

Literature Review on the Development of Educational Informatization in China

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ABSTRACT

Faced with the new coronavirus pneumonia epidemic and the development needs of the times, the education industry must continue to develop informatization. This paper mainly studies the degree of informatization of education at all levels and existing problems in the post-epidemic era, summarizes the findings, and provides solutions. The paper explores the informatization development of basic education, higher education and vocational education through a literature research method. Now, education informatization is mainly based on smart education, advocating the full use of advanced information technology to promote the reconstruction of the educational ecosystem. Although the specific contents of educational informatization development at all levels are different, the transformation of teachers' ideas and the improvement of hardware equipment still need to be strengthened on the whole.

Keywords: *Education Informatization, Basic education, Informatization, COVID-19, Information management.*

1. INTRODUCTION

Education informatization refers to the comprehensive and in-depth application of modern information technology in various fields of the education system under the unified planning and organization of the state and the education department to accelerate the process of realizing the modernization of education [1].

From the earliest stage of education informatization, the development of electronic education was based on radio and television. With the advancement of science and technology, education informatization takes computer-aided education, network education, and mobile learning as its main forms. Today, education informatization takes smart education as its main form [2]. COVID-19 has had a huge impact on the development of education informatization. To avoid the widespread of the epidemic, education departments at all levels switched students' learning modes from offline to online teaching when the epidemic was at its most serious in early 2020. This change has had a profound impact on the development of the education industry. The online teaching model has also been widely implemented. The impact of COVID-19 has also promoted the development of education informatization to some extent.

In recent years, the development of education informatization has continued to advance. From different perspectives of basic education, higher education and vocational education, educational informatization has achieved different degrees of development in the process of informatization.

In the continuous exploration and precipitation of educational informatization, educational informatization theory has also been developed, such as teaching structure theory. In the process of educational informatization development, intelligent technology provides conditions and motivation for the practice and realization of new educational concepts, such as cognitive computing to help personalized learning, rich media content and virtual reality experiences immersive learning, omni-channel learning content distribution, the smart classroom, learning data and learning analysis, perception technology, and real-time data sources [3].

By reviewing the previous research, this paper summarizes the current situation of educational informatization. This paper specifically studies the use of teaching equipment and platforms in the basic education stage, the management system construction problems in the higher education stage and the vocational education stage and the education informatization in the current

stage of the development of educational informatization. In addition, there are problems in the management and concept of education informatization by higher authorities. The purpose of this paper is to sort out the common problems in the process of educational informatization, summarize previous research experience and relevant results, which are helpful in providing suggestions for solving the problems in the process of educational informatization.

2. THE IMPACT OF COVID-19 ON EDUCATION

COVID-19 has had a huge impact on the normal teaching work of schools at all levels and types. At the beginning of 2020, to avoid the occurrence of cross-infection caused by the gathering of students in school, through the coordination of all parties, students will formulate relevant plans for online teaching, coordinate online teaching resources, and teachers will guide students online to conduct independent learning at home.

2.1. The impact during the outbreak

With the demand for online education, the downloads of DingTalk, Tencent Conference and other software have increased sharply. From the perspective of teachers and students, the network environment and the level of software and hardware equipment required for learning have higher requirements than before. To cope with the management of distance teaching, the school's teaching order management level has higher requirements compared with normal offline teaching.

2.2. The impact of the normalization of the epidemic

Now the epidemic has normalized, students have returned to campus, and courses in all aspects have resumed offline, but the online teaching model has not disappeared. To cope with the possible local cluster epidemic at any time, the school's teaching plan has also changed from the previous single offline teaching to online and offline mixed teaching.

With the passage of time, the number of online teaching software users has increased, and the feedback on the experience of different age groups has been sufficient. Through the information system to manage students' grades, personal information, etc., the teacher's management of students is also more informatized. Through the establishment of WeChat groups, the home-school connection is also closer. From the perspective of students, the impact of COVID-19 on studies and life has both advantages and disadvantages, and the impact on students of different age groups is quite different. For younger students, the study and life under the epidemic situation have higher requirements for self-discipline,

and many aspects need the supervision and help of parents. This is because it is difficult for students in the elementary education stage to use some online learning software independently and they need the help of their parents. The long-term use of electronic devices to study will have a certain degree of adverse effect on vision. For students in higher education and vocational education, online teaching is difficult for offline practice of some course content. Moreover, for students of all ages, online autonomous learning is a test of self-discipline ability, and students with weak self-discipline ability find it difficult to obtain good learning results.

3. EDUCATIONAL INFORMATIZATION

Due to the particularity of people, education is a complex system, and it is difficult for information technology to produce obvious direct value in the field of education. Therefore, the development of informatization in the field of education is slow and requires long-term, comprehensive and continuous development [3]. This article will analyze the development of education informatization from the perspectives of basic education, higher education and vocational education.

3.1. Basic education

Basic education is the key direction of education informatization. At present, teachers and students in the basic education stage mainly use the teaching system and an online learning platform. Teachers search for resources, prepare lessons online, and push learning resources to students through the Internet. In daily learning, students search for learning materials, complete homework, participate in classroom discussions to express personal opinions, take in-class tests and conduct collaborative learning through the Internet and online learning platforms. In terms of communication between students and teachers, students can use this online teaching platform to view teachers' feedback on homework through the Internet. Students can participate in teacher-organized course discussions online and ask questions of teachers specific to the learning content. In addition, teachers can provide guidance and answers to students remotely via the Internet.

The advantages of educational informatization are reflected in the fairness of education. Informatization can realize the co-construction and sharing of high-quality teaching resources, narrow the "digital divide", and meet the needs of teachers and students in different regions [4]. According to the research, it is found that educational informatization has a significant effect on the fairness of educational outcomes, which is embodied in the higher the degree of school informatization, the better the students' cognitive ability level and the average academic performance [4]. This advantage is mainly due to the relatively fixed living areas of students in the basic

education stage, which leads to differences between urban and rural areas in schools in different regions. However, through the teaching platform, high-quality teaching resources can be shared on the Internet without being affected by regional differences. However, at the same time, we must be vigilant and prevent the emergence of “new digital divides” such as the “skills gap” and the “use gap” [5].

However, the problems faced by education informatization are also very prominent. Due to the young age of students in the basic education stage, long-term online learning puts too much pressure on their eyes, and it is difficult to guarantee eye safety and eye hygiene. Moreover, there are still some problems in learning from different angles through the network platform. For students, their learning resources are mainly subject knowledge, and they have high requirements for autonomous learning ability and high requirements for home network equipment. For teachers, they have different degrees of recognition of students’ online self-learning, and the limitation of teachers’ own information technology will have a negative impact on the effect of online teaching. From the perspective of a network platform, the coverage of platform usage is uneven, and the degree of penetration varies greatly in different regions.

To solve the shortcomings of the current stage, the education department should improve the network infrastructure. The construction of learning platform should enrich online resources, and realize the co-construction and sharing of high-quality educational resources [6]. The construction and optimization of the basic education online learning resource platform will further innovate the educational service format, promote the integrated development of online and offline teaching, build a new educational pattern, and assist in the reform of educational and teaching organizational forms. In addition, the use of online teaching resources for younger children should also be carried out under the supervision of parents and teachers. The construction of learning platforms should adhere to the high-quality attributes of basic education online learning resources. Platform operators can attract more users through high-quality learning resources, and actively update learning materials to keep up with the dynamic changes in teaching content to enhance user stickiness and increase operator revenue.

3.2. Higher education

In the stage of higher education, education informatization is reflected in many aspects. From a learning perspective, higher education is the same as the basic education stage. The higher education stage also has online learning platforms. Learning through the online teaching platform can ignore the restrictions of regions and schools to participate in online courses opened by well-known universities for learning. Students

attending courses through the Internet can not only use their time flexibly, but also reduce the burden of offline transportation.

From a school management perspective, students’ course selection management, grade inquiry, grade recognition, scholarship application and registration all need to be operated in the educational administration system of each school. College students are more mature than those in elementary education. The school’s management of students mainly depends on the students’ consciousness. For example, many school announcements and requirements will be uploaded to the university’s official website for students to view by themselves. Also, the registration and change of student information need to be registered and updated by themselves through the management system. Therefore, the university management system is an indispensable part for students and teachers to participate in university activities.

There are still some problems in the construction of teaching management informatization in colleges and universities. From the perspective of school management, there are differences in the construction and operation of various colleges and universities. Some colleges and universities still adhere to the traditional model, pay insufficient attention to the informatization of teaching management, and the management system construction is insufficiently mature and standardized enough. From the point of view of information systems, due to the relatively late application of modern technology, the operational technology, mechanisms and security awareness are not perfect. From the perspective of teachers, some teachers are conservative and lack awareness of teaching management information [7].

In the face of the existing deficiencies, colleges and universities should continue to increase the importance of management informatization in the future development. The school should continue to innovate the education management system of colleges and universities according to the actual situation, so as to adapt to the needs of new forms and new development. Reforming and improving the educational management of higher education institutions and establishing the sub-systems of various faculties under the main school system are also an equally important part. This helps teachers clarify their responsibilities. Improve the assessment and evaluation systems in the management system and establish a stable guarantee mechanism. A sound management system can simplify the workflow. The informatization management team of colleges and universities and the leaders of colleges and universities should regularly evaluate the system constructed and used to determine its security and stability, and use the collected information to conduct data analysis on students’ learning processes and achievements, and improve the applicability of the information system [7].

It is more conducive to the convenience of the school's daily management in the future, and can actively implement the decisions affecting the school's development to speed up the school's construction. For school enrollment management and student in-school management, the simple and convenient mechanism brings convenience to students and teachers, and will create a good campus image for the outside world to attract students to apply.

3.3. Vocational Education

Vocational education is also an important part of national education. The purpose of vocational education is to cultivate applied talents, which focuses on the cultivation of practical-management skills and practical work ability. Vocational education informatization includes informatization environment construction, digital resource development, teacher professional development, informatization teaching applications, and vocational education management informatization. The content of vocational education informatization is similar to that of basic education informatization, but because the purpose of vocational education is to cultivate students' professional knowledge and practical skills, the informatization of vocational education is different from the informatization development of other education stages in the process of practice [8].

The informatization of vocational education is embodied in the following aspects: the construction of the campus network of vocational colleges, the improvement of multimedia teaching equipment, the development and application of campus websites and campus systems, the implementation of informatization management in schools, the continuous enrichment of digital teaching resources, and the enhancement of teacher education. Informatization awareness realizes the full application of information technology means in the teaching process of teachers, provides students with more practical opportunities through information technology means, and combines knowledge and skills, and improves teaching effects. These applications are similar to higher education and basic education, and the problems they face are also similar.

However, vocational education has more severe challenges in the development of teaching informatization. This is mainly because the vocational education stage is mainly based on practical teaching and skills training for occupations. Different teaching contents lead to difficulties in the process of promoting education informatization in higher vocational colleges. This is mainly because the school-based online learning resources of higher vocational colleges are not abundant, and the online resources suitable for the characteristics of higher vocational education personnel training are scarce [9].

Therefore, in the development of vocational education informatization, more attention should be paid to the co-construction and sharing of teaching resources, so as to enrich the network teaching resources. Moreover, in the development of informatization, it is also very important to introduce virtual simulation training systems for practical content. For example, virtual simulation technology has played a huge role in nursing teaching. The application of a nursing technology simulation teaching system has improved the teaching effect as a whole and enhanced the image of pathology teaching [10]. The introduction of simulator teaching in network engineering courses based on the content of the author's major can realize long-distance non-equipment experiments, avoiding the problem of no physical machines due to online teaching and daily practice. Through the gradual improvement of the online and offline mixed teaching modes, the teaching resources are enriched to achieve the purpose of improving the teaching effect.

4. DISCUSSION

With the passage of time and the actual needs of the new coronavirus pneumonia, the informatization process of education is constantly advancing. The development of educational informatization is analyzed from three perspectives: basic education, higher education and vocational education. However, at this stage, education informatization is mainly based on teachers' use of informatization equipment for teaching, students mainly conduct self-study through learning resource platforms, and schools manage students and teachers through the already built campus management system. People's knowledge of themselves tends to be lifelong, so there is more flexibility in terms of time and space for learning knowledge. Based on the needs of reality, the development of education informatization is becoming more and more mature, and different educated groups will not be limited to studying on fixed campuses.

Problems and shortcomings have also been exposed to the practice of educational informatization in schools at all levels. Because the situation of the education industry in different stages and regions is different, a new education model will always face various problems at the beginning of its innovation. In the face of problems and difficulties, it is necessary to sum up experience and actively seek solutions. Faced with the problem that equipment is difficult to support information-based teaching, the education departments at all levels should make unified planning and improve the network infrastructure and hardware equipment of schools in the same area. Moreover, information technology training should also be provided to teachers who are relatively weak in information technology. In the process of information technology training, the attitudes of teachers who are too conservative in education informatization

can be gradually transformed. Departments in charge of education and teaching should continue to strengthen the improvement of education informatization management systems and application methods.

5. CONCLUSION

In conclusion, the paper identifies the development status and existing problems of educational informatization. By summarizing the previous research experience and results, the paper makes some suggestions to solve the problem of educational informatization. From the material level, the school should continue to strengthen the software and hardware configuration of campus informatization. From the spiritual level, it is necessary to transform the traditional teaching concept of conservative teachers through training and publicity, so that more teachers can be invested in the practice of information-based teaching. In the basic education stage, equipment construction and the transformation of teaching viewpoints should be strengthened. At the higher education stage, managers should continue to improve the management system as much as possible and establish a guarantee mechanism. In the vocational education stage, the virtual simulation training system should continue to be introduced. Due to the fact that the research method only stays in the literature research method, there are still limitations in the content and viewpoints of the whole article. In the future, if there is an opportunity to conduct further research on educational informatization, the focus of the research will be on the field investigation and observation of specific teaching situations.

REFERENCES

- [1] Yang Xiaohong, Liang Li. Comprehensive Interpretation of Educational Informatization. *E-education Research* (01) (2005) pp.27-33.
- [2] Xiu Yongfu. Review and Prospect: the Evolution of Educational Informatization in China since the Reform and Opening-up. *Journal of Tianjin R & TV University*. (01) (2020) pp.61-66.
- [3] ZHU Zhiting, WEI Fei. Educational Informatization 2.0: Starting on a Journey of Intelligence Education Guided by Smart Education. *E-education Research*, 39(09) (2018) pp.5-16.
- [4] Hu Qintai, Lin Xiaofan & Zhang Yan. How Informatization Promotes the Equity of Basic Education Outcomes—Based on the Data from the China Education Panel Survey. *Educational Research*, 42(09), 2021, pp.142-153.
- [5] Wang Mei, Sui Xiaoxiao. New Digital Divide: The New Challenge of Promoting Educational Equity with ICT. *Modern Distance Education Research*. (04) (2014) pp.97-103.
- [6] MENG Xianbin, LUO Yingzhi, LI Chaohai, XU Wenna. Application of Online Learning Resources to Basic Education in the Post-epidemic Platform Construction: Status Quo and Improvement. *Modern Education Management*, (04), 2021, pp. 99-105.
- [7] Wang Yan, Huang Ruiyan, Liu Ying, Qian Wenyi. Informatization Construction of Teaching Management in Colleges and Universities in the Big Data Era. *Journal of Shanxi University of Finance and Economics*, 43(S2), 2021, pp. 99-102.
- [8] Jiang Yumei, Xing Xishen, Tong Yuanzhi. The Current Situation, Problem and Development Path for the Vocational Education Informatization in the 2.0 Era. *China Educational Technology* (07) (2020) pp.119-124.
- [9] Xiong Sujuan, Liu Rui, Zhu Zhiyong. Practical research on innovative application mode of teaching form informatization in higher vocational colleges. *Vocational & Technical Education Forum* (02) (2019) pp.67-71.
- [10] Shao Yingjie. Analysis of the Application of Virtual Simulation Technology in Nursing Teaching. *Health Vocational Education* (06) (2012) pp.36-37. DOI:10.3969/j.issn.1671-1246.2012.06.021