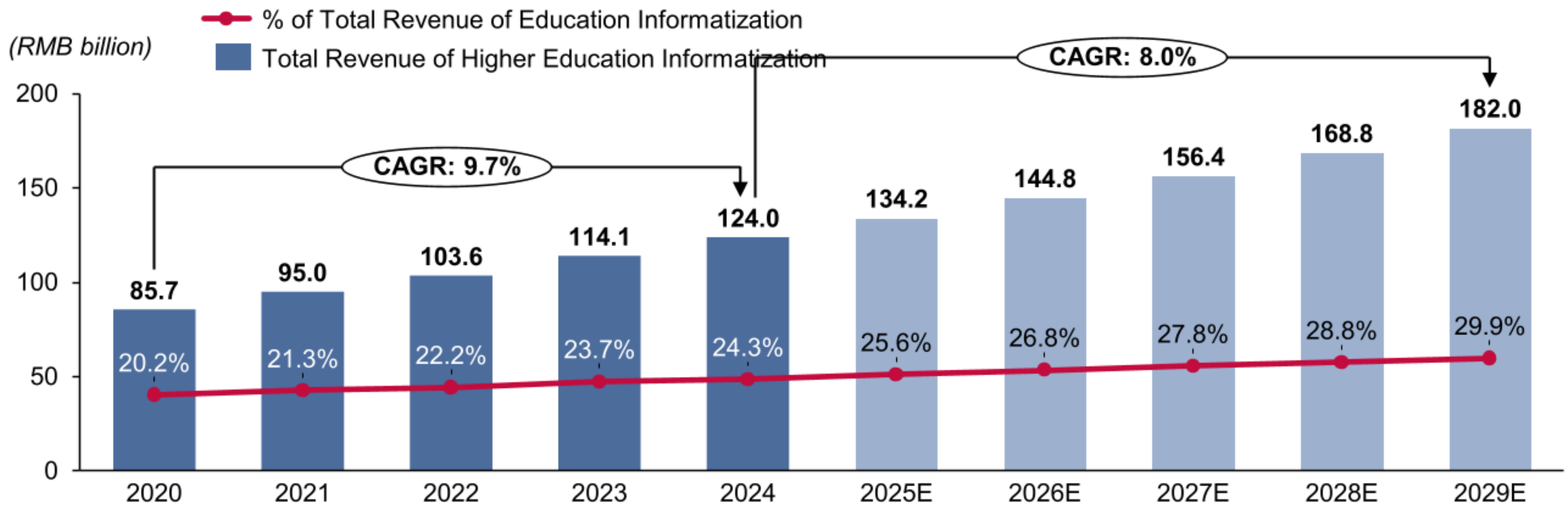
- **Campus Service Informatization（校園服務信息化）**

Source: Frost & Sullivan

Overview of China’s Higher Education Informatization Market

Market Size of Higher Education Informatization Industry in China

Market Size of Higher Education Informatization (China), 2020-2029E



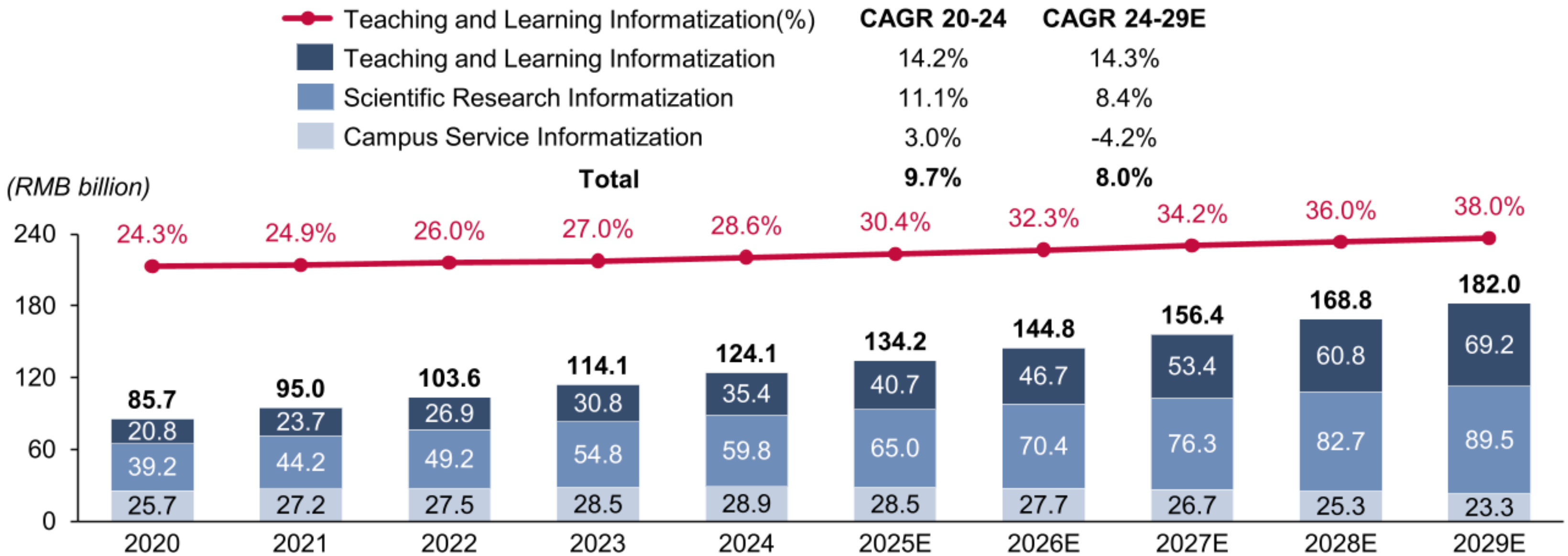
- The 2024 “Chinese Government Work Report” reiterates the significance of the in-depth implementation of the strategy of developing the country through science and education. Higher education plays a crucial role in China’s high-quality development process, especially for high-skilled talents cultivation, innovative scientific research and public services. The use of information technology in higher education is widespread due to the wide range of disciplines and the rapid iteration of knowledge under higher education. Under the influence of the rapid development and iteration of revolutionary technologies, greater policy orientation and financial support will be given to higher education informatization. By 2024, the government expenditure on higher education informatization reached RMB124.0 billion, accounting for 24.3% of the total education informatization expenditure. Accompanied by a steady increase in fiscal support for education, continued growth in the number of students, and policy support from central and local governments, higher education informatization is accelerating and will continue to be the largest subsegment in education informatization in terms of annual additional investment in the future.
- The market size of higher education informatization in terms of total revenue in China reached RMB124.0 billion in 2024, with a CAGR of 9.7% from 2020. By 2029, the market size of higher education informatization in terms of total revenue in China is expected to reach RMB182.0 billion, with a CAGR of 8.0% from 2024 to 2029.

Source: MOE, National Bureau of Statistics, Frost & Sullivan

Overview of China's Higher Education Informatization Market

Market Size of Higher Education Informatization by Application Scenario

Market Size of Higher Education Informatization by Application Scenario (China), 2020-2029E



- In the past ten years, the construction of campus informational hardware facilities and equipment of higher education institutions developed rapidly, with the average annual informatization expenditure exceeding RMB10.0 million for each higher education institution. By the end of 2024, the construction of campus informational hardware facilities and equipment of higher education institutions has been highly penetrated, and more than 90% of the higher education institutions have implemented campus service systems such as campus administration management system and library management system. In the past ten years, the average campus service informatization expenditure cumulatively reached approximately RMB30.0 million for each higher education institution, and the campus service informatization expenditure per institution in developed regions in China is near saturation. As campus service informatization construction entering the operational stage, future expenditure on higher education campus service informatization is expected to decrease correspondingly. The market size of campus service informatization in terms of revenue reached RMB28.8 billion in 2024, with a CAGR of 3.0% from 2020 to 2024. It is expected to decrease to RMB23.3 billion in 2029, with a CAGR of -4.2% from 2024 to 2029. The development of campus service informatization has also laid the foundation for scientific research informatization and teaching and learning informatization in higher education.

Source: MOE, National Bureau of Statistics, Frost & Sullivan

Overview of China's Higher Education Informatization Market

Market Size of Higher Education Informatization by Application Scenario (Cont.)

- Scientific research informatization is another important subsegment of the higher education informatization market. The market size of higher education scientific research informatization in terms of revenue reached RMB59.8 billion in 2024, with a CAGR of 11.1% from 2020 to 2024. With the rising demand for emerging technologies in scientific research activities, the market size of higher education scientific research informatization is expected to increase to RMB89.5 billion in 2029, with a CAGR of 8.4% from 2024 to 2029.
- Teaching and learning informatization is the most promising subsegment of higher education informatization. Higher education teaching and learning informatization has become the core of higher education informatization. In recent years, the relevant national departments have increasingly emphasized the importance of teaching and learning informatization. The Ministry of Education and other six departments in the "Promoting the Construction of New Educational Infrastructure to Build a High-quality Education Support System of the Guiding Opinions" (《關於推進教育新型基礎設施建設構建高質量教育支撐體系的指導意見》) clearly state that, "to improve the digital teaching and learning facilities, upgrade multimedia teaching equipment, introduce high-definition live and recording teaching methods; to establish subject-specific classrooms and teaching laboratories, and create a vivid and intuitive teaching and learning environment through perceptual interaction, simulation experiments and other equipment; where possible, to popularize personalized teaching and learning devices that meet technical standards and learning needs; to support the construction of video interactive systems that meet teaching and management needs, and support home learning and home-school interaction." After the COVID-19 pandemic, teachers and students in higher education are accustomed to a robust, flexible and efficient technology-based teaching and learning system, which stimulates further investment in higher education teaching and learning informatization. In the future, higher education teaching and learning informatization is expected to become one of the two mainstays of higher education informatization. The market size of higher education teaching and learning informatization in terms of revenue reached RMB35.4 billion in 2024, with a CAGR of 14.2% from 2020 to 2024. It is expected to increase to RMB69.2 billion in 2029, with a CAGR of 14.3% from 2024 to 2029. The revenue of higher education teaching and learning informatization accounted for 28.6% of the total revenue of higher education informatization, and this share is expected to rise continuously and to reach 38.0% in 2029.

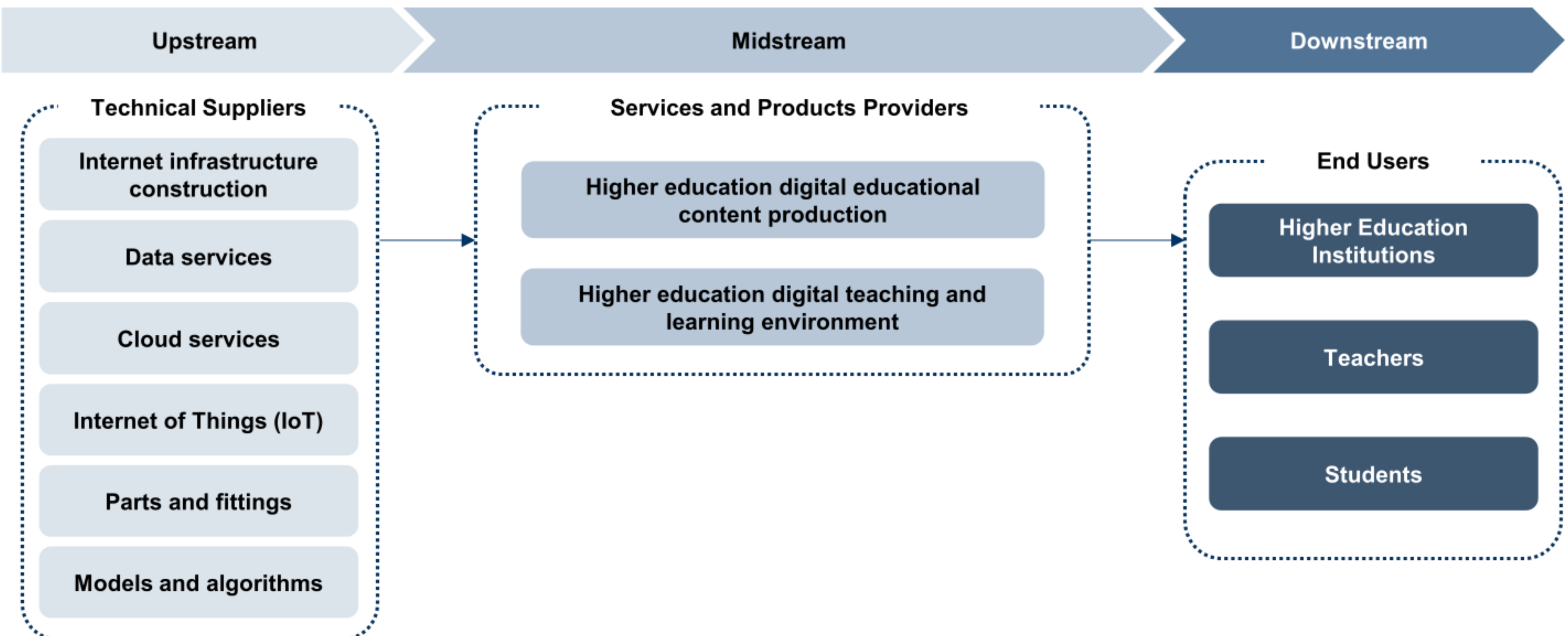
Source: Frost & Sullivan

Content

Overview of China’s Higher Education Teaching and Learning Informatization Market

Value Chain of China’s Higher Education Teaching and Learning Digitalization Market

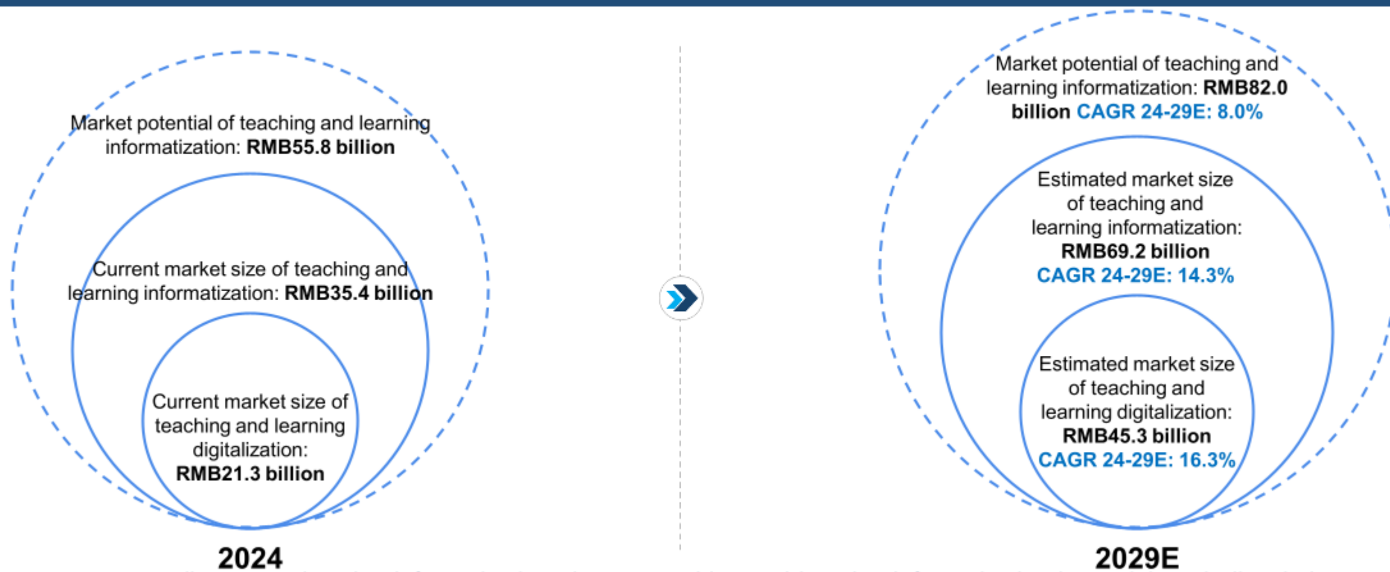
- The value chain of China’s higher education teaching and learning digitalization market includes upstream technical suppliers, midstream services and products providers and downstream end users.
- The upstream of China’s higher education teaching and learning digitalization market mainly involves technical suppliers providing internet infrastructure construction, data services, cloud services, Internet of Things (IoT), parts and fittings and models and algorithms.
- The midstream of China’s higher education teaching and learning digitalization market mainly involves two types of services and products for higher education institutions, including (i) digital educational content production and (ii) digital teaching and learning environment. Some leading services and products providers offer both.
- The downstream of China’s higher education teaching and learning digitalization market mainly involves end users such as higher education institutions, teachers and students.



Source: Frost & Sullivan

Market Potential of China's Higher Education Teaching and Learning Informatization Market

Market Potential of Higher Education Teaching and Learning Informatization Market (China), 2024 vs. 2029E



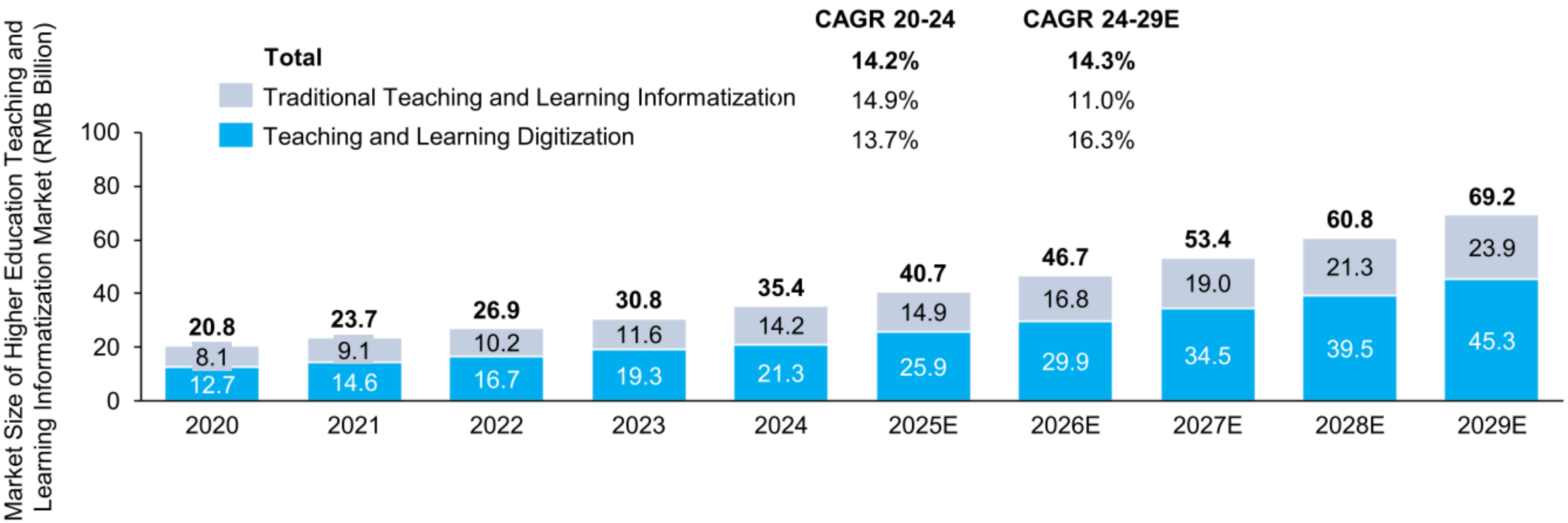
- Within all government expenditure on education informatization, that on teaching and learning informatization is crucial, as it directly impacts the improvement of education quality and the strengthening of academic and scientific research capabilities. Maintaining a high proportion of expenditure on teaching and learning informatization is an important component of the long-term strategy for advancing education, science, and shaping a digital China. It contributes to the continuous enhancement of teaching experiences and efficiency, and plays a positive role in cultivating innovative talents and advancing academic disciplines.
- In 2024, estimated based on market demand, the market potential for China's higher education teaching and learning informatization market has reached approximately RMB55.8 billion, which constitutes about 45% of the total higher education informatization expenditure. However, the current market size was only about RMB35.4 billion in 2024. This gap highlights the latent demand for expenditure on teaching and learning informatization and also reveals the significant potential for future market growth.
- Looking ahead, with the continuous advancement of higher education informatization and the increasing demand for smart learning and digital education, national expenditure on higher education informatization will increasingly prioritize enhancing teaching and learning processes. The potential market size of China's higher education teaching and learning informatization market is projected to exceed RMB82.0 billion by 2029.
- Education digitalization is an extension and deepening of education informatization, which not only involves converting paper-based educational materials in the teaching process into digital forms, but more importantly, fully digitalizing teaching processes and modes. This includes leveraging technologies such as cloud computing, big data, IoT, and AI to analyze, apply, and interconnect the data generated and collected during the teaching and learning process. As of 2024, the market size of China's higher education teaching and learning digitalization market was RMB21.3 billion, and is expected to reach RMB45.3 billion by 2029, with a CAGR of 16.3% from 2024 to 2029.

Source: MOE, National Bureau of Statistics, Frost & Sullivan

Overview of China's Higher Education Teaching and Learning Informatization Market

Market Size and Growth of China's Higher Education Teaching and Learning Informatization Market

Market Size of Higher Education Teaching and Learning Informatization Market by Development Stage (China), 2020-2029E



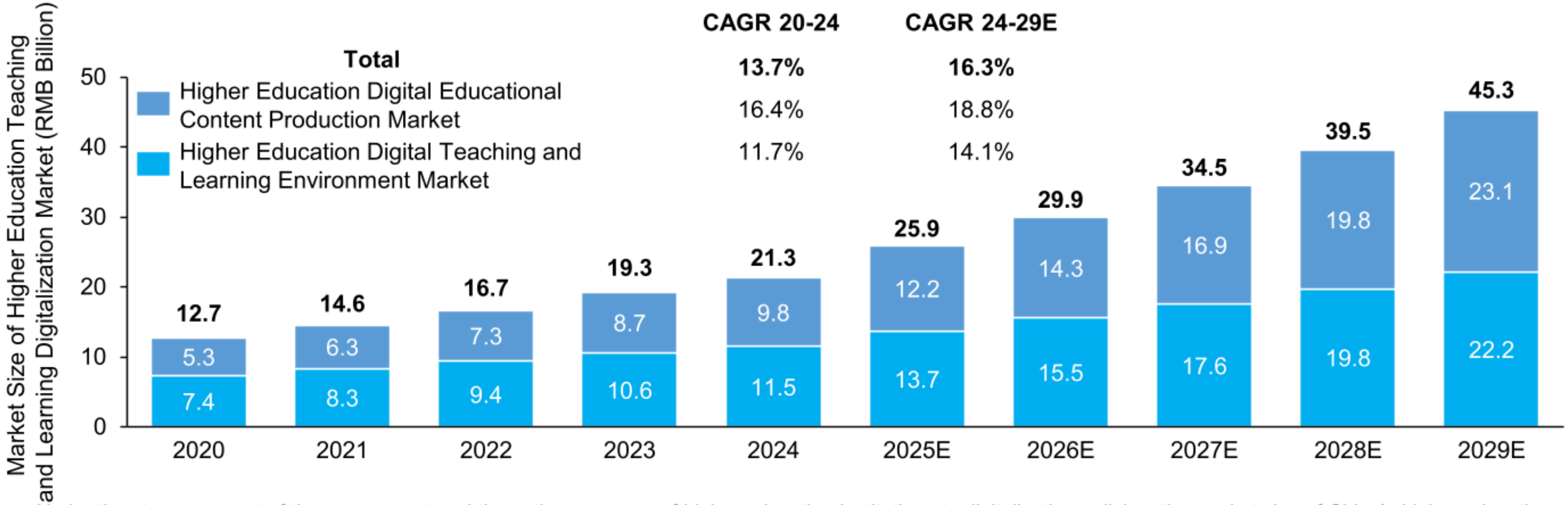
- With the rise in government expenditure on higher education informatization and the growing proportion of expenditure on teaching and learning informatization, the market size of China's higher education teaching and learning informatization market increased from RMB20.8 billion in 2020 to RMB35.4 billion in 2024, with a CAGR of 14.2%. It is expected to reach RMB69.2 billion by 2029, representing a CAGR of 14.3% from 2024 to 2029. In terms of development stage, higher education teaching and informatization market can be divided into traditional teaching and learning informatization and teaching and learning digitalization. The market share of higher education teaching and learning digitalization is expected to increase from 60.0% in 2024 to 65.5% in 2029.

Source: MOE, National Bureau of Statistics, Frost & Sullivan

Overview of China's Higher Education Teaching and Learning Informatization Market

Market Size and Growth of China's Higher Education Teaching and Learning Digitalization Market

Market Size of Higher Education Teaching and Learning Digitalization Market by Product / Service Type (China), 2020-2029E

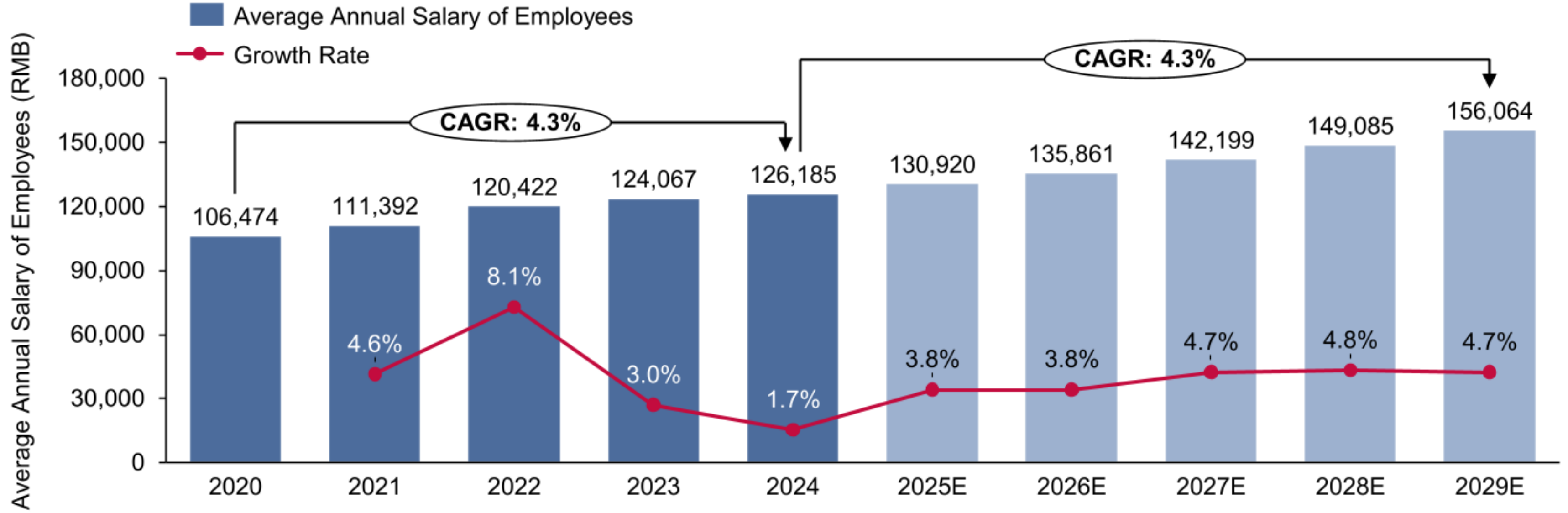


- Under the strong support of the government and the active response of higher education institutions to digitalization policies, the market size of China's higher education teaching and learning digitalization market has grown from RMB12.7 billion in 2010 to RMB21.3 billion in 2024, with a CAGR of 13.7%, demonstrating a strong market demand for digital teaching and learning environment services and products. It is expected to reach RMB45.3 billion by 2029, with a CAGR of 16.3% from 2024 to 2029. The higher education teaching and learning digitalization market can be categorized into two sub-markets by productor service type: higher education digital educational content production market and higher education digital teaching and learning environment market.
- Digital educational content production is the core of education, the starting point and foundation of teaching and learning digitalization in higher education. High-quality educational content is carefully designed and produced by outstanding teaching teams within higher institutions, based on curricula. Capturing the teaching process or creating course materials allows students to watch independently or engage in hands-on learning, laying an important content foundation for digital teaching. In 2024, higher education digital educational content production market accounted for 46.0% of the overall market size of higher education teaching and learning digitalization in China, and is projected to reach 51% by 2029.
- Digital teaching and learning environment represents the environmental carrier for education, such as smart classrooms and LMS. These are intended to provide teachers and students with an immersive teaching experience and to serve personalized user requirements in various scenarios. It also refers to cloud platforms, software, or cloud-based APIs provided to higher education institutions to facilitate the management of their teaching resources. These tools serve the entire process of teaching activities, from course development, course management, course selection and payment, classroom teaching, online learning, to certification of studies.
- In addition, a few services and products providers are actively developing an ecosystem for higher education teaching and learning digitalization, offering vital support to leverage the increased value of digital educational content and the digital teaching and learning environment, contributing significantly to the advancement of the industry.

Source: MOE, National Bureau of Statistics, Frost & Sullivan

Overview of China’s Higher Education Teaching and Learning Informatization Market
Cost Analysis – Average Annual Salary of Employees

Average Annual Salary of Employees (China), 2020-2029E



- In China’s higher education teaching and learning digitalization industry, employee benefit expenses are one of the major cost expenses for companies in the industry.
- With the prosperity of China's macro economy and the development of the education industry, the average annual salary of employees in the China’s Higher education teaching and learning digitalization market has increased from RMB106,474 in 2020 to RMB126,185 in 2024, representing a CAGR of 4.3%, according to the National Bureau of Statistics.
- Moreover, it is expected to continue to grow to RMB156,064 by 2029, with a CAGR of 4.3% from 2024 to 2029 due to the country’s emphasis on the education industry.
- The rise in staff costs is both a challenge and an opportunity for education enterprises: on the one hand, it increases their operating costs and competitive pressure in the market, affecting their profitability and investment attractiveness; on the other hand, it forces them to pay more attention to cost management and innovation, pushing them to adopt new technologies and optimize their operating models, as well as launching new products or services that are more competitive and adaptable in the market.

Source: National Bureau of Statistics, Frost & Sullivan

Overview of China's Higher Education Teaching and Learning Informatization Market

Key Drivers of China's Higher Education Teaching and Learning Digitalization Market

	Major Drivers	Impact (1-2 years)	Impact (3-5 years)
1	**Demands for Educational Equity**	High	High
2	**Favorable Policies and Financial Support**	Medium	High
3	**Technology Accumulation and Innovative Application**	High	High

Major Drivers	Description
Demands for Educational Equity	The continuous advancement of society places greater demands on educational equity. An increasing number of leading domestic higher education institutions are leveraging teaching and learning digitalization services and products to share high-quality educational resources with regional institutions that struggle with scarce educational materials or outdated teaching methods. This shared effort can help reduce regional imbalances in the distribution of educational resources, thereby promoting educational equity.
Favorable Policies and Financial Support	The Chinese government is actively advocating for the implementation of digitalization in higher education teaching and learning, with the goal of nurturing more talents who can contribute to scientific research innovation and drive the overall economic and social development. Favorable policies to promote and facilitate the sharing and integration of high-quality educational resources can also enhance the overall quality of higher education.
Technology Accumulation and Innovative Application	Innovative developments in AI, virtual simulation, audio-video technology, and data security have accelerated the transformation from traditional classrooms to digital and intelligent learning spaces. These technologies not only enhance the quality of education, but also facilitate the construction of intelligent teaching and learning environments and the sharing of resources, creating a constantly evolving digital ecosystem for education.

Source: Frost & Sullivan

Overview of China's Higher Education Teaching and Learning Informatization Market
Key Drivers of China's Higher Education Teaching and Learning Digitalization Market

	Major Drivers	Impact (1-2 years)	Impact (3-5 years)
4	**Pioneering Impact of Leading Higher Education Institutions**	High	High
5	**Evolution of Teaching and Learning Habits**	High	High

Major Drivers	Description
Pioneering Impact of Leading Higher Education Institutions	Higher education institutions in "Double First-Class Initiative" and "Double High Plan" are leading higher education institutions that excel in research capabilities, discipline building, and faculty strength compared to other institutions. These leading universities are pioneers and leaders in China's teaching digitalization in higher education, leading to the development of the entire market. In 2021, the average total expenditure on higher education informatization for universities within the "Double First Class Initiative" reached RMB33.4 million, which was about three to four times that of other universities. Similarly, the average total expenditure on higher education informatization for vocational colleges within the "Double High Plan" reached RMB15.8 million in 2021, approximately two to three times that of other vocational colleges. In terms of digitalization capabilities and willingness, these leading higher education institutions are significantly ahead of other domestic higher education institutions, playing a driving and exemplary role in the digitalization construction of other higher education institutions.
Evolution of Teaching and Learning Habits	The digital era has not only affected students, but has also significantly impacted teachers. As students increasingly embrace digital learning tools, teachers are adapting to this shift by incorporating digital resources into their teaching methods. This shift in teaching and learning habits has been accelerated by the COVID-19 pandemic, as teachers and students have had to quickly adjust to remote and online teaching and learning environments. As a result, higher education institutions are required to continuously update teaching facilities and methods to align with emerging learning habits and requirements. This trend has also stimulated the expansion of the market for higher education teaching and learning digitalization services and products.

Source: Frost & Sullivan

Overview of China's Higher Education Teaching and Learning Informatization Market
Policies and Regulations (Cont.)

Policies and Regulations on Higher Education Teaching and Learning Digitalization (China)

Name	Issued Time	Issued Department	Key Messages
Opinions on Accelerating Education Digitalization 《關於加快推進教育數字化的意見》	2025	The Ministry of Education of the PRC and Eight Other Departments 中華人民共和國教育部等九部門	• The policy sets out to establish a modern, inclusive, and high-quality digital education system that supports lifelong learning and national modernization goals. • Promote digital upgrades across all educational stages—from preschool to higher and vocational education—through smart classrooms, digital campuses, and intelligent teaching tools. Enhance national digital education infrastructure, including cloud platforms, data centers, and broadband connectivity in schools, particularly in rural and remote areas. Encourage the creation and sharing of high-quality digital teaching resources to reduce regional disparities and promote educational equity. Foster new pedagogical models such as blended learning, AI-assisted teaching, and personalized learning paths based on data and analytics.
The 2024-2035 Master Plan on Building China into a Leading Country in Education 《教育強國建設規劃綱要（2024—2035年）》	2025	Central Committee of the PRC, State Council of the PRC 中共中央、國務院	• Implement the national digital education strategy. Promote integration, intelligence, and internationalization while strengthening and utilizing the National Smart Education Public Service Platform to establish a digital education system. Develop new types of digital education resources. • Advance the construction of digital campuses and explore effective ways for digital empowerment in large-scale personalized learning and innovative teaching. Facilitate the global reach of high-quality Massive Open Online Courses (MOOCs).
Highlights of the National Education Digitization Strategy Initiative 2024 《國家教育數字化戰略行動2024年工作要點》	2024	Ministry of Education of the PRC 中華人民共和國教育部	• Strengthen overall planning for education digitalization; improve the National Smart Education Public Service Platform system; implement AI-powered education initiatives; and build a sound ecosystem for digital education applications.
China Smart Education Development Report (2023) 《中國智慧教育發展報告（2023）》	2024	China National Academy of Educational Sciences 中國教育科學研究院	• The global development of digital education will follow five major trends: (1)The application prospects of generative artificial intelligence in education are vast. (2)Technology-driven immersive scenarios will enhance the learning experience. (3)Education assessment will undergo a digital transformation. (4)Teachers and artificial intelligence will coexist, co-teach, and co-learn. (5)The digital education application ecosystem will thrive.

Source: Frost & Sullivan

Overview of China's Higher Education Teaching and Learning Informatization Market
Policies and Regulations

Over the past years, the Chinese government has issued a series of policies and regulations to encourage and promote the development of higher education teaching and learning digitalization. Below listed some policies and regulations that are promulgated in recent years.

Policies and Regulations on Higher Education Teaching and Learning Digitalization (China)

Name	Issued Time	Issued Department	Key Messages
Plan for the Overall Layout of Building a Digital China 《數字中國建設整體布局規劃》	2023	Central Committee of the PRC, State Council of the PRC 中共中央、國務院	• To vigorously implement the national education digitalization strategic action and improve the national smart education platform.
Highlights of the work of the Department of Higher Education of the Ministry of Education for the year 2023 《教育部高等教育司2023年工作要點》	2023	Ministry of Education of the PRC 中華人民共和國教育部	• Emphasized the in-depth implementation of the digital strategy action and the shaping of new advantages in the reform and development of higher education, include accelerating the digital transformation of higher education and creating a new form of teaching and learning in higher education; strengthening the construction of the National Higher Education Intelligent Education Platform, expanding the content of the platform, perfecting the platform's functions, and constructing a comprehensive service platform for higher education rich in content and highly efficient in terms of services.
Notice on the release of two education industry standards for the smart education platform series 《關於發布智慧教育平臺系列兩項教育行業標準的通知》	2022	Ministry of Education of the PRC 中華人民共和國教育部	• To solidly advance the national education digitalization strategic action, to improve the education informatization standard system, and to enhance the construction and application level of smart education platforms at all levels.
Guiding Opinions of the Ministry of Education and Five Other Departments on Promoting the Construction of New Educational Infrastructures and Constructing a High-Quality Educational Support System 《教育部等六部門關於推進教育新型基礎設施建設構建高質量教育支撐體系的指導意見》	2021	Ministry of Education of the PRC, Office of the Central Cyberspace Affairs Commission, National Development and Reform Commission, Ministry of Industry and Information Technology of the PRC, Ministry of Finance of the PRC, the People's Bank of China 中華人民共和國教育部、中央網絡安全和信息化委員會辦公室、國家發展改革委、中華人民共和國工業和信息化部、中華人民共和國財政部、中國人民銀行	• To popularize blended, cooperative, experiential and inquiry-based teaching under new technology conditions, and explore new teaching methods. • To promote applications such as the "three classrooms" and expand the coverage of high-quality resources. • Develop applications such as intelligent diagnosis, resource pushing and learning counselling based on big data to promote students' personalized development. • Develop teaching applications such as intelligent teaching assistants and intelligent learning companions based on artificial intelligence, realizing "human-machine co-teaching and human-machine co-education", and improving the quality of education and teaching and learning.
Digital Campus Construction Specifications for Higher Education Institutions 《高等學校數字校園建設規範》	2021	Ministry of Education of the PRC 中華人民共和國教育部	• Emphasized the establishment of a stable funding mechanism to ensure that the financial needs of digital campus construction are met. • The government supports and incentivizes the construction of digital campuses in terms of policy, and promotes universities to accelerate the pace of information technology construction through policy guidance and financial support.
Implementation Program for the Evaluation of Undergraduate Education Teaching and Learning in General Colleges and Universities (2021-2025) 《普通高等學校本科教育教學審核評估實施方案（2021-2025年）》	2021	Ministry of Education of the PRC 中華人民共和國教育部	• Defined assessment criteria for undergraduate teaching, in which the digitalization of the content of the curriculum by schools and teachers plays an important role

Source: Frost & Sullivan

Overview of China's Higher Education Teaching and Learning Informatization Market
Policies and Regulations (Cont.)

Policies and Regulations on Higher Education Teaching and Learning Digitalization (China)

Name	Issued Time	Issued Department	Key Messages
Measures for the Recommendation and Recognition of National First-Class Undergraduate Programs under the "Twenty Thousand Plan" 《「雙萬計劃」國家級一流本科課程推薦認定辦法》	2019	Ministry of Education of the PRC 中華人民共和國教育部	• From 2019 to 2021, it would complete the identification of about 4,000 national online first-class courses (national high-quality online open courses), 4,000 national offline first-class courses, 6,000 national online and offline blended first-class courses, 1,500 national first-class courses for virtual simulation experimental teaching, and 1,000 national first-class courses for social practice.
China Education Modernization 2035 《中國教育現代化2035》	2019	Central Committee of the PRC, State Council of the PRC 中共中央、國務院	• Emphasized the importance of accelerating educational change in the information age. • Proposed the construction of an intelligent campus and the coordinated construction of an integrated digital teaching, management and service platform. • Proposed the use of modern technology to promote the reform of the talent training model and achieve the organic combination of large-scale education and personalized training.
Implementation Program for Accelerating the Modernization of Education (2018-2022) 《加快推進教育現代化實施方案（2018—2022年）》	2019	Central Committee of the PRC, State Council of the PRC 中共中央、國務院	• Included "vigorously promoting education informatization" as one of the ten key tasks, emphasizing the key role of education informatization in the modernization of education.
Education Informatization 2.0 Action Plan 《教育信息化2.0行動計劃》	2018	Ministry of Education of the PRC 中華人民共和國教育部	• Put forward the development goal of 'three full, two high and one big', i.e. teaching application covers all teachers, learning application covers all students of school age, digital campus construction covers all schools, the level of informatization application and the information literacy of teachers and students are generally improved, and the 'Internet + Education' platform is established. • Emphasized on the deep integration of information technology and education; to promote the upgrading of the mode of supply of educational services and the level of educational governance.
13th Five-Year Plan for Education Informatization 《教育信息化「十三五」規劃》	2016	Ministry of Education of the PRC 中華人民共和國教育部	• Emphasized the in-depth integration of information technology and education services. • To promote innovation in education concepts and models, and to reform the talent training model.
Opinions on Strengthening the Application and Management of Online Open Course Construction in Higher Education Institutions 《關於加強高等學校在線開放課程建設應用與管理的意見》	2015	Ministry of Education of the PRC 中華人民共和國教育部	• Colleges and universities should carry out the innovation of credit recognition and credit management system of online courses. Online courses should expand the scope of mutual recognition of credits, establish a unified standard for mutual recognition of credits, and rely on third-party recognition institutions to carry out credit recognition, accumulation and conversion.

Source: Frost & Sullivan

Overview of China’s Higher Education Teaching and Learning Informatization Market
Policies and Regulations (Cont.)

- Policies related to the digitalization of higher education in China have greatly advanced the development of digital teaching and learning. These policies provide clear development direction, enhance infrastructure, promote the integration of technology and education, facilitate the sharing of high-quality resources, upgrade the digital literacy of teachers and students, and optimize education management and services. This strong support has fostered innovation in education models and improved education quality, aligning higher education with the demands of the digital age.

Source: Frost & Sullivan

Future Trends of China's Higher Education Teaching and Learning Digitalization Market

Focusing on high-quality digital Educational content

- The uneven distribution of educational resources reveals that teachers and courses in key disciplines will receive greater attention, prompting an increasing number of teachers to assume responsibility for the dissemination of knowledge and prioritize the creation of high-quality digital educational content. The continuous accumulation of such content fuels the expansion of digital environments and broadens the scope of digital resource sharing. This fosters equity in education, thus raising overall education standards.

Blended learning models

- Blended learning models, which combine online and offline approaches, are emerging as a prominent educational strategy. This integration of traditional offline and online teaching methods is shaping a new standardized teaching model. Moreover, it encompasses a rich fusion of real-world and virtual learning environments, spanning experiences both within and beyond individual institutions. In this model, digital tools and platforms are seamlessly integrated into teaching scenarios, enhancing flexibility in learning while maintaining continuity and quality of education.

Personalized Teaching and Learning Approaches

- With the increasing maturity of next-generation technologies such as AI, big data, and cloud services, attention will be further focused on meeting personalized needs of teachers and students through intelligent analysis and management tools. Taking university knowledge graphs as an example, as the core brain and engine of the future "AI + education" era, knowledge graphs not only help teachers visualize, personalize, and systematize fragmented teaching resources, and provide intelligent education services, but also facilitate students' personalized deep learning and adaptive learning from their own perspectives, achieving scientific learning paths.

Enhanced and integrated support for digital and intelligent teaching methods

- Next-generation information technologies such as artificial intelligence, and big data serve as new drivers for the advancement of teaching and learning digitalization in higher education, facilitating the full integration and innovative evolution of information technology across all aspects of the higher education teaching system. This includes the establishment and enhancement of support systems for teaching and learning digitalization in higher education, such as integrated teaching and learning environments, teacher competency frameworks, technology-enabled teaching methodologies, personalized education resource services, education evaluation systems, data-driven governance frameworks for modern education, and assurance systems for emerging education ecosystems.

Future Trends of China's Higher Education Teaching and Learning Digitalization Market

Source: Frost & Sullivan

Challenges for China's Higher Education Teaching and Learning Digitalization Market

Challenges

Data Privacy and Security

- The increased use of digital platforms for learning has heightened concerns about data privacy and security. Robust systems must be implemented to protect students' personal information.

Regulatory Environment

- The regulatory environment for higher education teaching and learning digitalization in China is still evolving, leading to potential uncertainties and policy changes that could impact the market.

Quality of Digital Content

- There is a need for high-quality, engaging, and interactive digital content that can effectively facilitate learning. This requires considerable investment in content development and regular updates to keep pace with advancements in various fields of study.

Training for Educators

- Many educators may lack proficiency in using digital tools and platforms for teaching. Providing comprehensive training is crucial to ensure the effective implementation of digital teaching and learning in higher education.

Source: Frost & Sullivan

Content

Top Five Companies in Higher Education Teaching and Learning Digitalization Market by Revenue (China), 2024

Ranking	Top Five Companies in Higher Education Teaching and Learning Digitalization Market	Revenue (RMB Million)	Market Share (%)
1	Company A	950	4.5%
2	**The Company**	**848**	**4.0%**
3	Company B	440	2.1%
4	Company C	300	1.4%
5	Company D	200	0.9%
	Top five	**2,738**	**12.9%**
	Total	**21,258**	**100.0%**

Note:

1. *Company A is a private domestic company, founded in 2000 and headquartered in Beijing. It primarily offers digital library solutions and services and products for higher education teaching and learning digitalization.*
2. *Company B is a private domestic company, founded in 2019 and headquartered in Guizhou Province. It primarily provides cloud services for IT infrastructure, including services and products for higher education teaching and learning digitalization.*
3. *Company C is a subsidiary of a New York Stock Exchange and Hong Kong Exchange listed company, founded in 2008 and headquartered in Zhejiang Province. It primarily provides cloud services for IT infrastructure, including services and products for higher education teaching and learning digitalization.*
4. *Company D is a subsidiary of a Hong Kong Exchange listed company, founded in 2010 and headquartered in Beijing. It primarily provides cloud services for IT infrastructure, including services and products for higher education teaching and learning digitalization.*

- China's higher education teaching and learning digitalization market is characterized by a highly fragmented competitive landscape, with many providers offering a variety of services and products. By 2024, the top five providers accounted for an aggregate market share of 12.9% in terms of revenue of teaching digitalization market in higher education. There were around 2,000 players in higher education teaching and learning digitalization market in 2024.
- The Company ranked second among all providers in China, with a market share of 4.0% in terms of revenue from higher education teaching and learning digitalization services and products in 2024. This marked an increase from the Company's 2023 market share of 3.4%.
- The Company's total revenue from digitalizing teaching in higher education experienced a CAGR of 27.2% from 2021 to 2024, in contrast to Company A's CAGR of 2.5%.

Source: Frost & Sullivan

Top Three Companies in Higher Education Digital Educational Content Production Market (China), 2024

Ranking	Top Three Companies in Higher Education Digital Educational Content Production Market Revenue Market	Revenue (RMB Million)	Market Share (%)
1	**The Company**	**710**	**7.3%**
2	Company A	450	4.6%
3	Company F	60	0.6%
	Top three	**1,220**	**12.5%**
	Total	**9,779**	**100.0%**

Note:
1. Company F is a private domestic company, founded in 2010 and headquartered in Liaoning province. It primarily offers products and services for teaching and learning digitalization in higher education.

- The higher education digital educational content production market is characterized by a highly fragmented competitive landscape. By 2024, the top three providers accounted for an aggregate market share of 12.5% in terms of revenue. There were around 1,000 players in higher education digital educational content production market in 2024.
- The Company ranked first among all providers of teaching and learning digitalization in higher education in China, with a market share of 7.3% in terms of revenue in higher education digital educational content production market..
- The Company's total revenue from digital educational content production in teaching and learning digitalization market in higher education experienced a CAGR of 28.5% from 2021 to 2024, in contrast to Company A's CAGR of 1.7%.
- There were around 2,000 players in higher education teaching and learning digitalization market and around 1,000 players in higher education digital educational content production market in 2023.

Source: Frost & Sullivan

Top Five Companies in Higher Education Digital Teaching and Learning Environment Market by Revenue (China), 2024

Ranking	Top Five Companies in Higher Education Digital Teaching and Learning Environment Market	Revenue (RMB Million)	Market Share (%)
1	Company A	500	4.4%
2	Company B	440	3.8%
3	Company C	300	2.6%
4	Company D	200	1.7%
5	**The Company**	**138**	**1.2%**
	Top five	**1,578**	**13.7%**
	Total	**11,479**	**100.0%**

- China's higher education digital teaching and learning environment market is characterized by a highly fragmented competitive landscape. By 2024, the top five providers accounted for an aggregate market share of 13.7% in terms of revenue. There were around 1,500 players in higher education digital teaching and learning environment market in 2024.
- The Company ranked fifth among all providers of teaching and learning digitalization in higher education in China, with a market share of 1.2% in terms of revenue in higher education digital teaching and learning environment market.

Source: Frost & Sullivan

Entry Barriers of China's Higher Education Teaching and Learning Digitalization Market

Entry Barriers

Comprehensive Understanding of Teaching Across Varied Disciplines	• A deep understanding of the diverse disciplinary knowledge related to teaching and learning processes in higher education is a fundamental prerequisite for teaching and learning digitalization. Providers of services and products for teaching and learning digitalization in higher education must accumulate and understand the relevant disciplinary knowledge in order to effectively utilize their technical resources and capabilities, thus providing technological solutions that are in line with the requirements of higher education institutions.
Operational and Service Capabilities	• Higher education institutions, as large and complex systems, require service providers to have mature operational and service capabilities. By deploying management and technical personnel to deliver on-site services, service providers can help higher education institutions achieve digital and intelligent education transformation. For newcomers, mastering and implementing the requirements of products and services for teaching and learning digitalization in higher education to meet competitive standards can be challenging.
Technological Sensitivity and Expertise in Application Development	• Building robust, reliable and user-friendly end-to-end services and products for teaching and learning digitalization in higher education requires significant technological investment and expertise. Services and products providers must also customize technology to effectively address specific application scenarios in higher education institutions. This could pose a challenge for emerging companies.

Source: Frost & Sullivan

Entry Barriers of China's Higher Education Teaching and Learning Digitalization Market

Entry Barriers

Quality of Services and Products

- Digital services and products for teaching and learning in higher education often contain technical errors, bugs and security issues that are difficult to detect and correct, especially when new versions or upgrades are first introduced or implemented. For new entrants to the industry, their services and products may contain significant bugs, defects or security issues, resulting in loss of customers and significant remediation costs.

Reputation and Past Performance

- A solid track record and extensive past performance of providers offering services and products for teaching and learning digitalization in higher education in China are key factors that are closely evaluated by clients during the bidding process. Providers of teaching and learning digitalization in higher education with a proven track record often provide high-quality services, and their established market share significantly limits the entry of other competitors into the market. Therefore, the service experience and reputation of providers in China also serve as barriers for new entrants. For example, providers with a strong reputation and excellent performance can demonstrate their business capabilities through project quality, comprehensive execution capabilities and after-sales service, all of which are not easily achieved in a short period of time. Leading providers can gain a competitive advantage through their robust resource networks, excellent reputation and outstanding performance in bidding processes.

Source: Frost & Sullivan

Content

Appendix
Identities of Competitors

Company	English	Chinese
Company A	Beijing Superstar Information Technology Co., Ltd.	北京世紀超星信息技術發展有限公司
Company B	Huawei Cloud Computing Technology Co., Ltd.	華為雲計算技術有限公司
Company C	Aliyun Computing Co., Ltd.	阿里雲計算有限公司
Company D	Tencent Cloud Computing (Beijing) Co., Ltd.	騰訊雲計算（北京）有限責任公司
Company E	Beijing Muhua Information Service Co., Ltd.	北京慕華信息科技有限公司
Company F	Liaoning Sunflower Digital Technology Co., Ltd.	遼寧向日葵數字技術股份有限公司

Source: Frost & Sullivan

Appendix
Competitive Advantages of the Group (1/3)

Features of the Services and Products offered by the Group and its Peers

- The Group is a leading digital teaching and learning solution provider for higher education institutions in China. The Group provides both digital educational content services and products and digital teaching and learning environment services and products. The services and products offered by the Group are characterized by the following main features:
- For digital educational content services and products as well as digital teaching and learning environment services and products provided by the Group:

① Full-chain Services: The Group offers comprehensive digital educational content services and products, as well as digital teaching and learning environment solutions. Distinguished among its peers in China, the Group uniquely addresses the diverse needs of higher education institutions holistically. In contrast, most competitors specialize solely in either educational content digitization or the digitalization of learning and teaching environments.

② Full-chain Coverage: The Group has developed a scalable portfolio of services and products encompassing the entire value chain of higher education digitalization, which includes solutions for teaching, learning, testing, practicing, evaluating, and administration.

③ Higher Market Share and Customer Recognition: According to Frost & Sullivan, the Group ranked second in terms of revenue among all companies in China's higher education teaching and learning digitalization market with a market share of 3.4%.

- For digital educational content services and products provided by the Group only:

① Wide Range of Disciplines Covered: During the Track Record Period, the Group had developed more than 34,000 digital courses and its services and products spanned 12 disciplines and 92 subjects recognized by the Ministry of Education.

② Good Quality Content: The Group had 627 digital courses that won the gold awards in the first and second batch of national recognition of first-class undergraduate courses and the review of national online quality courses for vocational education by the Ministry of Education, being the most among the top five players by revenue in China's higher education teaching and learning digitalization market.

③ Higher Market Share and Customer Recognition: According to Frost & Sullivan, the Group ranked first in terms of revenue among all companies in China's higher education digital educational content production market with a market share of 7.3% in 2024.

Source: Frost & Sullivan

Appendix

Competitive Advantages of the Group (2/3)

Average Selling Prices of the Services and Products offered by the Group and its Peers

Services and Products	The Group	Company A	Company B	Company C	Company D
Digital Educational Content Services and Products					
Digital Course	RMB10,000 -RMB100,000 per course	RMB10,000 - RMB100,000 per course	Not applicable	Not applicable	Not applicable
Knowledge Graph	RMB100,000 - RMB150,000 per course/set	RMB50,000 - RMB100,000 per course/set	Not applicable	Not applicable	Not applicable
Virtual Simulation	RMB100,000 - RMB300,000 per course /experiment	RMB150,000 - RMB300,000 per course /experiment	Not applicable	Not applicable	Not applicable
Digital Teaching and Learning Environment Services and Products					
Cloud LMS	RMB50,000 - RMB200,000 per annum	RMB50,000 - RMB150,000 per annum	RMB50,000 - RMB150,000 per annum	RMB50,000 - RMB150,000 per annum	RMB50,000 - RMB200,000 per annum
Digital Classroom					
Immersive Classroom	RMB800,000 - RMB1,000,000 per classroom	RMB800,000 - RMB1,000,000 per classroom	RMB100,000 - RMB800,000 per classroom	MB100,000 - RMB800,000 per classroom	MB200,000 - RMB800,000 per classroom
Panoramic Teaching Space	RMB2,000,000 - RMB4,000,000 per classroom	Not applicable	Not applicable	Not applicable	Not applicable
LiveCourse Software	RMB100,000 - RMB400,000 per year	Not applicable	R Not applicable	Not applicable	Not applicable

- The Group offers services and products with wider price range. The Group can offer competitively priced solutions, thanks to its technical expertise, efficient cost management, operational capabilities, and extensive content production experience. It can also provide optional high-priced customized services or products, thanks to its advanced technology in educational content production, good reputation in the industry and stable relationships with its customers.
- In terms of digital teaching and learning environment services and products, the Group does not hold a significant price advantage. This is due to the more advanced development and utilization of hardware and equipment by various cloud service competitors. However, the Group is one of the few companies that can offer panoramic teaching space and live course software services and products.

Source: Frost & Sullivan

Competitive Advantages of the Group (3/3)

Technologies of the Services and Products offered by the Group and its Peers

- The Group's offerings encompass a broad spectrum of advanced technologies, including artificial intelligence, immersive teaching and learning environment construction, real-time media cloud, and virtual simulation technology. These technologies are widely recognized and utilized in comparable services and products provided by the Group's industry peers.

Source: Frost & Sullivan

Appendix
About the Group

- The Group is a leading provider of digital teaching and learning solutions for higher education institutions in China, leading the intelligent transformation of the education industry.
- The digitalization for the higher education teaching and learning encompasses both educational content digitization and the teaching and learning environment digitalization. The Group is among the select players in China capable of holistically addressing the multifaceted needs of higher education institutions in such aspects.
- The Group created a system which uses mainstream and advanced three-dimensional simulation technology for research and development, including establishing realistic three-dimensional models and functional requirements development, and can complete the data docking of experimental resources with the specified platform. The system follows the industry standards and best practices for developing high-quality and user-friendly virtual simulation resources that can meet the diverse and changing needs of the education market.
- The Group competes with other digital hardware manufacturers that develop and offer classroom construction supplies, course content developer for customers.
- The Group’s credit course sharing platform has been recognized as one of the leading platforms in China, boasting one of the largest numbers of available courses.
- The Group’s strong technology capabilities drive the growth of its business.
- As one of a few players in China that is able to comprehensively address the needs of higher education institutions for both education content and environment digitalization, the diversification of the Group’s offerings create more cross-selling opportunities for the Group.
- The Group has attracted a large portion of Lighthouse Customers, representing key segments of the Leading Higher Education Institutions in China, has seen significant growth in terms of the number of Lighthouse Customers and revenue contributed by such customers, underscoring its influence and reputation in in China’s higher education teaching and learning digitalization market.
- The Group’s Lighthouse Customers are among the pioneers and leaders in China’s teaching digitalization in higher education.
- As of June 30, 2024, the Group maintained 236 customer service and support centers in 92 cities. 69.3% of higher education institutions in China are located in those 92 cities, covering substantially all provinces, municipal cities and autonomous regions in China.
- The payment process of the Group’s customers are subject to the influence of various factors, including budget cycle and operating schedule of higher education institutions; and the payment process of the Group’s customers had been prolonged due to the pandemic. In 2023, the Group improved efficiency in communicating with customers and enhanced management over trade receivables.

Source: Frost & Sullivan

Appendix
About the Group (Cont.)

- The Group is at the forefront of digitalizing higher education and enjoys strong reputation, consistently setting industry benchmarks with its innovative products.
- The Group has led the development of products specifically designed for the unique demands of higher education, resulting in valuable experience, successful product launches, and rapid commercialization. The Group's pioneering efforts in digitalization lead the development of the industry, working closely with institutions to achieve significant milestones.
- The Group utilizes its deep understanding of teaching practices and subject nuances to meet the needs of educators in premier universities and colleges.
- To address the need for digital education content delivery in teaching and learning environments and overcome challenges posed by the outdated teaching facilities in higher education institutions, the Group developed smart, multi-environment and multi-purpose teaching spaces that integrate software and hardware solutions.
- The Group's panoramic teaching space is a key innovation. Unlike most of the Group's competitors who focus on either educational content or learning and teaching environment digitalization, the Group's integrated new digital infrastructure benefits from synergies and customer retention through this comprehensive approach.
- The Group stays at the forefront of educational technology and application research, delivering competitive and cutting-edge solutions.
- The Group is the leading digital teaching and learning solution provider for higher education institutions in China.
- The Group is one of the first movers and leading player of China's higher education teaching and learning digitalization industry. The Group has gained profound insights into customer needs, a large and loyal customer base and significant influence on stakeholders' value system through its long-term leading position and continuous and deep involvement.
- The Group operates a leading credit course sharing platform in China in terms of number of courses.
- The Group's leading market position have resulted in strong operational capabilities that serves to continually strengthen its industry leadership and position as well as to further capitalize on the growth potential of China's teaching and learning digitalization industry for higher education institutions.
- Leveraging the Group's deep understanding of the industry, the Group has shown its pioneering services and products development capabilities and customer service. The Group has developed a portfolio of various types of scalable services and products covering the full value chain of higher education teaching and learning digitalization.

Source: Frost & Sullivan

Appendix
About the Group (Cont.)

- The Group has become one of the few companies in the industry that can leverage advanced technologies to enable a wide range of application scenarios, including both digital educational content and learning and teaching environment. Moreover, the Group is one of the few companies in the industry who can quickly grasp the latest technologies that appear in the market and is one of the first companies to carry out application research and development in the first time to form services and products that meet the common needs of a large number of customers, and obtain wide market recognition, achieving rapid commercialization success.
- As one of the few players in China that is able to comprehensively address the needs of higher education institutions for both educational content and environment digitalization, the diversification of the Group's offerings create more cross-selling opportunities for the Group.
- As a leader in the higher education digital teaching and learning industry, the Group has constantly been one of the first players to spot industry trends, develop market benchmark products and extend those products to a wider range of higher education institutions.
- Utilizing the Group's expertise in AI, big data, cloud computing, and content production, the Group develop cutting-edge solutions that elevate educational quality and efficiency.
- The Group had 513 digital courses that won the gold awards in the first and second batch of national recognition of first-class undergraduate courses and the review of national online quality courses for vocational education by the Ministry of Education, being the most among the top five players by revenue in China's higher education teaching and learning digitalization market.
- The Group's customers with good credit history are primarily higher education institutions from the public sector.
- The Group's labor force is mobile, which makes it impracticable for the Group to make such contributions in time for the relevant employees who are only with the Group on a temporary basis. This is not uncommon in industry practice.
- The Group faces competition in various aspects of our business, including research and development capabilities, customer services and retention, talents, brand awareness, commercial relationships, and financial, technical, marketing, and other resources.
- The Group is an exemplary provider of digital teaching and learning solutions for higher education.
- The Group pioneers industry-leading digital teaching and learning products and garner widespread recognition.
- The Group is a pioneer leading the intelligent digitalization of the higher education industry.
- The Group competes with numerous domestic companies, including those with extensive marketing and sales networks, strong industry experience and extensive technology development resources.
- Historically, the Group has successfully introduced many innovative services and products that fill the gaps in the industry. The Group is one of the first companies to provide digital course content; knowledge graph and panoramic teaching space services and products for higher education institutions in China.

Source: Frost & Sullivan

Appendix
About the Group (Cont.)

- Committed to empowering higher educational institutions, teachers, and students, the Group drives industry progress, securing its competitive edge and industry position.
- The Group's results of operations are exposed to seasonal fluctuations, which is in line with the market.
- The Group holds pioneer position in AI technology application for higher education digitalization.
- The Group's offering and operation of full-chain services and products create a virtuous cycle, creating more value to the industry and increasing customer loyalty and satisfaction.
- The Group's effective syllabus digitization process is underpinned by a strong inhouse team of course consultants, which differentiates the Group from peers.
- The Group relies on its employees to deploy and deliver services and products, as well as support the business operation. As a result, in 2021, 2022 and 2023, employee benefit expenses formed the largest portion of the Group's cost of sales while accounted for 29.0%, 36.5% and 24.5% of the Group's total revenue. As the Group's business continues to grow, the Group expects to further expand its employee base. Thus, the proportion of the employee benefit expenses is expected to continue to rise in the future. After conducting market research and interviews with market professionals, Frost & Sullivan confirms that the Group's major cost components align with those of other companies in China's higher education digitalization industry.
- The Group's first mover advantage in the field of knowledge graph which had established the Group as the leader, innovator and benefitted from a loyal customer base, allowing the Group to have more discretion in formulating favorable pricing policies.
- The Group focuses on the universities nominated under the "Project 985", "Project 211" and "Double First-Class Initiative" and the higher vocational colleges nominated under the "Double High Plan" which are its Lighthouse Customer since they are among the pioneers and leaders in China's teaching and learning digitalization in higher education, demonstrating the willingness to proactively adopt the latest digitized teaching and learning services and products and have a much stronger spending power than other higher education institutions.
- Unlike certain companies relying on material projects such as general AI solution companies or construction companies, the Company's project based services and products by nature do not carry significant amount lasting several years.
- The Group's scalability in the production of knowledge graphs has facilitated the economies of scale.
- Unlike other technology product or services providers targeting the extensive Chinese enterprise market flourished with new entrants each year, the Group's target customers are relatively stable.

Source: Frost & Sullivan

Appendix
About the Group (Cont.)

- It is respectfully submitted the following detailed comparisons between the Group and its peers in China's higher education teaching and learning digitalization market on the following metrics.
- (i) Full-chain Services: The Group offers comprehensive digital educational content services and products, as well as digital teaching and learning environment solutions. Unlike most competitors who focus solely on either digital educational content services and products or digital teaching and learning environment solutions, the Group uniquely addresses the diverse needs of higher education institutions holistically. As one of the few players in China that can comprehensively address the needs of higher education institutions for both education content and environment digitalization, the comprehensive approach allows the Group to create more cross-selling opportunities and stand out among its peers in China.
- (ii) Full-chain Coverage: The Group provides a scalable portfolio of services and products that cover the entire value chain of higher education teaching and learning digitalization, which includes solutions for teaching, learning, testing, practicing, evaluating and administration. By offering a coherent and coordinated set of holistic solutions, the Group reduces integration costs and complexity, providing unified technical support and maintenance services to simplify school operations and increase customer satisfaction. This level of service is unmatched by suppliers who focus on niche modules.
- (iii) Number of Course Provided: During the Track Record Period, the Group developed more than 27,000 digital courses, and its services and products spanned 12 disciplines and 92 subjects recognized by the Ministry of Education. The Group's credit course sharing platform is one of the leading platforms in China, offering a significantly larger number of digital courses than Company E and most other industry peers.
- (iv) Number of Course that Won the Gold Awards: The Group had 513 digital courses that won the gold awards in the first and second batch of national recognition of first-class undergraduate courses and the review of national online quality courses for vocational education by the Ministry of Education, being the highest among the top five players by revenue in China's higher education teaching and learning digitalization market. During the Track Record Period, Company A and Company E launched 280 and 325 courses that won the gold awards, respectively.
- (v) Number of Knowledge Graph Launched: The Group developed more than 1,200 knowledge graphs during the Track Record Period, more than any peers in the industry, which have developed fewer than 1,000 knowledge graphs. According to the disclosure of public bid information, in 2023, the winning bid amount of the Group's knowledge graph business is much higher than that of its peers. In the same comparison dimension, the winning bid amount of its knowledge graph business is more than three times that of Company A.
- (vi) Professional Capabilities: To ensure continuous output of quality content as well as advanced products and services, the Group has invested heavily in developing in-house professional content development capabilities and related technologies for higher education teaching and learning digitalization. From 2021 to 2023, the Group's R&D expenses accounting for 16.6%, 24.5% and 15.5% of the total revenue, respectively, significantly higher than the industry average of approximately 5% to 10%.
- The above industry information is based on Frost & Sullivan's best efforts. Public data and information are limited in China's higher education teaching and learning digitalization industry due to the large number of market players, all of which are private companies.
- Frost & Sullivan has researched and analyzed the performance of competitors and industry averages on a comparable basis based on secondary research and in-depth interviews with industry experts. However, due to the non-public nature of the competitor data and confidentiality obligations, we do not recommend the publication of the above competitor information in the Prospectus.

Source: Frost & Sullivan

Appendix
About the Group (Cont.)

- According to Frost & Sullivan, through online searches of bidding-related documents and announcements of higher education institutions in Mainland China, it concludes that it is not uncommon for higher education institutions in Mainland China to require their suppliers to provide deposits to guarantee the suppliers' performance obligation before the delivery of services and products to the higher education institutions. For example, Shaanxi Normal University (陝西師範大學), Xuzhou Medical University (徐州醫科大學) and Guangxi University of Finance and Economics (廣西財經學院) and Shanxi Medical University (山西医科大学) require their suppliers to provide a deposit, which typically amounts to approximately 5% to 10% of the contract value, during their bidding processes to guarantee the suppliers' performance of their contractual obligations. Therefore, the Group's deposit arrangements with customers are in line with the industry norm. In instances where a customer makes full payment to the supplier before the contract has commenced, it is not uncommon for the supplier to make a deposit exceeding 10% of the contract value.
- The percentage of the prepayment amount was primarily affected by the contract fulfillment progress. On occasions where a customer makes full payment to the supplier for a contract that has not yet commenced, the supplier generally agrees to make a deposit up to the full amount of the prepayment. According to Frost & Sullivan, it is not uncommon that the variation range of 25% to 100% in deposit amounts paid as a percentage of the prepayment amounts received by the suppliers in China's higher education teaching and learning digitalization industry. Based on expert interviews conducted by Frost & Sullivan, such practice often takes the form of supplementary agreements voluntarily signed by the parties.
- The demand for the majority of the Group's services and products, except for Cloud LMS and LiveCourse software which is based on annual subscription, do not demonstrate an annual or regular pattern, which is primarily due to (i) each university's various schools and colleges independently develop their digitalization plans based on specific needs, which do not typically follow an annual trend; and (ii) the budgeting processes of these schools and colleges impose constraints, resulting in non-uniform purchasing decisions across different institutions and time periods.
- Regarding the disclosed customer retention rate, the Company submits that the "retention rate for customers" submitted in the Reply to the 1st comment letter on June 15, 2024, was determined by dividing the number of customers from the previous year who remained with the Group in the current year by the total number of customers in the current year. In contrast, the customer retention rate disclosed in the revised Post Application Proof 2 is divided by the total number of customers from the previous year as such approach reflects a more accurate representation of the retention metric and aligns with industry norms.
- The demand for the Company's services and products is influenced by various factors, including the budgeting cycles of universities and governments, their decision-making processes, industry trends, reputation and technological advancements. Consequently, the frequency of customer re-engagement may not accurately reflect the actual demand and does not provide additional meaningful information for investors to assess the Company's business performance.

Source: Frost & Sullivan

Appendix
About the Group (Cont.)

- The Group's customers generally finalize their budgets in the first quarter of the year while make payments in the remaining period of a year in line with industry norm.
- The Group's customers generally settle payments in the second half of a year in line with industry norm.
- The Group's customers generally conduct communication and engagement processes in the second half of a year in line with industry norm.
- Influenced by industry seasonality patterns, the Group recognizes less revenue and fewer services and products delivered in the first half of a year than in the remaining period of a year.
- The customers of the Company generally comprised higher educational institutions in Mainland China, which typically operate under annual procurement plans. In addition, due to industry seasonality patterns, these institutions generally engage with suppliers such as the Company in the second half of the year. As a result, it is common for certain customers to make prepayments to suppliers near year end to complete their annual procurement targets.
- According to the internal procedures of such customers, when making large amounts of prepayments, they generally request corresponding deposits from the relevant suppliers to hedge the counterparty risks.

Source: Frost & Sullivan

Appendix
Industry Norms

- Chinese higher education institutions are facing a wave of digitalization.
- Teachers and students face a variety of challenges in the traditional course delivery process, primarily including: (i) lack of flexibility and limited access; (ii) tendency for passive learning with lecture-based teaching resulting in students not actively engaging in the course materials; (iii) one-size-fits-all teaching approach.
- Traditional educational methods and content are often linear, making it difficult for students to achieve an overall grasp and in-depth understanding of the course.
- The market for higher education teaching and learning digitalization in China in which the Group operates and competes is constantly developing with innovations, since the demands of teachers and students are evolving.
- The demands for education digitalization and intellectualization in higher education institutions continue to evolve in terms of content, form, and method.
- In recent years, China's higher education teaching and learning digitalization market has been on the cusp of significant change due to the rapid development and integration of AI technologies. These technologies are expected to revolutionize the way digital educational content and digital teaching and learning environment services and products are delivered and have the potential to change the competitive landscape.
- In particular, AI technology companies have been actively exploring commercial application opportunities in the education industry and participated in bidding for knowledge graph development projects for higher education institutions.
- Competition for talent and qualified personnel in the digitalization services and products industry for higher education is intense, and the availability of suitable and qualified candidates in the PRC is limited.
- Insurance companies in China do not currently offer as extensive an array of insurance products as insurance companies in other more developed economies do.
- The development of knowledge graphs is an advanced step in the digitization of educational content, as it enriches and enhances the digital courses with more structured and interconnected information.
- An increasing number of higher education institutions are seeking digital learning and teaching environment services and products that enable the creation of an effective integrated digital setting, both online and offline. These environments are crucial for the efficient management of teaching and learning resources, the delivery of digital educational content, and the enhancement of interactions between teachers and students.
- The Company tends to generate the majority of its revenue and profit in the fourth quarter, which is in line with industry practice.

Source: Frost & Sullivan

Appendix
Industry Norms (Cont.)

- AI technologies are at early stages of development and continue to evolve. Similar to many innovations, AI technologies present risks and challenges, such as potential misuse by third parties for inappropriate purposes or biased applications which breach public confidence or violate applicable laws and regulations in China and other jurisdictions or litigation or other proceedings initiated by certain individuals claiming for infringement of legitimate rights such as privacy or personality rights.
- The expansion of the market for digital teaching and learning solutions for higher education institutions, in turn, depends on a number of factors, including the cost, performance, and perceived value associated with cloud computing as well as the ability of service providers to address security and privacy concerns.
- AI technologies are still at a preliminary stage of development and will continue to evolve. Flaws or deficiencies in AI technologies could undermine the accuracy and thoroughness of the analysis and decisions made by the Group's AI solutions. AI technologies are constantly evolving.
- It is not uncommon that employees living in rural areas are reluctant to make payment of social insurance and housing provident fund contributions.
- China's leading higher education institutions are at the forefront of digital education, boasting an unparalleled collection of digital content resources. They are the trailblazers in educational innovation, taking an proactive role in the industry's current and future direction.
- Higher education digitalization transformation requires a systematic overhaul to ensure smooth adaption and integration, and therefore a full-chain digitalization services and products is required. In addition, the digitalization of teaching and learning interact closely to generate synergistic effect. The accumulation of high-quality content then drives the optimization and upgrading of environments. Digitalization of the teaching and learning environments will further expand and improve the digital infrastructure for teaching and learning in higher education institutions, which in turn will promote more high-quality educational content creation and teaching and learning environment innovation.
- Content digitization is the cornerstone of digital teaching and learning.
- Favorable government policies in China have led to and will continue to support the sustainable growth of teaching and learning digitalization industry for higher education institutions.
- In particular, AI technology companies have been actively exploring commercial application opportunities in the education sector and participated in bidding for knowledge graph development projects for higher education institutions.
- In digitalization some institutions are significantly ahead of other domestic higher education institutions, and play an important role in driving and promoting the acceptance of digitalization in other higher education institutions.

Source: Frost & Sullivan

Appendix

Industry Norms (Cont.)

- The Group's business and operating results are impacted by general factors affecting China's higher education teaching and learning digitalization market, including:
  - The development and penetration of digital transformation across the higher education institutions in China;
  - The development of cloud computing, big data analytics and AI technologies and their application to the teaching and learning activities for higher education across China;
  - The influential role of leading higher education institutions in pioneering and showcasing successful digital teaching practices, further encouraging sector wide adoption;
  - Government policies supporting the digitalization of higher education; and
  - The budget and expenditures of higher education institutions on digitalization transformation, along with their future growth trends.
- In terms of digitalization capabilities and willingness, leading institutions are significantly ahead of other domestic higher education institutions, playing a driving and exemplary role in the digitalization construction of other higher education institutions.
- The number of higher education institutions in Chengdu and Xi'an is higher than the national average. Chengdu and Xi'an have regional advantages such as the vast talent pool of young individuals available at a lower cost.
- Knowledge graph products have been increasingly popular among higher educations.
- In the shared pursuit of advancing China's higher education with long-termism through digitalization, the government, universities, teachers, and the Group as builders and promoters, each play a pivotal role. The government, as the architect and guarantor, universities as implementers, teachers as practitioners, and the Group as innovators, together create a unified vision. The collaborative efforts have fostered mutual trust, a stable value chain, and positive outcomes in digitalization practices.
- The overall improvement of the quality of education in China and the acceleration of digitalization are leading to an increasing demand for digitalization services and products among higher education institutions. The creation, redefinition and merging of majors on an annual basis result in requirements for new educational content, teaching methods as well as other new ancillary demands. The introduction of education reform measures, such as the National Innovation and Entrepreneurship Course and the Industry-Education Integration Courses), the "Project 101" for higher education and the "Double Ten Thousand Plan", have led to an increasing demand for the informatization of education in higher education institutions across the country.
- The selection of a digital teaching and learning solution provider depends on a number of factors, including but not limited to the quality of services and products provided, the level of pricing, and the operating capabilities of the provider.

Source: Frost & Sullivan

Appendix
Industry Norms (Cont.)

- Similar to many disruptive innovations, AI technologies present risks and challenges that could affect user perception and public opinion.
- The evolving demands of higher education institutions for digitalization highlight a pronounced preference for solution providers capable of comprehensively addressing their challenges throughout their digital transformation.
- Students and teachers have different needs that are not wholly compatible with the traditional standard format of course teaching.
- The development of knowledge graphs for school-specific courses is a complex process that requires systematic and standardized recommendations and guidance. Teachers need to use a “visible” method to analyze, present, link, share, and improve their courses.
- With the development of digital education, knowledge graphs have gained popularity in transforming traditional teaching methods.
- For traditional course delivery mode, there are commonly seen difficulties, such as inadequate engagement of teachers and students, unsatisfactory learning outcomes and logistical strain on educators with lectures at multiple locations.
- In the field of educational content, there is a digitization trend.
- Industry-university-research collaboration is an initiative proposed by the PRC Government and approved by the Ministry of Education on project basis every year which combines industry, academia and research organically, with enterprises as the main body and universities and research institutions as the support. The purpose of industry-university-research collaboration is to promote the transformation of scientific and technological achievements, improve the innovation and competitiveness of enterprises, and drive the development of economy and society.
- Since China’s higher education digital educational content production market and higher education digital teaching and learning environment market are both the submarkets of China’s higher education teaching and learning digitalization market, the key drivers, future trends, entry barriers and challenges for these two submarkets are consistent with those of China’s higher education teaching and learning digitalization market.
- According to Frost & Sullivan, based on interviews with industry professionals from leading market players and higher education institutions, the ideal proportion of scientific research informatization, teaching and learning informatization, and campus service informatization for China's higher education informatization market could be 50% , 45%, and 5%.
- According to Frost & Sullivan, the Group’s deposit arrangements with customers are in line with the industry norm, as they are widely accepted and implemented within the industry to ensure the fulfilment of service and product delivery obligations, and play a vital role in risk management, customer confidence, and operational efficiency.

Source: Frost & Sullivan

Appendix
Industry Norms (Cont.)

- The Group started research and development process of knowledge graph in 2021, and relevant costs for 2021 and 2022 are recorded as research and development expenses for the relevant periods before the launch of the Group's knowledge graph business, which leads to a higher profit margin compared with its peers in the industry.
- The Group’s seasonal fluctuations are in line with other market players in China’s higher education teaching and learning digitalization market.
- According to the Ministry of Education, there were approximately 76,800 digital courses available for higher education by the end of January 2024. This represents less than 10% of the total higher education courses, indicating substantial potential for growth in the higher education digital educational content production market, as well as the overall higher education teaching and learning digitalization market.
- “Project 985”, “Project 211”, the “Double First-Class Initiative”, and the “Double High Plan”, are the only four higher education development and sponsorship programs initiated by the Chinese central government. The nominated universities and higher vocational colleges are selected, updated, and reviewed objectively and regularly by relevant authorities, including the Ministry of Education, to enhance the comprehensive strength and international competitiveness of China's higher education. As a result, universities and higher vocational colleges nominated under such programs are widely and deeply recognized by the general public of the PRC, including teachers, students, parents, hiring firms and entities, as the presentation of the top universities in PRC. As of December 31, 2023, there were 344 universities nominated under the “Double First-Class Initiative” and higher vocational colleges nominated under the “Double High Plan”, covering all the universities/colleges under above-mentioned four Projects/Initiative/Plan.
- The universities nominated under the “Project 985”, “Project 211” and “Double First-Class Initiative” and the higher vocational colleges nominated under the “Double High Plan” which had engaged the Group for its services and products had demonstrated (i) the willingness to proactively adopt the latest digitized teaching and learning services and products; (ii) a much stronger spending power than other higher education institutions; and (iii) a strong emphasis on the quality of the digitized teaching and learning services and products.
- Leading higher education institutions in China typically pioneer the trends in adopting innovative digital technologies in their daily teaching and learning activities, demonstrating higher willingness in investing in relevant services and products.
- According to Frost & Sullivan, the arrangement in relation to deposits paid to customers with respect to the prepayment is not uncommon in the industry.
- Influenced by market conditions, the interest rates on wealth management products were lower in 2024.
- The Group’s customers generally settle payments in the second half of the year.
- There was general decline in hardware across the market in 2024.

Source: Frost & Sullivan

Impact of COVID-19

- During the Covid-19 pandemic, higher education institutions in China accelerated the adoption of teaching methods digitalization in response to mitigate measures which promoted remote and online education. Such shift in teaching methods increased awareness, reinforced usage habits and motivated China's higher education institutions' investment in digital teaching and learning environment services and products. The market demand for teaching and learning digitalization services and products increased during the pandemic.
- However, the Covid-19 pandemic also impacted the business operations of companies operating in China's higher education teaching and learning digitalization market. Pandemic control measures such as travel restrictions and social distancing impacted customer engagement, communication and service and support process, as well as the deployment of services and products, leading to a slower delivery of our services and products due to the business operation disruption brought by the pandemic.
- The pandemic has impacted China's higher education teaching and learning digitalization market in various aspect, including (i) disruptions in customer engagement and communication, especially for offline marketing and customer service and support; (ii) decreased efficiency in providing timely customer support; and (iii) prolonged decision making and settlement process of customers.
- The market needs of higher education digitization are changing in the post pandemic period.
- The global COVID-19 pandemic has exacerbated the uneven distribution of teaching resources in China.

Source: Frost & Sullivan

Appendix
Market Opportunities

- In the new era of economic and social development, the higher education sector faces a critical demand: leveraging technology to foster the creation, dissemination, and accessibility of high-quality educational content. This advancement is essential to enhance the overall teaching quality across higher education institutions, thereby nurturing the talents who can contribute to scientific research innovation and drive the overall economic and social development. These demands align with the shared values of all stakeholders – the government, society, higher education institutions, teachers, and students alike. There is a collective aspiration for higher education institutions to excel, cultivate talent, and achieve educational parity and distinction. Higher education institutions, as representatives of national policies, shoulder the crucial responsibility of guiding and inspiring teachers to elevate teaching quality, while providing students with rich resources and an environment conducive to superior learning outcomes. Both teachers and students, as active participants and beneficiaries of this system, seek to be empowered by superior teaching and learning tools and resources, aiming to enhance the efficacy of the educational process.
- Digitalization is the key to meeting the core needs of higher education institutions, as it fully leverages technology to address the challenges in creating, sharing, and accessing high-quality educational resources. It enables the widespread distribution of quality resources, enhances teaching efficiency, and fosters innovative and practical skills in a cost-effective way. Digitalization also adapts continuously, meeting the evolving demands for talent in advanced scientific research and societal development. Both the governments and higher education institutions have made significant investments in the informatization of higher education institutions. This increased focus on teaching and learning underscores the importance of digitalization in advancing educational goals.
- The government's unwavering commitment to digitalization is a testament to its dedication to advancing equity and quality in higher education across China, with all stakeholders actively engaged in this transformative journey. Technological innovation and the technical revolution are propelling the construction of new digital teaching and learning infrastructures, opening doors to growth opportunities. The deployment of cutting-edge technologies like AI, virtual simulation, audio and video, and data security is reshaping higher education. This shift from traditional offline classroom teaching to a digitalized ecosystem integrates online and offline experiences, establishing digital classrooms as the foundation for targeted content delivery, cloud-based connectivity, and resource sharing. As new technologies emerge and iterate, they spawn new demands, services, and products, fueling opportunities for expansion.
- China's higher education is transitioning from informatization to digitalization, steered by advanced technologies like AI, with a focus on digitalization and intelligentization. The development of basic informatization infrastructure and the widespread application of digitalization in non-teaching environments lay the groundwork for extensive use in teaching and learning.

Source: Frost & Sullivan

Appendix
Abbreviations and Terms

- **CAGR**: compound annual growth rate
- **China**: if not specified refers to mainland China, excluding Hong Kong, Taiwan and Macau
- **PRC**: People's Republic of China 中华人民共和国
- **GDP:** gross domestic product
- **RMB:** Renminbi, the lawful currency of the PRC
- **IMF** (International Monetary Fund): 国际货币基金组织
- **COVID-19:** A viral respiratory disease caused by the severe acute, respiratory syndrome coronavirus 2, which has been declared by World Health Organization as a pandemic on March 11, 2020

Source: Frost & Sullivan

Limitations in Source of Information

- Interviews with end-users, venders and distributors are conducted to collect information for this report, based on a best-efforts basis.
- Frost & Sullivan will not be responsible for any information gaps where interviewees have refused to divulge confidential data or figures.
- In instances where information is not available, figures based on similar indicators combined with Frost & Sullivan in-house analysis will be deployed to arrive at an estimate.
- Frost & Sullivan will state the information sources at the bottom right-hand corner of each slide for easy reference.

Note to Numeric Calculations

- Value and percentage figures in this report are all rounded. Figures may not add up to the respective totals owing to rounding.
- The base year is 2024. The historic period is from 2020 to 2023. The forecast period is from 2025 to 2029.

Source: Frost & Sullivan

Appendix
Methodologies

- Frost & Sullivan is an independent global consulting firm, which was founded in 1961 in New York. It offers industry research and market strategies and provides growth consulting and corporate training. Its industry coverage in the PRC includes education, automotive and transportation, chemicals, materials and food, commercial aviation, consumer products, energy and power systems, environment and building technologies, healthcare, industrial automation and electronics, industrial and machinery, and technology, media and telecom.
- The Frost & Sullivan's report includes information on the China's macro economy, overview of China's higher education informatization market and China's higher education teaching and learning informatization market, and competitive landscape of China's higher education teaching and learning digitalization market.
- In preparing the report, Frost & Sullivan conducted both primary and secondary research and relied on various sources. The primary research was conducted via interviews with key industry experts and leading industry participants. The secondary research involved analysis of market data obtained from several publicly available data sources, such as the National Bureau of Statistics of China and other industrial associations.
- Projected total market size was obtained from historical data analysis plotted against macroeconomic data as well as specific related industry drivers.
- The market projections in the Frost & Sullivan Report are based on the following key assumptions:

    (i) the overall social, economic and political environment in China is expected to remain stable during the forecast period;

    (ii) China's economic and industrial development is likely to maintain a steady growth in the forecast period;

    (iii) related industry key drivers, such as demands for educational equity, technology accumulation and innovative application, pioneering impact of leading higher education institutions, evolution of teaching and learning habits and favorable policies and financial support are likely to drive the growth of China's higher education informatization market as well as higher education teaching and learning digitalization market in the forecast period;

    and (iv) there is no extreme force majeure or industry regulation which may affect the market dramatically or fundamentally.
- All the data and information regarding the Group is provided by the Group.

Source: Frost & Sullivan

Methodologies

- Frost & Sullivan estimated the overall market size of China's higher education teaching and learning digitalization industry with reference to (i) the national fiscal expenditure on education, (ii) the national fiscal expenditure on higher education, (iii) the proportion of expenditure on education informatization to the overall national fiscal expenditure on education, (iv) the proportion of expenditure on higher education informatization to the overall national fiscal expenditure on higher education, (v) the penetration rate of higher education teaching and learning informatization, and (vi) the penetration rate of higher education teaching and learning digitization, which were derived with reference to data published by the Ministry of Education of the PRC and collected through interviews with industry professionals from leading market players and higher education institutions.
- Frost & Sullivan estimates the number of market players in China's higher education teaching and learning digitalization industry based on the following methodologies:

(i) identifying potential major market players in China's higher education teaching and learning digitalization industry and determining the ranking and market shares of such potential major market players with reference to their revenue generated from their higher education teaching and learning digitalization products and services. The research was based on publicly available information, such as government publications, bidding documents of higher education institutions;

(ii) estimating the business scale and number of long-tail and/or local market players in China's higher education teaching and learning digitalization industry based on the data collected from interviews with industry professionals from major market players and higher education institutions; and

(iii) cross-checking the data collected from interviews with professionals against Frost & Sullivan's own estimates to verify the accuracy of such data.

- The revenue generated from higher education teaching and learning digitalization products and services by private companies in 2023 was estimated based on data collected from industry professional interviews including the top five market players. Frost & Sullivan collected certain information about these companies for comparison purposes through interviews with reputable industry professionals and through other secondary databases, with confidentiality agreement entered into between the Frost & Sullivan and such counterparties not to disclose the conversation or any material information contained therein without the prior consent of the other party.

Source: Frost & Sullivan

Thanks!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