



Research on the "Digital Divide" Problem in Artificial Intelligence

Education Management Innovation

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KEYWORDS

ABSTRACT

Artificial intelligence ; Education management ; Educational innovation; Digital divide; Educational equity

The deep integration of artificial intelligence (AI) technology with education management is profoundly transforming education governance models towards precision, personalization, and intelligence. However, while the technological wave brings efficiency, it may also exacerbate or create new inequalities—the "digital divide . " Therefore, bridging the digital divide is a crucial measure to promote balanced educational development and achieve educational modernization. This paper expands research on the "digital divide" from the access level to the level of capabilities and benefits, and integrates it with theories of technological innovation and education, providing a new framework for promoting the healthy and sustainable development of AI-enabled education management.

INTRODUCTION

In the field of education management, the application of artificial intelligence is reshaping management processes and models in all aspects. Its potential to improve efficiency, liberate manpower and realize personalized services has attracted much attention . Governments and international organizations around the world have placed "AI + Education" at a strategic high position [1]. Practice shows that due to differences in economy, society, culture and existing education foundation, there are significant gaps in the opportunities and abilities of different regions, schools and groups of teachers and students to access, utilize and benefit from these AI management tools and platforms. This gap is the new form of "digital divide" in the field of education in the AI era. Therefore, bridging the digital divide is an important measure to promote balanced development of education and realize the modernization of education .

1. Definition and Application Research of Artificial Intelligence in Educational Management Innovation

1.1. Core Concepts

At the moment when global digital transformation and education modernization are converging, the foundation, goals and methods of artificial intelligence education are constantly changing . Intelligent education is based on big data and uses artificial intelligence technology to accurately calculate students' knowledge base, subject orientation, thinking type, emotional preference and ability potential. According to the laws of cognition and education, it scientifically implements teaching according to aptitude, realizes personalized training and comprehensive improvement of talent quality[2]. The characteristics of artificial intelligence education are applied to the fields of educational administration, school governance, teaching management, and student services, aiming to improve management efficiency, decision-making science and

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educational equity.

1.2. Innovative Application Scenarios of Artificial Intelligence in Educational Management

Educational management can be divided into three dimensions: "managing people" (students and teachers), "managing affairs" (teaching, research, and evaluation), and "managing things" (resources and facilities). Artificial intelligence is permeating all these areas[3].

1. Student development and precision management .

Personalized learning path planning : AI analyzes students' learning behavior, grades, and knowledge gaps to customize dynamic learning plans and resource recommendations, achieving "one plan for each student".

Mental health and risk early warning . By analyzing students' behavioral data, facial expressions and voice (within compliance with regulations) on the campus network and digital platforms, as well as questionnaire results, AI can identify risks such as anxiety, depression, and bullying at an early stage, and provide timely warnings and interventions.

Learning planning and college application guidance . Based on massive amounts of data on universities, majors, and the job market, combined with student interest and ability profiles, AI can provide scientific career planning advice.

2. Teacher Support and Professional Development

Intelligent teaching assistant . AI helps teachers analyze student learning, automatically grade objective questions, and generate personalized practice questions, reducing administrative burdens and allowing teachers to focus more on instructional design and teacher-student interaction.

Precision teaching research and training . AI analyzes teachers' classroom recordings and videos (with authorization) to provide objective feedback on teaching language, interaction patterns, and pacing, supporting precision teaching research. Simultaneously, it delivers customized professional development resources to teachers.

3. Reform of Teaching Management and Quality Evaluation
Process-oriented evaluation system . Moving beyond a single outcome-based evaluation, AI can track the entire learning process of students and build a comprehensive evaluation model that includes multiple dimensions such as knowledge acquisition, ability improvement, participation, and collaboration skills.

Teaching quality monitoring and diagnosis . AI can perform

macro-level analysis of teaching quality at the regional, school, and class levels, diagnose common problems, and provide data support for educational decision-making.

4. Intelligent administration and operation

Data and Decision Support . Provides schools and regional education administrators with visualized data dashboards to monitor the real-time operation of the education ecosystem and enable data-driven, scientific decision-making.

Intelligent scheduling and resource allocation . Taking into account multiple complex constraints such as teachers, classrooms, courses, and student course selection, AI can generate optimal scheduling schemes and resource allocation plans.

Campus safety and facilities management . Utilizing visual AI and IoT data, we can achieve campus safety monitoring and early warning, intelligent energy consumption control, and predictive equipment maintenance.



Fig.1. AI Innovation in Educational Management: Definition and Application Research

2. Research on the "Digital Divide" Problem in Artificial Intelligence Education Management Innovation

2.1. The New Connotation of the "Digital Divide"

The traditional "digital divide" primarily refers to the disparities in opportunities and capabilities among different social groups to access and use digital technologies (such as the internet and computers) in the digital age. These disparities can exacerbate social inequality and wealth disparity. It includes not only access to digital networks (the accessibility divide) but also proficiency in using digital tools and services (the usability divide). Now, in the context



of innovation in education management driven by artificial intelligence, the divide has evolved into an "intelligence divide," encompassing three levels:

First, the access chasm. Does the campus have the hardware, high-speed network, and basic digital environment to support the operation of AI systems?

Second, the usage gap. Do administrators, teachers, and students possess the digital education management skills and literacy necessary to effectively utilize AI management tools?

Third, the value gap. Can we extract deep value from AI applications, including data-driven decision-making, personalized services, and business model innovation, rather than just superficial forms?

2.2.A Three-Dimensional Analysis of the "Digital Divide" in AI-Driven Educational Management Innovation

1. Infrastructure and Data Access Gap

Manifestations: There are huge gaps between regions and campuses in terms of hardware (servers, sensing devices), high-speed and stable networks, and basic digital platforms required to support the AI management system[4]. More importantly, there is a data access gap—weak schools lack the ability to generate high-quality, structured data (such as the lack of a unified academic affairs and student registration system), which leads to their "data poverty" and makes it impossible to provide "fuel" for AI models.

Causes: Differences in economic development levels, fiscal investment, and historical debts. This is the most obvious, but not the only, gap.

2. The gap between data literacy and AI application capabilities

Manifestations: **Administrative Capability Gap**: Principals and administrators lack awareness and ability in "data-driven decision-making," failing to understand, interpret, or even question the AI system's suggestions, leading to "system stagnation" or "blindly following." **Teacher Capability Gap**: Teachers feel uncomfortable, distrustful, or lack the operational skills to integrate into AI management processes (such as using AI learning reports to guide teaching). **Teacher and Student "Being Managed" Competency Gap**: Teachers and students, as the subjects evaluated and guided by the AI system, lack understanding of its operational logic and their own data rights, leaving

them in a passive and voiceless state[5].

Causes: Lack of training system, insufficient support for professional development, and slow organizational culture transformation. This is a deeper and more critical gap.

3. The gap between innovation benefits and empowerment outcomes

Performance: Even after connecting to the system and possessing basic usage capabilities, the "actual benefits" gained by different entities from AI management vary significantly. Schools with superior resources can leverage AI to "add icing on the cake," further strengthening their competitive advantage (such as more precise cultivation of top-notch innovative talents); while weaker schools may only be able to "barely maintain" basic management functions, unable to reach in-depth innovation. AI may solidify and amplify existing educational inequalities.

Causes: Differences in the innovation ecosystem (supporting resources, expert support, cultural atmosphere), potential biases in AI algorithms (training based on data from advantageous groups), and a singular definition of "benefit" in the evaluation mechanism (such as overemphasizing score improvement).

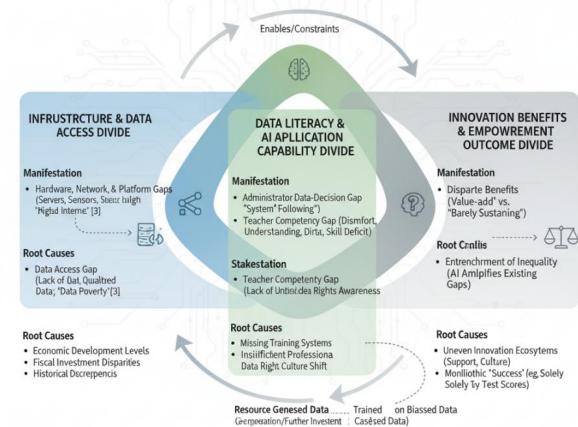


Fig.2. Three-Dimensional Analysis of the "Digital Divide" in AI Educational Management Innovation

3.Bridging the Gap: Innovation Pathways and Strategies

1. Policy guidance and balanced development:

Establish an AI+education management development index and baseline standards to clarify the level of intelligent management that schools should achieve at different stages of development.

Establish special transfer payments or public funds to prioritize providing lightweight, open-source, and customizable AI management tools and basic data platforms



to underdeveloped regions and schools.

Promote "group-style" development, encourage strong schools to support weaker schools, and share AI management experience, models, and even computing power.

2. Capacity building and competency enhancement:

"Educational data literacy" and "AI general knowledge" will be included in the mandatory training and assessment for principals and education administrators.

We conducted training for all teachers on "human-machine collaboration" management scenarios, focusing on how to interpret data and how to collaborate with AI to make better educational decisions.

Offer digital citizenship courses for students and parents to help them understand the principles, rights, and boundaries of AI management.

3. Technological Approach and Business Model Innovation:

Advocating for "lightweight and scenario-based" innovation: Instead of pursuing a "large and comprehensive" AI platform, we develop "micro-applications" that solve specific management pain points (such as intelligent class scheduling, dropout warning, and personalized homework distribution).

Promote open-source ecosystem and public models: Education authorities can take the lead in building open education data pools (after anonymization) and benchmark algorithm models to reduce technical barriers and costs.

Explore "human-centered AI design": ensure that AI tools are transparent, explainable, and interventionable, and retain necessary human review and emotional communication links in management processes.

4. Ethical Norms and Institutional Development

Establish a school-level AI ethics committee, formulate norms for data collection, use, and auditing, and protect the privacy of teachers and students.

Improve the accountability mechanism for algorithms to ensure that AI-assisted decisions (such as evaluation and resource allocation) are traceable, appealable, and correctable.

We foster an organizational culture of "intelligent for good," emphasizing that AI empowers rather than replaces, with the ultimate goal of promoting holistic human development and educational equity.

Conclusion

Artificial intelligence (AI) presents a historic opportunity for

the modernization of education management. AI-driven innovation in education management represents not only a tool upgrade but also a paradigm shift in the education governance system. Its goal is to leverage technology to build a more efficient, equitable, and flexible education management system, ultimately serving the holistic development of individuals. With the essence of education at its core, technology should become a supporting force for promoting high-quality education development. Therefore, promoting AI-driven innovation in education management must place bridging the digital divide and promoting educational equity at its core. Adhering to the fundamental value orientation of promoting educational equity and human development, while pursuing efficiency, greater attention should be paid to the deep integration of technological ethics and the principles of educational equity at the operational level, continuously exploring these principles, so that AI-driven innovation in education management truly becomes an equalizer for promoting high-quality education development.

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