



Research on the Development Path of Online Education Based on Big Data

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ABSTRACT

The deep integration of Internet and education has produced online education. This paper presents data and quantitative analysis on the development status of online education in China in four dimensions: platform development, teaching resources, teaching quality and teaching management. The results show that the quality of online teaching in China is poor and the teaching management is lack of personalization and precision. Use big data technology to conduct data mining, prediction and learning analysis for online education, and propose development strategies for online education, so as to promote personalization and precision of online education and improve teaching quality.

Keywords: big data; online education; data analysis; quantitative analysis

1. INTRODUCTION

1.1. Background of online education development

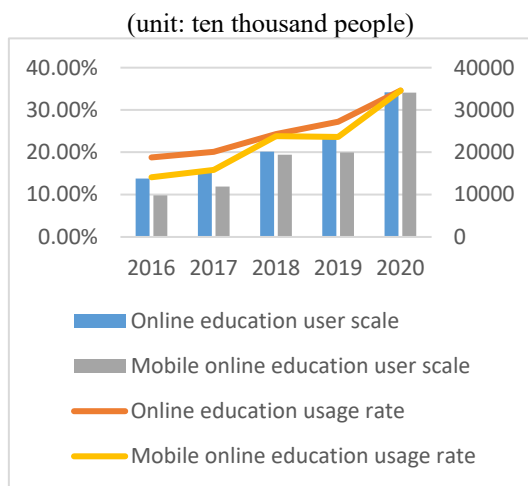
In recent years, with the in-depth development of the information age and the promotion of educational technology, online education also came into being. Online education is a distance education method based on Internet technology, which breaks the limitations of traditional education: time and space restrictions, this learning method is more flexible and can meet the personalized learning needs of various people [2]. Based on the advantages of big data application, China's education industry has also collected a large number of educational data, which can be mined and analyzed for useful values, so that personalized learning can be better carried out. Therefore, in order to realize the application and development of big data in the field of online education, it is necessary to deeply understand the advantages and shortcomings of the development of online education, explore the application of big data in the field of online education, and provide a reliable basis and path for the development of online education.

1.2. Research background and methodology

According to the 47th Statistical Report on the Development Status of the Internet in China released by the China Internet Network Information Center (CNNIC), as of December 2020, the number of online education users in China had reached 342 million, a decrease of 81.25 million compared with the end of 2020. It accounts for 34.6% of the overall Internet users. The scale of mobile online education users reached 341 million, a decrease of 79.5 million compared with March 2020, accounting for 34.6% of mobile Internet users. 2020, affected by the novel coronavirus pneumonia, education informationization further innovated and developed, many institutions and capital entered the online education field, promoting more users to obtain more equitable and personalized education and services. The overall market scale of online education is also expanding. However, at the same time, online education in China is still in its infancy, and the quality of courses is difficult to guarantee. The distribution of education resources in China is very uneven [8], with high-quality resources mainly concentrated in first-tier cities, while there is also a great demand for high-quality education resources in the second and third tier cities. Through the quantitative analysis of the development of online education in China, in order to realize the accuracy and personalization of online

education and promote the healthy development of online education.

Table 1: User scale and utilization rate of online education and mobile online education from 2016 to 2020



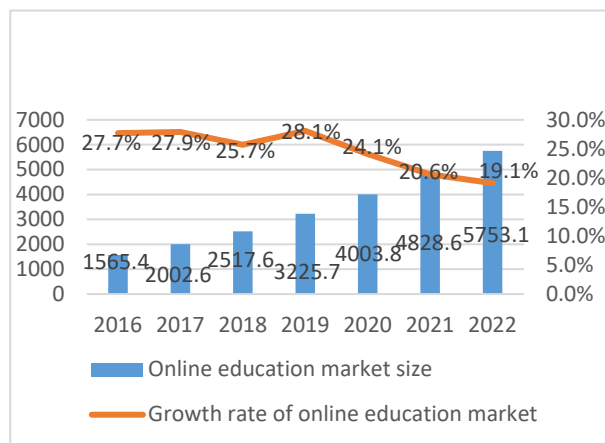
The data comes from CNNIC in 2020.12

2. OVERVIEW OF DOMESTIC ONLINE EDUCATION DEVELOPMENT

2.1. Online education market is booming

The development of big data has led to a broader online education market, and with the combination of Internet and education, major online education platforms have sprung up and high-quality education resources have been shared. In 2016, China's online education market saw approximately hundreds of billions of dollars of investment. With the construction of Internet infrastructure across the country, the content and form of online education has been greatly innovated, more flexible and convenient to use, and many high-quality online education and training institutions have emerged. It is because of this convenience that this learning mode of online education is also widely popular [4]. Due to the strong support of national policies and the accession of Internet giants, the user scale of online education is also gradually huge, which promotes the normalized development of online education. From table 2, it can be seen that the scale of China's online education market was about 400.38 billion yuan in 2020, with a year-on-year growth of 24.1%. Although the increase in 2021 and 2022 was not significant, it can be seen that the overall trend of online education market is moving forward.

Table 2: Scale and forecast of China's online education market from 2016 to 2022

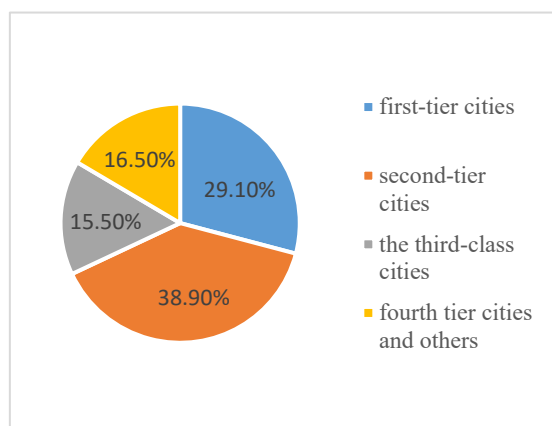


The data comes from iResearch in 2017

2.2. Online education breaks the uneven distribution of resources

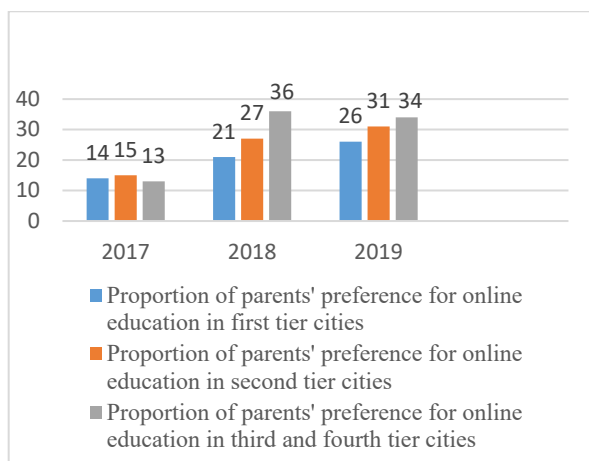
China's educational resources are unevenly distributed. There are many high-quality educational resources in the first and second tier cities, while the third and fourth tier cities are difficult to access to high-quality teaching resources [1]. Many parents want their children to win at the starting line and receive a good education, but due to various conditions, the education situation of children in many areas is not ideal. Due to the progress of science and technology, many remote places also use the Internet, which provides the possibility for the development of online education. Using big data to analyze the data, the number of users who used to study using online education in economically underdeveloped areas has gradually increased. As can be seen from Figure 3, the second-tier cities have the largest number of online learning users, accounting for 38.9%, while the third tier cities and fourth tier cities account for 15.5% and 16.5% respectively. From the data, we can see that parents' preference for online education is generally on the rise, whether in Tier 1 and Tier 2 cities or in Tier 3 and Tier 4 cities. According to Figure 4, in 2019, 26% of parents in Tier 1 cities prefer online education; 31% of parents in Tier 2 cities prefer online education; and 34% of parents in Tier 3 and 4 cities prefer online education. On the whole, parents in Tier 3 and 4 cities are more supportive of online education. At the same time, it also shows that parents in third and fourth tier cities can provide their children with more high-quality education resources through the channel of online education and break the uneven distribution of education resources.

Table3: Geographical distribution of online learning users in China in 2020 (unit:%)



The data comes from data.iimedia.cn in 2020

Table4: Changes in the proportion of parents' preference for online education in different cities in China from 2017 to 2019 (unit:%)



The data comes from qianzhan.com in 2020

2.3. The effect of online teaching is poor

Analyzing the current overall situation of online education in China at present, it mainly follows the traditional form of teaching and learning. Although online education no longer uses chalk and blackboard, there is no big difference in the essence of teaching, and these teaching resources are not new, and students' actual learning situation is not grasped enough. Therefore, the personalized teaching program is not put into practice, and students' academic performance is difficult to improve [7]. In addition, online teaching still focuses on knowledge explanation, with the teacher's lecture as the center, the articulation between teaching and learning is not enough, and the interaction frequency between teachers and students is not high. Secondly, the competition among the major online education platforms is fierce, and the management and supervision of the number of course participants and course content are not in place. As can be seen from

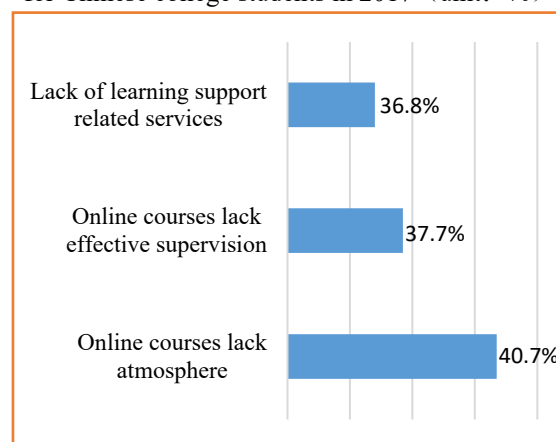
Figure 5, among the pain points of online course learning among Chinese college students in 2017, the lack of effective supervision of online courses accounted for 37.7%. Because online learning mainly relies on autonomous ability, the learning effect will not be ideal if effective supervision is not strengthened.

2.4. Online teaching management is difficult to control

The online education platforms covers a wide range and has almost no restrictions. No matter what age, occupation, city or status, you can choose the educational resources you are interested in online according to your learning needs. This is one of the features of online education. Online education makes the boundaries between school and society, school and school gradually disappear, but students may also be difficult to generate a learning atmosphere. As shown in the figure, the lack of learning atmosphere in online courses reaches 36.8% in the process of online course learning.

Coupled with the fact that many students are affected by subjectivity, it is difficult to concentrate on learning courseware, while teachers often neglect classroom management in order to complete the teaching schedule, and the learning effect is poor.

Table5:Top three pain points of online course learning for Chinese college students in 2017 (unit: %)



The data comes from iResearch in 2017

3. ANALYSIS OF ONLINE EDUCATION DEVELOPMENT STRATEGIES UNDER BIG DATA TECHNOLOGY

3.1. Using big data to optimize course quality

Using big data to record data as a value, record data such as students' hobbies and learning abilities, then analyze the data, automatically match relevant courses, and then transmit these courses to students. After online learning, big data will compare post-learning and

pre-learning tests to optimize the push algorithm, and the accuracy of predictions will be substantially improved [5]. Big data technology can also help course providers optimize course quality by comparing pre- and post-learning to analyze course learning effectiveness. Using big data technology, we can record data such as whether students are satisfied with the course and their participation, analyze the results, and finally transmit the course data with the best course quality to students, so as to improve the teaching quality of online courses.

3.2. Using big data to enliven the classroom atmosphere

Big data can improve the teaching and learning process. For example, playing students' motivation can be random quizzes, so that the classroom atmosphere can be enlivened and a certain fairness can be ensured. At the same time, big data can provide students with diverse learning resources, such as animations, oral simulation exercises, etc. And students can exert their motivation according to their interests to achieve more effective personalized learning. In today's era of fragmented learning, students' attention span in the classroom can last up to 20 minutes, after which it plummets. Therefore, according to this rule, teachers can ask students questions every 15-20 minutes to focus their attention, or enrich the form of learning, carry out small discussions, judge the effect of pre-study and readiness of students, improve the efficiency of learning, or use small videos to break the dull teaching atmosphere.

3.3. Use big data to implement precise and personalized education

Using big data to drive online education toward accuracy mainly includes accurate survey data, locating students' learning weaknesses, and accurately predicting students' future learning to ensure the effectiveness of online teaching and a better learning experience for students. For example, we first use data mining technology to analyze massive data, extract available information from the data, then analyze the valuable information obtained about students' overall learning status, discover the difficulties students encounter, and later provide targeted teaching programs to help students master the relevant knowledge and successfully complete their learning goals.

Big data technology can record learning data in the background, improve the teaching methods to a certain extent through these data, and rich and diverse teaching activities can be carried out to meet the diverse learning needs of students [6]. With the help of big data technology, corresponding models can be built to match the learning content relevant to the students, the learning

of each student is recorded in the background. The model is reconstructed with corresponding data to meet the personalized development needs of each student.

3.4. Using big data to promote the reform and development of online education

One of the biggest features of big data technology is that it can accurately predict, which can be applied to online education by collecting data sets or specific data, analyzing and studying the data, and making predictions about the trend of something [3]. Using the application value of big data can promote the progress of students, teachers, and administrators together. Big data can clarify the future direction of teaching for teachers, refine the teaching process, and improve the teaching level. In terms of students, big data can analyze students' learning situation, organize data information of students' learning process, help students evaluate their own learning situation, timely check the gaps and make up for them, and conduct a deeper study of what they have learned. For administrators, big data is used to improve platform management capabilities, dynamically manage and detect student learning, and implement scientific and accurate management methods.

4. CONCLUSION

The era of big data has come, and online education has become a hot topic. How to apply big data technology to online education is a problem that various educational institutions should consider. In order to ensure the effective application of big data and promote the healthy development of online education, it is necessary to change the thinking, establish a unified data standard, ensure the accuracy and authenticity of data, and use the data flexibly to realize the mutual promotion of big data and online education.

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