Exploration of the Goals and Action Plans for the Digital Transformation of Basic Education in China

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Abstract. With the rapid development of information technology, the digital transformation of basic education has become an important way to improve the quality of education and adapt to the needs of the new era. By analyzing the current difficulties in the process of digital transformation of basic education in China, this paper discusses the main objectives and action plans of digital transformation of basic education. The study points out that although China has made some progress in the construction of educational digitalization, there are still many challenges in policy mechanism, educational environment, teacher's digital literacy and evaluation system. Therefore, this paper puts forward some measures such as strengthening top-level design, creating digital learning environment, improving teachers' digital literacy and perfecting supervision and evaluation mechanism.

Keywords: Digital Transformation, Basic Education, Action Plans

1 Introduction

Amidst the swift progression of information technology, the digitalization of the educational sector has emerged as a critical area of focus. Recognizing the foundational role of basic education in nurturing the talents of tomorrow, its digital evolution is pivotal to both educational excellence and the broader goal of achieving educational modernization at a national level. Despite the advancements made in advancing the digitalization of China's basic education, numerous obstacles persist, including policy gaps, a lack of digital proficiency among educators, and an underdeveloped educational infrastructure. Addressing these challenges effectively and fostering a comprehensive digital transformation in basic education is an urgent research priority. This paper seeks to examine the status and challenges of digital transformation in China's basic education, delve into its goals and strategies, and propose actionable solutions and recommendations [1]. The study aspires to offer insights for educational decision-makers and practitioners, ensuring the successful implementation of digital reforms in basic education and enhancing its quality and equity.

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2 Main Objectives of Digital Transformation of Basic Education

In the realm of educational digitalization, regional and school-level entities must concentrate on distinct tasks, yet both are dedicated to the same overarching goals: enhancing educational resource distribution and elevating educational standards. Their efforts are interdependent and collectively drive the advancement of educational digitalization. Schools, being the primary incubators of talent, must evolve their talent development models to meet the intelligent era's talent demands. The digitalization of basic education is motivated by the intertwined dynamics of personal growth and societal needs within the intelligent era. The fulfillment of basic education's individual and social roles is contingent upon digital transformation in the age of intelligence. The objective of optimizing educational resource allocation is to achieve an equitable distribution of educational assets through digital solutions [2]. This means using the Internet, cloud computing and other technologies to extend high-quality educational resources to remote and rural areas and narrow the educational gap between different regions. Digital platform enables teachers and students to access rich teaching materials and learning tools, thus improving the efficiency and popularity of educational resources [3]. The overall improvement of education quality is achieved by innovating teaching methods and improving the quality of education content. Digital transformation encourages teachers to adopt more flexible and interactive teaching methods, such as online teaching and flipped classroom, to adapt to the learning needs and styles of different students. The digitalization of educational content also makes the teaching content richer and more dynamic, and can update and reflect the latest academic achievements and social needs in a timely manner.

3 Realistic Dilemmas of Digital Transformation of Basic Education

3.1 Operational Mechanism Issues

A complete mechanism and system are the key to ensure the orderly and effective digital transformation of basic education. Provinces have strategic plans or programs related to education informationization or digitization in accordance with national policies. It has been deployed from the aspects of infrastructure construction, digital transformation of basic education, digital transformation of higher education and vocational education, digital transformation of teachers, improvement of digital governance level of education, and job security, but it lacks a special digital transformation plan for basic education. The policy or implementation plan of the digital transformation of basic education needs to be improved urgently [4]. The foundational and platform aspects of basic education have largely been established, yet there exists an absence of tailored strategic plans and policy frameworks specifically for the digital transformation within this sector. This gap hinders the comprehensive guidance and advancement of digital transformation in basic

education, particularly in terms of organizational and motivational structures. Consequently, institutions and schools are left without clear policy directives, leading to a lack of clarity regarding the transformation's objectives. The clarity of the goals for the digital transformation of basic education remains insufficient [5]. Currently, while the major platforms boast a wealth of digital resources, these are merely quantitative accumulations online, marred by issues such as outdated and redundant content, inconsistent quality, lack of a cohesive resource network, low resource utility and alignment, and a mismatch between resource availability and demand. Regarding the integration of digital technology in teaching, the availability of resources is significant, but the approach to designing and utilizing these resources holds even greater importance.

3.2 Educational Environment Issues

E-learning environment is a highly informative learning field, whose core is to integrate computer technology, communication technology and network technology to build an interactive, efficient and resource-rich learning ecosystem. The whole digital learning environment is composed of a series of infrastructure, rich and diverse resources, efficient and convenient platform, communication system and intelligent tools. In this environment, knowledge and information are intelligently processed through advanced computer multimedia technology, which makes it more suitable for the needs of learners. At the same time, the humanized design makes the learning process more comfortable and natural, while the scene virtualization technology makes the learning experience more vivid and lifelike, as if the real students and teachers can keep up with the pace of development of the times, actively cultivate Internet thinking, and devote themselves to optimizing and improving the internal structure of the digital learning environment. This positive attitude and action initially show the actual effect of online education and teaching to a certain extent. However, in teaching practice, we often encounter many problems, such as teaching network congestion, software crash, uncontrollable main control software and terminal update asynchronously, student terminal out of classroom management and so on. Some schools still do not have enough technical support to solve the problems encountered in the use of digital tools, which affects teaching efficiency. On the other hand, although digital tools can support distance learning, they cannot completely replicate the experience of social interaction and teamwork in the classroom, and the lack of face-to-face communication between teachers, students and students affects the learning atmosphere and experience of students.

3.3 Digital Literacy Issues

The promotion of digital awareness is very important to motivate teachers to improve their digital literacy, which involves three progressive dimensions of digital awareness, digital willingness and digital will. In the current stage, most teachers have generally shown concern for digital technology, and can actively integrate its elements into teaching practice, however, there are still some teachers whose digital

awareness needs to be further improved. Although digital technology has been widely used, teachers' teaching philosophy has not fully adapted to the requirements of the digital age, and some teachers still equate digital teaching with the traditional use of information technology teaching, and do not fully understand the deeper meaning of digitalization in education and teaching. In addition, although the maturity of teachers in the use of information technology has improved, their teaching ideas still lag behind the rapid pace of the digital age [6]. In the new era of educational digitalization, teachers should not only be proficient in the operation of information technology tools, but also have a profound insight into and lead a fundamental change in educational objectives, content innovation and teaching methods caused by digitalization, so as to ensure that educational practice resonates with the development of the times.

3.4 Supervision and Evaluation Issues

Schools or regions use digital technology to enable evaluation, which improves the efficiency and quality of evaluation to a certain extent, and has achieved some results, but the relevant evaluation mechanism of digital transformation has not yet been perfected, and the mechanism of promoting reform and transformation by evaluation has not yet been formed. There is a lack of supervision mechanism for the digital transformation of basic education. To ensure the orderly and efficient promotion of the digital transformation of basic education, we need scientific supervision and management mechanism as a support, but the lack of relevant supervision and management mechanism leads to the disorder and random state of the digital transformation of basic education. The negative impact of technology also needs to be taken into account [7]. At present, the framework or policy to protect the physical and mental health of teachers and students in primary and secondary schools and the security of data privacy is not perfect, and the mechanism of human-computer collaboration and ensuring the fairness and justice of algorithms is not yet perfect. With the continuous development of artificial intelligence, how to optimize algorithms, how to educate machines, how to cooperate between human and machine, and other related theoretical and practical research need to be further studied. The existing laws have not been fully implemented in the process of digital application, and the hidden dangers of digital security still exist.

4 Action Plans for Digital Transformation of Basic Education

4.1 Strengthen Top-Level Design

The nation has rolled out a strategy for the digitalization of basic education, enhancing the associated mechanisms from policy provision to the execution and support elements of this shift, thus establishing a policy framework that supports the digitalization of basic education and offers directional guidance. A comprehensive

assessment of the digitalization status in basic education is essential, gathering and analyzing the current landscape, challenges, experiences, or recommendations from various stakeholders and institutions involved in the process, to inform policy development. Based on this assessment, it is crucial to refine the policy structure for the digitalization of basic education, devise a comprehensive rollout plan, and initiate pilot programs to advance the digitalization agenda systematically. By combining grassroots demand analysis with top-level policy direction, a dynamic transformation model can be established that invigorates the drive for digitalization in basic education. Enhancing the execution and oversight mechanisms for the digital transformation in basic education is also key. Vertically, provinces should align with the national strategy, carrying out province-specific planning and deployment, devising their own plans or methods for the digital transformation of primary and secondary education. Subsequently, municipal and county education authorities and schools should break down their tasks in accordance with the provincial plan and their unique circumstances, progressively refining their approach. Horizontally, we should make overall arrangements from the aspects of transformation objectives, implementation plans, evaluation and adjustment, formulate short-term, medium-term and long-term transformation objectives, improve the implementation mechanism of transformation, refine the organization, guarantee, incentive and supervision mechanism, ensure the promotion of specialized leadership management and specialized agencies, and integrate digital technology into teaching, learning and research. So as to form the idea of digital transformation of basic education, which is promoted vertically and interlinked horizontally.

4.2 Create Digital Environment

To build an efficient digital learning environment, from the technical point of view, developers need to effectively solve the contradiction between large-scale network data concurrent processing and limited frequency domain resources of LAN, and ensure the stability and efficiency of the system through efficient data processing strategies and resource optimization means [8]. As shown in Figure 1, with the steady growth of China's GDP, the total investment in compulsory education has increased accordingly, from 1420 billion yuan in 2014 to 28427 billion yuan. The proportion of total investment in compulsory education to GDP is stable between 2.2% and 2.4%. These data show that China has sufficient financial capacity to invest in the construction and optimization of digital learning environment.

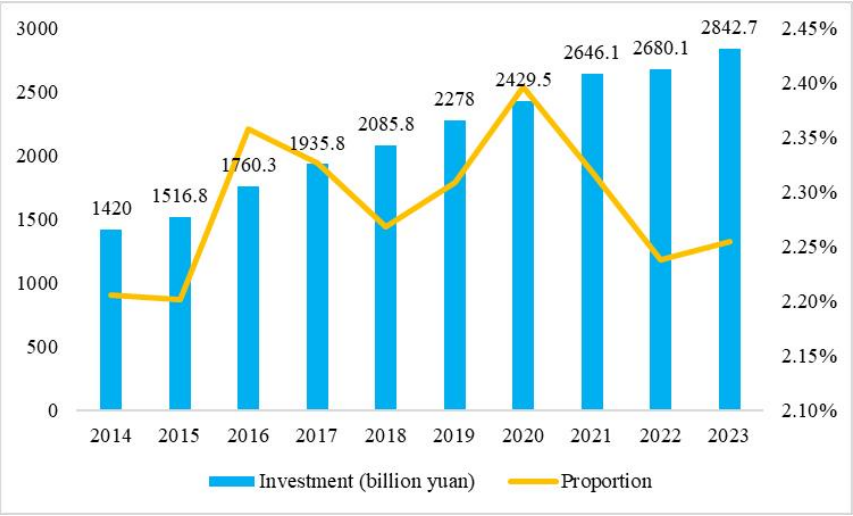

Fig. 1. Total investment in compulsory education in China and its proportion in GDP

In the design of control software, it is necessary to develop a centralized mobile lock screen management console to achieve comprehensive monitoring and precise control of the status of all digital devices, so as to improve the efficiency and security of operation and maintenance management. Teachers should give full play to the advantages of computers, multimedia classrooms, educational platforms and rich online educational resources to build a multi-level and modern learning environment, so as to optimize learning effectiveness and realize the deep integration and efficient use of information resources [9]. At the same time, we need to actively promote the advantages of the use of information network platform, relying on professional network classrooms, to ensure real-time updating and transmission of information. In order to maintain the smooth operation and continuous optimization of the digital learning environment, innovative, interesting and diversified teaching guidance strategies are adopted to encourage students to interact actively and effectively with teachers and classmates. In this context, we gradually focus on the implementation of the policy of digital learning environment construction, in-depth analysis of the requirements and connotations of digital resources construction, actively design digital resources such as electronic teaching plans, online question banks, electronic literature, intelligent book materials, broaden educational ideas, and lay the foundation for enhancing the construction and development of digital learning environment.

4.3 Enhance Digital Literacy

Teachers' digital skills refer to the ability of teachers to effectively use digital technology to design, implement and evaluate teaching in the process of teaching, which is one of the necessary abilities in the process of digital education. First of all, strengthen digital awareness. Teachers should change their understanding of digitalization and understand that digital technology is not only a teaching tool, but also an important force to change educational concepts, change educational methods and break through traditional teaching modes. As educators, teachers should take the initiative to pay attention to the new planning and requirements of the relevant departments of the state and the field of education in the field of digitalization, synchronize with the world's digital information, actively integrate digital technology into teaching practice, and improve the teaching effect and quality. Secondly, enhance the digital capability. On the one hand, teachers should actively participate in digital teaching training, systematically learn how to use basic equipment, how to use digital technology for teaching, how to acquire and integrate teaching resources, and master basic digital skills [10]. On the other hand, teachers should cultivate their own digital productivity and security capabilities. We should cultivate our own data thinking, redevelop the existing digital educational resources, actively participate in the development and sharing activities related to digital teaching, constantly enrich the content of digital teaching resources, and build a diversified and three-dimensional educational resource system. In order to enable part-time subject teachers to master platform application methods more quickly and carry out more "professional" teaching, the school has set up a technology + application promotion team. After many attempts and practices, this paper puts forward the double-teacher classroom teaching mode of "on-demand + guided learning" and the five-step lesson preparation method based on the national smart education platform for primary and secondary schools. The following is the flow chart and model diagram of the model, which shows the specific implementation steps of the double-teacher classroom teaching model in detail (Figure 2).

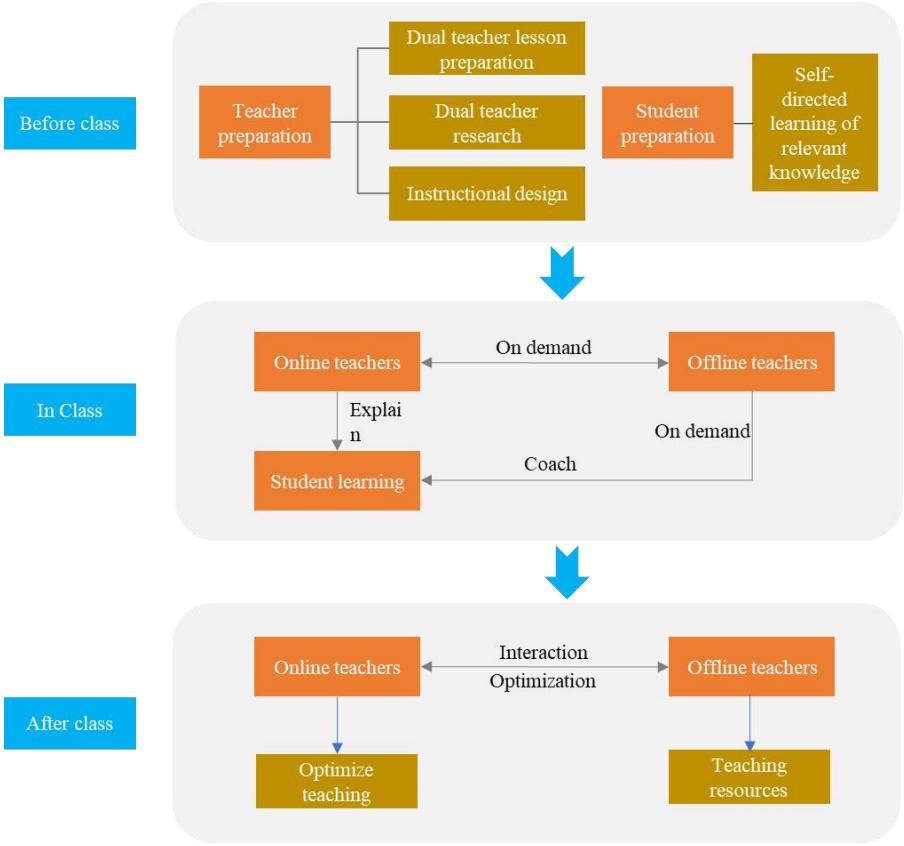

Fig. 2. Digital double-teacher classroom teaching model

4.4 Improve Supervision and Evaluation

The digital evolution of school education is significantly contingent upon the advancement of educational assessment within this transformation. To catalyze change, basic education must prioritize the reform of its evaluative mechanisms, embracing an evidence-informed approach that emphasizes data collection and leverages its potential. This shift in educational evaluation should be a pivotal entry point for instigating broader reforms and innovations driven by assessment practices. Initially, it is essential to refine the evaluative mechanisms for the digital transformation in basic education. Building upon the current general model for educational digital transformation maturity, frameworks such as the Basic Education Digital Transformation Maturity Model should be established to direct the execution of transformation initiatives and assess the progress of these efforts. It is also crucial to continuously refine and update the evaluation system to ensure it accurately captures the outcomes and challenges of digital transformation in basic education, offering a foundation for subsequent refinements and enhancements. Furthermore,

enforcing privacy data security regulations for educators and students is imperative, as is the optimization of fair and equitable algorithmic mechanisms. The over-reliance on technology can have detrimental effects on students' vision and overall well-being. With the rapid evolution of artificial intelligence comes new digital security challenges, necessitating the development of algorithms that ensure the ethical and constrained use of technology by educators and students, safeguarding their personal data privacy.

5 Conclusions

China's basic education is undergoing a pivotal phase in its digital transformation journey. Even though the process is impeded by incomplete mechanisms, suboptimal educational settings, and teachers' insufficient digital proficiency, the clear objectives and strategic plans for this digital shift offer a roadmap to overcoming these hurdles. By enhancing strategic planning at the highest levels, establishing an effective digital infrastructure, elevating educators' digital competencies, and refining the mechanisms for oversight and assessment, the digital transformation of basic education can proceed more steadily. As technological advancements continue and policy implementations deepen, digital education stands to not only markedly enhance educational quality and efficiency but also to establish a robust foundation for nurturing innovative talents who will thrive in the intelligent era. Looking ahead, the further advancement of digital transformation in basic education will foster broader dissemination of educational equity and high-caliber educational resources, achieve the aims of educational modernization, and stimulate comprehensive societal advancement and development.

References

1. Iivari N, Sharma S, Ventä-Olkkonen L. Digital transformation of everyday life–How COVID-19 pandemic transformed the basic education of the young generation and why information management research should care?[J]. International journal of information management, 2020, 55: 102183.
2. Cheng E C K, Wang T. Leading digital transformation and eliminating barriers for teachers to incorporate artificial intelligence in basic education in Hong Kong[J]. Computers and Education: Artificial Intelligence, 2023, 5: 100171.
3. Chomunorwa S, Mashonganyika E S, Marevesa A. Digital transformation and post-Covid-19 education in South Africa: a review of literature[J]. South African Computer Journal, 2023, 35(1): 91-100.
4. Akour M, Alenezi M. Higher education future in the era of digital transformation[J]. Education Sciences, 2022, 12(11): 784.
5. Demartini C G, Benussi L, Gatteschi V, et al. Education and digital transformation: The “riconnessioni” project[J]. IEEE Access, 2020, 8: 186233-186256.
6. Cwala S C. Digital transformation in the basic education sector: a case study of selected disadvantaged Schools in the Western Cape[D]. 2022.

7. Zmyzgova T R, Polyakova E N, Karpov E K. Digital transformation of education and artificial intelligence[C]//2nd International Scientific and Practical Conference “Modern Management Trends and the Digital Economy: from Regional Development to Global Economic Growth”(MTDE 2020). Atlantis Press, 2020: 824-829.
8. Vachkova S N, Petryaeva E Y, Milyaeva D A, et al. Analytical review of education policies on digital transformation of school education worldwide[J]. European Proceedings of Educational Sciences, 2021.
9. Siljebo J. Digitalization and digital transformation in schools: a challenge to educational theory?[J]. Education in the North, 2020.
10. Rêgo B S, Lourenço D, Moreira F, et al. Digital transformation, skills and education: a systematic literature review[J]. Industry and higher education, 2024, 38(4): 336-349.