

Thoughts on the Digital Transformation of Teaching in Chinese Higher Education

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Abstract. Higher education institutions have been infiltrated by the technological progress brought about by the Industrial Revolution 4.0, compelling these institutions to undertake a comprehensive digital transformation. Applying digital transformation methods to higher education teaching is an emerging area that has attracted attention in recent times. This paper investigates the current situation and challenges in the implementation process of digital transformation in Chinese higher education teaching. Subsequently, it puts forward coping strategies such as strengthening technical training, optimizing resource integration, innovating teaching models, enhancing data security, and promoting educational equality and inclusiveness, aiming to promote the smooth progress of digital teaching transformation in higher education.

1 Introduction

In the era of rapid information technology development, digitization has emerged as a formidable catalyst for change in all sectors. Higher education, which plays a pivotal role in societal progress and talent development, finds itself confronted with unprecedented opportunities and challenges. The swift evolution of advanced technologies, such as cloud computing, big data, and artificial intelligence, has necessitated the digitization of educational resources and the intelligentization of teaching methods. This digital transformation of teaching in higher education is not merely a prerequisite for keeping pace with the times; it is also a crucial means of enhancing educational quality, fostering educational equity, and nurturing innovative talents.

The importance of addressing the digital transformation of teaching in higher education cannot be overstated. As technology increasingly reshapes the educational landscape, it is imperative for educational institutions to adapt and harness these advancements to improve their offerings. In China, higher education institutions have been exploring and implementing digital teaching transformations. Figure 1 shows the size of China's education informatization market from 2019 to 2023. Many universities have formulated specific digital strategies to leverage the potential of new technologies. However, these efforts are often hindered by a lack of foresight, capability, or commitment to effectively implement these strategies. Therefore, a comprehensive understanding of the digital transformation of teaching in Chinese higher education is indispensable.

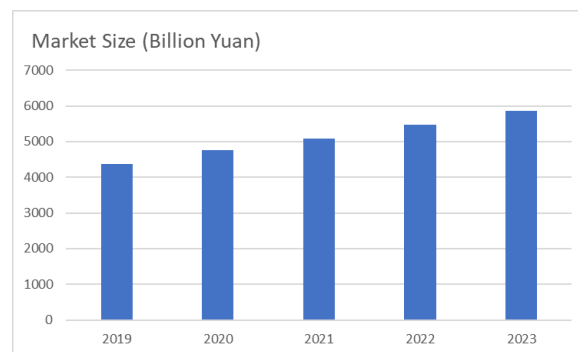


Fig. 1. Market Size of China's Education Informatization Industry from 2019 to 2023.

Existing research in the literature has examined various facets of digital transformation in higher education. Studies have investigated the adoption of digital technologies in teaching [1], the impact of these technologies on educational outcomes [2], and the challenges faced by educational institutions in implementing digital strategies [3]. While these studies provide valuable insights, they often focus on specific aspects of digital transformation, lacking a holistic perspective. In particular, few studies have explored the digital transformation of teaching in Chinese higher education.

This study aims to fill the research gap, and explore the current situation, challenges, and coping strategies regarding the digital transformation of teaching in Chinese higher education by reviewing the electronic databases CNKI. The paper will offer valuable insights for educational institutions, policymakers, and researchers on how to effectively navigate the digital transformation of teaching in Chinese higher education. Ultimately, this study will contribute to the advancement of higher education in China by shedding light on the

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intricacies of the digital transformation process and its implications for educational quality, equity, and innovation.

2 Current status

2.1 Extensive and deep application of technology

Higher education institutions have increasingly applied information technologies extensively and deeply in digital teaching. Cloud computing technology provides convenient access for the storage, sharing, and retrieval of educational resources, enabling teachers and students to access required teaching resources anytime and anywhere [4]. Big data technology, through the analysis of learning data, makes personalized teaching possible and helps teachers better understand students' learning situations to develop targeted teaching strategies [5]. The application of artificial intelligence technology in teaching is changing rapidly, from intelligent tutoring systems and virtual teaching assistants to automated assessment tools, all of which are constantly transforming traditional teaching methods.

2.2 The abundance and diversity of teaching resources

The digital transformation in teaching resulted in an increase in the richness and variety of teaching resources. New forms of teaching resources, including online courses, virtual laboratories, and digital libraries, are emerging continuously. This offers students more flexible and diverse learning alternatives. These resources not only span traditional academic domains but also incorporate emerging technologies and interdisciplinary fields, thus fulfilling the diverse learning requirements of students. Moreover, digital teaching resources are characterized as quick updates, easy access, and dissemination. It allows students to stay up-to-date and acquire the latest knowledge and skills.

2.3 Innovative and flexible teaching approaches

The digital transformation within teaching has spurred innovation and alteration in teaching approaches. New teaching approaches, such as flipped classrooms, blended learning, and distance education, have emerged in succession [6]. The time-and-space limitations of traditional classroom teaching have been shattered by these methods, providing students with a variety of flexible learning approaches. These approaches focus not only on transmitting knowledge but also on developing students' abilities for autonomous, collaborative, and innovative learning. Moreover, digital teaching platforms provide convenient means for the interactive communication between teachers and students. This allows for instant communication and feedback between the two parties, which is conducive to improving teaching effectiveness and learning quality.

2.4 Improvement and adaptation of digital literacy among teachers and students

As digital teaching develops in depth, the digital literacy of both teachers and students has been steadily enhanced. Teachers have gradually become proficient in using digital teaching tools and techniques, which empowers them to use digital teaching resources flexibly for instructional design and implementation. Students have also gradually become accustomed to the digital learning environment and are capable of independently obtaining, integrating, and applying digital teaching resources for their learning. Moreover, the interaction and communication between teachers and students during the digital teaching process have contributed to the mutual improvement and adaptation of their digital literacy.

3 Challenges

Despite the remarkable achievements, there are still some challenges in the process of digital teaching transformation in higher education. These challenges affect the effectiveness of digital teaching as well as pose constraints on higher education development.

3.1 The challenge of technological adaptability

Technological adaptability represents the main hurdle in the digital transformation of higher education teaching. The rapid development of information technology offers new teaching tools, platforms, and resources. However, not all teachers and students adapt to these new technologies expeditiously. On the one hand, because of their age, technical background, or teaching experience, some teachers have limited acceptance and application capabilities regarding new technologies. This makes it difficult for them to make full use of digital teaching tools for instructional design and implementation. On the other hand, students also vary in their technical literacy. Some students may lack the digital skills required to effectively utilize digital teaching resources for learning. This disparity in technological adaptability influences the effectiveness of digital teaching and intensifies educational inequality.

3.2 The challenge of resource integration and sharing

The digital teaching transformation has led to an extreme abundance and diversity of teaching resources. Nevertheless, this transformation also presents challenges regarding resource integration and sharing. Among different universities and disciplines, there are problems such as redundant construction of teaching resources and the formation of information silos. This results in a waste of resources and inefficiency. Moreover, due to considerations of intellectual property rights, data security and other factors, some high-quality teaching resources are difficult to be shared and mutually recognized. All of the problems limit the scope and depth of digital teaching.

3.3 The challenge of teaching mode innovation

Traditional teaching is teacher-centered. In contrast, the digital teaching environment is student-centered, focusing on interactive, personalized and independent learning [7]. Consequently, teachers need to engage in teaching innovations to adapt to the new teaching demands. However, the teaching inertia formed in the long traditional teaching process makes it difficult for teachers to change the existing teaching mode. Moreover, current teaching evaluations mainly focus on traditional indicators such as students' academic performance and teachers' teaching workloads. Little attention has been given to teachers' endeavors and accomplishments in teaching model innovation. As a result, teachers' motivation and willingness to innovate are low. Furthermore, the innovation of teaching mode is an exploration process filled with uncertainty. Not all innovative efforts can achieve the expected outcomes. The risks associated with innovation make teachers reluctant to innovate teaching mode.

3.4 The challenge of data security and privacy protection

With the continuous development of digital teaching, the issues of data security and privacy protection have become more and more evident. In China, during the period from January to November 2023, the education industry accounted for 26% of data leakage incidents on internet knowledge sharing platforms in terms of industry distribution, ranking second only to the financial industry (Figure 2).

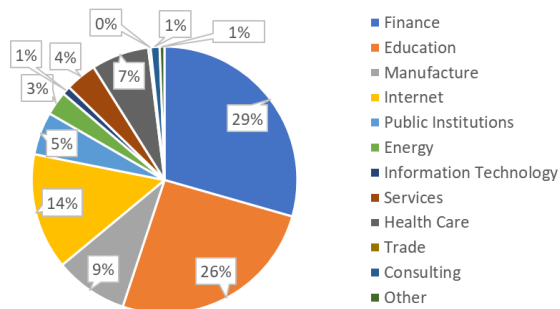


Fig. 2. Internet Knowledge Sharing Platform Data Leakage Industry Distribution.

When digital teaching platforms and tools are collecting, storing, and processing students' personal information and learning data, they may be exposed to security risks like data leakage and data tampering. Moreover, because of the imperfections or insufficient implementation of data security and privacy protection laws and regulations, some universities and teachers may infringe on students' privacy rights when dealing with their personal information.

3.5 The challenge of educational equity and inclusivity

The digital teaching transformation can enhance the quality of education. However, it may also worsen

educational inequality [8]. In terms of technological adaptability, different students show distinct capabilities in accepting and mastering the technologies used in digital teaching. Those students who have been brought up in an environment rich in information technology are likely to be well-acquainted with digital teaching tools like online learning platforms, e-textbooks, and virtual laboratories. They are thereby able to adapt swiftly to the new teaching model. However, for students from regions with relatively insufficient information technology, the situation is far from the same.

Additional, in terms of resource allocation, students in some developed regions or well-equipped schools can have access to a wide range of digital teaching resources. In contrary, in some remote or economically underdeveloped regions' schools, digital teaching resources are rather scarce. This imbalance in resource allocation makes it hard for some students to fully benefit from the convenience and advantages brought by digital teaching.

4 Copping strategies

Higher education institutions need to adopt a range of comprehensive and effective strategies in response to the challenges posed by the digital teaching transformation. This is crucial for ensuring a smooth transition during the transformation process and a steady enhancement of education quality.

4.1 Empowering with technology and adaptive training

It is essential to proactively introduce and promote state-of-the-art technological tools and platforms, such as intelligent teaching systems, online collaboration platforms, and big-data analysis tools. These tools can offer teachers and students more abundant, flexible, and personalized teaching and learning experiences. Moreover, close attention should be paid to the latest technological advancements to guarantee that the introduced technologies remain at the industry's cutting-edge to meet the requirements of educational innovation.

In addition, systematic technical training should be carried out to assist teachers in proficiently mastering crucial skills, including digital teaching design, online teaching interaction, and data-driven teaching evaluation. This involves organizing regular seminars, workshops, and online courses, inviting experts in educational technology to lecture, and sharing the latest teaching concepts and practical experiences. Through these trainings, teachers can make better use of digital technology to optimize the teaching process, enhance teaching effectiveness, and gain a better understanding of students' learning needs, thereby providing students with more personalized learning support.

4.2 Resource integration and optimization of sharing mechanisms

In promoting the digital transformation of teaching, higher education institutions should strive to build an efficient, comprehensive, and vibrant digital teaching resource library, including but not limited to online courses, classic teaching cases, frontier research data, and lecture videos by educational experts. These resources should cover different disciplines and meet various learning needs, ensuring that students have access to diversified and high-quality learning materials.

Additional, higher education institutions should build an open sharing mechanism to promote cross-institutional and interdisciplinary resource sharing, breaking information islands and facilitating the widespread dissemination and in-depth exchange of knowledge. On this basis, inter-school cooperation should be strengthened to jointly develop high-quality teaching resources, reducing redundant construction and enhancing resource utilization efficiency.

4.3 Innovation in teaching models and evaluation systems

It is a crucial step for teachers to be encouraged to explore and put into practice new teaching models like blended learning, flipped classrooms, and project-based learning. This is essential for adapting to the learning needs of students in the digital era and enhancing both the quality and efficiency of teaching. These teaching models place emphasis not only on the initiative and practicality of learning but also on promoting interaction and cooperation between teachers and students and among students. In doing so, they offer a wide-ranging platform for cultivating students' critical thinking, innovation ability, and team collaboration ability.

In addition, it is important for higher education institutions to build a diversified teaching evaluation system. It can effectively evaluate the effectiveness of these new teaching models. This evaluations system should incorporate both formative and summative evaluations. It should not only focus on students' learning outcomes but also on their performance and progress during the learning process. Moreover, the diversified evaluation system should also involve peer evaluation and self-evaluation. This encourages students to examine their learning from different viewpoints and cultivate their self-reflection and metacognitive abilities.

4.4 Data security and privacy protection

While reaping the benefits of digitization, it is essential to attach great importance on data security and the protection of personal privacy. A robust data management and privacy protection mechanism should be set up. Advanced encryption techniques and access control strategies need to be adopted to safeguard the personal information of teachers and students as well as teaching data.

Simultaneously, higher education institutions should strengthen the network security awareness education for teachers and students to fend off network attacks and the risks of data leakage. Additionally,

higher education institutions should develop an emergency response mechanism for data breaches. In case of a data breach, emergency plans can be promptly activated. These plans may include isolating the affected systems, notifying the affected teachers and students, and collaborating with relevant departments for investigation.

4.5 Promoting educational equity and inclusivity

The digital transformation in teaching is not merely a technological innovation process; it is also a significant means of promoting educational equity and reducing educational disparities. In this regard, a key objective in achieving educational modernization is to guarantee equal access to high-quality educational resources for all students, regardless of their technological proficiency, financial situation, or geographic location. By means of providing technical support, network access, study guidance, and other measures, students with lower technological adaptability or poorer economic conditions can be assisted in overcoming obstacles, thereby attaining educational equity.

Furthermore, in order to narrow educational disparities, attention should also be given to the diversity and inclusivity of teaching content. It is crucial to guarantee the teaching content encompasses multiculturalism and multiple backgrounds, thus avoiding biases from a single perspective. In this way, all students can find something that resonates with them and feel respected and included. Simultaneously, providing learning resources and support in multiple languages can meet the requirements of students from diverse linguistic backgrounds.

5 Conclusion

This research has delved deeply into the current state and challenges that the digital teaching transformation in higher education is confronted with, and has also presented a series of coping strategies, such as strengthening technical training, optimizing resource integration, innovating teaching models, strengthening data security, and promoting educational equity and inclusiveness. The research suggests that the digital teaching transformation is important for enhancing the quality of education, promoting educational equity, and cultivating innovative talents. Coping with the challenges during the transformation process is crucial for attaining these goals. Consequently, this research not only enriches the theoretical framework of the digital teaching transformation in higher education but also offers robust support for practical-level reforms and innovations. In the future, as information technology keeps on developing and educational concepts are continuously updated, the digital teaching transformation in higher education will continue to the cultivation of more talents with innovative spirits and practical abilities.

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