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Research on Strategies and Pathways for Digital Empowerment in Education Governance: An Analysis Based on 14 Policy Texts on Digital Transformation in Education

Heyv Gao

School of Management Hebei University, Baoding 071002, China

ABSTRACT
The rapid development of the digital economy and digital technologies has profoundly impacted all aspects of human life. In the field of education, the deep integration of education and digital technology represents a new trend in future educational development, and the digital transformation of education governance serves as a driving force for building a strong education system. Using NVivo 11 Plus software and policy text analysis methods, this study analyzes 14 representative policy texts on digital transformation in education from 2018 to 2022, summarizing and categorizing the motivations, strategies, pathways, and safeguards of policy formulation. This provides an overview of the current state of digital governance policies in education and offers a reference for future policy development.

KEYWORDS
Digital governance in education; Digitalization; Policy text

1 Introduction

1.1 Research Background

With the advent of the digital era, digital information and big data are profoundly transforming human society and influencing daily life. Meanwhile, the application of new-generation technologies, represented by generative artificial intelligence, has ushered humanity into a new age of the digital economy[1]. Against this backdrop, advancing high-quality education and cultivating a large pool of talented individuals to support economic growth and technological progress necessitates leveraging digital technologies to drive further development in education governance, injecting new momentum into the modernization of education.

China's policy support for educational informatization has a long history. As early as 2000, the Ministry of Education issued the Notice on Implementing the "School-to-School Connectivity" Project in Primary and Secondary Schools, marking the first national development plan in the realm of educational digitization. In 2016, the 13th Five-Year Plan for Educational Informatization emphasized "expanding the coverage of high-quality educational resources" and "deepening the integration of information technology with teaching and learning." From 2018 to 2022, the Ministry of Education released annual Key Tasks for Educational Informatization and Cybersecurity, signaling that China's educational digitization had entered a phase of integrated innovation. Educational digitization and informatization are intertwined, with the former representing an advanced stage of the latter. Informatization lays a solid foundation for digitization, driving its transformation and upgrading[2]. Currently, digital transformation has become a global trend. Amid complex international dynamics, only by relying on digital technologies to advance the digital transformation and reform of education can China achieve high-quality educational development and transition from an education powerhouse to a leader in education.

1.2 Research Significance

From the theoretical point of view, the first one, broadened and enriched the research scope of education governance. At present, the research of the education digital transformation in the background of education is studied and analyzed, and the systematic analysis of the digital policy of education in China is not studied. Second, the use of policy text analysis methods to analyze the digital policies of some of the education digital policies between 2018 and 2022 has certain methodological values.

From the practical perspective, this study holds significant value in two main aspects. First, it conducts a textual analysis of China's recent educational digital governance policies, summarizing the general issuance trends of policy texts between 2018 and 2022. It systematically examines the motivations, strategies, implementation pathways, and safeguards underlying these policies. Second, the findings can serve as a reference for the formulation of future digital-related policies, providing actionable recommendations for the government in developing educational digital governance policies.

2 Research Design

2.1 Data Sources and Text Selection

This study employs purposive sampling to select texts based on the following criteria: Policy texts are sourced from official documents published on the Chinese government and Ministry of Education websites. To ensure relevance, keywords such as "informatization," "digitization," "governance," and "digital education" were used for retrieval and analysis, with a focus on policies related to digital governance in education. The selected texts are representative official policies issued by the State Council or the Ministry of Education between 2018 and 2022, ensuring timeliness and validity.

2.2 Analytical Methods

Text analysis is a method for processing textual data, operating at two levels: Surface-level interpretation, such as word frequency analysis, where the text is treated as symbols. Deep-level interpretation, which examines hidden meanings by considering the context of text production. This study uses NVivo 11 Plus software to analyze 14 policy texts.

In governance research, scholars have proposed five elements: "governance subjects, governance values, governance objects, governance regulations, and governance outcomes."[3][4] The interaction and synergy among these elements directly determine the effectiveness of governance. Additional elements include governance concepts, mechanisms, solutions, safeguards, and tools. Based on these, this study defines the policy analysis framework into four components: governance motivations, strategies, pathways, and safeguards.

2.3 Coding Process and Results

First, the 14 policy texts were imported into NVivo 11 Plus, and a three-stage coding method was applied. Four primary nodes were established: governance motivations, strategies, pathways, and safeguards. Open coding was conducted to categorize content related to these nodes, followed by axial coding to integrate the content into tertiary nodes. Finally, the tertiary nodes were summarized into secondary nodes. The results are shown in the table below:

3 Text Analysis of Digital Governance in Education

3.1 Analysis of Governance Motivations

The motivations for digital governance in education refer to the key factors influencing China's formulation of digital education policies, categorized as international and domestic. International factors include digital technological advancements and economic development, while domestic factors encompass the need for digital talent, educational modernization, and smart environments.

Globally, the digital economy has become a critical component of competitiveness. China's 14th Five-Year Plan emphasizes accelerating the development of a digital economy, society, and government to drive transformative changes in governance. During the pandemic, the digital economy played a vital role in remote work, online education, and telemedicine, ensuring the stability of global supply chains. Domestically, the digital transformation of education governance impacts talent structures and labor markets. China's Education Modernization 2035 calls for accelerating modernization to build a strong education system, addressing challenges such as insufficient digital talent and limited teacher capabilities in digital instruction.

3.2 Analysis of Governance Strategies

Governance strategies refer to the solutions and methods for addressing issues in education governance. Two secondary nodes were identified: collaborative governance and comparative governance.

Collaborative Governance: Involves multiple stakeholders in decision-making to build partnerships and consensus. For example, the Notice on Strengthening Education Management Informatization in the New Era (2021) advocates for a supply system involving government guidance, societal participation, and user selection. China's Education Modernization 2035 emphasizes cross-departmental coordination and societal engagement.

Comparative Governance: Involves learning from diverse regional practices. Initiatives like "Smart Education Demonstration Zones" and "5G + Smart Education" pilot projects showcase best practices and promote innovation.

3.3 Analysis of Governance Pathways

The pathways for digital governance in education specifically refer to the concrete implementation routes formulated

based on governance objectives and strategies. Through systematic coding analysis, this study categorizes China's governance pathways into five secondary nodes: innovation in service systems, development and equalization of digital resources, construction of digital environments, innovation in teaching models, and cultivation of digital literacy.

Table 1 Coding Categories for China's Digital Transformation in Education Policy Texts

Primary Node	Secondary Node	Tertiary Node
Governance Motivations	International Factors	Digital economic development
		Digital technological advancement
	Domestic Factors	Need for digital talent
		Need for educational modernization
		Need for smart environments and technologies
Governance Strategies	Collaborative Governance	Multi-stakeholder participation
		Collaborative education projects
	Comparative Governance	Establishment of "smart education demonstration zones
		Special projects for educational informatization
Governance Pathways	Service System Innovation	Digital education resource public service system
		Sharing of educational administrative resources
		Digitization of administrative offices
	Digital Environment Construction	Standardized online learning spaces
		Improved digital infrastructure
		Digital campus construction
		Enhanced cybersecurity
	Digital Resource Development and Equity	Enriched high-quality resources
		Open educational resource platforms
		Support for digitally disadvantaged regions
		Targeted assistance for underdeveloped areas
	Teaching Model Innovation	Integration of IT and teaching
		Technology-driven teaching methods
	Digital Literacy Cultivation	Enhanced student digital literacyEnhanced student digital literacy
		Improved teacher digital skills
		Specialized training for online learning spaces
		Online ideological and legal education
Governance Safeguards	Organizational Management	Party leadership, International cooperation
		Strengthened supervision
	Policy Support	Improved policy systems
		Enhanced legal backing
	Economic Support	Increased fiscal investment
		Diversified funding channels

Firstly, innovation in service systems plays a coordinating and leading role in practical pathways, promoting the synergistic development of school governance systems and digital education environments while facilitating horizontal collaboration among various stakeholders[5]. In service innovation, the government emphasizes building a digital education construction system.

Secondly, digital education resources and environments serve as foundational supports. The effective supply of digital resources and continuous improvement of digital environments propel the further advancement of educational digital transformation. In digital governance of education, digital environments and resources exhibit an interdependent relationship. While the construction of digital infrastructure, digital campuses, online learning spaces, and smart education demonstration zones provides spatial carriers for digital education development, these new digital environments alone cannot fulfill the fundamental educational mission without being supported by high-quality educational resources as knowledge carriers[6].China implemented the "School-to-School Connectivity" project as early as 2000 to connect schools through networks for multimedia teaching resource utilization. Additionally, while implementing digital resource provision, equal emphasis has been placed on resource development to promote balanced distribution of quality educational resources. Comprehensive assistance has been provided to digitally disadvantaged areas to bridge the "digital divide", with targeted support for educationally underdeveloped regions adopting a combined point-surface approach to facilitate equitable development of digital resources and establish shared educational resource platforms.

Finally, the construction of digital environments and development of digital resources focus on innovating teaching models and centering on cultivating digital literacy, forming a learner-centered educational governance system. The digitization of teaching represents the core of educational digital transformation. Essentially, this transformation involves integrating digital technologies with teaching elements and methodologies, utilizing digital tools to optimize teaching components and processes, ultimately enhancing teaching effectiveness and providing instructional support for

cultivating digitally competent talents[7]. The ultimate goal of digital governance in education is to develop future workers equipped with digital literacy and skills adaptable to digitalized living. Therefore, digital literacy cultivation aims to enhance teachers' digital competencies first, subsequently nurturing digitally skilled talents who can then drive further innovations in digital environments, resources, and teaching models, thereby creating a virtuous bidirectional cycle.

3.4 Analysis of Governance Safeguards

The safeguards for digital governance in education constitute critical measures to ensure the effective implementation of governance pathways. Through systematic coding analysis, this study categorizes the secondary nodes into three dimensions: organizational safeguards, policy safeguards, and economic safeguards.

First, organizational safeguards establish the internal operational mechanisms for digital governance in education. Chinese government documents consistently emphasize upholding the Party's leadership and adhering to the socialist orientation of education. These organizational safeguards delineate the fundamental developmental trajectory for China's digital transformation in education governance. By maintaining comprehensive Party leadership while coordinating multiple stakeholders and reinforcing specialized supervision and evaluation mechanisms, the effective implementation of digital governance in education can be collectively advanced. Concurrently with Party leadership, it is imperative to strengthen international exchanges and cooperation, particularly through active participation in global digital conferences, to facilitate the nation's digital education development.

Second, policy safeguards provide the systemic framework for digital governance in education.China primarily delivers policy support through the formulation of digital education policies and the promulgation of relevant legislation. As articulated in China's Education Modernization 2035, there is an urgent need to accelerate the construction of a comprehensive legal framework for education, including formulating laws and regulations tailored to school governance. Furthermore, the 2022 Key Tasks for Informatization and Cybersecurity emphasizes standardizing intellectual property service mechanisms for digital education while advancing research and establishing technical standards for educational informatization[8].

Finally, economic safeguards furnish the material foundation for digital governance in education through three principal approaches:Implementing the "School Renovation Initiative" targeting economically disadvantaged institutions to augment financial investments; Refining fiscal support policies for relatively affluent regions by incorporating educational resource procurement into government purchasing systems to fulfill requirements for teacher training and institutional digital transformation;Encouraging financial institutions to develop specialized financial products supporting digital education, thereby channeling social capital toward this strategic development area. These multidimensional safeguards collectively form an integrated support system that ensures the robust and sustainable advancement of digital governance in education.

4 Conclusion

The digital transformation is gaining momentum, and digital governance represents the future trend in educational governance. This study employs policy text analysis methodology, utilizing NVivo 11 Plus to systematically code and analyze 14 representative official policies from 2018 to 2022. Through this approach, we have organized and examined the motivations, pathways, strategies, and safeguards of China's current digital governance in education, thereby providing valuable references and foundations for further advancing digital education governance. The primary motivations are categorized into international and domestic factors. In terms of governance strategies, China predominantly adopts a collaborative governance approach, complemented by comparative governance strategies. The governance pathways mainly encompass five key dimensions: innovation in governance services, construction of digital environments, development and sharing of digital resources, innovation in teaching models, and cultivation of digital literacy. Regarding governance safeguards, the focus lies on organizational leadership, policy support, and economic investment.

The digital transformation of educational governance constitutes a complex systemic endeavor,requiring coordination and collaboration across multiple elements and domains. In practice, it encounters various challenges and obstacles, such as the costs associated with digital technologies and concerns regarding data privacy security. Therefore, the reform of digital governance in education must extend beyond the technological aspects to include the integration of teaching methods, environments, and resources with digitalization, as well as the cultivation of information literacy among personnel. Moreover, it is essential to orchestrate the participation of diverse societal stakeholders to collectively drive the innovation and development of digital governance in education.This comprehensive approach ensures that the digital transformation of education governance is both holistic and sustainable, addressing both immediate challenges and long-term developmental goals.

About the Author

Heyv Gao, graduate, research direction: educational management.

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