The Technical Function and Dilemma Breakthrough of Education Governance Based on Artificial Intelligence Background

Yazhou Gao*

Hohai University, Nanjing 211100, China

*nyfzgyz@163.com

Abstract. Artificial intelligence is a common result of many industrial revolutions and long-term technological accumulation, and has a typical feature of high integration of technological advantages and social attributes. By analyzing the meaning of AI and technology input of artificial intelligence, it is concluded that with the help of key technologies such as machine learning, expert system and human-computer interaction, it can realize educational governance information screening and situation reproduction, system identification and response to complex educational situations, and neural network simulation to assist educational governance decision-making behavior. But because of the traditional education management mechanism is not adapt, make education governance is facing multiple subject "functional" absence, vertical one-way organization structure "initiative", governance system "regulation" and lack of ethics "normative" reality. In order to solve these problems, it is proposed to distinguish the authority of multiple governance subjects, optimize the governance organizational structure, promote the construction of governance concept and behavior, and pay special attention to the reconstruction of supervision mechanism and ethics, so as to provide support for the realization of intelligence and modernization of educational governance.

Keywords: artificial intelligence: education governance; algorithm: big data; decision-making

1 Introduction

Artificial intelligence, as the core of the driving technology of the new generation of industrial transformation, brings together emerging technologies and theoretical achievements such as big data, cloud computing, brain science and supercomputing, showing its unique advantages in intelligent decision-making, deep learning, emotional computing and other fields. On the understanding of artificial intelligence, many studies will be classified as weak artificial intelligence and strong artificial intelligence, weak artificial intelligence mainly memory storage and sensing, realize the general image recognition or information judgment function: strong artificial intelligence is refers to the intelligent machine with autonomous learning and adaptive

D. Hu et al. (eds.), *Proceedings of the 2024 5th International Conference on Modern Education and Information Management (ICMEIM 2024)*, Atlantis Highlights in Social Sciences, Education and Humanities 29,
https://doi.org/10.2991/978-94-6463-568-3_60

characteristics, can imitate human independent perception, understanding of learning ability, provide comprehensive intelligent basis for people's decision-making. In fact, artificial intelligence is an intelligent activity that endows computer logical judgment, perceptual reasoning and independent judgment ability through optimization algorithms, large-scale data analysis technology and high-performance computing systems to carry out cognitive learning and decision execution under specific input conditions[1]. After the trough in the 1970s and the recovery in the 1990s, in the early 21st century, AI made breakthroughs in the fields of deep learning, cognitive science and big data analysis, and AI had a transformative impact on production, life and social governance. Machine vision, speech recognition and natural language processing based on big data analysis show their intelligent effectiveness, combine with subjective experience and wisdom to assist social governance, and have the characteristics of highly integrated technical advantages and value judgment[2].

2 Educational Governance Function Based on Artificial Intelligence Support

2.1 Intelligent Information Screening and Situation Reproduction to Solve the Problem of Information Overload and Scarcity

In the era of big data, education governance is faced with the dual challenges of information processing overload and effective information scarcity. With its advantages of automatic information processing, artificial intelligence has become an effective way to mine educational governance information. Intelligent search engine to retrieve key information, analyze and sort text; to construct virtual situation with bionic experiment, deduce the advantages and disadvantages of decision scheme; deploy complex interactive data visualization network to assist student management and education governance; gather information with expert system to solve governance problems, predict the event direction, and present network public opinion in real time. These technologies jointly build an education governance platform driven by data and algorithms, accurately identify network group dynamics, and improve the intelligence and scientific nature of education governance.

2.2 Systems to Identify Fuzzy Response Tasks and Independently Adapt to Complex Educational Situations

Education governance system is a systematic project, with complex internal and external data interaction, and it is difficult to judge governance issues. Artificial intelligence uses computer recognition system to realize intelligent recognition and understanding. It can deal with fuzzy language, guide search, reason and solve complex problems. In social governance, artificial intelligence has been used to use news data analysis to achieve dynamic visualization[3] .

2.3 Neural Network Simulates the Operation Mechanism of Human Brain, and Assists Education in Governance and Decision-making Behavior

The complexity of education governance promotes the failure of traditional empirical decision-making, so it is necessary to turn to quantitative decision-making, combine mathematical models and technical tools, analyze governance factors and interactive mechanisms, and integrate qualitative and quantitative data. Artificial intelligence, through model analysis and deep learning, has become the key to improve governance capabilities[4] . Its artificial neural network can learn and summarize decision-making rules, without relying on expert system, and effectively deal with complex nonlinear problems. Using neural calculations to assess the nonlinear relationship between environmental stress and organizational governance, Samis et al. With its advantages of parallel processing and information storage, the artificial neural network especially shows its expertise in dealing with multi-dimensional non-linear problems. It can self-organize, adapt, fault-tolerant, associate and learn, make independent decisions according to environmental changes, simulate and assist human decision-making to the maximum extent, and promote the intelligent development of education governance.

3 Artificial Intelligence Education Analysis of Large Language Model

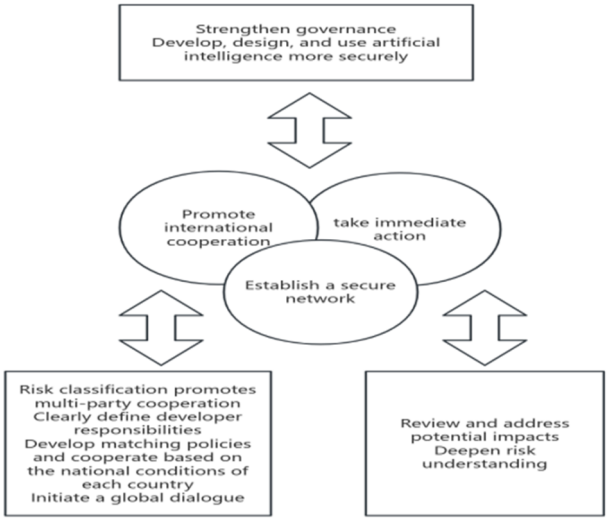

Fig. 1. Policy planning of international AI education governance.

AI education governance is crucial to the destiny of all mankind and is a common issue facing all countries in the world. Development of artificial intelligence, should actively advocate people-oriented, intelligent to the good, strengthen technical risk control, and abide by the principle of mutual respect, equality and mutual benefit,

encourage all parties to work together, strengthen the developing countries in artificial intelligence education global governance representative and voice constantly bridge intelligence gap and management ability gap. Based on the Declaration of the first AI Security Summit (Table 1), the policy plan for international AI education governance (see Figure 1).

Table 1. Classification method of educational AI.

Class	Apply	
Student-centered AI	Intelligent Tutoring System (ITS) Auxiliary application Auxiliary simulation learner support Automatic Article Generation (AEW)	Chat robot Automatic Formative Assessment (AFA) Dialogue-Based Coaching System (DBTS) Exploratory learning environment (ELE) Lifetime learning assistant
Teacher-centered AI	Plagiarism detection Learning data management Classroom monitoring	Automatic summative assessment Artificial intelligence teaching assistant Classroom arrangement
Agency-centric artificial intelligence	enroll new students Plan and schedule Electronic security	Risk student identification Electronic invigilation

The human-machine collaborative teaching model proposed in this study is shown in Figure 2. The core of this model is to take LLM as the core functional module of an auxiliary learning platform, and be embedded in the three key links of teaching, learning and evaluation in the way of virtual agent. For example, LLM can be used to help students solve complex programming problems (Table 2), or as an interactive chat to help students master abstract conceptual knowledge, prompt strategies, and related practical tasks through intelligent conversations[5] .

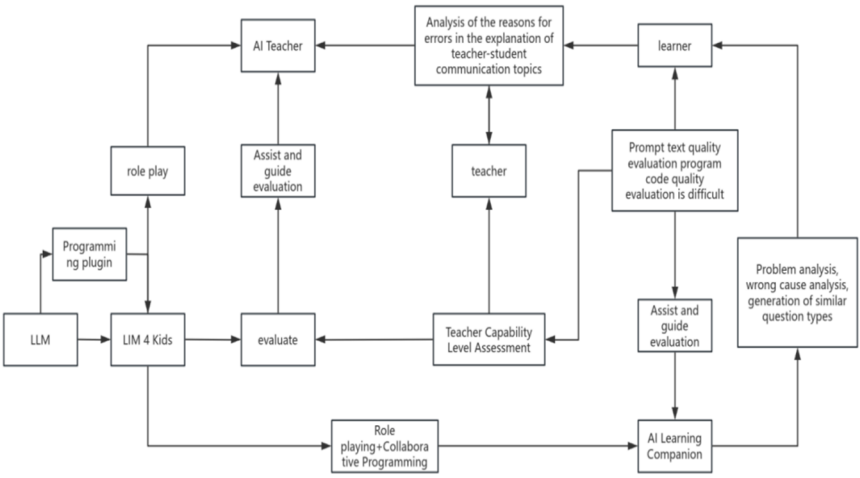

Fig. 2. Human-machine collaborative teaching supported by LLM.

Table 2. Treats the typical cognitive differences of the large models.

Typical role of the large model	Positive cognition	Negative cognition
Writing the text and wrote the program	AI model can be used as a content and program writing assistant, but should be honest	Cheating is difficult to obtain evidence, and its use should be strictly restricted at present
Provide different ideas and perspectives	It can inspire AI large models to generate more and more novel ideas	Develop a dependence on AI and lazy thinking
Explain knowledge, but there will be mistakes or even mislead students	Learn to distinguish common errors in Al results, and eliminate the true	Al is true or false, and students should be prevented from using it
Generate a review of articles or even book content	Help to quickly sort out the knowledge structure and establish the basic cognition of the unknown knowledge	Loss of awareness of inquiry and the ability to trace the source
Generate personalized content and tests	Effectively support different teaching, but we need teachers to accurately grasp the learning situation	Al will increase the burden of students and lead to the disorder of teaching evaluation
Optimize teaching programs and correct errors	Cross-review improves the quality of lesson plans in place of experienced teachers	The AI will not have the actual teaching experience of the teachers

A middle school has introduced an intelligent teaching system, in which AI teachers can provide personalized learning resources and guidance based on students' historical learning data, current learning progress and understanding ability. AI teachers can not only give intelligent explanations in class, but also interact with students through online platforms after class, answer questions and provide targeted learning suggestions. Suppose the function F (x, y, z) represents the overall effect of human-machine collaborative teaching mode, where x represents the role of AI teacher, y represents the role of programming learning plug-in and AI partner, and z represents the role of teaching evaluation assistant. Meanwhile, a synergy factor α is introduced to represent the strength of the synergy between these components.

(1) Suppose the function

The assumption function can be defined as:

$$F\left(\mathrm{x}, \mathrm{y}, \mathrm{z}\right) = \alpha\left(\omega_{\mathrm{x}} \cdot \mathrm{x} + \omega_{\mathrm{y}} \cdot \mathrm{y} + \omega_{\mathrm{z}} \cdot \mathrm{z}\right) \tag{1}$$

among:

F (x, y, z) represents the overall effect of the human-machine collaborative teaching model

A is a synergy factor, representing the strength of the synergy between the components, usually a number between 0 and 1 (but can also be greater than 1, indicating extraordinary synergy)

X represents the effective effect of AI teachers.

Y represents the action effect of the programming learning plugin and the AI learning partner

Z represents the functional effect of the teaching evaluation assistant,

ω_x, ω_y, ω_z The weights of x, y, and z, indicating their relative importance in the overall effect, and $\omega_x + \omega_y + \omega_z = 1$ (or normalized as needed)

$$\omega_x^{'} = \frac{\omega_x}{\omega_x \omega_y \omega_z} \tag{2}$$

$$\omega_y^{'} = \frac{\omega_y}{\omega_x \omega_y \omega_z} \tag{3}$$

$$\omega_z^{'} = \frac{\omega_z}{\omega_x \omega_y \omega_z} \tag{4}$$

Then, the normalized weights ω x ', ω y', ω z'were used in the hypothesis function.

(2) The weights were normalized

If the given weight does not directly meet the normalization condition, we can normalize it in the following way:

AI technology provides accurate teaching feedback for teachers through intelligent analysis of large amounts of teaching data, so as to optimize teaching strategies and improve teaching quality. AI technology can provide customized learning paths according to students 'personalized needs, and significantly improve students' learning effectiveness[6] .

4 The Realistic Dilemma of Education Governance under the Threshold of Artificial Intelligence

4.1 Absence of "Functionality" of Multiple Education Governance Subjects

The governance mechanism aims to solve the problem of dual failure of the government and the market, build a new pattern of education governance with the participation of the government, the market and the civil society, and pursue "good governance". However, in the era of AI, this model faces challenges: lack of regulations, market privacy violations, and lack of public participation. Educational administrative institutions need to strengthen "meta-governance" and formulate plans, systems, ethics and technical strategies for the application of AI education. At the same time, the market needs to improve the mechanism to prevent data abuse and create a level playing field. In addition, although social organizations are limited and mostly dependent on the government, it is difficult to guarantee the independence and high level of technical services. Therefore, in order to cope with the impact of AI, it is necessary to strengthen government guidance, improve market norms, enhance the independence and professionalism of social organizations, and jointly promote the modernization of education governance (Table 3, Table 4).

Table 3. Comparison of the improvement effect of teaching quality.

Project	Before AI	After AI was used	Increase percentage
teaching efficiency	60%	85%	41.67%
The degree of mastery of students	70%	88%	25.71%
Ability to transfer knowledge	65%	80%	23.08%

Table 4. Comparison of learning effect and enhancement effect.

project	Before AI	After AI was used	Increase percentage
Average test score	75 Points	85 Points	13.33%
Quality of work completion	70% Qualified rate	90% Qualified rate	28.57%
Learning interest improvement degree	60%	85%	41.67%

4.2 Insufficient "Initiative" of the Vertical and One-way Organizational Structure

The traditional "pyramid" governance structure relies on the single center of government. Although the hierarchical model realizes specialized division of labor, the communication is not smooth and the coordination is weak. The era of artificial intelligence emphasizes data openness and compatibility, and requires large-scale data input to support machine learning. At present, the educational governance structure is hierarchical, with different data standards between departments and lack of unified technical standards, forming "data barriers" and restricting the development of AI technology. The school also faces the problem of data system incompatibility, which affects the application of AI-based course management and student behavior analysis, and restricts the improvement of educational governance ability. Therefore, it is necessary to reform the governance structure and promote data sharing and compatibility to meet the needs of education governance in the AI era.

4.3 Lack of "Regulation" and Ethical "Standardization" of the Governance System

Effective institutional supply is crucial to the modernization of education governance, and it is necessary to explore the public governance mechanism and regulatory elements under the background of AI. Systems include formal rules (laws and regulations) and informal systems (ethical norms). At present, the AI legal framework is not perfect, and regulations on information security and responsibility recognition should be clarified. AI research and development is highly secretive, and the traditional supervision mechanism is difficult to work, and involves ethics and ethics. Crnkovic Emphasize that intelligent design should be integrated into ethical norms, but the unpredictability of AI algorithms and developer control go beyond the traditional governance framework. Therefore, developers need to assume new ethical responsibilities and build governance logic and behavior norms adapted to the AI era.

5 Strategies to Promote the Modernization of Education Governance in the Era of Artificial Intelligence

5.1 Discriminate the Authority of Multiple Governance Subjects and Coordinate the Pattern of Education Governance

In the era of artificial intelligence, education governance needs to build the three-way coordination mode of government, market and society. This requires open and inclusive governance concepts, ensuring the diversity of algorithms and the participation of multiple subjects, and realizing knowledge complementarity[6]. Education administrations should make legislation and regulations to clarify the ethical framework of AI technology, protect privacy, account for accidents, and draw on international experience such as the strategic report of the United States and the UK. The market should lead AI research and development and application, promote the commercialization of educational scientific and technological achievements, and promote industry-university-research cooperation. Social organizations and citizens should actively participate in the supervision of technology research and development, and enjoy policy support and financial support. This model aims to cope with the challenges of AI technology, form a new governance ecology in which the government sets standards, enterprises provide technology and the society jointly supervise, and promote the modernization of education governance .

5.2 Optimize the Governance and Organizational Structure, and Eliminate the Barriers to Data Sharing

Artificial intelligence improves the efficiency and decision-making of education governance, but it optimizes the organizational structure and data sharing simultaneously. The trend of power decentralization is obvious, and the flat and network structure is more suitable for the AI era. It is necessary to break the barriers of educational administrative data, build a unified standard data platform, clarify the authority and process, and optimize the data management. Schools should give full play to the advantages of data collection, establish a compatible system, integrate students' comprehensive quality data, innovate teaching mode, use AI to improve teaching, and accurately evaluate performance. At the same time, the school governance system should be integrated to improve the data quality, cultivate the data literacy of teachers and students, realize personalized service and precise governance, and promote the transformation of education to potential and creativity cultivation.

5.3 Restructure the Legal Supervision Mechanism, and Revise the Ethical and Moral Construction

System construction is the cornerstone of the modernization of education governance, to ensure that the system operation is evidence. Guy Peters emphasizes that institutions can expect value, regulate behavior, and define policy boundaries. In the face of the educational reform and technical ethical challenges brought by AI, it is necessary

to strengthen the system construction and build the legal supervision mechanism. The core of AI technology lies in data and algorithms, and supervising its rule-making and data analysis is the key. AI developers have discretion, and decentralized decisions require greater control. Drawing on Asimov's Law, we will establish a regulatory system of filing in advance, controlling risks in the process, and punishing and accountability after the event, so as to ensure the legal compliance of AI application, and promote the harmonious coexistence of educational governance ethics and technology.

6 Conclusion

Educational governance based on artificial intelligence background is undergoing unprecedented changes. Artificial intelligence technology has shown great potential and advantages in education governance, but it also faces many difficulties and challenges. In order to give full play to the role of artificial intelligence in education governance, it is necessary to increase investment in R & D and technological innovation, strengthen talent training and team building, improve the governance system and policies and regulations, and promote multi-party cooperation and coordinated development. Only in this way can we break through the dilemma of the application of artificial intelligence in education governance and promote the modernization and intelligent development of education governance.

Reference

1. Andreasyan A, Balyakin A. Transformation of education through Big Data: digital twins case study [J]. Journal of Physics: Conference Series, 2022, 2210(1):012003-.
2. Ragazou K. Environmental, Social, and Governance-Based Artificial Intelligence Governance: Digitalizing Firms' Leadership and Human Resources Management [J]. Sustainability, 2024, 16.
3. Bai Z. Research on Application of Artificial Intelligence in Communication Network [J]. Journal of Physics: Conference Series, 2022, 2209(1):012014-.
4. Xiao X. Reinforcement Learning Optimized Intelligent Electricity Dispatching System [J]. Journal of Physics: Conference Series, 2022, 2215(1):012013-.
5. Herington J, Mccradden M D, Kathleen CreelRonald BoellaardElizabeth C. JonesAbhinav K. JhaArman RahmimPeter J.H. ScottJohn J. SunderlRichard L. WahlSven ZuehlsdorffBabak Saboury. Ethical Considerations for Artificial Intelligence in Medical Imaging: Deployment and Governance [J]. The Journal of Nuclear Medicine, 2023, 64(10):1509-1515.
6. Gervais D J, Nay J J. Artificial intelligence and interspecific law [J]. Science, 2023, 382 (Oct.27 TN.6669): 376-378.