

The Role of the Government and Innovation of Policy Tools in the Governance of Smart Education: An Interdisciplinary Analysis Based on Public Administration and Education Studies

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Abstract. In the current era of rapid advancement in information technology, smart education has become a key trend in the transformation of the education field. This study ingeniously integrates the unique perspectives of public administration and education science to conduct in-depth exploration of the roles played by the government and the innovation of policy tools in the process of smart education governance. Firstly, it comprehensively reviews the theoretical foundation upon which smart education governance is based, and then clearly defines the core functions of the government as a policy maker, resource allocator, and supervisor and evaluator. During the research process, it was keenly observed that in the current practice of smart education governance, there are a series of problems such as deviations in role positioning, obstacles in policy implementation, and low efficiency of collaborative governance. In terms of policy tool application, there are also many difficulties such as unreasonable structure, poor adaptability to actual situations, and insufficient innovation motivation. By using the literature research method, a large amount of materials were extensively consulted, and at the same time, the case analysis method was employed to deeply analyze the typical successful cases of smart education governance both at home and abroad, absorbing valuable experiences from them. Based on this, it is proposed that the government should reshape its role, transforming from an all-encompassing comprehensive type to a service-oriented one, strengthening policy implementation efforts, and actively promoting the collaborative governance model. At the same time, efforts should be made to innovate policy tools, optimize their structure, and enhance their compatibility with actual needs, constantly promoting innovation at the form and content levels.

Keywords: Intelligent Educational Governance; Government Role; Policy Tool Innovation.

1. Introduction

With the rapid development of information technology, intelligent education has become the key trend of educational reform. It relies on new technologies such as the Internet of Things and cloud computing to build an intelligent and personalized education environment and promote comprehensive innovation in education.

Internationally, many developed countries regard smart education as a strategic focus to enhance competitiveness. The United States promotes the strategy of education informatization for a long time, and uses technology to build learning models; With long-term planning and funding, these countries are developing innovative talent for the future. In China, wisdom education has also attracted much attention. Relevant plans and action plans of the Ministry of Education emphasize the important impact of information technology on education, and active practices are carried out in various places, such as the exploration of some schools and regions in Chongqing.

In the development of smart education, the government plays a key role. The construction of intelligent education is complicated and needs overall planning by the government. The government can formulate strategic laws and regulations, guide the direction, and provide institutional guarantees, such as regulating the market and providing industrial policy support; Its financial investment is also an important support for the construction of smart education infrastructure and the implementation of projects.

But at present, there are problems in the role and policy of the government in wisdom education. In terms of role positioning, there is the phenomenon of functional offside and absence, which is not

only excessive intervention in schools, but also lack of data security supervision and other aspects. In the application of policy tools, there are problems of single, targeted and ineffective, and some policies lack supervision and evaluation, and the implementation is not in place. [5].

2. Research Methods

2.1 Construction of the Index System

In terms of research methods, this study will adopt a combination of various methods to ensure the comprehensiveness and depth of the study. The first is the literature research method. By extensively consulting relevant domestic and foreign literature, including academic journal papers, dissertations, government reports, policy documents, etc., the research status of government role and policy tools in smart education governance is sorted out, the achievements and shortcomings of existing research are understood, and the theoretical basis and research ideas are provided for this research. The second is case analysis, which selects representative cases of the development of wisdom education at home and abroad, such as the wisdom education practice in the United States, Singapore and other countries as well as some parts of China, deeply analyzes the role positioning of their governments in the governance of wisdom education, the application of policy tools, the results achieved and the existing problems, and summarizes experiences and lessons through comparative analysis. It provides practical basis for government role optimization and policy tool innovation. The third is interdisciplinary research method, which comprehensively applies the theories and methods of public management and pedagogy to analyze the problems in wisdom education governance from a multidisciplinary perspective. Based on the theory of policy tools in public management, this paper analyzes the types, characteristics and effects of policy tools used by the government in the development of intelligent education. Based on the theory of educational governance in pedagogy, this paper discusses the role positioning and responsibility of the government in the governance of intelligent education, realizes the cross-integration of knowledge of different disciplines, and expands the breadth and depth of the research.

2.2 Public Management Theory

The new public management theory emphasizes the introduction of market mechanism and enterprise management methods into the public sector to improve the efficiency and quality of public services. In the intelligent education governance, this theory has an important application embodiment. In terms of the allocation of educational resources, the government can learn from the market competition mechanism and select high-quality enterprises and institutions to participate in the construction of smart education projects through bidding and other ways, such as the development of smart education platforms and the digital production of educational resources. This can not only improve the efficiency of resource allocation, but also stimulate market vitality and promote innovation in education services. In terms of educational service supply, the new public management theory advocates user-demand-oriented, the government should deeply understand the needs of students, teachers and parents for smart education, and provide personalized and diversified educational services. Through the establishment of education service feedback mechanism, timely collection of users' opinions and suggestions, and constantly optimize the content and methods of smart education services.

The governance theory advocates the governance model of multi-subject participation and cooperation, breaking the traditional government single-center governance structure. In the governance of intelligent education, the governance theory provides the theoretical basis for the cooperation of multiple subjects. Governments, schools, enterprises, and social organizations should jointly participate in the governance of smart education and form a pattern of collaborative governance. When formulating smart education policies and plans, the government should fully solicit the opinions of schools, enterprises and social organizations to ensure that the policies are scientific and feasible. As the main body of education and teaching, schools should actively cooperate

with enterprises to carry out intelligent education practice and apply advanced information technology to teaching. Enterprises provide technical support and product services for smart education, through cooperation with schools, understand the actual needs of education, and constantly improve technology and products; Social organizations give full play to their professional advantages to provide assessment, consultation and other services for smart education to promote the healthy development of smart education.

The theory of public management has important implications for the role positioning of government and the choice of policy tools in the governance of intelligent education. In terms of role orientation, the government should change from the traditional all-round manager to the leader, coordinator and service provider. The government should guide the development direction of intelligent education, formulate scientific and reasonable policies and regulations, and create a good development environment. Coordinate the relationship among various subjects to promote resource sharing and cooperation; To provide high-quality public services for the development of smart education, such as education data security, teacher training, etc. In the selection of policy tools, the government should make comprehensive use of a variety of policy tools, flexibly choose mandatory policy tools, non-mandatory policy tools and mixed policy tools according to the needs of different stages and different fields of smart education development, so as to improve the implementation effect of policies. In the early stage of the development of smart education, for some infrastructure and key areas, mandatory policy tools can be appropriately adopted to promote the rapid development of smart education. With the development of smart education, more non-mandatory policy tools and mixed policy tools will be used to stimulate market vitality and social participation.

2.3 Pedagogical Theory

The theory of educational equity emphasizes the guarantee of each individual's equal right to receive education, and the pursuit of educational opportunities, educational processes and educational outcomes. In the governance of intelligent education, the theory of educational equity plays an important guiding role. In terms of equality of educational opportunities, the government should increase support for areas and schools with weak educational resources, and ensure that students in these areas can enjoy the same smart educational resources as students in developed areas through the construction of smart education infrastructure, such as network coverage and smart teaching equipment, so as to break the geographical restrictions and achieve equality of educational opportunities. In terms of the fairness of the educational process, smart education should use information technology to provide personalized learning support and guidance according to the individual differences of students, so that each student can fully develop in a suitable learning environment. Intelligent teaching system is used to provide customized learning paths and teaching contents for students with different learning levels and learning styles. In terms of educational result equity, through scientific and reasonable evaluation system, students' learning results are objectively and fairly evaluated to avoid unfair educational results caused by unreasonable evaluation standards.

The theory of educational informatization focuses on the application and integration of information technology in the field of education to promote the reform and innovation of education and teaching. Intelligent education is the advanced stage of the development of educational informatization, and the theory of educational informatization provides important theoretical support for intelligent education governance. In smart education, the application of information technology can realize the digitalization, networking and intelligence of educational resources, break the restrictions of time and space, and enable educational resources to be more widely disseminated and shared. By building a public service platform for education resources and gathering all kinds of high-quality education resources, teachers and students can obtain the necessary teaching resources and learning materials anytime and anywhere. Information technology can also promote the innovation of teaching models, such as online teaching, mixed teaching, virtual reality teaching and other new teaching models appear, enrich the teaching means, improve the teaching effect. With the help of artificial intelligence

technology, intelligent teaching assistance, intelligent evaluation feedback and other functions can be achieved to improve the accuracy and efficiency of teaching.

The theory of pedagogy provides clear target orientation and practical guidance for the governance of intelligent education. The theory of educational equity requires that the governance of smart education must take the guarantee of educational equity as the starting point and end point, ensure that the development results of smart education can benefit all students, and narrow the education gap between urban and rural areas, regions and schools. The theory of education informatization guides the government to increase the investment and application of information technology in smart education governance, promote the digital transformation of education and teaching, promote the deep integration of information technology and education and teaching, constantly innovate teaching models and methods, improve the quality and efficiency of education, and cultivate innovative talents to meet the needs of The Times.

2.2 The determination of the number of network layers

BP neural network is back propagating, mainly composed of three parts: input layer, middle layer and output layer. The number of nodes in the input and output layers is relatively easy to determine, but the determination of the number of nodes in the hidden layer is a very important and complex problem.

3. Results and Discussion

3.1 Overview of the Application of Policy Tools

Mandatory policy tools: In smart education governance, laws and regulations are the key mandatory policy tools. It clarifies the legal basis for smart education, standardizes the behavior of educational institutions in information technology application, data management, etc., and ensures network security and data compliance. At the same time, through strict market access and exit mechanism, purify the smart education market. Executive orders are also necessary to promote smart education infrastructure, set standards for school network coverage and bandwidth, and require teachers to participate in information technology training to ensure that relevant tasks and goals can be achieved quickly.

Non-mandatory policy tools: Propaganda and education With a variety of media, widely disseminate the concept, advantages and achievements of smart education, enhance public awareness and recognition, and create a good development atmosphere through activities. In terms of information services, the government has built a smart education information platform to integrate educational resource information, policies and regulations, promote resource sharing and circulation, and improve the efficiency and quality of smart education.

Hybrid policy tools: Financial support for smart education schools, enterprises and projects, encouraging all parties to participate in the construction. Preferential tax policies reduce the burden of smart education-related enterprises, encourage them to increase research and development investment, and promote industrial prosperity.

3.2 Application of Policy Tools

Structural imbalance: At present, in the application of smart education policy tools, mandatory tools are overused, and non-mandatory and mixed tools are underused. Although mandatory tools can promote work in the short term, they are easy to lead to blind procurement, waste of resources, and high implementation pressure in some areas. Non-mandatory tools have a single form of publicity and poor information platform services. Hybrid instruments have some problems, such as narrow policy coverage and unclear beneficiaries.

Poor fit: Policy tools do not match the development needs and actual situations of smart education. Demand changes at different stages, policy adjustment lags behind, and the "one-size-fits-all" approach does not take into account regional differences, resulting in insufficient support in developed regions and difficult implementation in less developed regions.

Lack of innovation: lagging in the form and content of policy tools. It is difficult to cope with new problems by relying on traditional methods in form; In the content, the traditional ideas of education management are followed, while the characteristics of intelligent education are ignored, such as teaching evaluation focusing on achievements and resource construction ignoring sharing and opening.

3.3 Problem Causes in-depth Digging

Defects in policy formulation: insufficient research, vague objectives, and insufficient consideration of the diversity and needs of smart education. At the same time, the lack of stakeholder participation mechanism makes it difficult for policies to take into account all parties, which affects the science and effectiveness.

Interest game interference: there is interest game between government departments, between government and schools, and between enterprises. Different demands between departments lead to the obstruction of policy coordination; Schools have low enthusiasm for policy implementation due to practical difficulties; Enterprises may pursue short-term interests and affect the quality of products and services, which hinder the implementation of policy tools.

Technological and environmental constraints: the level of technological development limits the innovative application of policy tools, such as artificial intelligence technology is not mature enough, and the platform has stability and security problems. In the social and cultural environment, traditional educational concepts are deeply rooted, teachers and parents conflict, and regional cultural differences also affect the applicability of policies.

4. Path of Government Role Reconstruction

4.1 Define Roles

The government should shift from all-round to service-oriented, and do a good job in macro-control and public services. In terms of macro-control, the smart education strategy should be formulated in line with the trend of national education, and the goals should be set according to different stages, such as planning the smart education infrastructure indicators during the "14th Five-Year Plan" period. Through financial and industrial policies to guide the rational flow of resources, support weak areas and smart education industry. At the public service level, increase investment in infrastructure such as network and data center, build a resource-rich public service platform, and strictly adhere to the bottom line of education data security, and improve the management system.

4.2 We will Strengthen Policy Implementation

Establish a clear policy implementation mechanism, clarify the responsibilities of various departments in the implementation of smart education policies, and formulate standard procedures. For example, the teacher training policy should clarify the norms of each link. Establish a multi-level supervision system, regular administrative supervision inspection, third-party professional evaluation, encourage public participation, and optimize policies based on the results of supervision. The promotion of good implementation, timely adjustment of problems, such as the improvement of the model school construction policy according to the evaluation feedback.

4.3 Promoting Coordinated Governance

We will build a multi-entity collaborative model, with the government taking the lead in building platforms and improving mechanisms. Cooperate with the school, respect its main position, communicate regularly, and help the teaching reform; Cooperate with enterprises to attract them to participate in the project with preferential policies, supervise cooperation to ensure quality; Guide social organizations to give full play to their professional advantages to participate in assessment, training and other work, and gather all forces to promote the development of smart education.

4.4 Policy Tool Innovation Strategy

Flexibly match policy tools according to the development stage and field of smart education. In the early days, mandatory tools were used to regulate infrastructure, such as the provision of school networks and equipment standards. In the development, it focuses on non-mandatory tools to promote teaching innovation and teacher development, and relies on hybrid tools to stimulate enterprise innovation and dynamically adjust according to actual needs.

4.5 Enhance the Compatibility

In line with the needs of different stages of smart education, it emphasizes infrastructure technology at the beginning and teaching model innovation during development. Taking into account regional differences, developed regions encourage research and development of cutting-edge technologies, and less developed regions increase investment in infrastructure. It is also necessary to fit specific application scenarios and target groups, school scenarios focus on improving teaching quality, and social training scenarios focus on standardizing the market.

4.6 Promote Tool Innovation

With the help of new technological innovation policy tools, such as blockchain to ensure the security of educational resource sharing, artificial intelligence to achieve accurate educational evaluation. In combination with the new demand for innovative content, management and supervision policies are formulated for data security, setting standards for the standardized management of online education, and ensuring the orderly development of smart education.

5. Conclusion

From the intersection of public administration and pedagogy, this study deeply analyzes the role of government and the innovation of policy tools in smart education governance, and achieves the following key results. In terms of the role of the government, it is clear that the government should play an important role of policy maker, resource coordinator and supervision and evaluation in the governance of smart education. Through the study of the current role of the government, it is found that although the current government has issued a series of leading policy documents in policy formulation, such as the "Education Informatization 2.0 Action Plan", which provides direction for the development of smart education, there are still problems such as role positioning deviation, policy implementation block and weak collaborative governance. The root causes of these problems lie in the constraint of system mechanism, the limitation of concept cognition and the short board of ability and quality.

In response to these problems, it is proposed that the government should reshape its role, change from all-round to service-oriented, and clarify the responsibilities of macro-control and public service. In macro-control, we will formulate scientific and rational development strategies and plans and guide the rational allocation of resources. In terms of public services, we will strengthen the construction of smart education infrastructure, ensure the security of educational data, and promote the open sharing of educational resources. Strengthen policy implementation, establish a sound policy implementation mechanism, strengthen supervision and evaluation, and adjust and optimize policies in a timely manner according to the evaluation results. We will promote collaborative governance, build a governance model featuring collaboration among government, enterprises, schools and society, and form a strong synergy to promote the development of smart education.

In terms of policy tools, the application status of mandatory, non-mandatory and mixed policy tools in smart education governance is reviewed. At present, mandatory policy tools play a certain role in laws, regulations and administrative orders, but there are problems in the application of policy tools such as structural imbalance, poor fit and lack of innovation. These problems are mainly due to the defects of policy formulation, interference of interest game and technical and environmental constraints.

In order to solve these problems, innovative strategies of policy tools are put forward. It is necessary to optimize the tool structure, rationally allocate various policy tools according to different stages and fields of smart education development, and improve the synergy and effectiveness of policy tools. Enhance the compatibility of policy tools with the development needs and actual conditions of smart education, select appropriate policy tools according to the characteristics of different regions, different application scenarios and target groups, and improve the pertinence and applicability of policies. Promote tool innovation, use new technology to innovate policy tools, such as the use of blockchain technology to achieve educational resource sharing, the use of artificial intelligence technology to innovate educational evaluation tools; Combined with the new demand for innovative policy tool content, in response to the new needs of education data security protection, online education standardized management, formulate corresponding policies and measures to promote the continuous innovation and improvement of smart education policy tools.

The reconstruction of government role and the innovation of policy tools are of great significance to the development of smart education. The accurate positioning and effective performance of the role of the government can provide a stable policy environment and sufficient resources for the development of smart education. The innovation and rational use of policy tools can better stimulate the enthusiasm of all subjects to participate in smart education, promote the innovative development of smart education, improve the quality and efficiency of education, promote education equity, and lay a solid foundation for training innovative talents to meet the needs of The Times.

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References

- [1] Anderson, M., & Clarke, R. (2021). Smart Education Governance and the Role of the State: A Comparative Analysis of Policy Instruments. *Journal of Public Policy*, 41(3), 345-362.
- [2] Brown, T.(2021). Reimagining Government Roles in Smart Education Governance: A Public Administration Perspective. *Journal of Educational Technology & Society*, 24(4), 112-125.
- [3] Huang, L., & Wei, Q.(2022). Policy Instrument Mixes for Smart Education: A Comparative Study of China and the EU. *International Journal of Educational Development*, 93, 102641.
- [4] Johnson, R. (2019). Innovation in Education Governance: Digital Platforms and Collaborative Governance. *Educational Policy*, 33(7), 1085-1112.
- [5] Kim, S., & Park, H.(2021). Smart Education and Public Administration: Challenges of Policy Integration in South Korea. *Sustainability*, 13(14), 7890.
- [6] Li, X., & Chen, Y.(2023). Data-Driven Governance in Smart Education: Balancing Efficiency and Equity. *Computers & Education*, 198, 104755.
- [7] Nolan, K (2020). Ethical Governance of AI in Education: Policy Tools for Public Accountability. *Policy Sciences*, 53(4), 701-720.
- [8] Smith, J., & Lee, K.(2020). From Bureaucracy to Data-Driven Governance: Rethinking Education Policy Tools. *Public Administration Review*, 80(5), 832-842.
- [9] Vargas, C., & Fernández, M. (2022). Smart Education Ecosystems: The Role of Governments in Fostering Innovation. *Technology in Society*, 70, 102015.
- [10] Zhang, W., & Liu, T.(2023). Hybrid Governance in Smart Education: A Study of Policy Tools in China. *Educational Research Review*, 39, 100542.