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The Transformation Path of Higher Education Management Driven by Big data

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Abstract

Against the backdrop of the rapid development of information technology, big data has become an important trend in the field of education. As an important base for cultivating knowledge and talents, colleges and universities need to rely on big data technology to optimize educational management in order to cope with the new challenges in educational development. However, the effective application of big data requires advanced technical support, and more importantly, it demands that universities establish a sound data management system and adopt strong data security protection measures. This article aims to explore the optimization strategies for university education management in the era of big data, especially in terms of data management and security protection. It aims to provide guiding suggestions for universities and help them achieve innovative development in education and management under the background of big data.

KEYWORDS: Insert Big data Colleges and universities, Educational management

I. THE CURRENT SITUATION OF THE INTEGRATION OF BIG DATA AND HIGHER EDUCATION MANAGEMENT

The advent of the information age has made big data a key force influencing the development of all fields in society, and the field of higher education is no exception. As educational institutions that cultivate the main forces of the future society, universities urgently need to explore the value of big data when facing the increasing amount of data in the process of teaching and management, in order to promote the improvement of educational quality and management efficiency. Facing this demand, effectively managing and protecting these data has become a challenge that university administrators must confront.

i. Data-driven teaching reform

Big data has made significant contributions to teaching reform. By analyzing students' learning data, such as online learning behaviors, grade distribution and learning habits, teachers can gain in-depth insights to better understand students' needs and preferences. This understanding enables teachers to

design teaching plans that are more in line with the individual differences of students, thereby enhancing the learning effect. For instance, based on the results of big data analysis, teachers can adjust the teaching content and speed to make them more in line with the actual situation of students. Meanwhile, through predictive analysis, teachers can identify students who may encounter learning difficulties in advance, and then provide timely tutoring and support to ensure that every student can succeed in the learning process.

ii. Intelligence of management decision-making

In terms of management decision-making, the application of big data technology has also played a significant role. By analyzing information such as student enrollment data, course participation, and graduation outcomes, the management of colleges and universities can make more scientific and reasonable decisions. For instance, through the analysis of historical data, schools can optimize the allocation of resources, such as library seats and laboratory equipment, to meet the changing needs of students. In addition, the curriculum can also be optimized through big data analysis. Schools can adjust or add new courses in a timely manner based on the demands of the job market and students' interests, ensuring the timeliness and forward-looking nature of educational content.

iii. Improvement of personalized services

Big data also demonstrates great potential for enhancing service personalization. By analyzing students' behavioral data, colleges and universities can provide more personalized services. For example, in terms of library services, by analyzing students' borrowing records, libraries can recommend books that students might be interested in, and even hold specific book exhibitions based on students' learning majors and interests. In employment guidance services, by analyzing the employment data of previous students, colleges and universities can provide more accurate career planning advice and employment information for current students, helping them better plan their future.

II. MAIN PROBLEMS FACED BY HIGHER EDUCATION MANAGEMENT IN THE ERA OF BIG DATA

A. Challenges in Data Integration and Management

In the era of big data, one of the major challenges faced by the educational management of colleges and universities is data integration and management. As is well known, in the big data environment, data sources are diverse, including but not limited to students' learning behavior data, teaching interaction data, library borrowing records, and usage data of online learning platforms, etc. The diversity of these data sources brings about integration problems. The data formats, standards and storage methods adopted by different systems vary, resulting in the phenomenon of data silos, which directly affects the effective utilization of data. The complexity of data integration is reflected at the technical level, and it also involves considerations at the management and

strategic levels. Effectively integrating these scattered data to form a more comprehensive understanding of students' behaviors and needs is an urgent problem to be solved at present. In addition, issues related to data quality and security are also very prominent. With the sharp increase in data volume, ensuring the accuracy, consistency and completeness of the data has become a challenge. Data may be biased due to errors in the processes of collection, transmission and processing, affecting the effectiveness of educational management decisions. Security issues are equally important, including the confidentiality, integrity and availability of data. Colleges and universities possess a large amount of personal sensitive information. Preventing data leakage, illegal access and data abuse is a major challenge. Data security issues are related to the privacy protection of students and staff, and may also affect the reputation and legal responsibilities of colleges and universities. Therefore, in the face of the challenges of data integration and management, universities need to take effective measures to ensure that data can play its due value under the premise of ensuring security.

B. Lack of professional techniques and talents

In the process of promoting the application of big data, colleges and universities often encounter dual bottlenecks of technology and professional talents. For many educational institutions, the first obstacle they encounter is the insufficiency of the existing technological foundation. This includes the backwardness of hardware facilities, such as insufficient data storage and processing capabilities, and also covers the lack of software resources, such as efficient data analysis tools and platforms. This technological backwardness limits the in-depth application of big data in educational management, making it difficult for colleges and universities to fully explore and utilize the existing data resources to optimize management decisions and improve educational quality. On the other hand, the shortage of professional talents is another major problem restricting the application of big data technology.

Colleges and universities often lack sufficient big data experts, data analysts and technical support personnel in their own teams. Even though some universities have recognized the significance of big data technology and attempted to alleviate this problem by training existing staff or recruiting new technical talents, due to the fierce competition for talents in the field of big data, universities often find it difficult to attract and retain these highly skilled talents. In addition, knowledge and skills related to big data are evolving rapidly, which requires talents to have a solid theoretical foundation and continuously learn the latest technologies and tools. This poses higher demands on talent cultivation and professional development in colleges and universities. In conclusion, the insufficiency of technical foundation and the lack of professional talents jointly constitute the major challenges that colleges and universities face when applying big data technology. This affects the effective application of big data technology in educational management and also restricts the pace of colleges and universities in improving educational quality and exploring innovative management models.

C. There are obstacles to cultural adaptation and reform

In the process of promoting the application of big data, colleges and universities often encounter problems of organizational culture adaptation and reform resistance, which affects the effective application of big data in educational management. Organizational culture is a profound force, encompassing values, traditions, customs and expected behavioral patterns, which has a profound impact on the behavior of its members. In most higher education institutions, traditional management and decision-making methods are deeply rooted. When new technologies such as big data are introduced, they often encounter obstacles from faculty and staff as well as management. On the one hand, the new work processes and decision-making mechanisms introduced by big data may break the existing power structure and working habits, causing some people to feel uneasy and oppressed. On the other hand, the lack of understanding and familiarity with big data technology will also increase the organizational members' resistance to reform. Furthermore, the success of big data applications often requires a high degree of cross-departmental cooperation and information sharing, but this conflicts with the common information barriers and the traditional culture of resource protection among departments in universities. This cultural and structural resistance has slowed down the promotion process of big data technology and also limited the potential of big data in improving the quality of education and optimizing management decisions. Therefore, in the face of this challenge, colleges and universities need to recognize that the reform of organizational culture is as important as the introduction of technology. Through gradual cultural adaptation and change management, they can reduce the resistance to reform and create favorable conditions for the effective application of big data technology in educational management

III. OPTIMIZATION STRATEGIES FOR HIGHER EDUCATION MANAGEMENT IN THE ERA OF BIG DATA

i. Establish and improve the data management system, and enhance data security and privacy protection
Under the background of the big data era, higher education institutions are confronted with major challenges in data management and security protection. With the advancement of technology and the sharp increase in data volume, while universities enjoy the convenience and progress brought by big data, they must also put forward higher requirements for data management and security protection. Establishing a sound data management system and strengthening data security and privacy protection are the keys to ensuring the effective utilization and protection of information resources.

The establishment of a data management system requires standardized management of the entire data life cycle, from data collection, storage, use to the final destruction or archiving, each link needs strict management policies and operational procedures. This kind of management requires technical support, but even more so, the constraints of regulations and systems. To this end, colleges and universities need to rely on relevant national laws and regulations, and in combination with the actual

situation on campus, formulate a comprehensive and detailed data management system to ensure the legality, legitimacy and security of the data processing process.

In terms of strengthening data security and privacy protection, universities need to take a variety of measures to deal with increasingly complex security threats. First of all, technical protection measures are the foundation, including but not limited to strengthening network security protection, implementing data encryption, adopting access control and identity authentication mechanisms, etc. These technical means can effectively prevent data leakage, tampering and loss, and ensure the integrity and confidentiality of the data.

Colleges and universities also need to classify and manage data, and adopt different levels of protection measures based on the sensitivity and importance of the data. For data containing personal privacy and confidential information, more stringent access control and monitoring mechanisms should be implemented to ensure that only authorized users can access such data. In addition, regular data security risk assessment and vulnerability scanning can help identify potential security hazards in a timely manner and take remedial measures.

Personnel training and awareness enhancement are also indispensable parts of strengthening data security and privacy protection. Colleges and universities should regularly organize data security training to enhance the data protection awareness of teachers and students, enabling them to understand the importance of data security and the basic methods of data protection. Through training, teachers and students can recognize their roles and responsibilities in data security, and thus adopt more cautious data processing behaviors in their daily work and study.

Facing increasingly complex data security threats, universities also need to establish a sound emergency response mechanism. In the event of a data breach or security incident, the emergency response team can promptly take measures to mitigate losses, restore the normal operation of the system, conduct a thorough investigation of the incident, summarize experiences, and prevent similar incidents from happening again.

Strengthening cooperation with external professional institutions and introducing advanced data security technologies and management experiences is also an effective way to enhance the data management and security protection level of colleges and universities. Through cooperation, universities can obtain more professional technical support, continuously update data security protection strategies, and keep pace with The Times to respond to emerging security challenges.

In conclusion, establishing a sound data management system and strengthening data security and privacy protection is a systematic project for higher education institutions. It involves improvements

at the technical level, but more importantly, it concerns changes in management concepts and culture. Under the background of the big data era, colleges and universities must take comprehensive measures to continuously enhance their data management and protection capabilities, ensure the security and reliability of data resources, and provide solid support for the teaching, research and management work of colleges and universities.

ii. Offer relevant professional courses and introduce advanced big data processing technologies and tools In order to meet the requirements of the era of big data, colleges and universities must take measures to cultivate professional talents and upgrade technologies. This demand has prompted educational institutions to offer professional courses related to big data, strengthen the teaching staff, and introduce and apply advanced big data processing technologies and tools at the same time. In this process, colleges and universities need to recognize that the rapid development of big data technology is not only a technical issue but also an opportunity for the transformation of educational content and methods.

Offering relevant professional courses is the foundation for cultivating future big data professionals. Course design should closely follow the latest developments in the field of big data and its applications, including data science, data analysis, machine learning, artificial intelligence, etc. These courses need to cover theoretical knowledge and, more importantly, emphasize the cultivation of practical skills, such as programming ability, data processing ability and the ability to analyze and solve problems. To this end, universities can cooperate with enterprises or research institutions to provide students with internship and project practice opportunities, allowing students to learn and apply big data technology in a real working environment.

Strengthening the teaching staff is the key to ensuring the quality of education. Facing the rapid changes in big data technology, the teaching staff needs to constantly update their knowledge and skills. Colleges and universities should encourage and support teachers to participate in professional training, workshops and academic conferences to learn the latest big data technologies and educational methods. In addition, introducing experts from the industry as part-time professors or lecturers can help students build a bridge between theory and practice, and also enrich the teaching content.

Introducing advanced big data processing technologies and tools is an important means to improve the quality of education and the level of research. Colleges and universities need to invest funds in building advanced computing platforms to provide sufficient computing resources and data storage space for students and teachers. In addition, the introduction of professional big data analysis software and tools can enhance the efficiency and accuracy of data processing, and also enable students to

become familiar with commonly used tools in the industry, thereby strengthening their employment competitiveness.

The implementation of these measures will greatly promote the education and research work of universities in the era of big data, providing students with opportunities to understand and master advanced technologies, and at the same time cultivating a large number of big data professionals for society. However, there are also challenges in this process, such as the need for financial investment, the effectiveness of teacher training, and the timely update of course content. Universities need to formulate clear strategic plans, actively seek external cooperation, and effectively utilize resources to ensure the successful implementation of the training program, ultimately achieving innovation and reform in educational content and methods to meet the needs of the era of big data.

iii. Establish an open organizational culture to enhance the adaptability and acceptance of big data applications among all faculty and students

Promoting cultural reform and improving adaptability is one of the important strategies for optimizing higher education management in the era of big data. In the face of the rapid development of big data technology and its wide application in the field of education, universities must establish an open organizational culture that encourages innovation and reform, and can enhance the adaptability and acceptance of big data applications among all faculty and students. An open organizational culture emphasizes the free flow of information, the diversity of opinions, and the value of innovative thinking, which is of crucial importance for cultivating faculty and students who can meet the requirements of the big data era.

In such a cultural environment, teachers and students are encouraged to explore new knowledge and technologies, and to try new methods to solve problems. This is conducive to improving the quality of teaching and research, and can also promote the application of big data technology in university management and educational practice. By organizing various seminars, workshops and lectures, universities can provide opportunities for teachers and students to learn and exchange knowledge about big data, and enhance their understanding of the value of big data and their application capabilities.

Furthermore, universities should actively promote policy and institutional reforms to support innovation and address the challenges of the big data era. This involves adjusting aspects such as the syllabus, research directions, and resource allocation to adapt to the development and application of big data technologies. For instance, introducing courses in fields like data science and artificial intelligence provides students with up-to-date knowledge and introduces new perspectives and methods to the research and management work of universities.

To enhance the adaptability and acceptance of big data applications among teachers and students, it is also necessary for the leadership of universities to demonstrate clear support and commitment. The support of the leadership can be reflected in ways such as providing necessary resources, establishing incentive mechanisms and creating an environment that encourages innovation. Meanwhile, through the exemplary role of the leadership, the importance and urgency of big data application can be effectively conveyed, and the enthusiasm and initiative of teachers and students can be stimulated.

To achieve this strategy, colleges and universities also need to focus on the improvement of the abilities of teachers and students. In addition to professional skills training, education on data ethics, privacy protection and data security should also be strengthened to ensure that teachers and students can abide by relevant laws, regulations and ethical standards when using big data. This is an investment in the personal career development of teachers and students, and it is also the foundation for ensuring the responsible and sustainable use of big data technology in colleges and universities.

Ultimately, by establishing an open organizational culture and encouraging innovation and reform, universities can maintain their competitiveness in the era of big data and continuously improve the quality of education and management efficiency. Although this process is full of challenges, through the joint efforts of all teachers and students in the school and continuous reforms, colleges and universities can effectively adapt to the changes brought by big data and fully exert the potential of big data in educational management.

IV. CONCLUSION

To sum up, in the era of big data, if colleges and universities want to fully utilize big data technology to optimize educational management, they must attach importance to the issues of data management and security protection. By establishing a sound data management system and implementing strict data security and privacy protection measures, colleges and universities can ensure the effective utilization of data, protect the personal information security of teachers and students, and improve the quality and efficiency of educational management. With the continuous advancement of technology and the increasing demand for education, colleges and universities need to constantly explore and improve the methods of data management and protection to adapt to the new requirements of educational management in the era of big data and achieve the goals of educational innovation and social development.

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