

# Chapter 2

## Transformation and Practices of Smart Education in China



Since the twenty-first century, China has been keeping its finger on the pulse of the times and its national realities, attaching great importance to the role of information technology in education reform, and working to promote education modernization by developing infrastructure, upgrading technology, integrating technology into classrooms, and deepening educational awareness. Through the digital transformation of education, China has been practicing smart education with an innovative approach.

### 2.1 The Evolution from Education Informatization to Smart Education

In the recent two decades, China has gone through two stages known as Education Informatization 1.0 and Education Informatization 2.0, laying a solid foundation for smart education development. Marked by China's Strategic Action Plan for Education Digitalization in January 2022, the development of smart education in China opened a new chapter.

#### 2.1.1 Education Informatization 1.0

China began its education informatization by using audio-visual aids in the late 1970s and this process accelerated from the beginning of twenty-first century to 2017, during which IT played a greater role in education and improved education philosophies and methods.

China implemented a series of major policies and projects on education system to realize the integration of IT and education. To facilitate education informatization, China has also issued a slew of policy papers including the *Notice of the Ministry of Education on Providing Internet Access to All Primary and Secondary Schools*, the *Outline of China's National Plan for Medium and Long-term Education Reform and Development (2010–2020)*, the *Ten-Year Development Plan of Education Informatization (2011–2020)*, the *Guiding Opinions on Actively Promoting the “Internet Plus” Action Plan*, and the *Thirteenth Five-Year Plan of Education Informatization*.

In terms of infrastructure, China implemented initiatives such as “Full Internet Access in Schools”,<sup>1</sup> “Modern Distance Education in Rural Primary and Secondary Schools”, “Three Accesses and Two Platforms”,<sup>2</sup> “Full Coverage of Digital Education Resources at All Teaching Venues”, and “Digital Campus Construction”. Educational institutions have accelerated to build broadband connection including both fixed and mobile and are gradually equipped with digital devices. The basic environment for informatization has been continuously improved.

In terms of applications in teaching, China launched campaigns, such as “One Course for Every Teacher, and One Teacher for Every Course” initiative,<sup>3</sup> teacher’s IT proficiency enhancement program, the national high-quality course sharing program, the national high-quality public video course program, and the specialized teaching resource development program for higher vocational education. Such action plans substantially improved teachers’ IT proficiency and the application of IT in education has gradually become popular.

### 2.1.2 Education Informatization 2.0

From 2018 to 2021, IT was innovatively integrated into education, paving the way for exploring smart education in China.

Following policy papers such as the *Education Informatization 2.0 Action Plan*, *China’s Education Modernization 2035*, the *Guiding Opinions on Promoting the*

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<sup>1</sup> “Full Internet Access in Schools” initiative: in November 2000, the Ministry of Education issued the *Notice of the Ministry of Education on Providing Internet Access to All Primary and Secondary Schools*, which proposed that in 5–10 years, about 90% of independent founded primary and secondary schools in China should have access to the internet to make sure that teachers and students in primary and secondary schools can share online education resources, improve the quality of education in all primary and secondary schools, and enable all teachers to receive continuing education aimed at improving their ability to implement quality education.

<sup>2</sup> “Three Accesses and Two Platforms” initiative: three “accesses” refer to broadband access to schools, quality resources access to every class, and online learning space access to everyone. “Two platforms” refer to public service platforms for education resources and education management platform.

<sup>3</sup> “One Course for Every Teacher, and One Teacher for Every Course” initiative: it aims to ensure that every primary and secondary school teacher could teach at least one course with IT tools and every course could be given by at least one teacher with IT tools.

*Construction of New Education Infrastructure and Building a High-Quality Education Support System, and the Action Plan of Artificial Intelligence Innovation for Institutions of Higher Education*, China has set several initiatives in motion to popularize digital resources and services, build digital campuses, expand the reach of online learning spaces, boost the capacity for education governance, and initiate the construction of smart education demonstration zones, which led to a basic digital ecosystem for Chinese education.

In terms of environments construction, the digital campus construction campaign is implemented in all schools. With the service mode of “platform plus education” introduced, public service platforms and support systems of various education resources at all levels are integrated to gradually connect the resource and management platforms. All provincial platforms are connected to the Smart Education of China platform, as a result, a big “internet plus education” platform is created.

In terms of application in teaching, China has made steady progress in the “Three Availabilities, Two Improvements, and One Big Platform” campaign<sup>4</sup> assuring that teaching applications are available to all teachers and learning applications are available to all school-age students, and that IT proficiency and information literacy of teachers and students are generally improved. China has systematically ramped up MOOC<sup>5</sup> and “MOOC in Western China” program, popularized the “Three Classrooms”<sup>6</sup> mode, and prioritized the “three regions and three prefectures”<sup>7</sup> when implementing the initiative of internet development as an intellectual booster. “Cloud classrooms” have been made available to fill the education gap in poor areas and improve their education quality. For example, Ningxia took the lead in building an “internet plus education” platform by creating the “cloud”, connecting to the “network”, and popularizing the “screen”.<sup>8</sup> More than 500 schools in Ningxia have been virtually paired with prominent schools in Beijing, Fujian, etc., effectively addressing the inadequacy of teachers and teaching resources in low-performing schools and promoting high-quality development of education.

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<sup>4</sup> “Three Availabilities, Two Improvements, and One Big Platform” campaign: teaching applications are available to all teachers, learning applications are available to all school-age students, digital campuses are available in all schools, the IT proficiency and information literacy of teachers and students are improved, and the “internet + education” platform is built.

<sup>5</sup> MOOC: Massive Open Online Courses.

<sup>6</sup> “Three Classrooms”: classrooms with featured topics, taught by famous teachers, and offered by renowned schools online.

<sup>7</sup> “Three regions and three prefectures”: poverty-stricken areas at the national level. The “three regions” refer to Tibet Autonomous Region, Tibetan areas in Qinghai, Sichuan, Gansu, and Yunnan provinces, Hotan, Aksu, Kashgar, and Kizilsu Kirgiz Autonomous Prefecture in southern Xinjiang. “Three prefectures” refers to Liangshan Prefecture in Sichuan, Nujiang Prefecture in Yunnan, and Linxia Prefecture in Gansu.

<sup>8</sup> “Cloud” refers to the construction of a cloud platform for education at all levels and of all forms; “Network” refers to an education network that increases the school network and the bandwidth and constructs an efficient and connected education network; “Screen” refers to the program of ensuring full coverage of quality resources in every class and providing digital blackboards for all primary and secondary schools in those regions, especially rural schools.

### ***2.1.3 China's Strategic Action Plan for Education Digitalization***

In 2022, China launched the Strategic Action Plan for Education Digitalization, built the public service platform called Smart Education of China platform, and leveraged resources and data to explore a new approach to providing teachers and students with convenient and efficient services in learning, teaching, management, research, and governance, opening up a new chapter of smart education development in China.

#### **i. Rationale**

Guided by the “3C” strategy of Connection, Content, and Cooperation, China's Strategic Action Plan for Education Digitalization aims to build the Smart Education of China platform in scientific methods, comprehensively improve the supply capacity of high-quality resources and services, strengthen the technical support of Smart Education of China platform, actively promote international exchanges and cooperation in digital education, transform the untapped potential of digital resources into the powerful energy of education reform, and explore new ideas, theories, paths and practices of smart education to realize fairer and higher-quality education.

**China's Strategic Action Plan for Education Digitalization follows three principles.** First, it is nationally planned to serve the public. Adhering to national guidance, the Action Plan is coordinated by multiple parties and planned, standardized, managed, and evaluated with uniform criteria. It adopts an open, public welfare-oriented, and inclusive mode to digitalize education resources and governance. Second, it is demand- and application-driven. Platform integration and upgrading, resource development and utilization, etc. should be driven by the demand for digital applications to serve teachers, students, schools, and society to tap the supportive role of digital education in the high-quality development of education. Third, it integrates systems for scaled-up practice. The Action Plan strengthens the integration of functions, data, business and the development of common key content. It focuses on scaling up resource construction and application and harnesses data to popularize the student-specific teaching approach and smart education governance to make digital transformation more thorough and extensive.

**China's Strategic Action Plan for Education Digitalization highlights the critical role of Smart Education of China platform.** Focusing on the construction of Smart Education of China platform, it gathers all kinds of digital education resources at all levels, provides learning and job-seeking services for learners and course preparation and education research services for teachers, helps schools in school management, cooperation, and exchanges, and assists the government in governance and decision-making. Smart Education of China platform plays the role of organizing the creation and distribution of education resources underpinned by the advantages in data consolidation and analysis, which has emerged as a key infrastructure for the digital transformation of education.

**China's Strategic Action Plan for Education Digitalization aims at creating a new era for education.** Through digital transformation in education, China aims

to change the conventional teaching practices, promote the balanced development of high-quality education, realize China's millennial dream of "education without distinction", serve the reform of "Double Deduction"<sup>9</sup> and "eliminating five obsessions",<sup>10</sup> and strive to run a satisfactory education system for the people. By digitalizing education on a super-large scale, China implements innovative education philosophies, methods and modes to lead the paradigm shift of global education. Aided by digital technology, China accelerates the overall improvement of education quality, addresses weaknesses and imbalances in education development, supports the construction of an "always-on" learning society and country, and opens up a new era of education.

## ii. Construction of Smart Education of China platform

Smart Education of China platform represents a milestone throughout the implementation of China's Strategic Action Plan for Education Digitalization and lays the cornerstones for bringing smart education to a higher level. Following the principles of "prioritizing application, putting service first, keeping simple and efficient, and achieving safe operation", the platform will be built on three phases: pilot and demonstration projects as the first phase, platform support and application integration as the second phase, and comprehensive coverage and overall demonstration as the third phase. During implementation, the existing infrastructure should be sufficiently used to strengthen integration and the development of common key content while making optimizations. Platform construction and application should satisfy the growing aspirations of learners in China for better education, and provide multilingual, international, and high-quality education resources for learners from across the world.

**It creates a complete system through platform construction.** Smart Education of China platform adopts a "five-tier" structure<sup>11</sup> covering the national, provincial, municipal, county, and school levels. The platform integrates three resource platforms including Smart Education of China, Platform for Primary and Secondary Education (SEC-PPSE), Smart Education of China, Platform for Vocational Education (SEC-PVE) and Smart Education of China, Platform for Higher Education (SEC-PHE), along with a service center for job-seeking, examination, academic degrees, and overseas study services (see Fig. 2.1). It also incorporates digital resources for moral,

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<sup>9</sup> "Double Deduction": it refers to the reduction of the burden of excessive homework and off-campus tutoring for students undergoing compulsory education.

<sup>10</sup> "Eliminating five obsessions": it refers to the elimination of obsessions in education evaluation with grades, college entrance, diplomas, papers, and titles.

<sup>11</sup> "Five-tier" structure refers to Smart Education of China platform on national, provincial, municipal, county, and school levels.



Fig. 2.1 Homepage of smart education of China platform. Source <https://www.smartedu.cn/>

intellectual, physical, aesthetic, and labor education, and creates a pattern with three horizontal and three vertical dimensions<sup>12</sup> based on the “3 + 1” model.<sup>13</sup>

**It gathers high-quality resources.** By the end of December 2022, SEC-PPSE has provided 44,000 items of education resources; SEC-PVE offered 32,000 online courses, 1,317 teaching resource libraries, 6,844 high-quality online courses, 2,217

<sup>12</sup> “Three horizontal and three vertical dimensions”: three horizontal dimensions include basic, vocational, and higher education, and three vertical dimensions include moral education, intellectual education and physical, aesthetic, and labor education, so that education is available to all grades and all people throughout all phases.

<sup>13</sup> “3 + 1” model: “3” refers to “Smart Education of China, Platform for Primary and Secondary Education (SEC-PPSE)”, “Smart Education of China, Platform for Vocational Education (SEC-PVE)” and “Smart Education of China, Platform for Higher Education (SEC-PHE)”, and “1” refers to the service center that integrates employment, examination, academic degrees, and overseas study services.

public course videos; SEC-PHE collected 27,000 high-quality MOOCs, and over 65,000 textbooks, course materials and case studies. Smart Education of China platform attracted over 912 million visitors contributing to approximately 5.49 billion platform views.

### iii. The Smart Education of China Platform Applications

With a mission to serve the actual needs of learners, Smart Education of China platform provides high-quality and personalized education service for different groups of learners.

**It serves students' development.** The platform gathers a considerable amount of high-quality education resources for students of all grades and allows for redevelopment. For example, Qinghai, Henan, and other provinces integrate the high-quality resources on Smart Education of China platform into the daily curriculum of all primary and secondary schools. SEC-PVE amasses 19,000 virtual simulation training materials and serves more than 5,000 vocational schools to carry out field training, skill assessment, contests, and examinations; SEC-PHE not just gathers plentiful courses, but offers service throughout the whole process of teaching and learning, such as MOOC homework, online discussion, Q&A sessions and online examination; as of September 2022, the National Service Platform for College Student Employment—24,365 Campus Recruitment Service Platform attracted 5.47 million registered graduates, shared 13.25 million jobs, and pushed 21.92 million job information messages to graduates.

**It serves teachers' development.** A “Teachers' Training” sector has been made available for teachers of all grades to help teachers in teaching, pedagogical research, course preparation and professional development. In July 2022, the platform launched the “Summer Vacation Training for Teachers” program, which provides resources on teacher ethics, mental health education and home-school co-education. It offers 2,300 high-quality resource items and provides customized training to kindergarten, primary, lower secondary, junior high school and university teachers. This program had a total of 1.3 billion visits by more than 13 million teachers during its 42-day training period.

**It serves school management.** The platform allows external system access to help schools carry out digital management and reform school governance. For example, utilizing this platform, Qingdao Lanting Primary School mobilized all campuses to develop courses taught by different teachers and encourage collaborative teaching and learning, which created a new education and teaching mode where every child can access high-quality teaching resources simultaneously. Hunan Automotive Engineering Vocational College used SEC-PVE in simulation instruction, collected and analyzed data throughout the lessons without disturbing teachers and students, and made a timely adjustment to the college's internal control, quality management, teaching evaluation, and teacher and student service, effectively advanced precision of school management. Zhejiang University built “Online Zhejiang University 2.0” to explore a path of smart governance and established a whole-process teaching management system incorporating digital and smart technologies, an open, integrated

scientific research management system, and a unified modern school governance system to shore up school operation and governance.

**It serves comprehensive research.** The platform dynamically monitors resource development and application data to serve the research on platform construction and talent cultivation. For example, Beijing utilized the employment data of the National Service Platform for College Student Employment to identify the underlying pattern of talent development, school operation, and social demand changes, and give feedback in school enrollment, talent training and management to build an employment system with tailor-made services. Minhang District of Shanghai made explorative attempts in “smart homework”, so that teachers could adjust teaching strategies and carry out personalized teaching and counseling according to the feedback, and monitor teaching quality through indicators such as homework validity, information content, differentiation, and capability.

**It serves governance.** Education administrative authorities at all levels use the platform to grasp in the latest trends in education development and make decisions scientifically. For example, Shaanxi, Anhui, and other provinces connect themselves thoroughly to the national platform to monitor the real-time development of education in the whole provinces. Chengdu is connected to the national platform to build a “smart brain of education”, which realizes the integration, sharing and processing of regional education big data and serves education development monitoring, academic degree prediction, equipment management, and supervisory model innovation.

## 2.2 Experience and Implications

In retrospect of China’s progress in education informatization, governments, education administrative authorities, schools, and teachers have made innovative attempts, enriched and developed theories, facilitated education digitalization, and created enabling conditions for smart education development.

### 2.2.1 *Keep the Focus on China and Tap the Institutional Advantages*

China incorporates education informatization, education digitalization, and smart education into the national strategy, makes overarching plans to promote smart education, and transforms the institutional advantages of socialism with Chinese characteristics into inexhaustible momentum for education development. China concentrates its efforts on making great changes, strengthens top-level design and overall deployment, and promotes education modernization via informatized tools to realize high-quality education development. It adopts a systemic approach by establishing a mechanism in which government at all levels are linked and each school works closely



together and gathers all forces to build the world's biggest digital center and service platform for education resources. China also integrates institutional advantages and advanced digital technologies, explores the philosophies, methods, and modes of smart education with Chinese characteristics, and forms a development pattern of "strong government coordination, active exploration of schools, and extensive social collaboration".

### ***2.2.2 Benefit all People and Serve Education Equity***

China regards education informatization as an important tool for education equity and constantly expands the coverage of quality education resources. It builds internet infrastructure covering all schools, grades, and subjects, and realizes "single-point access to be shared in the whole system". It builds "three classrooms" and MOOC, etc., to tap the leadership role of famous schools and teachers in order that low-performing schools can have adequate access to learning national curriculum. In this way, all students can share quality education, achieving a historic leap from receiving "education" to receiving "quality education". Smart Education of China platform benefits all people and enables more people to achieve lifelong learning and sustainable development.

### ***2.2.3 Prioritize Application to Improve Education Quality***

China attaches great attention to the integration of IT into education and teaching, which promotes education reform and innovation, and supports the construction of a high-quality education system. China sufficiently taps the multiplication and spillover effect of digital resources, adopts an application-driven approach in development of teaching content, serves the needs of teachers and students, and popularizes informatized teaching. China works to improve teachers' IT proficiency and leverages cyberspace to carry out multi-form and multi-channel teacher training so that teachers' professional expertise can keep abreast with the requirements of the digital age. Moreover, China promotes innovations across all application scenarios, explores new teaching and learning modes, and seeks to integrate large-scale education and personalized cultivation.

### ***2.2.4 Popularize Pilot Projects and Ensure Scientific Development***

Guided by the general principle of “following the lead of pilot projects, bringing mature service online first, implementing step by step, and making continuous improvement”, China accumulates experience through pilot projects, which serves as the guide for subsequent work to push forward education informatization in a scientific, orderly manner. China carries out pilot projects such as “internet plus education” and smart education initiatives, explores a new path of empowering education with science and technology, and lays a solid foundation for science-based development of smart education. China also makes continuous improvements in the course of construction and application, sets up demonstration cases, and works to popularize its experience gained from the pilot projects.

### ***2.2.5 Promote Openness and Cooperation, and Aim for Shared Prosperity***

China considers shared development, shared benefits, and win-win outcomes the means and ends of opening up on a higher level, promotes high-quality international cooperation in education, and strives for the sharing of high-quality education resources globally. China carries out close exchanges with other countries by drawing comparisons and learning from their best practices, deepens cooperation through communication, scales up the scope of education informatization and digitalization, and makes joint efforts to promote education reform and progress. Collaborating with UNESCO, China has held important international conferences, such as the International Conference on Education Informatization, and the International Conference on Artificial Intelligence and Education, and delivered landmark documents such as the *Qingdao Declaration* and the *Beijing Consensus*, which builds a global platform for the informatized, digital, and smart development of education. China also strengthens connectivity, focuses on building an international platform for online education, gathers, integrates, and shares resources to promote the establishment of credit and degree recognition standards, and shares diverse learning fruits.