Chapter 10
Drive the High-Quality Development of Education with Data, and Accelerate the Construction of a New Ecology of Smart Education

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10.1 Upgrade in an All-Round Way, and Continuously Consolidate the Foundation of Smart Education Construction

In recent years, Hexi District has fully implemented the Education Informatization 2.0 Action Plan, and completed three systematic projects: the modernization project of compulsory education schools, the upgrading project of compulsory education schools, and the construction of basic education informatization 'three links and two platforms'. It has achieved full coverage of regional optical fiber network, digital campus system, wireless network, classroom multimedia and teachers' information technology ability training.

Construction of regional network data center, unified export bandwidth of education network in the whole region of 4G, construction of multiple application systems and construction of high school characteristic innovation laboratory group. Establish a video conference system with remote, real-time and interactive functions, centering on the district education bureau, covering the whole district education system. Three-level monitoring projects of all kinds of kindergartens in the jurisdiction will be implemented, and monitoring equipment will be installed at more than 6,000 points in the whole district to realize full coverage and no dead ends of dynamic monitoring of children's activity places. Build a network security prevention and control system based on the concept of situational awareness, and comprehensively improve the network supervision, protection and operation support capabilities. Relying on the Tianjin Education Research Network, a high-quality intelligent education cloud

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platform will be built to realize the full application of online learning space and basic education data platform for teachers and students in the region. Start the pilot work of smart campus and smart classroom, and eight primary and secondary schools in the area are included in the municipal smart campus demonstration units. Under the condition that the utilization rate of "education cloud" resources in the original district-level data center is close to 80%, a big data construction project is implemented, and a new micro-module data center room with energy saving, environmental protection, green and low carbon is built, and the data processing capacity is increased by nearly 10 times. It also supports the realization of a new generation of high-performance computing power represented by Kunpeng's domestic CPU technology, so as to meet the needs of Hexi smart education development in the next five years.

10.2 Draw a Blueprint, and Make Overall Plans for Smart Education

Since Hexi District was selected as the creation area of the "Smart Education Demonstration Zone", smart education has been included in the *14th Five-Year Plan* for national economic and social development and the 14th Five-Year Plan for regional education development. At the same time, the construction of a smart education demonstration zone has been included in key projects of deepening reform of Hexi District Committee, key construction projects of the district government, special supervision contents of high-quality development and education responsibility assessment projects of the district in the *14th Five-Year Plan*, which provides a strong organizational guarantee for the construction of national "Smart Education Demonstration Zone" and provides a strong organizational guarantee for the region.

As a high-end form of educational informatization, smart education aims to build a smart learning environment, change the traditional teaching and learning methods, and give birth to the education system in the intelligent era. Data governance is an important starting point in the process of building smart education. Research on building a big data platform, improving the top-level governance flowchart and exploring governance paths shows that education data governance has a significant role in promoting education development.

10.3 Condense Practice and Explore Education Data Governance Methods

Hexi District promotes education government information integration and data sharing, continuously improves the intelligence level of education management informatization in the district, and realizes intelligent decision-making, visual control, security warning and remote supervision of education.

10.3.1 Building a Data Center to Carry Out Preliminary Governance

Relying on key infrastructure, Hexi District began to build a data center and conduct preliminary attempts at data governance. First, through the data decision visualization system, the modeling analysis found that the distribution of educational resources in Hexi District is "dense in the north and sparse in the south" and made a government recommendation report based on this trend. We assisted the government in planning four school clusters to improve the coverage of educational resources in new and expanded communities. Second, in response to the problem of weak teachers in new schools, a database of teachers employed by the district was set up to keep the Education Bureau informed of teacher assignments and mobility. Third, in order to effectively implement the "double reduction" policy, a database of private education operations supervision was established to include all out-of-school institutions, childcare facilities, and art and sports training schools in the district in the data governance. Through the above measures, Hexi District seeks to give full play to the foresight and refinement of education data governance in three areas: high quality and balanced allocation of education resources, high quality and flow of teachers, and high level of education risk prevention.

10.3.2 Optimizing Data Flow to Help Mechanism Reform

As Hexi District enters a phase of rapid development, the total economic volume grows and the population size expands, creating a need for institutional reform as public expenditure in education increases year by year. In response to the problems, Hexi District tried to promote mechanism reform by optimizing data flow. First, the government led a multi-department working group on education development in conjunction with the Development and Reform Commission, finance, civil affairs, planning, construction commission, public security and health. The health, public security and civil affairs units will provide basic data on the annual birth population, mobile population and pre-accommodation population. Secondly, the Education Bureau will summarize and analyze the number of school places in the

area under its jurisdiction and make annual forecast data according to the ratio of 80 school places per 1,000 people in communities and buildings. Again, the planning and construction committees build new schools or renovate old schools according to the design standards to form construction data that can be tracked and supervised. Finally, education and finance coordinate start-up funds, logistical assets, renovation and construction, and procurement of information technology and multimedia equipment based on construction data, ultimately forming supporting data to be given to school administrators. According to the above data flow governance scheme can basically solve the problems of waiting, relying and asking in construction management, and play the role of data governance for accurate scheduling and scientific management of the project life cycle.

In the context of the double reduction policy, in order to strengthen the governance of out-of-school training institutions and keep abreast of institutional dynamics, Hexi District has used big data thinking to explore the establishment of a private education regulatory mechanism, bringing nearly 1,000 out-of-school institutions, childcare parks, and arts and sports training into the scope of management, providing accurate risk tips with education big data analysis technology, greatly enhancing the scientific decision-making ability of the government and education departments, and achieving the This has greatly improved the scientific decision-making ability of the government and education department, and realized the target requirements of precise policy and targeting in the governance of out-of-school training institutions.

10.4 Empower Innovation and Explore New Modes of Data Application

In recent years, our district has actively undertaken the research of the Ministry of Education's "New Teaching and Learning Model Based on Teaching Reform and Integration of Information Technology" experimental zone, and vigorously implemented Tianjin's "Education Governance Informatization Enhancement Project" and "Smart School Construction Project".

10.4.1 Building Special Curriculum Data to Improve the Information Literacy of Teachers and Students

During the epidemic prevention and control period, Hexi District established the "Hexi Special Curriculum Platform" and the "Hexi Online Classroom Platform", opened online learning platform accounts for 7,000 teachers and 100,000 students in the district, and gathered digital education resources in the district by recording micro-courses and high-quality lessons. The online learning platform has been opened for 7,000 teachers and 100,000 students in the district. The first in the city to

launch the junior high school graduation class online live class, all course resources through the platform directly to the hands of students and parents. We have organized excellent teachers and textbook researchers of all subjects in the district to carefully produce more than 3,400 micro lessons and 5,000 micro videos, recorded more than 200 recorded lessons, developed more than 200 general education curriculum resources, and set up "classroom in the air" through various media channels such as cable TV, Unicom, telecom and mobile, allowing 90,000 students in Hexi to learn through The "Air Classroom" allows 90,000 students in Hexi to independently choose high-quality learning resources and online learning guidance services through cell phones, computers, cable TV, etc. Junior and senior students will watch the review course through live streaming, while other students will choose their own learning content according to their needs and learning progress.

On February 10, 2020, the first day of online learning guidance in our district, the number of simultaneous visitors to the "Hexi special course platform" reached 53,000, creating a historical access flood. By the time classes resumed, the cumulative frequency of visits to the platform exceeded 30 million times. At present, the district has initially established a learning "diagnosis-correction" system based on big data of student development, making it possible to realize accurate teaching and personalized teaching.

10.4.2 Sharing Quality Data and Universal Resources for "Thousands of Miles"

In response to the hot issue of uneven distribution of high-quality educational resources, the district has vigorously implemented the "One Lesson, Special Curriculum Platform" project, based on regional characteristics and school-based characteristics, in compliance with the laws of physical and mental development of students and the laws of education and teaching, to build a special curriculum system. At present, a regional curriculum system with forward-looking and contemporary characteristics has been initially established, including 58 different types and subjects such as Beijing opera, tea art, Chinese costume, cooking, astronomy and geography. At present, the cumulative amount of uploaded videos exceeds 4,000 and the frequency of user visits exceeds 3 million.

In the region's pilot work to promote home care services, Hexi Education has taken the initiative to create the "Banyan Tree Classroom" and actively build a home care education resource system, incorporating party building, opera, tea art, clothing, chess and other courses into the platform, so that the elderly can enjoy quality community education at home. In deepening the work of poverty alleviation collaboration, and actively innovative ideas, participate in the "Jin Long two cloud bridge" activities, and Pingliang City, Gansu Province to establish Jin Long education support mechanism, the "network cloud thinking politics" and "national unity education" The teaching content is shared through the "cloud bridge", so that students in Pingliang

City know the history of the Party and understand the ideology. In the "Thousands of Miles of Non-Foreign Heritage in Jingu" activity, we shared a classroom with a famous teacher in Nanping City, Fujian Province. Nanping teachers offered "Jianjian pottery class", and students in Hexi District listened to teachers explain the history and production process of Jianjian online, and tried to make pottery tires under the guidance of teachers around them offline. The students and teachers from the two regions were able to experience the profundity of Chinese culture through online and offline classes.

10.4.3 Grasp Dynamic Data to Optimize Teaching

Since the reform of the new college entrance examination system in 2017, the examination and enrollment system has undergone radical changes, and the right to choose courses has been handed over to students, and class selection has become an effective way to meet students' personalized course choices. Each school establishes a class selection system, oriented to students' personalized development, regulates the number of classes and class sizes to meet students' needs to the maximum, uses good teachers, one class schedule for one person and one class schedule for one subject, and students punch in and sign in through electronic class cards. With the support of information technology, class selection and class teaching can be promoted in an orderly manner, and students' personalized development is solidly guaranteed and supported.

10.5 Leading Education Big Data Governance with the Construction of Smart Education Demonstration Zone

Data governance is a comprehensive social project that requires multi-sectoral coordination and linkage, from the innovation of institutional mechanisms to the breakdown and refinement of methods and measures, all of which produce disruptive changes to the current workflow. Data analysis provides a layered perspective, forming the ability to overlook social development and gain insight into the trajectory of reform, which is an inevitable way to achieve quality and balanced education. During the 14th Five-Year Plan period, education data governance will be an important tool for promoting education informatization. We aim to create a smart education system that integrates the five education aspects of "future schools, future teachers and future students", and take the basic principles of "holistic thinking, integrated planning, synchronized construction, interoperability and sharing, step-by-step promotion, and use to promote construction" as our goal. The construction model of "one, three, seven" is clear, that is, one goal—to build a demonstration area of intelligent education; three

action dimensions—to create a wise education Heshi, smart and goodness of Heshi; seven major The seven major projects—the implementation of education model innovation project, education evaluation reform project, information literacy cultivation project, governance capacity enhancement project, education environment construction project, resource supply optimization project, and special intelligent innovation project. Steadily promote the four-step rhythm of "setting standards and building a platform, grasping management through data, gathering data for teaching, and using data for change", comprehensively connect the overall data links of bureaus, schools and individuals, ensure the unification and integration of various application systems, data sharing and mining analysis, and realize the integration of intelligent education data from macroscopic decision-making to microscopic services. By 2024, the district will have built a "smart education" ecosystem that matches the core area of the modern socialist metropolis, realizing "learning for all, learning everywhere, and learning at all times".