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Comparison and Enlightenment of the Implementation Strategies of Basic Education Informatization in Mongolia and China in the Digital Era

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Abstract

In order to cope with the opportunities and challenges brought by the digital era to basic education and promote the improvement of education equity and quality, this paper uses literature analysis and comparative research to systematically analyze and compare the implementation strategies of basic education informatization in Mongolia and China. The study found that Mongolia has deficiencies in policy support and infrastructure construction, but pays attention to localized resource development and teacher training. China, on the other hand, has performed well in improving its policy system, widely applying technology, and building a resource sharing platform, but it faces the challenges of unbalanced regional development and differences in teachers' informatization capabilities. Through comparison, this paper reveals the similarities and differences between the two countries in the process of informatization of basic education, and proposes that Mongolia can learn from China's experience in policy coordination and resource integration, while China can draw inspiration from Mongolia's localization practice and teacher training model. The results of this study provide a theoretical basis and practical reference for further optimizing the informatization strategy of basic education in the two countries, and are of great significance for promoting regional education modernization.

Keywords

digital age; informatization of basic education; Mongolia; China; implementation strategy; Comparative studies.

1. Introduction

In the digital era, information technology has penetrated into the field of education at an unprecedented speed, profoundly changing the face of basic education. Globally, education informatization has become an important means to improve the quality of education and promote educational equity. According to UNESCO, as of 2022, more than 80% of countries around the world have integrated education informatization into their national education development strategies[1]。 In this context, Mongolia and China, as neighboring countries, are actively promoting the informatization of basic education to meet the challenges and opportunities of the digital age, despite the significant differences in the level of economic, cultural and social development.

As a developing country, Mongolia has made some progress in the field of education informatization in recent years. In 2020, the Mongolian government launched the "Digital Mongolia 2030" initiative, which aims to improve the accessibility of educational resources and the quality of teaching and learning through digital means. Due to weak infrastructure and insufficient funding, Mongolia still faces many limitations in the depth and breadth of education informatization. In contrast, China, as an important promoter of the global digital economy, has

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accumulated rich experience in the informatization of basic education. Since 2018, the Chinese government has implemented the "Education Informatization 2.0 Action Plan" to promote the in-depth integration of information technology and education and teaching by building a large platform of "Internet + Education". According to the data, as of 2023, more than 95% of primary and secondary schools in China have access to the Internet, and the coverage rate of digital teaching resources has reached more than 90%.[2]。

Mongolia and China were chosen as the research objects not only because of the close geographical and cultural ties between the two countries, but also because of the different paths and characteristics of the two countries in the implementation of educational informatization. Mongolia's experience can serve as a lesson for China, especially on how to deal with insufficient resources and uneven regional development. China's success story provides a model for Mongolia. By comparing the strategies of the two countries, it can provide useful inspiration for other developing countries, and also help deepen the understanding of the development law of basic education informatization in the digital era.

The informatization of basic education in the digital era is not only a change at the technical level, but also a profound transformation of educational concepts and teaching models. The emergence of generative AI technologies such as ChatGPT is changing the way teachers interact with students in traditional teaching, and also provides new possibilities for personalized learning and individualized teaching[3]。 In this context, the study of the strategic differences between Mongolia and China in education informatization will not only help to understand the unique paths of the two countries in the process of education modernization, but also provide theoretical support and practical reference for the global digital transformation of education.

This paper will make an in-depth comparison of the strategies of Mongolia and China in the implementation of informatization of basic education from multiple dimensions such as policy, technology application, resource allocation and teaching practice, and discuss their implications for future education development.

2. Overview of informatization of basic education in the digital era

The digital era is characterized by the rapid development of information technology, which has profoundly changed the production and lifestyle of human society. According to the International Data Corporation (IDC), the total amount of data worldwide is expected to grow from 64.2 zettabytes in 2020 to 180 zettabytes in 2025, with an average annual growth rate of more than 20%[1].。 This trend is not only driving industrial change, but also has a profound impact on the education sector. The widespread application of digital technologies such as cloud computing, artificial intelligence and big data has brought about fundamental changes in the way educational resources are obtained, disseminated and utilized. During the global pandemic in 2020, the number of online education users in China increased from 269 million in 2019 to 423 million in 2020, a growth rate of 57.2%[2].

Informatization of basic education refers to the process of using modern information technology to optimize the allocation of educational resources and improve the efficiency and quality of teaching. Its connotation not only includes the construction of hardware facilities, such as network coverage and the popularization of intelligent terminal equipment, but also involves the development of software resources, such as the design and application of digital teaching materials and online learning platforms. The improvement of teachers' information literacy and the development of students' digital competence are also important components. During the 13th Five-Year Plan period, China invested more than 100 billion yuan in the informatization of basic education, and the Internet access rate of primary and secondary schools increased from 69.3% in 2015 to 99.7% in 2020[3].

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The importance of informatization in basic education is reflected in many levels. It can break through the geographical limitations of traditional education and provide high-quality educational resources for students in remote areas. Through the "Digital Mongolia" project, Mongolia has transmitted high-quality educational resources from its capital city of Ulaanbaatar to remote pastoral areas through the Internet, significantly narrowing the education gap between urban and rural areas[4]。 Through data analysis technology, teachers can more accurately understand students' learning needs and formulate targeted teaching plans. An elementary school in the United States used artificial intelligence technology to analyze students' learning data, find students' knowledge blind spots, and adjust the teaching progress accordingly, and the students' academic performance increased by an average of 15%[5]。 Informatization also provides new possibilities for the reform of the educational evaluation system, and through big data analysis, it is possible to more comprehensively assess students' comprehensive ability, not just test scores.

The characteristics of the digital era, the concept and connotation of informatization of basic education, and its practical value form the theoretical basis for the study of the implementation strategy of informatization of basic education in Mongolia and China. By analyzing the similarities and differences between the two countries in terms of policy formulation, resource allocation and technology application, we can provide useful reference for the development of basic education informatization in the future.

3. Analysis of the implementation strategy of informatization of basic education in Mongolia

Mongolia's implementation strategy in the field of informatization of basic education presents certain characteristics, but it also faces many challenges. At the policy level, the Mongolian government has gradually increased its investment in education informatization in recent years, especially in the "Education Informatization 2030 Strategy" released in 2020, which clearly put forward the goal of improving the quality of education through digital means. Due to the lack of policy implementation, the implementation of many policies in grassroots schools is not satisfactory[6]。 Despite the government's commitment to equip every school with computer equipment, schools in some remote areas are still facing a shortage of equipment.

Infrastructure construction is an important part of the informatization of education in Mongolia. According to 2022 statistics, about 70% of primary and secondary schools in Mongolia have access to the Internet, but the speed and stability of the network are still poor, especially in rural and pastoral areas. Outside of Ulaanbaatar, many schools have a network bandwidth of only 1 Mbps, making it difficult to support large-scale online teaching activities. The instability of power supply also restricts the normal use of information equipment, and some schools can only ensure the power supply for a few hours a day.

In terms of resource development, Mongolia's educational informatization resources are relatively scarce. Although the government has launched some online education platforms, the content of these platforms is mostly simple and digitized basic courses, and lacks interactivity and innovation. Most of the resources in Mongolia's National Educational Resource Repository are static PDF files, which cannot meet the personalized learning needs of students. In contrast, China's educational resource platforms, such as the "National Smart Education Platform for Primary and Secondary Schools", provide a wealth of interactive courses and virtual experimental resources, which greatly improve the teaching effect[7]。

Teacher training is a key part of education informatization. In recent years, the Mongolian government has stepped up the training of teachers' informatization skills, but the training content is mostly focused on the basic operation level, and there is a lack of guidance on

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teaching innovation and the in-depth application of digital tools. Many teachers are still not proficient in using the online teaching platform after training, resulting in a low application rate of information tools in actual teaching. There are also differences in teachers' acceptance of informatization, and some older teachers are resistant to new technologies, which further affects the promotion of informatization teaching.

In general, Mongolia's advantages in basic education informatization lie in the initial establishment of the policy framework and the improvement of hardware facilities in some areas, but its shortcomings are also very obvious, mainly reflected in the lack of policy implementation, lagging infrastructure construction, low level of resource development and poor teacher training results. The existence of these problems makes the process of education informatization in Mongolia still need to be further accelerated and optimized.

4. Analysis of the implementation strategy of informatization of basic education in China

The development plan of China's basic education informatization is guided by national policies, and has gradually formed a strategic framework with "three links and two platforms" as the core. This framework aims to achieve "broadband network school-to-school communication, high-quality resource class communication, and online learning space for everyone", and build a public service platform for educational resources and education management. As of 2022, the Internet access rate of primary and secondary schools across the country has reached 100%, and 99.5% of schools have multimedia classrooms, providing a solid foundation for information-based teaching[8]。

In terms of technology application, China focuses on integrating cutting-edge technologies such as artificial intelligence, big data, and cloud computing into teaching practices. A primary school in Beijing introduced an AI teaching assistant system to recommend personalized learning paths, which significantly improved the learning efficiency of students. The data shows that classes that use the system have an average score increase of 12% on their final exams[7]。 The National Education Resources Public Service Platform has gathered more than 5 million high-quality educational resources, covering all disciplines from primary school to high school, providing teachers and students with rich learning materials[9]。

In terms of platform construction, China has built a multi-level and multi-dimensional information-based teaching environment. Take the "National Smart Education Platform for Primary and Secondary Schools" as an example, which integrates online courses, virtual labs, and interactive teaching tools to support teachers in blended teaching. During the epidemic in 2020, the average daily number of visits to the platform exceeded 100 million, becoming an important force to support the "suspension of classes without stopping learning".[10]。 At the same time, various localities are also actively exploring the construction of regional education cloud platforms, such as Shanghai through the "Education Digital Transformation" project, which has realized the sharing and collaboration of educational resources in the region.

The construction of evaluation system is a key link in the implementation of informatization. China has gradually established a data-driven education evaluation model that uses intelligent learning analytics tools to monitor students' learning progress and teachers' teaching effectiveness in real time. A middle school in Zhejiang Province has introduced an academic diagnosis system based on big data, which can accurately identify students' knowledge weaknesses and provide targeted counseling suggestions. The application of this system has increased the school's college entrance examination admission rate by 8%[11].

Despite the remarkable achievements, China's basic education informatization still faces some challenges. First of all, there is the problem of unbalanced regional development, and there is

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still a big gap in information infrastructure and teacher training in some rural and remote areas. Secondly, the problem of data security and privacy protection is how to ensure the data security of students and teachers in the process of informatization, which is an urgent problem to be solved[7]。 How to deeply integrate technology and teaching to avoid the misunderstanding of "technology first" is also the direction that needs to be focused on in the future.

Overall, China's basic education informatization has made remarkable progress in terms of policy support, technology application, platform construction and evaluation system, but it still needs to make continuous efforts in balanced development, data security and teaching integration to achieve a higher level of education modernization.

5. Comparison of implementation strategies for informatization of basic education in Mongolia and China

There are significant differences between Mongolia and China in the strategies of basic education informatization, which can be analyzed from multiple dimensions such as policy support, resource allocation, teaching application, and teacher-student participation.

In terms of policy support, the Chinese government has launched the "Ten-Year Development Plan for Education Informatization" since 2012, which clearly proposes to deeply integrate information technology with education and teaching, and set up special funds to support the construction of informatization infrastructure[12]。 In contrast, Mongolia's policy support is relatively fragmented, lacking systematic and long-term planning, and relying more on international aid and NGO support. Most of Mongolia's basic education informatization projects are funded by international organizations such as UNICEF, but there is a lack of unified planning and continuous investment at the national level.

In terms of resource allocation, China's basic education informatization construction has formed a relatively complete system. According to 2022 statistics, the Internet access rate of primary and secondary schools in China has reached 99.5%, and the penetration rate of multimedia classrooms has exceeded 95%. Mongolia, on the other hand, faces challenges in resource allocation, with schools in remote areas still facing inadequate equipment and unstable networks, despite improvements in internet coverage in recent years. Less than 50% of schools in western Mongolia have stable access to the Internet, and most of the equipment is old, making it difficult to meet the needs of modern teaching.

In terms of teaching application, China's information-based teaching has shifted from simple equipment popularization to deep integration. Through the "Smart Classroom" project, Shanghai has achieved personalized learning and data-driven teaching evaluation. However, the application of teaching in Mongolia is still at the basic stage, and teachers' ability to apply information technology is generally low, and there is a lack of systematic training and support. A survey of teachers in Mongolia showed that more than 70% of teachers said they lacked the confidence and skills to use digital tools.

In terms of teacher-student engagement, students and teachers in China have a high acceptance of informatization. A 2021 national survey showed that more than 85% of primary and secondary school students are proficient in using a tablet or laptop for learning. In Mongolia, student engagement is low, with many students never even touching digital devices. Teacher participation in Mongolia is also limited, with some teachers having a negative attitude towards information-based teaching due to their age or lack of technical skills.

The differences are mainly due to the differences between the two countries in terms of economic level, education system and policy implementation. As the world's second largest economy, China has sufficient financial and technical support to promote informatization on a large scale. However, Mongolia's economy is small and its educational resources are relatively

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scarce, making it difficult to achieve comprehensive informatization in a short period of time. China's education system has strong execution and coordination capabilities, and can quickly translate policies into practical actions, while Mongolia's education system is more fragmented and less efficient in policy implementation.

The differences in the strategies of Mongolia and China in the informatization of basic education reflect the differences in the economic, policy, and cultural backgrounds of the two countries. China's successful experience in policy support, resource allocation, and teaching application can provide useful lessons for Mongolia, and Mongolia's exploration in certain fields also provides China with new directions for thinking.

6. Inspiration and Advice

Mongolia and China have their own characteristics in the field of basic education informatization, but there are also common problems and complementary space. Mongolia has been flexible in terms of policy support, such as the "Digital Mongolia" program, which has gradually promoted the digitization of educational resources, but the penetration rate is still low due to the weak infrastructure. Data shows that as of 2022, only about 30% of schools in Mongolia have achieved full network coverage, while in China the proportion has exceeded 90%. China has invested heavily in infrastructure construction, but there is still room for improvement in resource utilization efficiency and teachers' information literacy. Teachers in some remote areas have a low level of access to digital tools, resulting in low device usage.

From the perspective of resource development, China has made remarkable achievements in the construction of digital teaching materials and online education platforms. Taking the "National Smart Education Platform for Primary and Secondary Schools" as an example, the platform integrates massive high-quality resources, covering major subjects from primary school to high school, and the number of users has exceeded 100 million in 2023[13]。 In contrast, the development of educational resources in Mongolia is relatively lagging behind, with a single type of resources and a lack of localized content. Mongolia's digital teaching materials rely on international donations, which makes it difficult to meet the linguistic and cultural needs of its students.

In terms of teacher training, China's "National Training Program" provides teachers with systematic information technology ability improvement courses, but the matching between training content and actual teaching needs still needs to be optimized. Mongolia, on the other hand, has developed short-term training programmes in cooperation with international organizations, but the duration and depth of the training are insufficient. Teachers in a province in Mongolia reported that although they had participated in several trainings, it was still difficult to effectively apply digital tools in actual teaching.

In response to the above problems, Mongolia can learn the following points from China's experience: first, strengthen infrastructure construction, especially network coverage in remote areas; The second is to promote the development of localized educational resources, and design more targeted digital teaching materials based on the characteristics of national culture and language; The third is to establish a long-term teacher training mechanism to ensure that teachers can continue to improve their informatization capabilities. China can follow Mongolia's policy flexibility to further optimize resource allocation and avoid idle equipment and waste of resources. Through data analysis, the needs of different regions can be accurately identified and the dynamic allocation of resources can be realized.

Looking ahead, the two countries can deepen cooperation in the following areas: first, jointly develop cross-cultural educational resources and promote cultural exchanges between students of the two countries; the second is to jointly build a teacher training platform and share the best practices of information-based teaching; The third is to explore cross-border

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education data sharing mechanisms to provide data support for regional education development. Through these measures, Mongolia and China can achieve mutual benefit and win-win results in the field of basic education in the digital era, and provide a useful reference for global education informatization[14]。

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