

Artificial Intelligence Enabling Education Governance: Value Orientation, Key Issues, Path Optimization

Pingping Sun, Tao Huang, Wenbo Ma, Zhu Gao, Jie Cai

Artificial Intelligence and Education New Quality Productivity Research Institute, Ningxia Normal University, Ningxia, China
Email: 1584569622@qq.com

How to cite this paper: Sun, P. P., Huang, T., Ma, W. B., Gao, Z., & Cai, J. (2024). Artificial Intelligence Enabling Education Governance: Value Orientation, Key Issues, Path Optimization. *Open Journal of Social Sciences*, 12, 219-237.

<https://doi.org/10.4236/jss.2024.1211015>

Received: October 9, 2024

Accepted: November 12, 2024

Published: November 15, 2024

Copyright © 2024 by author(s) and Scientific Research Publishing Inc. This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

Abstract

Educational governance is an important hand in modernizing the national educational governance system and governance capacity. Artificial intelligence is reconfiguring education time and space, empowering the whole process of education, various links, and multiple fields in a holistic and coherent manner. Based on the research and judgment needs of education governance, it is based on the ontology, phenomenon, value, and process to summarize the value implication and technology orientation. At present, AI-enabled education governance faces problems, such as insufficient consideration of ethical and legal boundaries, imperfect governance concepts, modes and systems, shortcomings in technology integration and application, and insufficient efforts to transform the governance system into an intelligent one, etc. Policy recommendations are put forward to address the above key issues from four aspects: strengthening ethical scrutiny and building an intelligent regulatory and legal system; reshaping the governance framework; and strengthening the governance system. In view of the above key issues, policy recommendations are put forward in four aspects: strengthening ethical review and constructing an intelligent regulatory legal system; reshaping the governance framework and constructing a new ecology of human-machine synergy; activating the digital ecology and realizing a new pattern of overall intelligent governance; and integrating science and efficiency to drive the intelligent transformation of education governance, so as to provide reference for the problems of education governance.

Keywords

Educational Governance, Artificial Intelligence, Data Empowerment, Digital Transformation of Education

1. Introduction

Technology is the driving force behind the world clock of human development (Chemm, 1999). In the 17th century, Leibniz, Thomas Hobbes, and Descartes began the historical quest for artificial intelligence by asking “whether it is possible to transform human rational thought into a system of algebra or geometry”. In 1950, Alan Turing explored the possibility of “intelligent machines” and proposed the Turing Test. The leap from the “Turing Test” to “expert systems” led to the second wave of AI, and in November 2022 OpenAI released ChatGPT, a concrete realization and application of AI technology in specific fields. As early as 2021, the Ministry of Education of the People’s Republic of China issued the “Notice on Strengthening Education Management Informatization in the New Era”, which clearly pointed out that the new generation of information technology should be used to promote the transformation of education decision-making from the traditional experience-driven to data-based drive. In 2024, the National Conference on Education Work further put forward, “constantly open up a new digitalization track in education”. The National Education Work Conference in 2024 further proposed that “constantly open up new tracks of education digitization”, “adhere to the application as the king and take the road of integration”, “empower education governance with intelligence and lead education change and innovation” has become an important task of education change and innovation, which will help to realize the transformation of education governance from experience and sloppy, static supervision to scientific and precise, multi-dimensional and common governance. For the transformation of education governance from rough experience and static supervision to scientific precision and multi-dimensional common governance, technology plays a more and more significant role in education governance, and plays a prominent role in scientific decision-making, subject synergy, and data governance. Education informatization governance capacity is an endogenous variable of education systematic change, and it is an important grasp and way to lead the development of education modernization (Zhai et al., 2021).

However, how is the value of AI-enabled education governance realized? What are the key issues in technology-enabled education governance? How can the path be optimized? In the theory of the value of AI-enabled education governance, there are practical problems such as insufficient research, lack of practical programs, and the mode of technology-enabled education governance needs to be explored and innovated, which, to a certain extent, hinders the innovative development of technology-enabled education governance. Therefore, there is an urgent need to clarify the value and mechanism of AI technology-enabled education governance, analyze the key issues and practice directions of empowerment, and explore the key paths for the deep integration of AI-enabled education governance.

2. The Value of Artificial Intelligence-Enabled Education Governance: The Demand for Education Governance Research and Judgment

In March 2021, the Ministry of Education issued the Circular on Strengthening

the Informatization of Education Management in the New Era, in which it proposed that a new generation of information technology should be used to enhance the digital, networked and intelligent level of education management, and to promote the comprehensive transformation of education decision-making, education management, education services, etc. It also put forward the requirement of urgently solving the problems of insufficient integration of the system, poor data sharing, poor service experience, and duplicated construction of facilities. Problems. According to the Chinese Academy of Education's 2022 China's wisdom education development index data, China's current education governance index is 0.84, the data management of education digital governance, practice and application and security of the system architecture has been initially built, but the "data silos" and other problems have not been completely eliminated, and the value and benefits of the data elements and information in education governance have not yet been fully realized. The value and benefits of data elements and information in education governance have not yet been fully realized. So, how should artificial intelligence drive education governance in the stage of digital transformation of education? How can artificial intelligence technology empower education governance? Responding to these questions requires clarifying the connotation of AI-enabled education governance, sorting out the mechanism of AI-enabled education governance, rationally exploring the enabling system, and promoting the practical actions of education governance with the system mechanism, so as to promote the modernization of the education governance system and governance capacity.

2.1. Connotations of Artificial Intelligence Enabling Education Governance

Reviewing the results of previous research, educational governance involves cooperation between the government and multiple actors, such as various social organizations, market forces, schools, and individual citizens, in the management of public affairs in the field of education through interaction such as participation, dialogue, consultation and negotiation, on the basis of autonomy, equality, and reciprocity, aiming to respond to the challenges of the changing times and to achieve effective governance outcomes (Zhou, Li, & Chen, 2022). By taking the phenomenon of educational governance as a research object, a system consisting of four basic categories and logics: educational governance activities, educational governance system, educational governance mechanism, and educational governance concept (Sun & Xu, 2023).

What exactly is artificial intelligence-enabled educational governance? Some scholars believe that the understanding of AI-enabled education governance is "AI-enabled" "education governance", emphasizing the use of artificial intelligence means of governance of the three elements of education, people, things, things, from the research perspective there are based on an epistemological perspective, responding to From the research perspective, there are based on epistemological

perspective, responding to the question “what is artificial intelligence-enabled education”, based on the process perspective, focusing on the progress of the process of artificial intelligence-enabled education, focusing on technical methodology, exploring the mechanism of empowerment of education governance by means of intelligent technology, and focusing on the perspective of content, and the construction of education governance system and other researches. From another perspective, that is, research on the ontology of AI-enabled education and AI-enabled education governance applied research. Artificial intelligence brings great opportunities to promote the transformation of university governance and development mode, and its comprehensive penetration in many aspects of university governance concepts, systems and capabilities helps to update the kernel of university governance, optimize the pattern of university governance, serve the decision-making of university governance, improve the mode of university governance, and break through the boundaries of university governance (Shen & Shen, 2023). In response to the previous research combing, artificial intelligence-enabled education governance is the integration and application of artificial intelligence technology in the whole field and process of education governance, through the construction of an integrated education management and service platform, strengthening education data management, integration and application, realizing the reshaping of the organizational structure of education governance and the reengineering of the management and service process, promoting the participation of multiple subjects in common governance, and promoting the scientific, efficient, fair and orderly governance of education, thus forming an artificial intelligence-supported technology to support the governance of higher education. Thus, the new mode and new form of education governance supported by artificial intelligence technology is formed, and the empowerment process includes the practice process of the integration of artificial intelligence technology and education governance. This paper systematically studies the value of artificial intelligence in education governance from the perspective of technology empowerment process.

2.2. The Value Implications of Artificial Intelligence Enabling Education Governance

2.2.1. Artificial Intelligence Technology Drives Cultural Values

The advancement of school governance reveals the problems of emphasizing the mode or technology and ignoring the value orientation, and by reshaping the dialectical relationship between governance and value, and by integrating instrumental rationality into the dimension of meaning, school governance can truly get rid of the poverty of value and formalism, and then be full of vitality and vitality (Zeng, 2018). Artificial intelligence technology has been deeply integrated into the field of education, and has become a powerful driving force for updating and reshaping the concept of education, prompting a double innovation in the concept of knowledge and values. Technological innovation has not only changed the

material dimension of university governance, but also affected its cultural values at a deeper level. This process requires the educational governance system to be rooted in the concept of knowledge of openness, sharing and autonomy, and to optimize and reconstruct the value relationship between the subjects of educational governance by strengthening the values of security, justice and integrity. This process not only reflects the profound impact of technology on the level of educational thinking, but also emphasizes the importance of breaking through the traditional conceptual constraints and continuously promoting the concept of education to keep pace with the times, which opens up a new path for educational innovation and development. In addition, technological innovation not only touches the material level of university governance, but also triggers changes in the cultivation of intelligent talents and cultural values at a deeper level. As a pioneer of technological culture, it should actively advocate the values of innovation, collaboration and sharing, and the deep integration of concepts and AI technology has shaped an open and inclusive educational environment. In this environment, students are able to establish a more open and shared view of knowledge, which promotes the acceptance and integration of multiple cultures, and lays a solid foundation for the cultivation of intelligent talents with cross-cultural literacy, comprehensive quality and innovative thinking. Such talents will not only be able to adapt to the rapidly changing needs of society, but also be able to lead the development of society and technology in the future.

From technological empowerment to cultural leadership, the shaping of values is a complex process from the impact of technology to the guidance of institutional norms, and then to the comprehensive renewal and reshaping of culture and values. Artificial intelligence-enabled education governance, through features such as the flattening of power, breaks the traditional boundaries of time and space, bringing unprecedented uncertainty and challenges to governance. However, it is this uncertainty that has led to the digitization and comprehensive integration of the elements of education governance, realizing a fundamental shift from a “supply”-oriented to a “demand”-oriented approach. On this basis, the flow of data facilitates the optimization of organizational relations and power structures, promotes the process of modernizing educational governance, and ultimately creates a positive atmosphere of an ecology of data altruism and the co-creation of educational values, injecting a strong impetus for the sustainable development of education.

2.2.2. Artificial Intelligence Empowers the Quality Leap of Education Services

Under the profound insight of the philosophy of technology, the deep integration of artificial intelligence technology is not only a fundamental challenge to the traditional education service model, but also a comprehensive reshaping of the concept and path of education services. This process marks that educational services are gradually getting rid of traditional constraints and transforming to modernization and intelligence. As Bergmann said, “technology is not a simple means, but

has become an environment and a way of life. This is the ‘substantial’ impact of technology.” In order to survive and thrive, man has found technology as an irreplaceable helper and has gained dominion over the entire world with the help of technology (Feenberg, 2005). Heidegger also quoted Hölderlin’s poem to find an exit under danger: “Where there is danger, there also begets salvation.” Where something grows is where it takes root and where it develops. Rooting and development take place covertly, silently and at the right time (Heidegger, 1996). The concept of technology empowering education and technology serving life has been explored by previous generations from different angles. However, the people’s call for satisfactory education is urgent and the enhancement of educational effectiveness has been long awaited, which urgently requires the innovative application of AI technology in the field of educational services, prompting the innovation of service concepts driven by the power of technology to better adapt to the needs of educational development in the new era. In addition, the introduction of AI technology has injected a strong impetus for the optimization of the educational service process and the improvement of efficiency and quality. Through intelligent means, education services have realized the transformation from standardization to personalization, providing more convenient, efficient and personalized learning support. From a micro point of view, the precise application of intelligent recommendation and tutoring systems not only meets the diversified learning needs of students, but also, through the in-depth analysis of learning data, provides learners with tailored, efficient, and accurate learning programs, significantly enhancing the relevance and effectiveness of learning. This process not only improves the overall quality of education services, but also brings students an unprecedented learning experience. In addition, how does AI technology empower educational decision-making and improve the quality of education? Through the collection and analysis of big data, the complex laws behind the phenomenon of education can be revealed, providing a more accurate and reliable basis for the development of education policy, and providing a hand for education decision-making to gradually move towards a new stage of scientization and data. At the same time, the intelligent resource allocation function of artificial intelligence technology has realized the real-time monitoring and optimization adjustment of educational resources, which significantly improves the efficiency and effectiveness of resource utilization. This intelligent transformation of resource allocation also promotes the further improvement of the quality of education services, and lays a solid foundation for the sustainable development of education.

2.3. Technological Dimensions of Artificial Intelligence-Enabled Education Governance

The continuous innovation of artificial intelligence technology is leading the development of education governance in the direction of more intelligent, humanized and sustainable. In the face of the complex challenges of the future society such as sustainable development, AI ethics, digital divide, etc., education governance needs to take a forward-looking perspective, deeply integrate technological

innovation with education concepts and governance modes, and explore education governance modes adapted to the needs of the future society by relying on intelligent education platforms, optimizing the allocation of education resources, and promoting education equity and inclusive growth. At the same time, the construction of the global education governance ecosystem cannot be separated from the intelligent technology to play a central role in the cross-border knowledge sharing, experience exchange and cooperation, and jointly respond to the global education challenges, still need artificial intelligence technology as an endogenous driving force to support the development. Therefore, artificial intelligence is not only a technical tool, but also an important force to promote the change of university governance and even global education governance ecology.

2.3.1. Technological Innovation as a Fundamental Shift in the Paradigm of Educational Governance

The evolutionary law of technology follows a life cycle from the beginning of conception to rapid development to maturity and perfection to stability and tends to degradation (Chen, 2012). Driven by artificial intelligence technology, university governance is undergoing a profound change from the outside in, from the surface to the inside. Technological innovation not only optimizes the governance process as an auxiliary tool, but also triggers a fundamental shift in the governance paradigm at a deeper level. The traditional mode of university governance often relies on the accumulation of experience and human judgment, while artificial intelligence, with its powerful data processing, pattern recognition and predictive analysis capabilities, provides scientific, accurate and efficient decision-making support for university governance. This conversion marks the progress of university governance from empirical management to the modern governance model of data-driven and intelligent decision-making, laying a solid foundation for the modernization and transformation of educational governance.

Decision-making in educational governance is the key, and the intelligent decision support system can analyze massive data in real time, provide management with an accurate basis for decision-making, optimize resource allocation, and improve governance efficiency. At the same time, artificial intelligence technology also promotes the democratization of the governance process, and through online platforms, social media and other channels, teachers and students are able to participate more extensively in the decision-making process, express their opinions and suggestions, and enhance the transparency and credibility of governance. This acceleration of the democratization process not only enhances the legitimacy and effectiveness of university governance, but also promotes the harmony of teacher-student relations and the prosperity of campus culture.

2.3.2. Data-Driven Is the Practice of Education Governance Refinement

In the world of artificial intelligence, data is the essence of everything (Liu, 2019). Data governance, as a core concept with interdisciplinary explanatory power, embodies the intersection of data governance and educational governance in terms of means and ends, and data-driven and educational spontaneity in terms of

governance concepts (Xie, 2020). Educational decision-making based on data evidence not only implies decision-making for data, but also involves utilizing data for decision-making (Zhao, 2022). Among them, data-driven, as the core driving force, leads educational governance to a new height of refinement and intelligence. The first and foremost of the data-driven practice of education governance refinement lies in the construction of a solid data cornerstone. This requires the education system to comprehensively and accurately collect various types of education data, including but not limited to student academic performance, behavioral performance, teacher allocation, resource allocation, policy implementation effects and other multi-dimensional information. Through the use of big data processing and intelligent analysis technology, the system realizes in-depth mining and efficient integration of massive data, thus revealing the inherent laws and potential trends of educational activities. This process not only reflects a high degree of pursuit of data quality and accuracy, but is also a prerequisite and important guarantee for the intelligent transformation of educational governance.

Based on a solid data foundation, education governance can move towards a more refined stage. Through the in-depth analysis of data by intelligent algorithms, personalized service plans and precise interventions can be dynamically generated for the specific needs and problems of different students, teachers and even schools. For example, for students with learning difficulties, learning resources and tutoring strategies can be customized and pushed; for the problem of uneven distribution of educational resources, resource allocation programs can be optimized to achieve balanced and efficient use of resources. This kind of data-based fine strategy generation not only improves the relevance and effectiveness of education services, but also provides strong support for scientific decision-making in education governance.

The data-driven practice of education governance refinement is not a static process that can be achieved overnight, but a dynamic system that is continuously iterative and optimized. In this process, the main body of educational governance needs to build a perfect feedback and assessment mechanism to regularly monitor and assess the effect of data-driven practice, and timely identify existing problems and deficiencies. Based on the results of the assessment, through artificial intelligence technology and related policies and then adjusted, the education governance strategy for timely optimization and upgrading, to ensure that education governance is always along the direction of accurate, high-quality development. The establishment of this closed-loop system of governance not only ensures the effectiveness and sustainability of data-driven practices, but also injects inexhaustible power for the continuous innovation and development of educational governance.

3. Key Issues in Artificial Intelligence-Enabled Education Governance

3.1. Insufficient Consideration of Ethical and Legal Boundaries

At a time when AI is increasingly permeating education governance, ensuring the

ethical legitimacy and legal compliance of the technology has become an unavoidable issue, with comprehensive discussions and strategic integration of data privacy protection, legal and regulatory improvement and enforcement, as well as attribution of responsibility and ethical and moral risks. Among them, the reshaping of the ethical framework has become the first issue, which requires us to start from the principle level, clarify the ethical boundaries of data use, such as respecting individual privacy, ensuring data fairness, promoting educational equity and other basic principles, and then transform these principles into operational practical guidelines. Systematic legislation to regulate the educational application of AI is an important path to modernize Chinese-style education (Liu, 2024). The current lack of detailed data management specifications and real-time initiatives to monitor the full life cycle of data collection, processing, storage, analysis, sharing, and destruction makes it difficult to ensure that each step meets ethical requirements. In addition, the lack of ethical education makes it difficult to raise the ethical awareness and sense of responsibility of teachers, students and educational administrators, and to form a top-down, all-volunteer ethical culture, which lacks a boost for the healthy application of AI technology.

Existing legal systems are often lagging behind, making it difficult to fully cover the legal challenges posed by new technologies. Technology has the characteristic of self-concealment; when a tool is fully utilized, it usually does not reveal its true nature, but remains in a state of self-concealment. Precisely because of this self-concealing characteristic of the tool, people often feel that it is controlled only by the will of the user of the tool, which can be used to create material value, can be used to improve the efficiency of the work, and can also be used as a means of crime (Lu et al., 2020). In the AI-enabled education governance system, the construction of the responsibility mechanism is particularly critical, and the definition of rights and responsibilities from vague to clear is the goal that is constantly pursued. This requires us to clarify the responsible subject in all aspects of technology application, define the scope of their responsibilities, and establish an effective mechanism for pursuing responsibility. Specifically, a data responsibility system needs to be established to clarify the data responsibilities of data collectors, processors, users and other parties; in the process of intelligent decision-making and governance, a responsibility tracing system should be implemented to ensure that the responsible subject can be quickly located when problems occur; at the same time, supervision and assessment should be strengthened, and the operation of the AI system should be reviewed and assessed on a regular basis, so as to ensure that it meets ethical and legal requirements. In addition, a multifaceted governance model should be established, encouraging the participation of multiple parties, including the government, schools, enterprises, social organizations and the public, to jointly build a responsible governance system for AI education.

3.2. Governance Concepts, Models and Systems Are Not Yet Perfect

Education reform is a key part of deepening reform, and all reform measures

should be closely linked to the overall goal, starting with the internal reform of the education system, building a standardized education governance system and improving governance capacity. Specifically, by deepening the comprehensive reform of education, the governance system and capacity should be strengthened, and the healthy development of education should be promoted, which in turn promotes educational equity, optimizes the structure and improves the quality (Yuan, 2014). The root of education reform is the reform of the concept. Fundamental changes in the concept and mode of education governance can only adapt to the challenges and opportunities brought by new technologies. However, this process of change involves the updating of the concept of governance, the reconstruction of the governance structure, and the innovation of the governance mechanism at multiple levels. The problems of “not wanting to use” at the conceptual level, “not being able to use” at the technical level, “not being able to use” at the intelligent level and “not daring to use” at the institutional level have been highlighted. The problem of “not wanting to use”, “not being able to use” at the conceptual level, “not being able to use” at the technical level, “not being able to use” at the intelligent level, and “not daring to use” at the institutional level has been highlighted.

It is necessary to build a school digital governance power system centered on the governance concept and organizational system that coordinates the technology value and education value as a whole (Yang, 2024). The renewal of the governance concept requires governors to abandon traditional empiricism and administrative intervention thinking and shift to a data-driven, user-needs-oriented governance concept. This requires governors to have a high degree of data sensitivity and analytical ability, and to be able to make full use of the data support provided by AI technology to achieve accurate governance. The essence of school digital governance is the integration of the school digital system and the school governance system (Liu et al., 2024). The reconfiguration and integration of the governance system structure implies breaking the original power distribution pattern and establishing a more open, inclusive, and synergistic governance system, which requires that multiple subjects such as the government, schools, and society participate in the governance process and form a synergy. However, in practice, the reconstruction of the governance structure often faces many difficulties due to conflicts of interest, differences in concepts and other reasons. Finally, the innovation of governance mechanism is the key to guarantee the success of the change of governance concept and mode. The governance structure of education is even more complex than that of other social organizations, because of problems such as unclear or overlapping authority of various departments, blurred division of authority, non-standardized business processes, and confusing data management. In the education governance system, there are often multiple systems and centers, and many departments, institutions, and colleges prefer to build information systems alone, which makes it difficult to share, expand, and iterate data, and thus difficult to achieve data articulation and sharing, as well as matching and

co-governance of governance mechanisms, which increases the difficulty of digital governance in higher education (Du & Niu, 2024). This requires governors to continuously explore new governance tools and methods, such as the use of blockchain technology to enhance data transparency and the use of smart contracts to achieve automated regulation. However, the introduction of these innovative mechanisms also needs to overcome the barriers of technology, law, ethics and other aspects.

3.3. Shortcomings in Technology Integration and Application

The integration of technology and governance has become a core feature of school governance in the age of digital intelligence (Liu, 2024). Technology has reconfigured the content of education monitoring, reorganized the monitoring process, and expanded the application field of monitoring results, which helps to promote the digital governance of education evaluation (Xu & Zhang, 2023). At the technical level, AI-enabled education governance also faces many challenges. First, the difficulty of technology integration is a problem that cannot be ignored. There are compatibility problems between different education systems and technology platforms, making it difficult to realize data interoperability and sharing. This has led to a large amount of valuable data not being effectively utilized, limiting the space for AI technology to play. Only by strengthening the development and promotion of technical standards and protocols and promoting interoperability and compatibility between different systems can institutional efficiency be increased. Second, limited application scenarios are also a prominent issue. Although AI technology has been applied and developed to a certain extent in the field of education, its application scenarios are still relatively limited. We need to further dig deeper into the potential needs and application points in educational scenarios to expand the application scenarios and scope of AI technology. In terms of intelligent teaching, AI technology is used to achieve personalized teaching and intelligent assessment; in terms of intelligent management, technology is used to optimize resource allocation and management processes, etc. However, the lack of innovative practice is also one of the key factors restricting the integration and application of technology. In actual application, many educational institutions and departments lack innovative awareness and practical ability, making it difficult to effectively integrate AI technology into education teaching and management. In addition, the “technological black box”, with its opacity and non-interpretability, will further exacerbate the uncertainty of educational governance. The use of digital technology will inevitably generate public data, individual data, research data and cross-border data, and other data flows will inevitably touch on privacy and security (Liu, Yang, & Li, 2017). Artificial intelligence lacks transparency in the collection and use of user information, and the details of user data processing and destruction are unclear. The results are mainly derived from the statistical laws of the training data, not a true understanding of the complex world and abstract systems like humans, so the system may give incorrect or misleading information, and may

even produce offensive or biased content. Further, general-purpose AI technologies were not initially developed with a focus on education, and therefore inevitably have the limitations of general-purpose AI. As a result, AI may not be able to fully understand certain highly specialized education governance issues, and the results it generates and the effectiveness of its governance may not be entirely reliable.

3.4. Insufficient “Smart” Transformation of the Education Governance System

At present, the digital transformation of education is characterized by organizational-level mismatches such as ambiguous goals and solidified organizational boundaries, open integration patterns and barricaded organizational operations, and resource coordination and dispersed organizational authority and responsibility (Wu & Chen, 2023). The intelligent transformation of the governance system is also one of the important challenges we must face. In terms of the level of automation, the existing education governance system still has a lot of room for improvement. Educational governance system, as a systematic project centered on norms, has traditionally favored the utility of technological governance (Jin, 2021), and more advanced automation technologies and tools are the only way to improve the efficiency and accuracy, and to reduce the possibility of human intervention and errors. At the same time, there are deficiencies in intelligent decision support. The lack of intelligent decision support systems to assist decision makers in their scientific decision making and predictive analyzing efforts makes the decision-making process often dependent on experience and intuition rather than data driven. In order to solve this problem, we need to strengthen the construction and popularization of intelligent decision support systems, and improve the science and accuracy of decision-making by using technical means such as big data analysis and machine learning. Clarify that “multiple common governance” is the essence of education governance, that is, multiple subjects to jointly manage education public affairs, to defend the public welfare and service of education with the power of multiple subjects, and to adhere to the bottom line of education as a service for the development of society and for the development of students (Dai & Zhu, 2023). In addition, there are deficiencies in personalized services. The existing education governance system still has great deficiencies in providing personalized services cannot meet the needs and preferences of different users. In order to solve this problem, we need to introduce more advanced personalized recommendation technology and algorithms to achieve more accurate service push and content presentation and other work to improve the user experience and satisfaction.

4. Exploring the Path of Artificial Intelligence Enabling Education Governance

4.1. Strengthening Ethical Scrutiny and Building a Legal System for Smart Regulation

Clarifying the potential risks brought by AI to education, formulating policy

planning for international AI education governance, and exploring innovative paths to promote international cooperation in AI education governance will help promote the all-round empowerment of education by AI technology and the construction of an academic community for AI education governance (Lan et al., 2024). The state should establish an intelligent data supervision platform, strengthen the supervision of data collection, analysis, and preservation, and carry out reasonable splitting, encryption, and desensitization when cleaning the data, so as to protect the personal privacy of the data. The education department should organize data security training on a regular basis, incorporate the ability to protect data privacy into the evaluation system of teachers, provide constraints and guidance to the process of data use by teachers, improve teachers' awareness of risk prevention, ensure the proper and legal use of educational data, and improve the safety and reliability of teachers' use of intelligent technology.

In addition, improving the legal system has become a key part of guaranteeing AI-enabled education governance. The core task of the rule of law in education is to establish and maintain a good system of education law norms and ensure that the system is well implemented (Zhan, 2019). It should be noted that the law has a lagging nature, the current law lags behind the iteration of technology, and a system of education laws and regulations that are compatible with AI has not yet been formed. Comprehensively promoting education governance must not underestimate the profound impact of digital technology, and improving education governance with the rule of law thinking and the rule of law is the way to modernize education governance in the digital era. By formulating or revising relevant laws and regulations, the legal status of intelligent educational products, the rights and obligations of developers and users should be clarified; a legal framework for data protection should be established, and the legal provisions on issues such as data privacy protection, cross-border flow of data, and data ownership should be refined; and law enforcement should be strengthened, and a rapid response mechanism should be established, so as to impose severe penalties on illegal behavior. Assisting education governance with artificial intelligence, education justice has shifted to a new model of open timelines, diversified scenarios, and online and offline integration, promoting the innovation of intelligent trial models, and realizing a higher level of fairness and justice. Through the promotion of international cooperation, it has jointly formulated internationally accepted data governance standards and norms to address the challenges of data flow and governance in the context of globalization.

4.2. Reshaping the Governance Framework to Build a New Ecology of Human-Machine Collaboration

The lack of talent and technology, algorithmic shadow bureaucracy, algorithmic bias, and difficulties in human-machine collaboration urgently require the construction of a technology-for-good system to promote the effective application of artificial intelligence in national governance (Xu & Zhang, 2023). Technological

innovation, as an engine for reshaping the framework of education governance, is driving the transformation of the education system from traditional experience-based management to data-based intelligent governance, a transformation process that is not only a profound reflection and transcendence of the existing governance model, but also a positive response to the forward-looking layout of the future education ecology. By building a new ecosystem of human-machine collaboration, it aims to break the information silos and decision-making barriers in traditional education governance. Through intelligent means, it promotes information circulation and resource sharing among multiple subjects, builds a new model of education governance driven by data, centered on synergy and led by innovation, and forms an AI+ education innovation and development system integrating “government, industry, academia and research” (Liu, 2022). Under the promotion of human-machine collaboration, it is possible to improve the effectiveness and quality of education governance, thanks to the precise control and dynamic optimization of intelligent technology for the education process, as well as the educational innovation ecosystem jointly constructed by the efficient communication and collaboration mechanism between multiple subjects under the human-machine collaboration mode.

In the face of the ethical challenges and sustainable development issues brought about by AI-enabled education governance, we need to adopt a prudent and responsible attitude. Not only should we make full use of the convenience and advantages brought by the technology to promote the modernization of education governance, but also establish sound ethical norms and regulatory mechanisms to ensure the healthy development of the technology and social harmony and stability. At the same time, attention should also be paid to the paths and strategies for realizing the goals of educational equity and sustainable development. It should fully solve the real problems of fragmentation and insufficient integration of governance services, and optimize management process services by building an efficient and high-quality governance framework system.

4.3. Activating the Digital Ecology and Realizing a New Pattern of Overall Wise Governance

The first task in activating the digital ecology is to build a solid, efficient and secure digital infrastructure. This includes upgrading the bandwidth and stability of the education network, constructing a wide-coverage education cloud platform, and enhancing the layout and optimization of key facilities such as data centers and the Internet of Things. The key to activating the digital ecology lies in breaking down data silos and realizing comprehensive integration and efficient sharing of education data. This requires the establishment of unified data standards and exchange mechanisms, and the promotion of data interconnection between different systems and departments. At the same time, data governance should be strengthened to ensure the accuracy, completeness and timeliness of data to provide strong support for educational decision-making.

Under the guidance of the concept of “application is king and service is supreme”, how to effectively and efficiently “use up” the data generated in the process of school operation is the key to the “breakthrough” of the modernization of higher education governance. How to effectively and efficiently “use” the data generated in the process of school operation is the key to the modernization of higher education governance “breakthrough”, and how to effectively aggregate the scattered and fragmented data to form a synergy that effectively empowers the core and focus of education governance (Jia, 2024). The innovation and promotion of intelligent applications, as an important driving force to activate the education digital ecology and promote the new pattern of overall smart governance, is changing the face of education and teaching at an unprecedented speed, injecting new vitality and momentum into education governance.

The enhancement and popularization of the digital literacy of the subjects in the education ecosystem is becoming increasingly important as a soft power guarantee for activating the education digital ecosystem and realizing the new pattern of overall smart governance. Teachers become learning guides and teaching researchers, and are expected to understand the thinking process of learners in learning through human-computer collaborative learning data analysis and diagnosis, and carry out targeted teaching activity design based on the real learning state of learners to promote empirical teaching gradually to evidence-based educational professional practice activities (Cao et al., 2024). Only when teachers, students and education administrators have sufficient digital literacy can the advantages and value of digital technology be fully utilized to promote education governance to a higher level.

The guidance and support of policies and regulations, as the external guarantee force to activate the digital ecology of education and realize the new pattern of overall smart governance, is of great importance and cannot be ignored. The global governance of AI education has problems such as the lack of global cooperation among sovereign states at the macro level, and it is advocated that globalization cooperation be strengthened to enhance the common understanding and progress of sovereign states, international organizations and other stakeholders, and to negotiate and formulate the rules or guidelines for the global governance of AI education (Lu et al., 2020). Only under a good policy environment and legal framework can the education digital ecology be able to only under a favorable policy environment and legal framework can the education digital ecology flourish and continue to play its important role in education governance.

4.4. Integrating Science and Effectiveness to Drive Intelligent Transformation of Education Governance

Scientific governance is particularly crucial in the process of deep integration of artificial intelligence and education (Li, Wang, & Gu, 2022). Governance efficiency serves as a potential standard to test the scientific and feasible degree of governance mechanism (Liu, 2021). The scientization of educational governance

in the digital era refers to analyzing and solving relevant problems in the field of education under the guidance of correct educational thought, following the objective law of educational development, and supplemented by digital technology. The essential requirement of the scientization of educational governance is to apply scientific methods to ensure that the results of educational governance are correct (Zhou, Li, & Chen, 2022). With the support of digital technology, the government is able to update its governance philosophy and adjust its governance strategy in a timely manner to promote more scientific education governance. In addition, the key to integrating science and efficacy lies in closely combining the deep heritage of education science with the cutting-edge exploration of AI technology to form a powerful synergy that promotes the intelligent transformation of education governance, which not only ensures the scientific and standardized nature of education governance, but also endows it with unprecedented intelligence and flexibility.

The construction of an efficiency-oriented intelligent governance system aims to deeply transform and upgrade all aspects of educational governance through intelligent means, realizing the efficient allocation and utilization of educational resources, the precise control and optimization of the educational teaching process, and the timely response and adjustment of the educational assessment and feedback mechanism, so as to comprehensively enhance the effectiveness and level of educational governance. The synergistic promotion of intelligent decision-making and precise policy-making is an important manifestation of the intelligent transformation of educational governance. Through intelligent means to realize the depth of educational data mining and analysis, to provide accurate support for educational decision-making; at the same time, according to the decision-making results to develop and implement targeted policy measures to ensure that educational governance of the precise implementation of policy and effective landing, so as to promote educational governance to a higher level.

Due to the role of instrumental rationality, the efficiency of education governance is often misunderstood as only focusing on whether the final result achieves the goal and whether the benefit is maximized. However, in the digital era led by the new development concept, the efficiency of education governance is not a one-sided and blind pursuit of efficiency, but needs to take into account the systemic, synergistic, equitable and sustainable nature of education governance. That is to say, in the process of focusing on the improvement of the effectiveness of educational governance, it is also necessary to continue to reflect on the deep-rooted positions and pursuits behind educational governance.

The process of integrating science and effectiveness and driving the intelligent transformation of educational governance is a journey full of challenges and opportunities. In this process, it is necessary to establish a dynamic mechanism of continuous innovation and iterative optimization, encourage the participation of multiple subjects and collaborative innovation, and continuously promote the updating and upgrading of the concepts, technologies, modes and methods of

educational governance in order to adapt to the needs of the development of the times and the changes in the educational environment.

Author's Introduction

Pingping Sun (1995-), female, Artificial Intelligence and Education New Quality Productivity Research Institute, Ningxia Normal University.

Funding

Supported by the Western First-class Project: "Research on the Path of Rural Teacher Team Building in the Context of the Strong Teacher Program"; Ningxia Excellent Teacher Development Research Talent Small Highland Project: "Research on the Measurement of Principals' Digital Leadership in the Context of Digital Transformation".

Data Availability

We do not analyze or generate any datasets, because our work proceeds within a theoretical and mathematical approach. One can obtain the relevant materials from the references below.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

- Cao, P. J., Xie, Y. B., Wu, H. Z. et al. (2024). The Development Status, Innovative Architectures and Application Prospects of Educational Large Models. *Modern Educational Technology*, 34, 5-12.
- Chemm, K. (1999). *An Introduction to the Philosophy of Technology* (Translated by D. X. Yin, & N. Y. Cao, pp. 1-30). Tianjin Science and Technology Press.
- Chen, C. S. (2012). *An Introduction to the Philosophy of Technology* (p. 126). Science Press.
- Dai, L., & Zhu, Z. T. (2023). The Logical Starting Point, Target Orientation and Action Path of Educational Digital Transformation. *Chinese Journal of Education*, 7, 14-20.
- Du, Y. Y., & Niu, J. M. (2024). Digital Governance in Higher Education: A Model of Higher Education Governance in the Digital Era. *Jiangsu Higher Education*, 3, 53-61.
- Feenberg, A. (2005). *Critical Theory of Technology* (Translated by L. Q. Han, & G. F. Cao, p. 6). Peking University Press.
- Heidegger, M. (1996). *Heidegger's Selected Works (Volume 2)* (Translated by Z. X. Sun, p. 947). SDX Joint Publishing Company.
- Jia, Z. B. (2024). The Modernization of Higher Education Governance Empowered by Digital Intelligence: Promotion Mechanisms and Practical Approaches. *China Educational Technology*, 8, 80-86.
- Jin, L. T. (2021). From "Technology Governance" to "Governance Technology": A Key Breakthrough in the Modernization of Educational Governance. *Modern Educational Management*, 12, 46-52.

- Lan, G. S., Du, S. L., Xiao, Q. et al. (2024). Research on the Policy Planning and Innovation Paths of International Artificial Intelligence Education Governance—Key Points and Reflections on the “Bletchley Declaration” of the First Artificial Intelligence Security Summit. *China Educational Informatization*, 30, 43-51.
- Li, S. J., Wang, C. L., & Gu, X. Q. (2022). Artificial Intelligence Education Governance: Logical Mechanisms and Practical Approaches. *Journal of East China Normal University (Educational Science Edition)*, 40, 55-66.
- Liu, B. Q., Zhu, H. J., Yu, Y. K. et al. (2024). Intelligent Technology Empowers School Digital Governance: Connotation, Framework and Typical Scenes. *Modern Distance Education*, 4, 3-11.
- Liu, S. N. (2022). The Integrated Development Path of Artificial Intelligence + Education. *Journal of the National Institute of Educational Administration*, 22, 7-10.
- Liu, S. N., Yang, Z. K., & Li, Q. (2017). Educational Data Ethics: New Challenges for Education in the Big Data Era. *Educational Research*, 38, 15-20.
- Liu, W. (2019). *Questioning Artificial Intelligence: From Cambridge to Beijing*. Science Press.
- Liu, X. D. (2024). Change and Response: Four-Dimensional Paths of Artificial Intelligence Education Legislation. *Comparative Education Journal*, 4, 34-51.
- Liu, Y. (2021). Empowering and Reconstructing Modern Education Governance in the Context of Artificial Intelligence. *Teaching & Management*, 21, 28-30.
- Lu, D., Duan, S. F., Hu, K. et al. (2020). The Global Governance of Artificial Intelligence Education: Frameworks, Challenges and Transformations. *Distance Education Journal*, 38, 3-12.
- Shen, G. C., & Shen, H. N. (2023). Artificial Intelligence Empowers the Modernization of University Governance: Connotation, Vision and Path. *Modern Educational Technology*, 33, 5-13.
- Sun, M. T., & Xu, H. (2023). From Management to Governance: New Choices Faced by the Development of Educational Management in the New Era. *Modern Educational Management*, 27, 1-11.
- Wu, N. Z., & Chen, E. L. (2023). The Organizational Adaptation Mechanism and Its Construction Path in the Digital Transformation of Higher Education. *Modern Distance Education*, 6, 53-60.
- Xie, J. (2020). The Ethical Framework of Education Data Governance: Values, Dimensions and Paths. *Modern Distance Education Research*, 32, 15-24.
- Xu, J. J., & Zhang, M. X. (2023). Global Observation of the Digital Transformation of Education Monitoring and Its Implications. Global Observation of the Digital Transformation of Education Monitoring and Its Implications. *Chinese Journal of Education*, No. 7, 34-39.
- Yang, Z. M. (2024). The Dilemmas of School Digital Governance: Manifestations, Causes and Responses. *Educational Technology Research*, 3, 32-38.
<https://doi.org/10.54012/ijcer.v3i1.257>
- Yuan, G. R. (2014). Deepening the Comprehensive Reform in the Education Field and Accelerating the Modernization of the Education Governance System and Governance Capacity. *China Higher Education*, 5, 4-11.
- Zeng, W. J. (2018). On the Construction of the Value Dimension of School Governance. *Journal of Educational Studies*, 14, 58-64.
- Zhai, X. S., Zhu, Y. M., Zhang, Z. H. et al. (2021). Evaluation of the Governance Capacity

of Educational Informatization in Colleges and Universities: Definition, Practice and Reflection. *Open Education Research*, 27, 24-33.

Zhan, Z. L. (2019). On the Improvement of the Normative System of Education Law in China. *China Higher Education*, 8, 25-27.

Zhao, L. L. (2022). Artificial Intelligence Empowers University Data Governance: Logic, Challenges and Practice. *Chongqing Higher Education Research*, 10, 71-79.

Zhou, H. Y., Li, Z. W., & Chen, X. Z. (2022). *Research on Education Governance in China* (p. 16). Hubei Education Press.