Analysis on the Application and Challenge of Educational Big Data in University Teaching Management

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ABSTRACT

In the era of big data, due to the continuous improvement of university information construction, university databases have shown explosive growth, and the application environment of educational big data has initially formed. In today's rapid development of science and technology, the rational and efficient use of educational big data is an inevitable demand for university teaching management in the context of the development of the times. This article mainly analyzes the application space of educational big data in teaching management such as subject diversification, personalized teaching management, teaching evaluation system, human resource management, and the challenges in the use of educational big data.

Keywords: educational big data, teaching management, application space, challenge

I. INTRODUCTION

With the development of the times, more and more emerging technologies have emerged. Following cloud computing and the Internet of Things, big data technologies have emerged. Big data technology has extremely high value in people's daily life, daily study, and work. The data analysis and mining results obtained through the use of big data are changing the way people study, live, and work. Professor Gary King of Harvard University said: "This is a revolution. The huge data resources have started the quantification process in various fields, whether in academia, business or government, all fields will begin this process. [1]"

II. OVERVIEW OF EDUCATIONAL BIG DATA

In recent years, big data technology has continuously exerted extensive influence on various industries and fields around the world, bringing changes to people's work, life and thinking. Big data technology is undoubtedly an important scientific force to promote the innovation and development of education. The use of big data technology is conducive to the development of teaching management in colleges and universities, and enables college management to analyze the effectiveness of management work and facilitate subsequent decision-making. The combination of education and big data can better commit to teaching activities and the personalized development of teachers and students, and educational big data has emerged as the times require. Educational big data refers to the data analysis application in the education industry, which gathers a variety of information within universities and is quite practical. By collecting data and sorting out and analyzing all kinds of data at the fastest speed, the emergence of educational big data has changed the development track of university teaching management. It is a revolution in the management of universities and colleges, which is conducive to the high-speed and effective management of universities and colleges. The biggest difference between educational big data and traditional education data is that the educational big data can use modern and advanced IT technology to data extensively collect education-related and meticulously, and at the same time use professional data analysis software to organize and analyze the collected education data [2].

In the daily teaching process, colleges and universities will produce massive amounts of data and information, which can truly reflect the development of various teaching activities of the school, and play an important role in monitoring the progress of daily teaching activities. According to the difference in scope and source, educational big data can be roughly divided into six forms of individual educational big data, curriculum educational big data, class educational big data, school educational big data, regional educational big data, and national educational big data [3]. Among them, individual educational big data mainly refers to basic personal information such as school faculty, staff and students' household registration information, family situation, etc. All information is closely related to individuals and is the key to understanding the basic



situation of individuals. Curriculum educational big data, the main data is specifically related to the teaching curriculum. The information includes the number of teaching weeks, the nature of the curriculum, course information, course assignment, course assessment, class teachers and other data. The data comes from individuals and is used to describe individual information related to course learning. Class educational big data refers to the relevant data collected by the class, including each student's test data, homework data, class management data, etc. School educational big data mainly includes school management data, teaching data, educational administration data, equipment use and maintenance data, campus safety data, etc. Regional educational big data mainly includes two major aspects inside and outside the school, involving the sorting and analysis of information on education, scientific research, and competitions in the region. It is mainly to strengthen the relationship between universities and relevant departments of the Ministry of Education. At the same time, it is also conducive to the sharing of education data between universities and education training institutions, and promotes the steady development of online and offline education. National educational big data collects educational data generated from all regions of the country, focusing on collecting data on teaching management in the region. China attaches great importance to the application of big data in education and established the China Education Big Data Research Institute in September 2015. The institute mainly focuses on the issues of education policy and education practice, strives to build an international think tank resource platform, provides big data services for education reform and education decision-making, carries out scientific research on educational big data and cultivates innovative talents, and aims to promote transformation and application of research results of educational big data.

III. THE APPLICATION SPACE OF EDUCATIONAL BIG DATA IN UNIVERSITY TEACHING MANAGEMENT

With the rapid development of China's colleges and universities informatization, and the popularization of the application of network information technology in college teaching management, most colleges and universities across China have established campus networks and put modern teaching management methods into application. The use of information technology to more effectively serve the daily teaching management of colleges and universities has become one of the important means for contemporary teaching managers to carry out daily teaching management. The main application programs of the teaching management system used by most colleges and universities include: basic information management of students, online course selection of students, final grade management of students, teaching evaluation of teachers and students, college teaching plan management, systematic course scheduling, record score system, etc. The system is also the main source of information for college and university educational big data.

A. Improving the diversification of teaching management

Massive educational big data provides basic information for teaching management. Based on the analysis and mining of educational big data, colleges and universities should effectively combine the results of big data analysis, clarify the problems and deficiencies in teaching management, apply scientific and practical teaching management concepts, and implement innovative reforms in teaching management concepts.

For university management, the teaching management objectives should be improved according to the needs of each university. One of the important tasks of school education management is to change the overall management thinking of colleges and universities and improve the decision-making methods. Most colleges and universities in China make decisions based on management opinions, putting the work experience and ideas of college managers in the first place. However, this kind of decision-making method is usually subjective, and management decision-making errors are often caused by various levels of managers' limited understanding of management, personal empiricism, and so on. With the continuous increase in the use of educational big data in colleges and universities, the factors that affect educational management decisions are gradually increasing, and the management thoughts and experience of managers are no longer the main reasons that affect management decisions. In this case, the rational use of the results of data analysis can improve the management thinking of college education managers and make the decisionmaking methods of education decision-makers more scientific and democratic.

The management of higher education institutions can combine the analysis results of educational big data, according to actual needs, to realize the innovation of traditional management concepts and to transfer from the traditional teaching management model to a new teaching management model with teachers and students as the main body. At the same time, educational big data can also rely on the Internet to collect information. The Internet is an excellent medium for information dissemination and communication. The process of using the Internet to collect educational information can not only harvest updated and more relevant information, but also listen to the voices from all walks of life in order to broaden the decision-making ideas of college education managers and allow managers to make education management decision that is more in line with the actual needs of society.

The role played by university management in management has changed from traditional decisionmakers to asking questions, explaining questions, and collecting and analyzing data around questions. Through the analysis and summary of the data obtained, the management personnel search for the internal laws and point out the direction for teaching management. In recent years, in the development of teaching management, the university where the author works has made good use of educational big data, referring to the perspectives of teachers and students, and at the same time combining the suggestions and opinions of teachers and students on teaching management to carry out reform of teaching management subject in the university. From the managers of all levels of the school to the teachers and students of the whole school, they all participate in the teaching management of the university, become the core of teaching management, and realize the diversified teaching management main body [4].

In the teaching management of colleges and universities, combining the results of the big data analysis of education and attaching importance to the diversification of teaching management subjects can enable college administrators to target the entire school faculty and staff, students from different departments and different majors in the following work to carry out specific teaching, scientific research, and life management to fully ensure the effectiveness of teaching management.

B. Realizing personalized teaching management for different needs

In the era of digital campus, the development of educational big data has further promoted the innovation of teaching management work. In the development of teaching management in colleges and universities, not only can the traditional educational administration management system be used, but also the personalized management of teaching management can be assisted with the help of network technology, mobile phones and mobile terminals.

At present, there are many educational big data applications with student management, which can be called grid management applications. They can be applied to all aspects of student management, providing one-to-one companion guidance to students' learning and campus life, and they can also be an innovative model to guide the development of education. However, these applications related to big data in education have not yet formed universal applications in colleges and universities. Most of the application software is profitable, so it is not universal in the coverage of the number of users.

At the same time, some colleges and universities have gradually established functional applications such as comprehensive student data retrieval, student academic early warning, student family status analysis, student group analysis, and employment status analysis to facilitate the classification of students, so as to better develop training programs, manage different types of students at different levels, and then provide students with personalized management plans in terms of study, life, psychological counseling, and employment.

In recent years, Internet classrooms have emerged. Facing the convenience and efficiency of Internet classrooms, more and more college students can find their own personalized learning methods through online teaching. Whether from the perspective of university administrators or from the perspective of teachers and students, the establishment of online teaching can achieve multi-source data acquisition. The development of online teaching is an important part of the teaching work of colleges and universities. The data collected from online teaching can help college management to analyze the overall situation of college teaching more comprehensively.

At present, the most common form of online teaching in colleges and universities is online classroom, and the combination of online classroom and offline teaching mode can achieve effective complementarity. Online classrooms are restricted by teaching conditions. recent years, although various colleges and In universities have implemented online classrooms to a certain extent, the coverage is not very wide. However, affected by the sudden global epidemic this year, colleges and universities across the country that were supposed to start school in March were forced to adopt online teaching methods, and the colleges and universities where the author belonged also adopted online teaching methods. Before the online teaching was launched, the teachers and students of the entire school of the unit where the author worked also had their own lectures and preparations. One month after the implementation of online teaching, the school conducted a periodic inspection of teachers and students who used online teaching, integrated and analyzed the obtained educational big data, and used the useful information obtained in the subsequent teaching management. During the students' use of online classrooms, each instructor can also use the data to learn about the student's class attendance, homework completion, test answer stay time, right or wrong, course preview and review, classroom participation and other information. Through the data obtained, teachers can carry out the next stage of teaching in a targeted manner, and to a certain extent realize teaching in accordance with their aptitude.

After a semester of online teaching, all colleges and universities have obtained valuable online teaching experience and educational data, which can lay the foundation for future teaching management and classroom teaching reform and innovation. The author hopes that after this special form of teaching, educational big data can be better used in the subsequent development of daily teaching work. Each teaching teacher can use educational big data reasonably, combine the students' own learning situation and the employer's information analysis of the required talents, and realize personalized classroom teaching. At the same time, combined with educational big data, teachers have a clearer understanding of the acceptance of students' classroom content. In classroom teaching, teachers can use hierarchical teaching methods to teach knowledge through the learning ability and learning needs of students of different levels. Through the use of educational big data, hierarchical and personalized management of teachers and students at different levels in education, scientific research, and life can also enable college management to achieve good management results in the development of teaching management. Effective use of the analytical conclusions of educational big data can enable university administrators and teachers to achieve targeted teaching-related activities, and combine the actual learning needs of students to achieve targeted and personalized teaching. The rational use of educational big data can improve teaching effects to a certain extent and achieve the reform and innovation of teaching management.

C. Improving the teaching evaluation system of colleges and universities

In the context of educational big data, teaching evaluation will enter a new stage. In the teaching evaluation process, the use of educational big data can achieve a more complete teaching evaluation system construction [5]. Compared with traditional teaching evaluation work, colleges and universities can use modern and advanced network technology to collect teaching evaluation data more comprehensively and in large quantities. At the same time, professional data analysis software can be used to sort and analyze the collected information, making the data results more real and effective. The implementation of the analysis and conclusion of the use of educational big data in teaching evaluation can promote the innovation and reform of teaching evaluation, realize the authenticity and fairness of the evaluation results, and effectively reflect the teaching effect of the instructor.

Based on the teaching evaluation system and established on the basis of the evaluation system, introducing teachers, students and teaching supervisors to complete the teaching scoring of the teaching conditions of the teachers, the introduction of this system has laid the foundation for more authentic and effective teaching evaluation work in universities. By summarizing the scores from different raters, the obtained teaching evaluation can be more accurate and comprehensive [6]. By using the improved teaching evaluation system, teachers can reflect on the teaching work in time, improve the deficiencies and deficiencies of teaching work, and strive to improve the effect of classroom teaching.

Through the results of teaching evaluation, teachers can reflect on their teaching behaviors, strengthen their investment in weak teaching, improve their personal abilities, and urge themselves to become more excellent teachers. Therefore, university teaching administrators should focus on the application scope of big data, use educational big data efficiently and reasonably, and achieve continuous improvement of the classroom teaching of teachers and their own comprehensive level.

D. Improving the human resource management system in colleges and universities

According to the results of the application of big data in human resource management by well-known domestic companies, it has a wide range of applications. In the same way, educational big data can also be applied to the human resource management system of colleges and universities. By analyzing the personal data of faculty and staff, it can provide data reference for human resource management. For example: the analysis and prediction of mobile personnel for university faculty and staff can help effectively carry out talent retention and screening and recruitment; by analyzing the behavior data of faculty and staff, excellent management, teaching and scientific research talents can be selected; educational big data can also be used to analyze relevant data of various departments, improve the work performance of faculty, optimize policies, resource allocation and provision, increase faculty's job satisfaction, improve faculty's working environment, and so on.

At the same time, educational big data can also be applied to improve the training plan of faculty. For example, online training can be carried out through the network platform. Through the analysis of the data, we can understand the actual needs of the faculty and staff for training, so that the training is not superficial and effective. By analyzing the behavior data of the faculty and staff during the training process, the effects of the training can also be grasped in real time. The use of educational big data can improve the comprehensive evaluation of talents, and accurately and effectively apply the analytical results to the decision-making of management talents.

Educational big data can also be used in the incentive mechanism for faculty and staff. It can retain outstanding talents by optimizing compensation and



reward decisions, optimize the overall working environment of universities and provide comfortable work experience for faculty and staff. Using educational big data to analyze the salary and personal needs of faculty and staff can further improve the incentive mechanism. At the same time, understanding the actual demands of the faculty and staff of the school can make the incentive mechanism formulated by various universities more suitable for the school.

IV. ANALYSIS OF CHALLENGES FACING EDUCATIONAL BIG DATA

A. Data collection and security

When colleges and universities use educational big data, they first face the extremely difficult task of data collection and analysis. The related data of faculty, staff and students is huge and diverse, and different departments and institutions have different standards for data, which will lead to uneven data, hindering the collection and analysis of data and being not conducive to achieving the goal of maximizing the value of data. In addition, the widespread use of educational big data may lead to the disclosure of the private information of faculty and students and threaten the security of their personal information. Therefore, when using educational big data, colleges and universities should establish a sound management and use standard system to unify data standards, facilitate data processing, integration, and analysis, and ensure that all departments can share data. At the same time, it is necessary to ensure the data collection process, use authority and scope, and ensure the safety of data collection and use from the system.

B. Timeliness and reliability of data

The use of educational big data also faces an important challenge, that is, whether educational big data can quickly and accurately reflect the actual needs of faculty and students. As the scale of data continues to expand, the time for analysis and processing will increase accordingly, and users of data results require more and more timeliness of information processing. Therefore, in the face of massive data, processing big data requires simple and effective new problem-solving methods [7]. Another problem that needs to be solved is the reliability of the data. It is worth noting that the activities between people are very complicated. For example, in teaching evaluation, when teachers and students are required to perform signed evaluation, the results obtained will be different from those obtained by anonymous evaluation, which will cause the data to be unable to fully present the actual situation. Therefore, if people want to apply educational big data to teaching management and exert good results, they must pay attention to improving the reliability of the data. When collecting data, teaching managers should give priority

to how to obtain more authentic data, and then verify the collected data to ensure the reliability of the data.

C. Restrictions on the comprehensive ability of teaching managers

Integrating and extracting useful information from educational big data requires teaching managers to be more flexible in processing and using data analysis capabilities, but these are often skills that managers lack. Therefore, data analysis skills are the abilities that teaching managers need to focus on improving. In addition to the limitations on the overall capabilities of the managers themselves, university management will also face other challenges. First, it is that whether the school has senior analytical talents who can reasonably use educational big data; second, it is that whether the existing network information technology support of the university can be matched; finally, it is extremely important that colleges and universities need forwardlooking and practical leaders who can reasonably use the results and analysis obtained from educational big data, formulate corresponding strategies and implement them. Therefore, in order to solve related problems, colleges and universities should focus on strengthening and improving the comprehensive capabilities of management personnel, and ensure that relevant personnel have reliable educational big data analysis capabilities and information technology use capabilities by introducing relevant talents or strengthening educational big data-related training, to make sure that educational big data technology can be better used in the subsequent work process.

D. Limitations of the application of educational big data

At present, most colleges and universities have initially established education management information systems of a certain scale, but most of the collected data use permissions are owned by various departments. The use of data has limitations and it is difficult to achieve school-wide data sharing and integration. Therefore, each university can establish a special institution to coordinate the information platform of the relevant departments such as the Academic Affairs Office, the Scientific Research Office, the Library, the Logistics Management Office and the relevant departments of the students and faculty to regulate and integrate the information, build an education management data collection platform, and form a school-wide teaching management database to ensure comprehensive collection, timely update and sharing of educational big data, and to fully tap the value of the data.

At the same time, in order to facilitate information maintenance and security, the databases used by most universities are local databases, and the data used is limited to the universities themselves. If cloud



technology can be used reasonably and data can be uploaded, so that universities across the country can realize data networking, the results obtained through educational big data mining will improve its applicability and accuracy. In view of the different levels of teaching, scientific research, and student levels in major universities, it can combine the actual situation of the school to integrate and analyze the data of the first-type undergraduate colleges and the second-type undergraduate colleges. It can be expected that the data results will be very valuable.

V. CONCLUSION

In summary, educational big data can be effectively used in teaching management, including improving the diversification of teaching management subjects, individualized teaching improving management according to the different needs of individuals, improving the teaching evaluation system of universities, and improving the human resource management system of universities. etc. However, when using educational big data, it is necessary to pay attention to the problems that will be faced when using the data. The first is the collection and security of data, and the second is the timeliness and reliability of the data. The use of educational big data is also restricted by the comprehensive ability of teaching managers. Finally, the limitations of educational big data itself need to be resolved. Therefore, it is necessary to choose an appropriate data collection method, ensure data security, but also pay attention to the effectiveness and reliability of the data, strive to improve the comprehensive ability of teaching managers, broaden the scope of application of educational big data, and expand its practical application fields.

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