Comparative Study and Implications of Education Informatization Policies in China and the United States

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Abstract: Education informatization is an important symbol of education modernization construction. With the rapid development of information technology, information technology has a profound impact on education, and countries fully recognize the strategic importance of artificial intelligence for their own countries, and the United States is the first country to introduce information technology into the field of education. In order to promote social equity, the U.S. has been exploring in the field of using education informatization to promote educational equity in different regions, and has achieved certain results. Therefore,a comparative analysis of education informatization policies in China and the U.S., sorting out the future direction and trends of international education informatization, and drawing on the rich experience of foreign education informatization development planning policies can provide important references for the strategy formulation and practical development of education informatization in China.

1. Introduction

As the core driver of social development, information technology in education will profoundly change the history and destiny of a nation and the competitiveness of a country, enterprise, and individual in the future era. In recent years, with the high attention and strong support from the state, China has made certain achievements in information technology education, but due to economic and technological reasons, there is still a certain gap compared with developed countries in the world, especially the United States. In this study, China and the U. S. education informatization policies are selected for comparative analysis. By systematically sorting out the policy lineage of education informatization policies in China and the United States, comparing and analyzing their similarities and differences, policy recommendations beneficial to the development of education informatization are derived.

2. The current development of education informatization policies in China and the United States

Five educational technology plans (NETPs) have been released in the United States from 1996 to 2015. As shown in Table 1. [1]Compared with the United States, the promulgation of China's education informatization policy can be traced back to 1989 at the earliest, from 1989 to 2018 the country promulgated a series of national education policy plans to help the rapid development of

education informatization, specific informatization policy plans are shown in Table 2. Looking at the time of national policy enactment, we find that China lags behind the U. S. in education informatization policy planning, indicating that the U. S. began to pay attention to the construction of education informatization at an early stage; in terms of the main content of the policy, the U. S. NETP from 1996 to 2015 always runs through the main line of improving teachers' and students' ICT application capabilities and information literacy skills, although China began to enact national policies from 1989 Although China began to promulgate its national policy from 1989, we found from the core viewpoint of the document that China really began to pay attention to the application of information technology in education teaching only gradually from 2012. [2]

Table 1: U. S. Education Information Technology Policy Plan

Year	Education Information Technology Policy	Main points
1996	Helping America's Students Prepare for the 21st Century: Meeting the Challenges of Technological Literacy	Equip every classroom in every school with networked computers, quality learning software, and digitally trained teachers
2000	Digital Learning: Bringing the world at your fingertips for all students A world of classrooms at the fingertips of all students	All teachers and students can use IT in the classroom, at home, or in the community; all teachers can effectively use technology to improve student learning
2005	Toward a Golden Age of American Education: How the Internet, the Law, and Students Are Transforming Educational Expectations	Improve leadership, transform budgets,improve teacher training, support online learning, and encourage the use of broadband networks
2010	Transforming American Education - Technology Drives Learning	Provide every teacher and student with resources that can be accessed anytime and anywhere, and share and communicate without the limitation of space and time; use information technology to improve the assessment system and change the teaching mode; improve the infrastructure to better carry out information technology teaching
2015	Preparing for the Future of Learning, Reconfiguring Technology The Role of Technology in Education	With a focus on learning, teaching, leadership, assessment and infrastructure
2017	Rethinking the Role of Technology in Education: 2017 National Educational Technology Plan Update	Ensure equal access to educational opportunities and resources for all learners by bringing multiple forces together

Table 2: China's Education Informatization Policy Plan

Year	Education Information Technology Policy	Main points
2006	National Strategy for the Development of Education Informatization 2006-2020	Accelerate the construction of education information system and improve the level of information technology.
2010	Outline of Education Planning	The development of education informatization is given comprehensive attention at the strategic level to eventually realize the modernization of education.
2012	Ten-Year Development Plan for Education Informatization (2011-2020)	Under the concept of educational innovation, the goal of deep integration of information technology and education is achieved.
2016	The Thirteenth Five-Year Plan for Education Informatization	Balancing the issues of educational quality and educational equity in the process of modernizing education.
2018	Education Informatization 2. 0 Action Plan	Promote the deep integration of information technology and education teaching, and realize the sustainable development of education informatization.

3. Comparative analysis of education informatization policies in China and the United States

3.1 Policy planning in both countries is highly consistent, but the driving forces are different

Although the two countries have developed education informatization at different times, the policy planning of education informatization in China and the U. S. has so far formed a preliminary similar development idea, with only slight differences in some aspects. Specifically, in the policy planning of informatization in primary and secondary schools: both countries take programming education as an important foundation for the implementation of informatization in primary and secondary schools, and advocate the promotion and popularization of programming education in primary and secondary schools; both countries use computer-based courses (mainly information technology courses in China and computer science courses in the United States), STEM informatization courses, comprehensive practical courses, and artificial intelligence and robotics Both countries have adopted computer courses (mainly information technology courses in China and computer science courses in the U. S.), STEM information technology courses, comprehensive practical courses, and artificial intelligence and robotics competitions as the main vehicles for information technology in primary and secondary schools. The first difference between the two countries in the policy planning of information technology in primary and secondary schools is that the U. S. mainly promotes the development of information technology in primary and secondary schools in each state through financial funding, while China relies on policies to promote the development of information technology in primary and secondary schools nationwide. [3]Therefore,

in the U. S. education informatization policy documents, the investment in education funding is always located in the most prominent place. Moreover, in recent years, the United States for primary and secondary school information technology funding is not only a huge amount, but also for primary and secondary school information technology to set up a special education funds. On the contrary, China's investment in information technology for primary and secondary schools is not so obvious growth, and there is no targeted special allocation of funds for primary and secondary school information technology. However, our government has introduced a number of guiding policies, and its impetus is very strong. Taking AI education as an example, since 2017 about primary and secondary school AI education awarded informatization cloth, various parts of China's primary and secondary school AI education have been gradually carried out from point to point. First, the new high school information technology standards containing AI were released, and accordingly, high school and junior high school AI teaching materials were developed one after another to informatize and enter the classrooms of more than forty secondary schools in various provinces, cities and autonomous regions. Secondly, the construction of AI disciplines in higher education institutions dovetailing with secondary education has also started to proceed fervently. In 2017 no more than forty colleges and universities in China offer AI majors, and by 2019 and 2020, the total number of approved "AI" majors in higher education institutions in China exceeds This reflects the strong impetus of the Chinese government's policy and its efficient implementation actions. [4]

3.2 The two countries have similar educational goal structures, but the deeper connotation of information technology education has differences

Both countries regard informatization of primary and secondary education as a national strategic priority and believe that educational technology should be made available to all primary and secondary school students for universal education. Both countries propose to cultivate users and innovators of informatization technology and focus on the cultivation of "soft qualities" such as computational thinking, innovation and creativity, and a sense of social responsibility in the information age. [5]Although there is a difference in timing between the two countries in terms of the development of computational thinking, the emphasis on it is highly consistent. For the cultivation of creative information technology, both countries propose to focus on stimulating learning interests and meeting students' learning needs at different levels, especially information technology, which should provide students with a strong interest in information learning and the ability to learn in depth with the opportunity to challenge themselves, so that their potential can be fully developed.

While the United States believes that creativity is nurtured more than the application of technology, i. e., that innovative creativity is higher than the ability to use technology in general, our country places equal emphasis on both without making a primary distinction. For this reason, China needs to understand more profoundly the importance of students' creativity cultivation, and it also reflects from the side that China needs to make a more detailed and clear presentation of the connotation and relationship of each element in the informationization of educational goals, in order to facilitate a more profound grasp of its spiritual inner information core and truly put it into practice. The same is true for the cultivation of cooperation ability and interdisciplinary thinking ability. The ability to cooperate is a core concept in American primary and secondary education, but in China's information literacy, "cooperation ability" only appears briefly in "information awareness" and "digital learning". In our country, "collaborative skills" only appears briefly in "information awareness" and "digital learning," and is not emphasized enough. [6]This suggests that our understanding of students' ability to collaborate on information technology needs to move

to a more central level, and that the emphasis on the development of collaborative skills should be more pronounced.

For interdisciplinary thinking ability, the United States it is not only in the computer science curriculum, but also in science, technology, engineering and mathematics and integrated practical classes and other disciplines to present the content of information technology education, while the content of artificial intelligence in primary and secondary schools in China is mostly presented in technology courses, slightly presented in science and integrated practical classes, and not obvious in other courses, especially mathematics courses, the lack of such presentation, for This lack of presentation is incomplete for the cultivation of interdisciplinary thinking of our primary and secondary school students. [7]

4. Summary and Insight

While information technology brings us convenience, it is also increasing the digital divide between people and widening the gap between different regions in education, which makes the balanced development of education a difficult problem. If we can make full use of information technology to expose the backward areas to advanced information and knowledge, we can effectively narrow the digital divide and promote the balanced development of education. After sorting out and analyzing the U.S. information technology for balanced education development policy and fully considering the current situation of education in each region of China, some insights can be drawn to jointly promote the development of China's education informatization and education equity from the theoretical level and practical level.

4.1 Strengthen infrastructure development

Infrastructure construction plays an important role in the construction of college education informatization. [8] Nowadays, with the rapid development of information technology and diversified needs of learners, it is especially important to provide the most optimal learning environment for learners. Through the above comparison of information technology construction in Chinese and American universities, China needs to continuously improve the network bandwidth, expand the network coverage, increase efforts to introduce new educational technology equipment, and on the basis of basic equipment, teachers should be encouraged to actively use technology to promote teaching optimization, realize students' personalized learning needs, and promote the steady improvement of China's education quality.

4.2 Promote international exchange and cooperation in education informatization

From a broader international perspective, China and the United States, and even any other country, can and should engage in positive and beneficial exchanges on issues related to AI education. Such cooperation should extend from the current most popular areas of information technology research and development and application to the education sector, which also has unlimited potential for development. Extensive educational exchanges and cooperation among countries would be beneficial not only for a particular country, but also for the entire human society, because the potential positive impact on society of AI talents with international perspectives cultivated through such cooperation would transcend national boundaries. [9] Therefore, in the era of artificial intelligence, which calls for human-machine collaboration, cooperation between people and countries should also be emphasized. As the two countries that have received the most international attention, it is also worth exploring the cooperation between China and the United States in AI education in primary and secondary schools. In particular, the development of AI

education in primary and secondary schools in both China and the U. S. is in its infancy, and both policy planning, targeting, and curriculum content are in a period of constant renewal. This exchange and cooperation is particularly important.

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