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Research on the Development Dilemma and Countermeasures of China's Education Industry from the Perspective of Digital Transformation

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Abstract: Amidst the rapid evolution and broadening adoption of information technology in China, the education sector is undergoing unprecedented transformation. While the digitalization of China's education industry is advancing swiftly, it is encountering various challenges that require ongoing attention and solutions. Promoting educational equality between cities and villages to reduce the difference is a critical component of this transition. The urban-rural education disparity significantly impedes the pace and quality of digital transformation of the education industry in China. Rural regions encounter issues such as inadequate infrastructure, unequal allocation of educational resources, and insufficient digital literacy among teachers. Implementing tutorial systems, establishing Professional Learning Communities (PLCs), and adopting the "three classrooms" model can effectively address these challenges. Collaboration among schools, government entities, and broader society is essential to promote educational equity, advance educational modernization, and cultivate talents tailored for future societal needs. Studying the challenges faced by China's education industry during its digital transformation phase, along with corresponding strategies, is pivotal for developing innovative teaching models and approaches. This endeavor fosters the evolution of educational content and instructional methods, aligning them with the swiftly changing social and economic landscape.

Keywords: Digital Transformation, Education Industry, Digital Education, Educational Equity, China

1. Introduction

1.1. Research Background

As humanity enters the third digital revolution, fresh cohort Internet technologies are utilised extensively in all spheres of life and have grown more sophisticated over time. These advanced technologies are not only driving the comprehensive transformation of society into the digital and intelligent age but also bringing profound changes and innovations in various fields [1]. China is currently leading the globe in the digital transformation of the industrial and commercial sectors, having accomplished extraordinary feats. This achievement not only sets an example for digital

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transformation in other fields but also inspires other fields to accelerate the pace of digital transformation. Because of the rapid evolution of information technology and its extensive penetration into various fields of society, China's education industry has gradually come to embrace digital transformation as a necessary development trend. [2]. In order to support the process of educational change and innovation, the digital transformation of education can be understood as using the Internet as the carrier, data resources as the fundamental components, and a deep integration of digital technology and instructional elements in the 5G environment.

1.2. Literature Review

The successful digital transformation of education marks the realization of human-machine integration, enabling both students and teachers to obtain more comprehensive development opportunities [3]. Xi Jinping put forward the guidelines of "promoting the digitisation of education and building a learning society and a learning-oriented country" in the report of the 20th National Congress of the Communist Party of China, with the goal of highlighting how crucial and urgent it is to digitise education in order to create a learning society and a big nation [4]. In the sphere of education, the digital transformation of education has gained popularity. and it is also one of the main directions of the reform of the education industry. In the digital age, the education industry needs to make continuous progress and actively seek new teaching models and methods to adapt to social development [5]. Digital technology is being used in China's educational system more and more lately. Digital education resources such as online learning platforms, digital textbooks, and interactive teaching tools have been widely adopted and have played an important role in China's educational practice. The outbreak of COVID-19 in 2020 has further catalyzed the digitization process in various industries. The pandemic has forced digital reform and innovation in the education system, with schools and universities across the country rapidly transitioning to online learning models to ensure continuity of education during the lockdown. On February 4, 2020, the Ministry of Education issued the Guiding Opinions on the Organization and Management of Online Teaching in Ordinary Colleges and Universities during the epidemic prevention and Control Period, which proposed the implementation of "no suspension of classes" measures [6]. According to data released by the China Internet Network Information Center (CNNIC), the number of users of online education platforms in China has shown a rapid growth trend since the outbreak of the epidemic. According to the 45th Statistical Report on the Development of the Internet in China, by March 2020, there were 423 million online learners in China, up 82% from June 2019. This represents 46.8% of all Internet users in the country [7]. This shows that the outbreak of the epidemic has prompted more students and parents to turn to online education, accelerating the development of the online education market. The convenience, flexibility, and other advantages of online education have been fully reflected during the pandemic. China's education sector is still in its infancy when it comes to digital transformation, and practice and research initiatives in this area have also shown several shortcomings. Li said existing textbooks and textbooks lack a deep and clear explanation of how teachers can make a contribution in the digital transformation of education [2]. Ding and Wu believe that information technology is not only a teaching aid but also a tool for teachers' professional development [8]. As Ding and Wu point out, the main goal of digital education is to help students acquire the critical skills necessary for success in the information era in both their personal and professional life. Digital education aims to promote students' lifelong learning capabilities, empowering them to participate actively in a globalized culture and play an active role in a globalized society [8]. Dong and Yang proposed that in the context of the new era, it is particularly urgent to raise the participants' level of knowledge about technology and proficiency in the classroom. Lacking systematic digital literacy training prevents teachers and students from taking full advantage of complex technological systems and tools [9].

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1.3. Research Framework

This paper aims to explore the development dilemmas faced by China's education industry in the process of digital transformation and put forward specific strategies to deal with these dilemmas effectively. This paper hopes to contribute to the goal of building a more equitable and sustainable education ecosystem in China.

2. Case Description

China's social growth has moved into a new age of technology, and the country's educational system is seeing a favourable digital transition. Given the current state of the world, using cutting-edge digital technology to further the digital transformation of education has grown in importance as a sector for educational research. In order to promote the digital development of education, education researchers explore how these technologies can be used to optimize the teaching process, provide high-quality educational resources, and improve educational management and evaluation [8].

In China's education industry in the twenty-first century, digital transformation has emerged as one of the primary national strategies. Over the past two decades, the Chinese government, through the formulation and implementation of a series of policies, programs, and plans, has significantly emphasized the role that digitalization plays in encouraging the equitable growth of education nationwide. The concept of digital transformation is not only deeply rooted in the discourse system in the field of education but also gradually won widespread social recognition, including the active acceptance and support of educators and other stakeholders in education [10].

The development of digital education has seen some success thanks to the significant public funding and human resource investments as well as efficient overall management, particularly in the areas of digital education resources and infrastructure [10]. Driven by new technologies, the infrastructure of digital education has been significantly optimized, with AI computing power and data centre base continuously strengthened. In addition, a digital ecosystem that promotes innovation in education is gradually being established, thus providing strong support for digital transformation in the education sector [11]. With ongoing advancements in digital infrastructure, the widespread use of Internet access, the rich accumulation of digital resources, and the increasing number of intelligent learning platforms and terminal equipment, mobile learning as an innovative learning mode came into being. This model significantly expands the boundaries of learning space, realizes the time-space liberation of learning activities, and provides students with new chances for autonomous learning and easy access to information [12]. As shown in Figure 1, the content related to "digital transformation of education" included in CNKI began to surge in 2019, which not only shows that the digital transformation of education has become a hot spot of The Times under the promotion of relevant policies but also demonstrates how China's digital education revolution is steadily maturing.

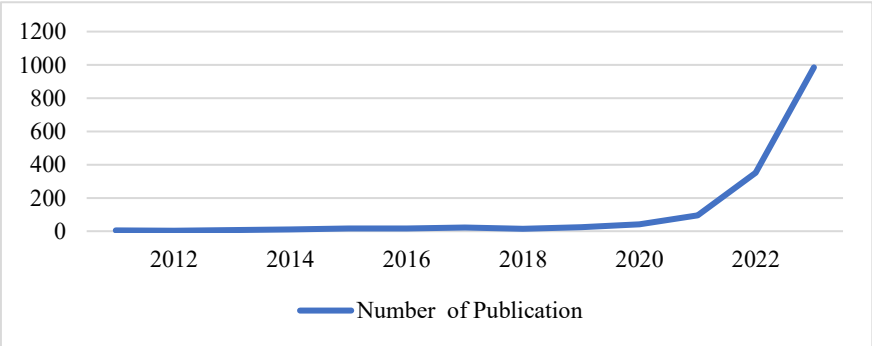

Figure 1: 2011-2023 Publication Volume on Digital Transformation of Education
(Photo credit: Origin)

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3. Analysis on the Problem

The digital revolution in the education sector contributes to the achievement of education's modernization objectives, satisfies the demands of social and economic advancement, and fosters the equitable and all-encompassing growth of education [13]. Several outcomes have been attained by China's education sector's digital transformation, but there still exists many difficulties. These dilemmas affect the speed and extent of the digital revolution in China's educational system.

3.1. Insufficient Digital Infrastructure

Insufficient digital infrastructure affects the digital transformation of China’s education industry. Digital infrastructure includes network equipment, Internet connection, computer hardware, etc., which provides the basic conditions for the storage, transmission, and access of digital educational resources. These digital infrastructures are relatively abundant in urban areas and may be lacking in rural areas. Inadequate digital infrastructure not only limits the dissemination and use of digital educational resources but also further exacerbates the gap in internet access between cities and villages. Urban areas often have more advanced digital infrastructure, such as broadband Internet, and mobile network coverage is more extensive and stable, which provides convenient conditions for the access and utilization of digital educational resources. In contrast, many rural areas still face slow Internet access, erratic service, or no Internet service at all. The use of educational technology is not practical if the teacher's school lacks a sufficient number of computers or a fast Internet connection [14,15]. Lacking digital infrastructure seriously restricts the dissemination and use of digital educational resources and directly affects the actual availability of digital educational resources [16]. Urban households tend to be better off and able to afford digital devices and Internet services. Due to the relatively poor economic conditions of rural households, it may be difficult to afford to buy computers tablets, and pay for continuous Internet costs, which further exacerbates the limitations of inadequate digital infrastructure on digital education in rural areas. Therefore, the lack of digital infrastructure not only affects the learning and teaching activities of teachers and students in villages but also seriously restricts the digital transformation process of rural education. To solve this problem, the government needs to contribute more money to building digital infrastructure in villages, improve network coverage and service quality in villages, and ensure that teachers and students in all regions can equally enjoy the advantages brought by digital education.

3.2. Uneven Distribution of Educational Resources

One major obstacle to China's education industry's digital transformation is the unequal distribution of educational resources. The unequal distribution of educational resources is caused by the disparity between the economic development of cities and villages. In villages, there are widespread phenomena such as low education investment, uneven distribution of education funds, inadequate teaching management, low teaching levels of teachers, and low classroom teaching efficiency [17]. High-quality educational resources are often concentrated in first-tier cities, while small and medium-sized cities and rural areas are relatively scarce [2]. Education resources usually go more to urban schools. For example, in the allocation of education funds, the government may be more inclined to invest more education funds in urban areas while ignoring the needs of rural areas. This may lead to a lack of financial support for rural schools to build digital education. Government education policies and resource planning may not adequately cover or prioritize the needs of rural areas. Sometimes, digital education development in rural areas is not seen as an urgent policy priority. In promoting the digital transformation of the education sector, policymakers may fail to adequately take into account differences between regions, which may lead to further unequal distribution of digital education resources [16]. Lack of government policy support and guidance in digital education in rural areas,

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resulting in insufficient supply of digital education resources. This lack of resources may affect the development and promotion of digital education. In addition to causing concentration and waste of educational resources, the unequal distribution of educational resources widens the achievement gap between cities and villages. The promotion of digital education is often concentrated in areas with better educational resources, which further aggravates the relative backwardness of areas with fewer resources. Schools that lack digital education resources may not be able to provide high-quality digital teaching, which not only limits students' learning opportunities and development potential but also is detrimental to China's education sector's overall growth and digital transformation. As a result, it's critical to support and expand the availability of educational resources in villages, advance the cause of educational parity between cities and villages, and raise educational standards.

3.3. Insufficient Digital Literacy of Teachers

The digital revolution of education in China's industry has encountered some problems due to the low level of digital literacy among teachers. In the context of digital education, the level of digital literacy that educators possess has become problematic. The degree of digital literacy among educators in China directly influences the speed and quality of digital change in the education sector.

The efficient use of digital educational resources by teachers will be influenced by their level of digital literacy, which will ultimately impact the standard and acceptance of digital education.

Teachers that lack digital literacy are unable to fully utilise digital educational resources for their lessons, which has an impact on how well educational materials are used. Some teachers lack basic digital skills and are unable to skillfully use computers, networks, and related software to conduct teaching activities. Some teachers hold a conservative attitude towards emerging digital technology and lack the spirit of trying and exploring, resulting in relatively backward teaching methods and methods. Many educators are not familiar with the principles and methods of digital instructional design and are unable to integrate digital technology into teaching practice effectively. Because teachers lack the ability to digital teaching design, teaching quality can not be effectively improved, and students' learning effect is not good. Urban teachers use electronic devices and digital tools more often in their daily lives and have more frequent contact with modern information technology. It is difficult to use digital educational resources effectively in rural areas because people there typically lack the technical knowledge and skills required, as well as a limited understanding of how to use current information technology [16]. Without effective technical training for teachers, they will not be able to take full advantage of digital technologies. Throughout their careers, they need adequate training to keep their skills up to date [14].

4. Suggestions

Schools, governments, and all sectors of society need to work together to promote equity in urban and rural education.

4.1. Implementation of Tutorial System and Establishment of PLCs

The government should formulate comprehensive policies to reduce educational inequality across the country and ensure that education in rural areas can also receive adequate support and development. These policies should pay attention to rural teachers and establish a more comprehensive education compensation mechanism. Because of the small scale of village schools, the number of teachers is limited, and the teaching activities are relatively independent, so the government can take measures to assist urban schools in supporting rural schools. Mentorship is seen as a professional relationship, usually involving an interaction between an experienced educator and another educator, designed to support the latter's career development. PLCs are Professional Learning Communities. It is a

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community of educators who work together to improve teaching practices, research, and collaboration and continuously improve teaching and learning. PLC members typically include teachers, school administrators, education experts, and others involved in education. In the implementation of the tutor system, the government can consider establishing a partnership between urban teachers and rural teachers. The government could set up assistance programs to facilitate teachers in urban schools and provide remote guidance and support to new teachers in rural areas to help rural teachers improve their teaching quality. In terms of setting up PLCs, the government could consider setting up PLCS between rural schools. This PLC can help rural teachers share resources, learn from each other, and make teaching plans together. The government can also encourage urban teachers to participate in the PLC and disseminate the latest educational models and knowledge remotely.

In the context of the more and more widespread use of the Internet, social networks are becoming more and more significant in the sphere of education. which greatly promotes the sharing and communication of educational resources. Through these measures, China has the capacity to raise educational standards across the board, eliminate the education gap between cities and villages, and advance the field of education as a whole. In conclusion, the Chinese government should take comprehensive measures to implement the tutorial system and PLCs to guarantee the equitable allocation of educational resources and advance educational parity throughout the nation [18].

4.2. Promote the Application of “Three Classrooms” with the Group Education Mode

Group running school is a school system in which one famous school and several schools form a school community. The schools have unified coordination and management to guarantee a constant standard of education but are relatively independent and pursue their own characteristics. “Three classes” is a general term for “delivery class”, “famous teacher class” and “famous school network class”, which provides solid backing for the balanced advancement of education. Promoting the application of “three classrooms” in the mode of group education is a crucial strategy for addressing the lack of resources for rural education. Encouraging the use of "delivery classrooms" can successfully address the issue of inadequate opening and poor opening of national curricula in rural schools. This study will help rural schools fully and effectively implement the state-mandated curriculum by setting up specific online courses or synchronizing online teaching to encourage the growth of nationwide education in a balanced manner. Promoting the application of a “famous teacher class” can address the issue of teachers' weak professional growth and teaching abilities. Great teachers inspire other teachers to raise the bar so that more people can access the resources of well-known educators. Encouraging the use of "famous school network classes" can successfully narrow the achievement gap between cities and villages. With top-notch schools serving as the major focus, this study will methodically and thoroughly encourage the sharing of top-notch educational resources to support students' individualised growth through online learning environments, online courses, and other means.

4.3. Promote the Precise Construction of Teachers

By using digital technology, detailed data of teachers in rural areas, such as age distribution, education level, and income, are analyzed and then compared with education level by big data so as to explore the needs for teacher capacity improvement. To raise the general standard of education talent in rural areas, a training plan for rural teachers in line with their professional development needs is formulated through network resources. In addition, through the formulation of preferential policies, such as giving preferential treatment in teacher recruitment, professional title evaluation, further training, living allowances, and construction of turnover dormitories, this study can provide solid teacher support for the precision poverty alleviation work in education, so as to effectively improve the

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current situation of rural teachers [17]. Through these measures, teachers can not only improve the quality of education but also enhance their career satisfaction and willingness to stay and further promote educational equity.

By ensuring that every region can equally benefit from digital education, the aforementioned steps can progressively reduce the disparity in education between cities and villages, supporting China's education industry's digital transformation.

5. Conclusion

5.1. Key Findings

In conclusion, the disparity in education between cities and villages has seriously hindered the digital transformation process in China's education industry. Achieving the digital transformation of China's education industry requires promoting equity in nationwide education. Urban areas usually have more financial support and investment. They can more easily promote the construction and renewal of digital education. In contrast, rural areas face problems such as inadequate infrastructure, inadequate allocation of educational resources, and insufficient digital literacy of teachers. Education in some villages is still stuck in the traditional mode and cannot keep up with the pace of the digital age. Teachers and students in these areas cannot fully access and use educational resources and may face problems of poor learning quality and limited opportunities for future development. Addressing the development dilemma of digital transformation in China's education industry requires close cooperation and coordination among schools, the government, and all sectors of society.

5.2. Research Significance

By strengthening infrastructure construction, increasing economic support for rural areas, improving the fairness of resource distribution, formulating more sound strategies and policies, and conducting teacher skills training, this study can lead to long-term national development and the cultivation of more exceptional talent in addition to raising the standard of education. Studying the development dilemmas faced by China's education industry in digital transformation has immense importance for educators, school administrators, and scholars studying educational technology, both in the present and the future. By systematically studying these issues, this study can provide data support and a decision-making basis for policymakers, educational institutions, and relevant stakeholders and promote the healthy development and modernization of China's education industry. This study aims to promote the development of China's education sector and contribute to broader social goals such as promoting social equity and social progress.

5.3. Limitations

This paper mainly adopts the literature analysis method. There is little use of primary data and a large amount of secondary data. To strengthen the article in the future, primary data might be gathered via interviews, questionnaires, and other methods. For example, rural teachers can be directly interviewed to understand their real views on digital education.

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