Research on the Path of Improving Governance Effectiveness in the Digital Transformation of Education Management

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Abstract: In the context of digital technology, which is deeply reshaping the social governance landscape, the digital transformation of education management has become a key path to improving governance effectiveness. This paper researches the digital transformation of education management and the improvement of governance effectiveness, analyzes the core concepts and theoretical basis of the digital transformation of education management and governance effectiveness, and sorts out the current transformation status, governance effectiveness level, and the problems and challenges faced. Practical experience is summarized through case analysis in basic, higher, and vocational education. This study suggests strategies for improving efficiency through technological innovation, management system reforms, talent training, data governance, and policy support. The research aims to provide theoretical reference and practical guidance for promoting the digital transformation of education management and achieving a leap in governance effectiveness.

1. Introduction

In the era of a booming digital economy and rapid development of artificial intelligence technology, the education sector is undergoing profound changes, and the digital transformation of education management has become an inevitable trend. From the strong promotion at the policy level to the urgent need of educational institutions for efficient management, digital transformation has brought new opportunities to improve education management and governance effectiveness. However, many problems still need to be solved in the transformation process.

The rapid development of digital technology has profoundly changed the way people live and work, and the education field is no exception. In the past, schools handled student enrollment, course arrangements, and other matters mainly by manual operation and paper documents, which were inefficient and prone to errors. Now, more and more schools are beginning to try to solve these problems with digital means, such as using online systems to handle student enrollment changes and optimizing course settings through big data analysis. It is the digital transformation of education management [1].

The government attaches great importance to the digital transformation of education management. It has introduced a series of policies to encourage schools to accelerate transformation and improve management. However, in the actual promotion process, many difficulties have been encountered. Although some schools have bought advanced equipment and built digital platforms, the platforms have become decorations because of the mismatch between technology and actual management needs; in some schools, data between departments are not interoperable, and information is like isolated islands, making it difficult to achieve efficient collaborative management. These problems have seriously affected the governance effectiveness of education management. Therefore, in-depth research on the path to improve governance effectiveness in the digital transformation of education management is of great significance to promoting the modernization of education management and achieving high-quality education development. This study aims to enhance governance effectiveness during the digital transformation of education management. Through theoretical analysis, research on

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the current situation, and case studies, it examines effective strategies to offer valuable references for advancing the modernization of education management.

2. Core Concepts and Theoretical Basis

2.1. Definition of Key Concepts

The digital transformation of education management refers to using digital technology to fundamentally change and reshape management processes, resource allocation, service models, etc., in the education management process. In terms of management processes, the traditional manual approval process was cumbersome and time-consuming. After the digital transformation, the online approval system can realize the automation and real-time tracking of the process, greatly improving the approval efficiency. With the help of big data analysis of student needs, discipline development trends, etc., teaching equipment and teaching staff can be allocated more accurately to avoid waste or mismatch of resources. The service model has also changed from a single offline service to an online and offline integration, and students and teachers obtain services through digital platforms anytime and anywhere.

Governance effectiveness covers multiple key dimensions in the context of education management. Management efficiency is reflected in the degree of streamlining of the education management process and the timeliness of transaction processing. For example, the traditional method of managing student enrollment may take weeks to complete transfers, leave of absence, and other procedures. In contrast, digital management can be completed within a few days or even in real-time. Scientific decision-making requires that decisions be based on sufficient and accurate data. Taking enrollment as an example, analyzing enrollment data over the years, employment market demand data, etc., is conducive to formulating more reasonable enrollment plans and professional settings. In addition, service quality is reflected in the satisfaction of teachers and students with the services provided, such as the stability and ease of use of the online teaching platform and whether the problems teachers and students encounter in this process can be solved promptly.

2.2. Theoretical Support System

Digital governance theory provides macro guidance for the digital transformation of education management. It emphasizes using digital technology to break down information barriers between departments and achieve collaborative governance. In education, different education management departments, such as the Academic Affairs Office, the Finance Office, and the Student Affairs Office, realize data sharing and business collaboration through digital platforms to avoid duplication of work and improve overall management efficiency. For example, in student scholarship assessment, the Academic Affairs Office provides performance data, the Student Affairs Office provides comprehensive performance data, and the Finance Office calculates and distributes scholarships based on these data. All departments work together to ensure the fairness and efficiency of the assessment process [2].

Education management theory provides a theoretical framework for the practical operation of digital transformation in education management. From setting educational goals to formulating, implementing, and evaluating educational plans, digital transformation needs to be closely centered on education management theory. When formulating teaching plans, digital tools can be used to analyze the development trends of disciplines, student learning characteristics, etc., so that teaching plans align with educational laws and student needs.

The information asymmetry theory also has important applications in education management. In traditional education management, information asymmetry is common. For example, it is difficult for school management to fully understand the teaching situation of front-line teachers, and parents have limited knowledge of students' learning details at school. Digital transformation builds an information sharing platform, so that teachers can upload teaching results, student performance and other information in real time, and parents and school management can obtain it in time, reducing information asymmetry and promoting all parties to make more reasonable decisions. For example,

parents can check students' homework completion and test scores at any time through the student learning management platform, so as to better cooperate with the school in family education.

3. Current Situation Analysis and Problems

3.1. Current Status of Digital Transformation

Regarding policy promotion, the government attaches great importance to the digital transformation of education management. It has issued a series of policy documents that propose accelerating the education digitalization process and promoting innovation in education management models. Education departments in various regions have responded positively, formulated local education digital development plans, and increased investment in education digitalization [3].

Significant progress has been made in infrastructure construction. Many schools have achieved full campus network coverage, and multimedia teaching equipment is widely used. Some schools in developed areas have even built smart campuses with smart classrooms and equipment. Taking the Wuhan University of Technology as an example, a special working group for data governance was established, and a data middle platform was built. They concentrated on a "single main line" of data-driven strategies. The focus was on "two architectures" involving applications and data. Additionally, they organized "three directories" encompassing services, systems, and data, which led to the creation of "four lists": the business informatization list, service item list, business data list, and electronic resource list. This process established a comprehensive data governance system.

Moreover, the practice of technology application is becoming increasingly rich. Online teaching platforms played an important role during the epidemic, achieving "no classes but no learning". Some schools use big data to analyze students' learning behavior and provide students with personalized learning suggestions; use artificial intelligence technology for intelligent marking and intelligent tutoring. For example, the primary school affiliated to Tsinghua University collects and aggregates students' physical health test data and smart bracelet monitoring data, systematically analyzes students' physical health scores, scientifically attributes diagnosis and improvement suggestions, and provides precise feedback guidance, forming high-quality physical health diagnosis and feedback reports for individuals.

3.2. Evaluation of Governance Effectiveness

In terms of management efficiency, some schools that have achieved digital transformation have made significant improvements in administrative management processes. For example, Shanghai has built a digital education platform to achieve one-stop and full-process online education government services, and has launched high-frequency services such as unified enrollment registration through the use of electronic certificates, greatly improving management efficiency.

In terms of scientific decision-making, some universities use data cockpits to gather key indicator data to provide a basis for decision-making. For example, Wuhan University of Technology has built a "three-level link" data cockpit for the president, director, and dean. Focusing on key areas such as students, disciplines, teaching, scientific research, and talents, it has gathered 106 key indicators to form the "Ten Indexes" of comprehensive school conditions, and achieved "system presentation and data speaking" in important decision-making meetings such as the school party committee standing committee and the president's office meeting, which has improved the scientific nature of decision-making [4].

In terms of service quality, the digital service platforms of some schools have been recognized by teachers and students. The Henan Provincial Primary and Secondary School Smart Education Platform has developed various smart learning scenarios, including gamified learning, after-class Q&A, and online student tutoring. Additionally, it offers teachers intelligent lesson preparation tools and easy-to-use resources such as teaching plans, courseware, and question banks. They have enhanced service quality and addressed the diverse needs of both teachers and students.

3.3. Existing Problems and Challenges

In terms of technical application bottlenecks, although some schools have introduced advanced technical equipment, there is a disconnect between technology and the actual needs of teaching management. Some online teaching platforms have complex functions and are difficult for teachers and students to master, resulting in low usage rates. Data security issues are becoming increasingly prominent, resulting in regularly occurring educational data leaks. For example, the personal information and performance data of students in some schools have been illegally obtained, threatening the privacy and security of students [5].

Management system obstacles are more prominent. The traditional education management system has many levels and unclear division of responsibilities between departments, making it difficult to achieve efficient collaboration during the digital transformation process. Different departments have different data standards, making sharing and integrating data difficult. For example, the Academic Affairs Office and the Finance Office have different definitions of the recording format of student information, making it difficult to conduct comprehensive data analysis.

The backwardness of staff concepts is also a major challenge. Some education administrators and teachers do not understand digital transformation and are resistant to it. Many teachers are used to traditional teaching methods and hesitate to adopt new digital tools, fearing it will increase their workload and hinder digital transformation.

4. Improvement Path and Strategy Construction

4.1. Strengthening the Application of Technological Innovation

Artificial intelligence technology can be deeply applied to education management. For example, the development of intelligent teaching assistants can automatically generate personalized teaching plans and courseware based on the teacher's teaching style and the student's learning situation, using intelligent analysis systems to conduct in-depth mining of students' homework and test data, timely discover students' learning problems, and provide teachers with targeted teaching improvement suggestions [6].

Big data technology can further optimize the allocation of educational resources. By collecting and analyzing multi-dimensional data such as students' learning needs, interests, and academic performance, schools can accurately understand individual differences among students and provide personalized learning resources for different students, such as recommending suitable online courses and learning materials. Additionally, by analyzing big data from the school's teaching staff, teaching facilities, and other resource usage, resource allocation can be effectively adjusted to prevent idle and overused resources.

Blockchain technology can ensure the security and credibility of educational data. In terms of student performance management, the tamper-proof nature of blockchain is used to ensure the authenticity and fairness of student performance. Once the performance is entered into the blockchain system, no one can modify it without authorization, providing a reliable performance basis for students' promotion and evaluation. In terms of academic certificate certification, by storing academic information on the blockchain, employers can quickly and easily verify the authenticity of academic qualifications, improving the efficiency and credibility of academic certification.

4.2. Promoting the Reform of Management System

First, it is recommended that the organizational structure of education management be optimized, management levels reduced, and a flat management model established. For example, schools can set up a special education digital management center to integrate the digital management functions originally scattered in different departments and be responsible for the school's information construction, data management, and other work to improve management efficiency. In addition, the responsibilities of each department in digital transformation should be clarified to avoid overlapping functions [7].

Second, it is necessary to establish a cross-departmental coordination mechanism to strengthen

communication and cooperation between departments. Taking the school's enrollment work as an example, the enrollment department, the academic affairs department, the student department, etc. should work together. The enrollment department is responsible for enrollment publicity and admissions, the academic affairs department provides information such as major settings and course arrangements, and the student department provides data such as students' performance in school to jointly complete the enrollment task. By establishing a cross-departmental working group, regular joint meetings are held to share information and coordinate to solve problems that arise in the work.

Third, we must improve the digital management system, formulate data management specifications, implement information security systems, and develop digital project construction, operation, and maintenance systems. We need to clarify the operational procedures and identify the entities responsible for data collection, storage, use, and sharing. It is crucial to ensure the security and compliance of data usage. Additionally, we must strengthen the protection of educational data, prevent data leakage and misuse, and enforce strict penalties for illegal activities related to data handling.

4.3. Strengthening the Construction of Talent Team

Digital management training is conducted for education managers, covering content such as digital management concepts, digital technology applications, data analysis and decision-making, etc. Industry experts and technicians are invited to give lectures, and managers are organized to visit and study schools that have achieved remarkable results in digital transformation to broaden managers' horizons and enhance their digital management capabilities. For example, education digital management forums are regularly held to allow managers to share experiences and exchange ideas.

Teachers must improve their digital teaching capabilities. Carry out digital teaching skills training for teachers, such as using online teaching platforms, operating teaching software, and developing digital teaching resources. Teachers are encouraged to participate in digital teaching reform practices and integrate digital technology into daily teaching, such as conducting blended online and offline teaching and using virtual reality technology to create teaching scenarios. Schools may set up a digital teaching reward mechanism to commend and reward teachers who perform outstandingly in digital teaching.

Furthermore, building a digital professional talent training system is necessary to set up relevant majors and courses in colleges and universities and cultivate compound talents who understand education and digital technology. It is suggested that enterprises cooperate with each other to establish internship and training bases so that students can accumulate practice experience and improve their practical operation ability. It is also suggested that professional digital talents be provided for the education field to meet the talent needs of the digital transformation of education management.

4.4. Promoting Data Governance Applications

It is necessary to standardize the management of educational data throughout its life cycle, starting from the data collection stage, to ensure the accuracy and completeness of the data. Formulate unified data collection standards, clarify the data sources and methods, and avoid duplicate and erroneous data collection. In terms of data storage, a safe and reliable data storage system must be established, and data encryption technology must be used to ensure data security. During the use of data, strictly follow the data use specifications to ensure the legal and compliant use of data.

It is suggested to establish a data sharing and opening mechanism to break down the data barriers between departments. Data sharing should be achieved between departments within the school, such as student performance data from the Academic Affairs Office, student reward and punishment data from the Student Affairs Office, and student payment data from the Finance Office, etc. Through data sharing, more comprehensive services can be provided to students. At the same time, under the premise of ensuring data security and personal privacy, some educational data, such as school enrollment data and employment data, can be moderately opened to the public to provide data support for educational research and social decision-making.

It is necessary to fully play the value of data-driven decision-making and use data analysis tools to conduct in-depth educational data mining. By analyzing students' learning data, we can understand

their learning progress and difficulties and provide a basis for teaching decisions, such as adjusting teaching content and optimizing teaching methods. Additionally, it is suggested to analyze the school's management data, evaluate the efficiency and effectiveness of management work, identify problems in management, and provide a reference for management decisions, such as optimizing management processes and adjusting resource allocation.

4.5. Improving Policy Support and Guarantee

The government should strengthen planning guidance, formulate national and local development plans for the digital transformation of education management, and clarify the transformation's goals, tasks, and implementation steps. For example, determine the specific indicators that the digital transformation of education management should achieve within a certain period, such as the coverage rate of digital teaching and the sharing rate of education data. Guide local education departments and schools to promote digital transformation in an orderly manner.

Second, increase capital investment and set up special funds for the digital transformation of education management to support the construction of school information infrastructure, technology research and development, and talent training. Encourage social capital to participate in the construction of education digitalization and attract enterprises to invest funds and technology through government procurement of services and PPP models to jointly promote the digital transformation of education management. For example, the government cooperates with enterprises to build an education cloud platform to provide schools with high-quality cloud computing services.

In addition, it is necessary to improve laws and regulations and formulate relevant laws and regulations such as the Education Data Security Law and the Education Digital Service Specification. It is recommended to clarify legal issues such as the ownership, use rights, and privacy rights of education data, regulate the behavior of education digital service providers, and ensure the healthy development of the digital transformation of education management on the track of the rule of law. Strictly penalize actions that compromise education data security, breach educational digital service requirements, and uphold a healthy digital educational environment.

5. Conclusion

By studying the pathways to enhance governance efficiency in the digital transformation of education management, this research highlights the significant importance and practical value of digital transformation for improving governance efficiency in education management. The multi-dimensional improvement strategy proposed in the study provides ideas for solving the problems in the current transformation process, which will help promote the development of education management in the direction of digitalization, intelligence, and efficiency and achieve a comprehensive improvement in governance efficiency. In the future, education management must prioritize digital transformation and continuously improve governance efficiency. These steps are essential for adapting to the evolving demands of our times, enhancing the quality of education, and nurturing high-quality talents.

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