

# Chapter 4

## Build a Smart Education Cloud Platform to Boost the Quality Development of Regional Education



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### 4.1 Background

In 2019, the Minhang District was selected as the “Smart Education Demonstration Zone” of the Ministry of Education, and then the *Implementation Plan for Establishing a “National Smart Education Demonstration Zone” in the Minhang District* was formulated. The district has promoted the “1258 Project” of tailoring teachers’ teaching to students’ varied abilities on a large scale.

The smart education in Minhang District has been built early, and the ecological chain of its education informatization is complete. However, with the deeper and deeper application, the flaws of traditional education informatization platform and application construction are gradually exposed, including management problems caused by complicated third-party applications, the inability to effectively integrate data information of various educational units, and lack of data security rules and regulations.

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## 4.2 Major Measures

### 4.2.1 *Constructing the Digital Base of Minhang Smart Education*

The construction of the smart education demonstration zone is based on the cloud platform. The digital base can largely improve personalized teaching management and big data applications for primary and secondary schools in the whole district.

**It needs to build a data center.** Through building a smart education cloud platform, data interconnection can be promoted significantly. The capabilities of data collection, analysis, governance, and sharing can be given full play. Through multi-department joint evaluation and collaboration, the basic data sources of five types of users in the area and other educational special business data sources are established. At the same time, with the support of multiple units at two levels in urban areas, the basic data is continuously collected and managed to form stable data assets.

**A number of theme libraries have to be established.** Based on all kinds of basic data and business data in the data center, a special subject database has been built. It could help us realize the sharing of data, and reduce data duplication and storage. Through the parallel promotion mode of “inner circulation” of regional education applications and “outer circulation” of municipal education applications, the service ability of the subject database is verified.

**Try to promote the use of the application in the Minhang District.** It is urged to evaluate the use coverage, user activity and development planning of educational applications in the region, promote the cloud deployment of educational applications, meet the requirements of intensive management in the new era, and realize the flexible management of resources. Meanwhile, checking the service capability of the cloud platform by applying data, refining educational data standards and business specifications and providing data-sharing services are also encouraged.

**Achieve the login process.** Through building a unified portal integration application, and promoting the login and logout process in the cloud platform, Minhang District has realized the smooth switch of the account system to the cloud platform. It also manages the existing user data in the Minhang District cloud OA system, teacher growth file system, student registration system, financial media, citizen cloud and other systems.

**Minhang District also implemented dynamic monitoring and promoted data management.** It develops visual pages of basic data, book borrowing, physical examination, data exchange, one-way network management, cloud application, etc., and presents data convergence and governance results of cloud platform, interface status of business application and dynamic business operation. Thus, it has realized dynamic, multi-dimensional and multi-granularity monitoring data governance and data application.

## ***4.2.2 Promote Data-Driven Individualized Teaching***

### **4.2.2.1 Promote the Smart Education Project**

The regional research center cooperates with the technology center to create a project promotion research atlas. In the first year, a total of 103 primary and secondary schools in Minhang District applied for 143 district-level research projects; 43 primary and secondary schools applied for 43 school-level projects. In the second “Promote Data-driven Individualized Teaching” project application, there were 68 small and medium-sized units, and 191 research projects were applied, including 141 district-level projects and 47 school-level projects. Minhang has set up an inter-school group CIO, and allocated district school project liaison officers, and formed a community of project research and implementation that is contacted by special people and coordinated.

### **4.2.2.2 Create Ecological Smart Education**

Build a digital business support system and provide diagnostic services and business support for teachers’ professional proficiency with the help of big data. Minhang has set up six education and teaching application and management systems: cloud recording and broadcasting classroom evaluation system, research and research management system, Minzhixuetang online course system, academic quality evaluation system, personalized learning intelligent service system, and electronic files of teachers’ professional growth.

Construct a learning support environment for students, and provide students with adaptive growth services by means of a mathematical intelligence teaching system and intelligent homework system. Establish a personalized evaluation model for students, accurately diagnose their personality growth, determine their weak knowledge points and learning paths, and recommend learning resources that match their learning ability.

### **4.2.2.3 Teaching Analysis Based on Artificial Intelligence**

Build an intelligent homework system, realize automatic homework marking, support intelligent evaluation of spoken English, etc., and reduce the burden on teachers. Data collection methods of paper job scanners and dot matrix digital pens are developed to realize multi-path intelligent job data. Mining students’ learning quality data embodied in intelligent homework, forming students’ portraits, and analyzing students’ academic level and value-added evaluation results; Using cluster analysis model, students can be classified, which can be used to guide hierarchical teaching in class. Carry out thematic comprehensive teaching and research activities based on homework data in primary schools. Through the data analysis of node homework,

carry out targeted teaching and research activities, improve related problems and test the effectiveness of problem solving, and realize data-driven accurate teaching and research.

### ***4.2.3 Promote the Construction of Two Assistants***

Develop intelligent teaching assistants and students' intelligent learning partners, and provide multi-terminal and multi-platform software services for teachers and students in the basic education section. Teachers' intelligent assistants take teachers' lesson preparation as the breakthrough point, provide teachers with learning information reference based on the ability of gathering and analyzing learning information of intelligent education cloud platform, and provide intelligent teaching aids to help teachers better realize personalized teaching and counseling. Students' Intelligent Learning Companion takes a "three-step method of intelligent learning" as AI learning path planning method, which realizes the overall learning coverage of the weekly study, exam sprint and intelligent vacation, and provides an interactive system with teachers' intelligent assistants, so as to realize the interconnection and cooperation between students and teachers.

## **4.3 Effect and Achievements**

### ***4.3.1 Build a Digital Base with Cloud Platform as the Core***

Minhang District Smart Education Cloud Platform has completed the construction of main functions and the governance and convergence of basic data in the whole district, and selected and promoted the cloud management of major educational informatization applications in the whole district in an orderly manner. After two years of construction, the cloud platform has made the following progress:

**Build a data warehouse.** As of May 2022, the smart education cloud platform has docked 48 education business systems, with 5,282 access data tables and 838,466,120 access data. At the same time, it has completed the construction of 19 professional question banks, including students' physical and mental health data and students' competition data. It provides 44 external data interface services, with 62 business applications calling interfaces, 2,448,061 interface calls and 88.89 million data calls.

**Eliminate information gaps.** The cloud platform has built three basic user libraries of institutions, students and teachers, and several subject libraries such as school calendar, enrollment schedule, enrollment area and senior high school entrance examination results query. Provide services for third-party applications through various data interfaces; Support kindergarten enrollment in Minhang District; Support the recruitment of teachers. One thing: the data flow is opened

and implemented. In 2021, Minhang, as the pilot of the first batch of accurate education services in the city, successfully completed the first accurate push of education policy in June.

**Explore the application of the cloud.** The cloud platform has successively completed the first batch of seven educational applications, including a comprehensive information release system, library management system and public service platform. These applications are deployed in containers, and can be flexibly recycled and expanded. The cloud application can call the basic data of the data center and return the business data, thus realizing the sharing and integration of the authoritative data of the cloud platform.

**Application unified authentication.** At present, the unified identity authentication, single sign-on and logout of five types of users in the cloud platform have been completed. The cloud platform docked and managed the existing user data in the Minhang District Cloud OA system, teacher growth file system, Shanghai student registration system, financial media, citizen cloud and other systems, and realized the smooth switch of account system to cloud platform. Complete the unified certification docking with the Shanghai Education Certification Platform, Shanghai Citizen Cloud, Shanghai One Netcom Office and Minhang Rong Media.

### ***4.3.2 The First Step to Data-Based Large-Scale Individualized Teaching***

**A regional-oriented big data platform for teachers has been built.** Referring to the professional standards of primary and secondary school teachers on the platform, combined with the basic forms of regional data collection and analysis, a three-dimensional portrait system of regional teachers is constructed according to three dimensions: label system, label hierarchy and label attributes. The label system is designed according to personal characteristics, professional characteristics, development preferences and social labels. In addition, a dynamic label generation mechanism is reserved to mine the characteristics of individual teachers and group teachers, and the label system is generated concomitantly.

**Promote differentiated teaching practice driven by data under the background of “double reduction”.** A platform to support differentiated teaching is built, and a unified standard data collection, analysis and application path is constructed. A high-level learning quality analysis model and a learning engagement analysis model are formed, and through the normal analysis of homework data, hierarchical suggestions for students are realized. At the same time, it can carry out interdisciplinary job duration warning, job burden analysis and job behavior analysis, so as to realize the “double reduction” data-driven mode.

### ***4.3.3 Promoting Modernization of Education Governance Based on the One Network Office***

After undertaking the pilot work of the municipal government and the municipal education commission, Minhang District has established an information disclosure system for public enterprises and institutions in the area of basic education, formulated a standardized catalogue, built an intensive platform, and accumulated a lot of information and data resources. At the same time, Minhang District pioneered the city's first district-level education public service scenario application. Ten public service items have been launched at the "follow-up" flagship store in Minhang District. The promotion plan of "New Teacher Entry" has been formulated and reported to the District "One Network Office" Promotion Office, No Meeting "to handle all kinds of review approvals, administrative approval network handling rate and the whole network handling rate are among the highest in the region. "Easy to do" matters are basically approved and approved by the District Review and Reform Office and the Administrative Service Center.

### ***4.3.4 Promoting the Construction of Informatization Benchmark School Based on Eight Application Scenarios***

Rose Primary School provides more convenient and personalized service by constructing health perception, intelligent lighting, safe recognition, teaching behavior recognition and so on. Minhang High School of Science and Technology Affiliated to ECUST adheres to technical empowerment, enriches teaching form in curriculum construction and implementation, classroom learning environment, teaching and learning mode transformation and virtual hierarchical teaching, and provides intelligent learning and exploration services to students. Based on data-driven grouping, Shanghai HuaEr Private Middle School tries the data integration and interoperability of one school, multi-district and multi-section, and builds the intelligent management platform of the school. The Southwest Project focuses on building the support system and core application of the "Virtual and Real Integration Learning Field". At the same time, three schools, Xincheng School, Xiangyuan Primary School and Aibo Guoguo, have been selected as the third batch of benchmark schools in Shanghai.

## 4.4 Problems and Experience

Smart education cloud platform demonstration in the process of creation, the same force, achieved initial results. But there are also many problems and difficulties in the process of propulsion.

**The mutual restraint between information application advancement and data security.** Too much attention is paid to application popularization and convenience, exposing the risks of too many systems, lagging information security management, improper system operation and maintenance, and weak personal privacy protection. Therefore, the region should do a good job of daily operation and maintenance, implement the system running on-line pre-record system, and entrust professional companies to supervise the whole process. At the same time, we should strengthen the education and protection of personal information security of teachers and students in the education system to avoid choking.

**Contradiction between data convergence and management convergence.** The Education Bureau of Minhang District, in conjunction with the opening of public data resources in the district, conducts business consolidation and data convergence to provide users with a service supply that matches their needs. It has reconstructed the school's smart learning environment and support services system, consolidated and upgraded a batch of "Teaching Cloud, Teacher Cloud, Student Cloud, Parent Cloud" applications, so as to improve service provisioning and user demand matching, and enhance user application experience.

**Further steps to explore sustainable incentives under existing conditions.** At present, under the condition that the total amount remains unchanged, we can explore incentives for the implementation of smart education projects through the Education Rewards Foundation and the Performance Pay Increase section. In terms of professional title evaluation, appraisal evaluation, talent training, teacher assessment, cadre promotion, subject research, project development, etc., create conditions for teachers to stimulate their enthusiasm under limited conditions.

**How to ensure sustained and effective investment in the severe economic situation.** Affected by the international situation and the COVID-19 epidemic, the domestic and international economic recovery cycle is long. At present, our district mainly ensures the funds needed for all kinds of projects in the establishment of the smart education demonstration zone through district and town financial funds. However, the investment period of informatization construction is long, and the effect is slow. It is suggested that the Ministry of Education give certain policy support from the top level to the regions that undertake the task of creating smart education demonstration zones, so as to raise funds from various parties and strive for supporting support from municipal and district-level funds.