Research on the Innovation of Educational Management in Colleges and Universities Based on the Background of Big Data

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Abstract: The study of educational management innovation in colleges and universities based on the background of big data involves not only the application of data technology, but also the updating of the concept of educational management, the optimization of the allocation of educational resources and the scientificization of educational decision-making. Based on this, the article carries out research on the innovation of college education management based on big data background, analyzes the significance of college education management innovation based on big data background, elaborates the problems of college education management innovation, and gives effective solution measures, in order to provide new ideas and references for the innovative development of higher education through the research.

1. Introduction

Accompanied by the development of the Internet and information technology, a huge amount of education-related data can be collected and analyzed, from student learning behavior to the allocation of teaching resources, to the formulation and implementation of educational policies, the application of big data provides richer and more accurate information support for all aspects of higher education. As the main carrier of higher education, how to utilize big data to improve the efficiency and quality of education management in this new data-driven era has become an important topic worth exploring.

2. The significance of education management innovation in colleges and universities based on the background of big data

The significance of college education management innovation based on the background of big data is reflected in the following aspects. First, the most direct impact of big data for college education management is the improvement of informatization decision-making. By collecting and analyzing students' learning data, teachers' teaching data and management's operation data, colleges and universities can more accurately grasp the various dynamics of the education process and provide data support for decision-making. For example, students' online learning behavior records can reflect their learning interests and learning effects, which can help teachers adjust their teaching methods in time and realize personalized teaching. Second, the introduction of big data technology

greatly enriches the content and form of education management. Colleges and universities can utilize big data for the design of learning paths, the prediction of student performance, and the assessment of education quality. For example, by analyzing students' learning trajectories, colleges and universities can design more appropriate learning paths and guide students to learn efficiently. Third, the education management of colleges and universities in the era of big data pays more attention to the overall development of students. Traditional education management often focuses only on students' performance, while ignoring students' emotional, psychological, social and other aspects. Big data enables education managers to comprehensively capture students' learning and life status and pay attention to students' comprehensive quality development. By analyzing students' social networks, participation in club activities, etc., schools can better understand students' social skills and mental health status and provide targeted counseling and support.

3. Based on the big data background of the university education management innovation problems

3.1 Lagging behind in the adjustment of teaching strategies

At present, many colleges and universities are facing the problem of lagging behind in the adjustment of teaching strategies, and this phenomenon is mainly reflected in several aspects. The first is the insufficient use of big data resources, the potential value of educational data in colleges and universities has not been fully explored, making it difficult to adjust and optimize teaching strategies in a timely manner based on data analysis. Secondly, in terms of teaching content and methodology, many courses still use traditional modes, making it difficult to adapt to rapidly changing educational needs and technological advances. Furthermore, teachers' acceptance of new technologies and methods varies, leading to slow advancement of teaching innovation in practice. The lag in the adjustment of teaching strategies adversely affects the quality and efficiency of higher education. For one thing, the teaching content is out of touch with the actual needs of students and the development trend of society, making it difficult for students to acquire the most cutting-edge knowledge and skills. Secondly, the backwardness of teaching methods affects students' interest and efficiency in learning, and the traditional indoctrination teaching is no longer suitable for the learning habits of modern students. At the same time, the teaching evaluation system has not been updated in a timely manner to accurately reflect the effectiveness of students' learning and the quality of teaching activities.

3.2 Inaccurate tracking of student information

"Inaccurate tracking of student information" has gradually become a key issue constraining management innovation. This inaccuracy is manifested in the incomplete, inaccurate or untimely mastery of key information on students' academic performance, learning behaviors, mental health and career planning. For example, the tracking of student performance is limited to transcript records, while ignoring multi-dimensional information such as students' study habits, learning strategies, and performance in participating in group learning or seminars; or in the case of mental health, only focusing on obvious problematic behaviors while ignoring possible underlying risk factors. This inaccuracy in student information tracking poses multiple challenges for colleges and universities. Inaccurate student information leads to an inappropriate allocation of educational resources, which may result in certain students in need being overlooked and resources being overly focused where they are not needed. In addition, the lack of a comprehensive understanding of students may cause the design of educational activities to deviate from the real needs of students, thus affecting the effectiveness of teaching and learning. Furthermore, future development planning

and career guidance for students may be based on misinformation, leading to misguidance, which is not conducive to the long-term development of students.

3.3 Slow response to management decisions

"Slow response to management decisions" has become a major problem hindering the innovation of education management in colleges and universities. There are several aspects of this problem: the lack of sensitivity to market changes and academic trends, which makes colleges and universities often lag behind the pace of the times when formulating educational policies, curriculum or enrollment strategies; in the face of sudden events or challenges, due to the lagging of information or cumbersome processing procedures, resulting in delayed decision-making, which results in missed opportunities or further deterioration of the problem; the collection, analysis, and application of big data is not efficient enough, resulting in decisions relying on an insufficiently solid information base, which in turn affects the accuracy and timeliness of decisions. This slow response to management decisions not only restricts educational innovation and optimization in universities, but also may lead to a series of problems. For example, lagging enrollment strategies may cause colleges and universities to miss out on outstanding students or to lose touch with market demand due to untimely adjustments in education policies, thus reducing the quality and competitiveness of education in colleges and universities. In addition, slow-response decision-making may increase the risk when responding to campus emergencies, such as security accidents and public health incidents, thus damaging the image and reputation of the university.

3.4 Inadequate data integration capacity

As a temple of knowledge, colleges and universities generate a large amount of data from their operations and management, including students' academic results, teachers' teaching evaluations, course feedback, and behavioral data. However, due to the lack of data integration capability, many universities face the problem of information silos, which leads to underutilization of all kinds of data resources and even results in data redundancy or duplication. The root cause of the lack of data integration capability may originate from several aspects. At the technical level, the differences in architecture and data formats of different systems or platforms make it difficult to interact and integrate data. At the management level, the lack of a unified data management strategy and process leads to differences in data management across departments or faculties, making it impossible to form a unified data management system. In addition, unfamiliarity with big data technologies and tools limits the depth and breadth of data integration in universities. This situation not only affects the management efficiency of colleges and universities, but also affects the scientific nature of educational decision-making. When data cannot provide administrators with the information they need in a timely and accurate manner, decisions are often based on subjective or outdated information, which will undoubtedly harm the quality and effectiveness of education in the long run. For example, the inability to accurately assess the effectiveness of teachers may lead to misdirection of educational resources or missed incentives and rewards for certain outstanding teachers.

4. Innovative Strategies for Educational Management in Colleges and Universities Based on the Background of Big Data

4.1 Optimizing the adaptation of teaching strategies

In order to better implement the "Optimized Instructional Strategy Adjustment" in the current teaching and learning environment, universities need to adopt the following specific and

implementable methods: Data-driven assessment of instructional strategies is the core. Educational departments should establish a comprehensive student data set, including information on student learning behaviors, learning outcomes, and engagement. Through in-depth analysis of these data, it is possible to identify which teaching strategies are effective and which need to be improved, thus providing accurate, real-time feedback on teaching strategies. At the same time, the education sector should also focus on the research of diversified teaching content and methods. For different groups of students, personalized teaching programs are developed, such as personalized recommendations with the help of artificial intelligence, as well as the use of virtual reality, augmented reality and other technologies to improve the teaching experience. To ensure real-time strategy adjustment, colleges and universities can consider establishing a dynamic mechanism for teaching strategy adjustment. This mechanism can automatically propose the optimization of teaching strategies according to the changes in student data, ensuring a high degree of matching between teaching strategies and students' needs. In addition, colleges and universities need to strengthen cooperation with educational technology enterprises, introduce advanced educational technology products and solutions, and accelerate the digital and intelligent transformation of teaching strategies. Teachers play a crucial role in this process. Colleges and universities should provide teachers with continuous professional development opportunities, such as regular skills training and participation in educational technology research and development programs, to ensure that teachers are proficient in the use of new teaching strategies and tools[1] . To optimize the adjustment of teaching strategies in the context of big data, colleges and universities should not only focus on the collection and analysis of data, but also on the implementation of the strategies and the training of teachers, to ensure the continuous optimization of teaching strategies and the enhancement of the actual effect.

4.2 Accurate tracking of student information

The implementation of "accurate tracking of student information" is not only the accumulation and storage of data, but also the deep mining and intelligent analysis of data to provide decision support for the management of university education. In order to achieve this goal, the education sector needs to establish a comprehensive database of student information. This database should not only include students' basic information, such as name, gender and age, but also cover various aspects of academic, social, psychological and health information[2] . This requires close cooperation between universities and other departments, such as libraries, student affairs departments, health centers, etc., to collect and integrate student information. In the process of data collection, colleges and universities should also introduce advanced data collection technologies, such as using IoT technology to track students' class attendance, book borrowing, lab use and other behaviors, while using big data analysis tools to intelligently analyze these data to timely identify students' learning difficulties, life problems or other potential risks. To ensure data security and privacy protection, colleges and universities should establish a comprehensive data protection system and technical protection measures to ensure that student information is not leaked or abused[3] . This is not only a legal and ethical requirement, but also the key to win the trust of students and society. In addition to tracking and analyzing internal data, colleges and universities should also pay attention to external data, such as social media and public forums, to capture students' opinions and suggestions through public opinion analysis tools and to provide a more comprehensive perspective on education management innovation. On the basis of accurate tracking of student information, colleges and universities also need to establish a rapid response mechanism to ensure that they can take prompt measures when problems are found, and provide timely help and support to students. Accurate tracking of student information is an important part of the educational management innovation strategy of colleges and universities, which requires colleges

and universities not only to focus on the collection and analysis of data, but also to pay more attention to the application and protection of data, to ensure that the student information provides a strong support for the innovation of educational management.

4.3 Accelerated response to management decisions

In the context of big data, universities need to focus on building an efficient, transparent and interactive management system in order to accelerate the response to management decisions. First, universities should implement a real-time data monitoring system that not only collects traditional teaching and management data, but also pays attention to student engagement, feedback, and even emotional changes, which can provide management with a comprehensive basis for decision-making. By establishing a big data analysis platform, managers can make faster and more accurate decisions based on data insights. Second, colleges and universities need to focus on streamlining and making decision-making processes more efficient. By reducing unnecessary administrative layers and procedures, schools can reduce the time it takes to make decisions. This can be achieved by introducing more flexible organizational structures and management processes, such as adopting a project management approach that allows teams involved in decision making to work together across departments and report directly, thus speeding up the decision-making process. In addition, establishing an effective internal communication mechanism is equally important to speed up the response to management decisions. Through the internal information sharing platform, the smooth transmission of information is guaranteed to ensure that all relevant departments and personnel can obtain decision-making information and feedback in a timely manner, so as to improve the efficiency and quality of decision-making. Universities should also focus on developing predictive analytics capabilities. Utilizing machine learning and artificial intelligence technology, future trends can be predicted, providing a forward-looking perspective for management decisions. This will not only help colleges and universities to respond to possible challenges in a timely manner, but also to remain proactive in strategic adjustments. Universities should also actively foster a data-driven management culture. This involves managers' knowledge and ability to use data, and through professional training and practice, they can improve their understanding and application of data analysis, thus making the whole decision-making process more efficient and precise. Finally, the improvement of the responsiveness of management decisions in colleges and universities is also inseparable from the participation and feedback of students, faculty and staff and other groups. By establishing effective feedback mechanisms, such as online questionnaires and social media interactions, school management can get closer to the actual needs of students and staff, and adjust and optimize their decisions in a timely manner.

4.4 Improvement of data integration capacity

Innovative strategies for college education management based on the background of big data are crucial for improving data integration. Modern college education involves a wide range of data types, from classroom interaction, academic research to administrative management, all of which generate massive amounts of data. Therefore, college administrators must pay attention to data integration and analysis to provide strong support for educational innovation. The core of data integration capability is to realize effective connection between data to form a unified and complete data view. To this end, universities should establish unified data standards and formats to ensure that data from different systems and departments can be integrated smoothly. At the same time, data quality management tools are introduced to clean, validate and complete the data to ensure the accuracy and completeness of the data. In addition, universities need to build a unified data warehouse to centrally store and manage all relevant data. The data warehouse can not only provide

a comprehensive view of data for colleges and universities, but also provide a solid foundation for data analysis. Through the data warehouse, administrators can analyze the data in depth, mine the value information in the data, and provide a decision-making basis for educational innovation. Data integration should not stop at the technical level. College administrators also need to establish cross-departmental data teams to promote data sharing and collaboration between departments. This not only improves data utilization, but also promotes communication and collaboration across departments to form a data-driven education management model. To support the implementation of data integration, colleges and universities also need to invest more in related technologies and talents. For example, advanced data integration tools and platforms are introduced to provide technical support for data integration. At the same time, the cultivation and introduction of data talents are strengthened to enhance the data integration and analysis capabilities of colleges and universities. At the same time, universities should not ignore the issues of data security and privacy protection in the process of promoting data integration. Strict data use and access policies should be formulated to ensure that data are not leaked or misused. And to better serve students and teachers, colleges and universities can also provide them with more personalized and intelligent educational services through data integration, such as intelligent course recommendations and personalized learning plans. Enhancing data integration capability is a key part of the educational management innovation strategy in colleges and universities. Only through effective data integration can colleges and universities make full use of the value of data to promote educational innovation and optimization.

5. Conclusion

The application of big data in education management in colleges and universities is not only a reflection of technological progress, but also a symbol of the innovation of education concepts and methods. It opens up a new, data-driven education management model, bringing unprecedented opportunities and challenges to colleges and universities. Through in-depth analysis and application of big data, colleges and universities can more accurately understand and respond to students' needs, optimize the allocation of teaching resources, and improve the quality and efficiency of education. In the future, along with the continuous maturation of technology and further updating of educational concepts, the education management of colleges and universities based on big data will become more and more an important force to promote the development of higher education, laying a solid foundation for the cultivation of high-quality talents adapted to the needs of the future society.

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