The influence of informatization on Chinese higher education

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Abstract: With the invention of the Internet, human beings have entered the information society, which is affecting all aspects of our life. In many ways, it has a greater impact on education, because human education has a history of thousands of years. China being the biggest developing country in the world, with a large number of universities and students. With the help of Internet technology, China has made remarkable achievements in the new century. Therefore, the impact of information technology on China's higher education is extensive. This paper analyzes the promotion role of information technology in China's higher education from the origin of information technology and the characteristics of China's higher education, and finds out some existing problems. The comparison of positive and negative aspects provides some references and suggestions for the sustainable development of higher education informatization in China.

1. What is informatization

The expression "informatization" first originated in the 1960s in the in Japan, proposed by the scholar Meizhao Tadao, and then spread to the West since being translated into English. Informatization refers to the historical process of cultivating and developing new productive forces represented by computer-oriented intelligent tools, and making them benefit the society. Information productivity is the level of productivity that is compatible with intelligent tools. The intelligent production tool differs from the earlier productivity's production tool,it is a large-scale, top-down, organized information network system rather than something isolated and dispersed. This type of network production tool will alter people's modes of production, working, learning, communicating, living, and thinking, among other things, and will result in incredibly significant changes in human society.

In the 1990s, as the information superhighway was being built, the idea of digitizing education was proposed. In September 1993, the Clinton government formally proposed the construction plan of the "National Information Infrastructure" (National Information Infrastructure, referred to as NII), commonly known as the "information Superhighway" Information highway. Its core is to develop the integrated Information service system with Internet as the core and promote the extensive application of Information Technology (IT) in various fields of society, especially the application of IT in education as an important way to implement the education reform facing the 21st century. The world reacted favorably to the United States' action, and many governments have developed plans to advance the digitization of their own educational systems. A new educational form, information education, is inevitably created as a result of the process of educational informatization, which is the process of broadly and deeply integrating modern information technology into the field of education. Modern information technology based on computer and network communication in the teaching process is the key component of educational digitization. From the technical point of view, the basic feature of educational informatization is digitalization, networking, intelligence and multi-media; From the perspective of education, Openness, sharing, interaction, and cooperation are the fundamental traits of educational information technology. [1]The informatization construction of higher education includes the following aspects:

1.1 Teaching informatization

Teaching informatization is the use of information means and technology, in the information environment to achieve the task of teaching and learning. Therefore, information-based teaching is

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the core task of education information-based teaching, which is not only the change of teaching media and means on the basis of traditional teaching, but also the reform and change of teaching concept, teaching environment, teaching resources, teaching application and innovation in the information-based environment, and is a revolutionary change of education information-based teaching system. It also marks that higher education has stepped into the era of big data.

1.2 Scientific research informatization

Scientific research informatization is an important means to promote the exchange of scientific and technological resources, the sharing of scientific and technological resources, the transformation of scientific and technological organizations and activities, and the transformation of science and technology. The development of informatization has profoundly affected scientific research activities, enhanced people's scientific research ability and collaboration ability, created new scientific research models, broadened scientific research ideas, opened up new fields, and promoted the development of science.

1.3 Management informatization

University management informatization is the use of computer, network and other advanced information technology and advanced management ideas for digital unified management, to achieve the basic data of teachers and students, education resources management, office management and other aspects of digital management.[2]

2. Development status of China's higher education

Education is the foundation of a hundred-year plan. China has established the world's largest higher education system and trained a large number of highly qualified professionals, who have played an extremely important role in national rejuvenation, economic construction, social development, and scientific and technological progress.

2.1 China has built the world's largest higher education system

At present, China has built the world's largest higher education system, with a total enrollment of more than 44.3 million students. The gross enrollment rate of higher education has increased from 30 percent in 2012 to 57.8 percent in 2021, an increase of 27.8 percentage points, making a historic leap forward, and higher education has entered the stage of popularization recognized by the world. At present, In China, 240 million people have completed their higher education, and the newly added labor force now has an average education level of 13.8 years. The quality structure of the labor force has undergone significant changes, and the quality of the entire country has been steadily rising. An important global talent center and innovation plateau are being built with the help of higher education's ongoing innovations in teaching strategies, school administration models, management systems, and security measures.

2.2 Higher education has been further improved

Through the "211" and "985" projects and the "Double first-class" construction plans, a number of universities and a large number of disciplines have reached the world's advanced level, and the overall level of China's higher education has entered the world's first square. It has formed the Chinese paradigm for the development of MOOCs and online education. China MOOCs Conference and World MoOCs Conference have been held successively, forming a set of Chinese paradigm for the development of MOOCs, including concepts, technologies, standards, methods, and evaluations. By the end of February 2022, the number of online MOOCs in China has exceeded 52,500, with 370 million registered users, and more than 330 million college students have obtained MOOCs credits, ranking first in the world in terms of the number and application scale of MOOCs. To build the "National Higher Education Smart Education Platform" and initiate the establishment of the World MOOC and online education Alliance, which has become a move and a key move to proactively lead the future development of world higher education "changing track and overtaking" strategy. The

capacity of higher education to serve the country has been significantly improved. Higher education has taken the initiative to subordinate the "small logic" service of its own development to the "big logic" of the country's economic and social development. The capacity of higher education institutions to serve the country's major strategies has been continuously enhanced, and they have won more than 60% of the three national science and technology awards. Higher education institutions conduct more than 60% of the nation's basic research and more than 80% of the National Natural Science Foundation projects. In order to support national development, universities have contributed key technologies to the development of supercomputers, the Beidou navigation satellite system, the Shenzhou series, and other national weapons as well as high-speed rail, nuclear power, biological breeding, vaccine research and development, and national defense.[3]

3. Informatization promotes the development of higher education

It is very obvious that information technology promotes the development of higher education. China's higher education can shorten the gap between China and other developed countries in just a few decades, and information technology is indispensable.

3.1 Changed the concept of education

Educators should actively promote the profound reform of educational concepts in the information age. On the one hand, the mode of knowledge transfer should be changed. Through information technology, we can strengthen the intelligent construction of the educational environment and the all-round perception of the educational process, break through the boundary restrictions of the traditional educator-centered educational concept, break the monopoly of educators on knowledge, and guide the transformation of educational concept into cognitive construction. On the other hand, we should build a wide learning environment. The advantages of information technology in breaking through time and space, rapid dissemination, rich means and other aspects, jumping out of the limitations of traditional education implementation methods, strengthening the expansion and extension of educational concept functions in both vertical and horizontal dimensions, and realizing lifelong learning for all. In particular, we will promote the development of personalized and customized precision education.

3.2 The construction of disciplines and specialties has been strengthened

Firstly, educational institutions must actively promote the development of academic disciplines to align with the objectives of personnel training. Leveraging the advantages of information technology, these institutions continuously optimize the alignment between academic disciplines and personnel training needs, catering to the individual requirements of learners and their future adaptability. Secondly, there is a need to foster a synergy between academic discipline development and the demands of economic and social progress. Educational systems should fully utilize the supportive and expansive role of information technology in vertical industries such as manufacturing, transportation, healthcare, and public services. This integration also involves related technologies like artificial intelligence, virtual reality, and big data, deeply embedding them into the entire process of academic and professional discipline construction. Thirdly, an emphasis should be placed on fostering cross-disciplinary and inter-specialty collaboration. Educational leaders and planners should focus on the strategic development of information technology and its associated fields, establishing a number of new and emerging disciplines and majors. This approach will break down barriers between existing disciplines, promote depth in interdisciplinary studies, and establish new growth poles for the evolution of academic disciplines.

3.3 Reform and innovation in education and teaching

Based on the provision of information intelligent and interconnected environment, we should strive to promote the reform of teaching content and constantly update and iterate knowledge, so that the teaching content of colleges and universities can fully reflect the new progress of disciplinary and professional research, new experience in related practice, and new needs for all-round development

of people. Efforts should be made to promote the reform of teaching methods, give full play to the advantages of information technology in creating an immersive, cross-regional and virtual teaching environment, encourage the use of participatory, discussation-style and interactive teaching methods, and promote teachers to enrich teaching methods and improve teaching effects. Efforts should be made to promote the improvement of teaching management services, strengthen the application of information technology in the teaching management process, establish a more flexible and accurate teaching management service system, and build a comprehensive, whole-process, all-weather support system.

3.4 We will modernize the education governance system and capacity

It is necessary to make use of the advantages of modern information technology to build a new mechanism of education governance with multiple participation, form multiple subjects and large-scale opinion interaction, improve the level of scientific and democratic decision-making, and enhance the diversity and participation of education governance. We should make use of the advantages of information technology, strengthen the ability of education public service, strengthen the application and grasp of the characteristics of modern information technology, and crack the obstacles existing in education management services. It is necessary to make use of the advantages of information technology to improve the level of university running and management, promote the integration of information technology and its group technology with education and teaching, and create a smart integrated environment for work, study and life. The service field provided by informatization is more detailed and highlights the people-oriented concept. Taking the "One Netcom Office" as an example, ten years ago, the information department did more around the network itself, as well as some management information system applications, and in fact did not pay more attention to the support services for teachers and students. Now, it is not difficult to find that the promotion of "One Netcom Office" and "one-stop service" is a witness that information can better serve teachers and students, and the service field pays more attention to a certain point in the business, an approval document, an approval process, etc., to truly realize that teachers and students can run away less. It can be seen that the information work pays more and more attention to the sense of gain and happiness of teachers and students. The improvement of information management and service level of school information management department and teachers and students' information literacy complement each other and promote each other, forming a benign development trend. University informatization pays more and more attention to user feedback, and takes it as an important reference to improve the service effect. While doing so, the improvement of teachers' and students' information literacy and feedback to information have become the driving force for the continuous development of information departments.

3.5 To promote contacts and cooperation between Chinese universities and other universities in the world

Due to the wide application of information technology, especially computer network technology, the cooperation between universities around the world is becoming easier and easier. Contingent upon pertinent information from the Department of Education, in 2013, more than one-fifth of China's colleges and universities had 577 Chinese-foreign cooperative programs and institutions. By the beginning of 2018, this number had increased to 2,626, covering an increasing number of countries, and the number of Chinese and foreign universities involved was evenly distributed. Chinese-foreign cooperative education programs include all levels and types of teaching in Chinese universities. These cooperation have effectively promoted the dissemination of knowledge and the improvement of the educational capabilities of both sides.[4]

4. Some problems existing in the process of informatization of higher education in China

Although China's higher education informatization has made some achievements after decades of development, there is still a certain gap with the developed countries in the world. There are some problems in the implementation of informatization that cannot be ignored, as follows:

4.1 The concept is backward and the importance of information technology is not recognized

Although the Internet has entered into every aspect of our lives today, it is very difficult to change people's educational ideas. When human society entered the civilized world, there was education, and with education, there was the concept of education. It is unrealistic to change ideas formed over thousands of years only in a few decades. Most people still stay at the tool use level for higher education informatization, and do not take the initiative to change their learning habits to adapt to the information age.

4.2 Attach importance to hardware investment and construction, neglect application

Many schools carry out information construction, often pay attention to the input of hardware equipment. In some people's idea, as long as the investment of sufficient funds to purchase hardware equipment and develop the corresponding system can realize the information of higher education. In fact, this is not the case. The informatization of higher education focuses on the application, and the simple hardware investment is only a part of it. More importantly, it is the specific business application. As long as we fully consider the actual situation of a specific school, formulate a plan to match, and pay attention to practical application in order to achieve informatization. In addition, relevant training for all employees is also an indispensable part.

4.3 The unbalanced investment of educational resources leads to the unbalanced development of informatization degree

China's domestic economic development is uneven, and so is its investment in education. Developed areas can achieve a lot of capital and material input, the less developed areas correspondingly get less capital and material resources. This requires the management departments to consider from the whole aspect, avoid the regional economic development differences, and achieve the balance of educational resources investment.

4.4 There is a shortage of information-based talents, and information literacy needs to be improved

The speed of information technology update is fast, so only the continuous update of main information resources and technologies can truly realize the rational and efficient use of information resources. At present, the knowledge update speed of information management talents in colleges and universities needs to be improved, and a large number of high-tech talents in the field of information technology are needed to maintain and update the system and manage the integration and development of various software in schools. At present, there are few specialized personnel in colleges and universities, only staff who maintain daily networks. There is no real implementation of information update and popularization. At the same time, the information literacy of teachers also needs to be improved. At present, many teachers cannot adapt to the new requirements of informatization, so that a large number of resource advantages cannot be converted into teaching and scientific research achievements, which limits the development of disciplines and students' learning. The reason for this problem is that teachers' educational ideas and concepts are deeply influenced by traditional ideas, and it takes a certain amount of time to accept new relationships and methods. At the same time, due to the lack of a good popularization of resource utilization technology, many teachers have the problem of "willingness but lack of strength" and cannot master the new use methods of information resources, resulting in low utilization rate.

4.5 Procurement is cumbersome, and the implementation efficiency of informatization needs to be improved

Compared with basic education or the enterprise market, colleges and universities have a strong feature that the professional level of teachers is very high, even in the field of information technology, especially involving cutting-edge technology: AI, big data, blockchain and so on. Colleges and universities themselves are pioneers and talent suppliers of these cutting-edge technologies, so colleges and universities generally have a higher acceptance of the concept of education

informatization, but they also encounter corresponding problems at the implementation level. The following is a brief description of two kinds of informatization management implementation methods in colleges and universities. (1) Independent procurement and implementation of various departments. At the beginning of the popularization of education informatization in colleges and universities, due to the complexity of university management, there are great differences between various departments and departments, and the management naturally takes the right to purchase information products down the level, and the secondary schools purchase independently. The information center of the school is essentially in a supporting role. However, for the college and various departments, teaching, scientific research and service are the top priorities, and information work has always been at the edge of the role. The selection and use of information products require a lot of time for participants to learn and select. So when the product did not play well at the beginning, everyone's enthusiasm decreased, and it was naturally abandoned. As a result, informatization has been carried out for more than 20 years, and there are not many products that are really used normally. In addition, the decision of each department and college has brought about a big problem, that is, data island. There is a lack of unified means to integrate data in different places and different dimensions, which runs counter to the original intention of educational informatization, which is "to conduct more effective teaching and management through informatization means". It further leads to the information products can not be seen in front of decision-making leaders and can not be used in the user interface. At this time, the information center of the school naturally assumes the role of "back pot man", which is not uncommon in various colleges and universities. (2) Unified procurement and management of information department. Because of various problems existing in the first internal implementation, in recent years, universities have begun to centralize the power to the information department to unify procurement and management, to investigate the needs of various colleges and departments, deployment and implementation. The advantages of this way are obvious: the whole school informatization is a chess game, which is more conducive to the overall planning, management and step by step implementation of informatization, but the difficulties are also prominent: the coordination of secondary colleges and departments is difficult: Under this system, the evaluation of informatization achievements has become the responsibility of the information department. In this way, it is difficult for secondary colleges to solve whether they are compatible with each other and the degree of cooperation. Moreover, each secondary college has its own assessment index, and the application of informatization has always been in a position of non-availability. Therefore, the information department often has a hot face with a cold butt situation. The differences between different departments are obvious, and the demand is scattered: In addition to the corresponding public facilities such as administration and personnel, there are great differences in discipline direction and management mode among secondary colleges, and differences appear in the information needs. Therefore, the difficulty of the preliminary research work + dispersed needs will slow down the deployment schedule, who comes first, who does management or teaching first, and how to unify standards. One problem after another lies ahead. The deployment period is long, and the effect is slow: In order to realize the university's informatization, a unified standard data center and user platform are necessities, and the construction of the platform is a matter that requires a lot of investment and a long period of time, and the effect is slow, after all, it is not first in the application layer, the lack of immediate effect, which will test the leadership's patience for this management method. The problem is particularly acute.

4.6 Not enough cooperation with universities in other parts of the world

In recent years, Chinese-foreign cooperation in running schools in Chinese universities has been developing strongly, with more and more universities running schools and more disciplines involved. According to the relevant data of the education department, in 2013, more than one-fifth of China's colleges and universities had 577 Chinese-foreign cooperative programs and institutions. By the beginning of 2018, this number had increased to 2,626, covering an increasing number of countries, and the number of Chinese and foreign universities involved was evenly distributed. Chinese-foreign cooperative education programs include all levels and types of teaching in Chinese universities. In

the initial stage of Chinese-foreign cooperative education in Chinese universities, the projects of cooperative education are mainly concentrated in economics, finance, management, law and other majors which are closely related to the market economy, which has solved the problem of insufficient quantity and low quality of talents training related to the market economy in a certain period of time[5]. However, with the deepening of China's reform and social development, this unreasonable professional structure of the subject obviously can not meet the needs of the development. In recent years, there has been an increasing number of cooperative schools in some frontier, blank and high-precision fields urgently needed by the country, and the rapid development of domestic and foreign educational programs in engineering, medicine, science, agriculture and other fields has strongly supported the progress of China's basic industry, the upgrading of equipment manufacturing, the national medical level and agricultural modernization. These cooperation is often limited to the academic and personnel training level, and few universities carry out cooperation on the level of education informatization. World-renowned universities are not only worth learning in academic aspects, especially in management and even informatization. If our colleges and universities can base on their own reality and learn the good experience and practice of other universities in the world in informatization, the comprehensive strength of the school will be promoted to a new height.[6]

5. Conclusion

Higher education informatization is a continuous process, which requires relevant decision makers to formulate policies and invest relevant resources in a responsible and scientific manner in accordance with the actual situation of the university. We must not change a manager for a different idea, deny the predecessor, and repeat the farce of construction, which is not only a great waste of resources, but also irresponsible for education. Quite a number of university managers do not know enough about information technology work, and their understanding of information technology department stays in the technical support department. Such a view is incomplete. With the increasingly close integration of information technology with our life, especially higher education, ignoring information technology work often causes great impact. In addition, we will increase the construction of information-based talents. Many colleges and universities do not pay enough attention to informatization, especially not enough attention to informatization talents, which often lays the hidden dangers of many problems. Informatization is a work that emphasizes efficiency, which needs to adhere to efficiency priority for information-related work. Many colleges and universities often lose a lot of opportunities in the implementation of information work. Therefore, only the management should timely change the concept to give information work due attention, increase the construction of information talent team, improve management efficiency, in order to make college information become a sustainable and traceable project, and truly benefit the majority of teachers and students.

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