Research on Education Management of Universities in the Context of Big Data

Cuilu Wang[✉], Lei Zhang, and Jingshu Liu

Air Force Engineering University, Xi'an 710051, China
daisybryant@163.com

Abstract. With the development of information technology, big data technology has been widely used in various fields of society, and the features and advantages of big data have largely changed people's life style, learning style and working style, and fundamentally changed people's management style. Big data technology plays an active role in promoting research reform, optimizing teaching management and promoting teaching resource sharing in all universities in China. Looking at the current application status of big data technology in China's universities, there are still many problems, such as imperfect system and unsound coordination mechanism, which undoubtedly bring many challenges to the information security of universities. Based on this, the research on this aspect needs to be more in-depth, which is of great significance to promote the current educational management reform of colleges and universities in China. This study will start from the basic information and concept of big data, and further extend to the existing problems of big data education management development in China's colleges and universities by analyzing the impact of big data on the development of college management. Finally, it will propose the thinking and countermeasures to promote the development of big data education management in China's colleges and universities. It provides a feasible reference for the research of college education management in the context of big data in China [1].

Keywords: big data · educational management · university education · management research

1 The Basic Concept of Big Data

1.1 Definition of Big Data

Big data generally refers to data with a volume greater than 1 petabyte, also known as massive data and huge data. Big Data: The Next Frontier for Innovation, Competition, and Productivity defines "Big Data" as "a mass of data whose size and specifications exceed the ability of traditional database software to capture, store, manage, and analyze it." Wikipedia defines "Big Data" as "a collection of data that cannot be captured and managed by commonly used software tools within a certain period of time." This shows that Big Data is not just a rigid definition, but also a collection of technical methodologies and ways of thinking.

1.2   Characteristics and Essence of Big Data

1.2.1   Characteristics of Big Data

As the research of Big Data continues to deepen, people's understanding of Big Data is becoming more and more comprehensive, and its characteristics have changed from the initial 3 V: i.e., large volume, variety and velocity to the current 8 V English words starting with the word to represent the characteristics of Big Data (volume, variety, veracity, viscosity, variability, variability, volatility, value).

(1) Sea quantification

Seascale refers to the sheer volume of data being collected and analyzed, jumping from terabytes to petabytes. 2010 saw over 7 EB of new data stored on hard drives by global enterprises, most of which was consumer data [2]. Of this, 1 EB of data is equivalent to more than 4,000 times the data stored in the Library of Congress. In the last 3 years, we have generated more data than we have in the last 40,000 years.

(2) Diversification

Diversity refers to the diversity of types of big data. Big data comes from multiple data sources, and the main types include structured data, semi-structured data and unstructured data. For example, facebook has hundreds of millions of status updates every day, and the daily frequency upload of YouTube website can reach 4 billion times in a single day. And according to incomplete statistics, the growth rate of structured, data in our university database is about 32%, while the growth rate of unstructured data reaches 63%.

(3) High speed

High speed means fast processing of data streams. With the emergence of big data, architectures for intensive data processing have emerged, such as Apache Hadoop, which is open source and runs in clusters of commodity hardware. In addition, there is also Apache Hadoop, a software framework that can process big data in a reliable, efficient, and scalable manner in a distributed manner.

(4) Accuracy

Accuracy means the accuracy of the data. The content in big data is closely related to the events that happen in the real world, and studying big data is the process of extracting from the huge network data that can explain and predict the real events. Only decisions based on data that are complete and real will be more scientific and accurate.

(5) Relevance

Relevance is the correlation between data streams. The value of correlated data is much greater than isolated data. Big Data does not value individual streams of data, but rather emphasizes finding relationships between streams of data that are related to each other, rather than cause-and-effect, and the need to know the "what" rather than the "why".

(6) Fungibility

Volatility counts the rate of change of data flow. Big data generation is instantaneous, data updates are extremely fast, and the decay rate of data values is high, requiring a rapid response to changing data, i.e., dynamic real-time analysis in an ever-changing state.

(7) Effectiveness

Validity records the validity of the data itself, i.e., the validity of analysis and prediction that relies on the data. Although big data seems to be cluttered, but with the progress of storage technology, big data storage space and time constraints will become less and less, these data can be effectively recorded and stored for a long time, but also retrospectively find the cycle of utilization, so that the validity of the data itself and the validity of analysis and prediction based on big data is greatly improved.

(8) Great value

Although the value density of big data is decreasing, the overall value is increasing because through the exchange, integration and analysis of big data, it is possible to find interconnections between data and generate significant discoveries. The influence of big data is superb and widespread, and it is about to play an increasing role in various fields such as government, education, transportation, health, and industry.

1.2.2   Basic Features of the Big Data Society

More than 20 years ago Internet guru Negroponte put forward the concept of digital existence, and today, more than 20 years later, the era of big data in human society has arrived, and everything is data-oriented or shows the trend of data-oriented [3].

(1) Data-based existence of things

Through the form of nerve impulses, humans can obtain cognitive information and knowledge. In the era of intelligence, cameras, microphones and sensors are the bionic of human sensory organs, and through sensor technology, everything can be data. Big data has become a microscope for observing human social behavior and a dashboard for monitoring nature, and the behavior of people and things in the real world is recorded in real time.

(2) Big data to predict the future

Through quantitative analysis, discovering the hidden laws in massive data, so as to deduce the future, intervene in reality and guide the results, is the source of human wisdom generation in the era of big data. Prediction is the core of the application of big data technology, and it is also the important meaning of big data mining. In the era of big data, the reliability of the knowledge built on the basis of massive data far exceeds that of the sample knowledge built on the basis of small data.

(3) Control of data

The predictive power of big data is also limited; it can make short-term predictions, but not long-term predictions. Big data prediction is based on the analysis of correlations, and the possibility of the analysis results obtained cannot be unique. We should be prepared with the thought that although big data is not a panacea, it does not affect the value of big data.

2   The Nature of College Education and the Existing Shortcomings of Traditional College Education Management

Smart education is the ideal form of human education. Under the background of big data technology, colleges and universities can realize the communication and knowledge of people, things and environment. However, big data technology is a "double-edged sword"

for colleges and universities [4]. Behind the glory of big data education management, there are also many terrible risks hidden, we need to use big data reasonably, so that big data can better contribute to college education management.

2.1 The Nature of Education Management in Universities

The essence of higher education management is to make students better by educating, nurturing, cultivating and empowering them to discover happiness, create happiness and experience happiness. It can be said that making people good and happy is the value of university education management [5].

(1) The nature of university education

Fundamentally, education is about helping the educated person, giving him the ability to develop himself and perfect his personality. Whether a person's heart feels happy, peaceful and powerful is ultimately a matter of returning to the essence of education, the essence of happiness and the essence of love. The university is the last stop before students enter the society, and it is the cradle for cultivating the "university man", who is a person of noble spirit.

(2) The nature of management

Management is a widespread and very important social phenomenon, a means and tool for organizations, and a necessary condition for the survival and development of an organization. "Management" contains the meaning of unblocking, guiding, promoting and affirming, and also contains the meaning of restricting, avoiding, restraining and denying. "Reason" contains the meaning of reasonable and smooth. Management is like the management of water, the combination of dredging and blocking, just in accordance with the law. Therefore, management refers to the application of scientific means to arrange and organize social activities so that they can be carried out in an orderly manner.

2.2 Analysis of the Existing Problems of Traditional University Education Management

There are many problems in traditional college education management: treating organization as a static structure, over-emphasizing management institutionalization, modeling and standardization, emphasizing rigid management and neglecting flexible management, emphasizing obedience and compliance, thus neglecting human autonomy, which are incompatible with modern management and are not conducive to the development of college students and teachers' professional development.

(1) Inadequate humanities

The traditional way of education management in colleges and universities makes the humanistic spirit of students missing, emphasizing knowledge and quality, skills and character, insufficient humanism and rigidity [6]. College education managers must establish the concept of people-oriented, pay more attention to the cultivation of organizational culture, form a common organizational vision and psychological contract, realize flexible management, stimulate the potential of teachers and students, and form the power of collective wisdom and cooperation. The existing problems are not only the reasons for the cost of the concept, but also the lack of data on the activities of teachers

and students in traditional colleges and universities, and the technical impossibility of data processing and analysis, all of which will become easier with the advent of big data."

(2) Single form

At present, some colleges and universities ignore the stimulation of students' subjective consciousness and the cultivation of subjective initiative in traditional education management, and only treat students as passive recipients of knowledge, so that students become peer objects without life and emotional will. The education management of colleges and universities should follow the trend of the times, make full use of the advantages of new media such as interactivity and immediacy, adhere to the combination of online and offline, combine theoretical inculcation and cultural inculcation, use big data technology to build a brand education management carrier, and improve the effect of education management of colleges and universities.

(3) Lack of personality

Traditional college education uses the same textbooks, does the same exercises to maintain the same teaching schedule, and expects one ruler to fit all. This kind of operation is similar to the production line teaching materials assembled in a factory, based on averages and unable to take into account individual preferences needs and material. We know that in fact every student is very different, and although education has universal regularity, we also have to do it according to the material. In the 21st century, personalization is not only applicable to production, but also to education.

(4) Inadequate feedback

Feedback in educational management refers to the act of feeding back the dynamic information of educational management to the manager, so that the manager's measures can be adjusted to suit the actual situation of the managed. Traditional university education management is vertical, top-down implementation, so that managers are high up in the cloud can not see the "people's suffering". With the support of the management platform, big data education management may be a doorway that can bring vitality and forgetfulness.

3   Problems in the Development of Big Data Education Management in China's Universities

At present, China's university education management is in the process of evolving from informatization to wisdom, and although the construction of big data for education management in China's universities has achieved certain results, there are some problems that must be paid great attention to [7]. For example, the information construction of colleges and universities is uneven, and the management of colleges and universities do not know enough and pay enough attention to big data and cloud computing technology. In the wave of data, whoever can grasp the first opportunity in time will be able to occupy the competitive high ground. Our colleges and universities need to make top-level design, system.

We should adhere to the concept of "people-oriented" and the principle of "green technology", and promote the common construction, sharing and common use of data resources, so that big data technology can really become a tool to promote the overall

development of students, the wisdom of educational management and the internal construction of schools, In this way, big data technology can become a powerful tool to promote students' overall development, educational management and internal construction of schools. At present, the following problems exist in the development of big data education management in colleges and universities [8].

3.1 Lack of Systematic Planning

In the era of big data, university managers also need to improve data literacy and data capability so that they can have unified argument and scientific planning for the whole university informatization construction. Domestic education information construction lacks three unified standards and unified planning in the early stage, so the management is sloppy and the resources are wasted, which affects the accuracy and relevance of management decisions. At present, although colleges and universities have also established OA (office automation, office automation) system, one card, academic affairs management system, student management system, etc., but the business flow is dominated, each system is incompatible with each other, and the door of information is closed. Universities should strengthen the unified planning of big data education management development, attract data flow and business flow (workflow) concept in the construction of university education management system, build the workflow information system development mode based on data flow, and make the data flow smoothly in each management department [9].

3.2 Lack of Financial Security

The high cost of operation and maintenance, funding has become an important constraint to the development of big data education management in China's universities. Restricted by funding, schools basically adopt the way of self-maintenance, which not only solves part of the problem of insufficient funds, but also forks the training of information technology talents. It has reached a consensus to guarantee the operation fund by raising the network with the network, but it has also brought some negative effects. Some universities have tried to differentiate traffic and implement free of charge for normal teaching and research activities in order to eliminate the negative effects. This positive attempt is a good start. Of course, open schooling and large-scale high-quality paid MOOC should also be another way for universities to increase revenue, which all requires universities to have a long-term vision and strategic thinking. At present, in the early stage of development of big data education management in China's colleges and universities, when effective financing mechanism has not yet been formed, the government should assume an important function, strengthen the macro regulation of education development and increase the financial investment in the construction of big data education management in colleges and universities.

3.3 Lack of Regulatory System

The construction and service of big data platform has become an important issue for the future development of colleges and universities, then the weak link that comes with it

is the problem of maintenance rather than construction. Due to the intricate crowd and data application, the security and management of big data platform in universities is becoming more and more prominent, which poses a great challenge to universities. The provisions for promoting the development of big data technology and protecting privacy are scattered in some legal provisions, which can no longer meet the requirements of maintaining human dignity and rights, and there is a lack of relevant laws for defining "data sovereignty" and data security management, and a lack of incentive laws for promoting data development. Data ownership and privacy are issues that cannot be avoided in the development of big data education management in universities, and these related support systems are not yet perfect [10].

3.4   Lack of Professional Support

The market is huge and the lack of talents are the biggest advantage and the biggest disadvantage facing the development of big data in China respectively. At present, big data industry is developing rapidly, no matter domestic or foreign, and the competition for talents between academia and enterprises is very fierce. And, China has not yet established a training mechanism that is conducive to the emergence of big data talents. At present, there are nearly 100 colleges and universities in China with information.

Security undergraduate majors, information technology personnel training on the road to specialization. But information technology, information security and big data application talents are still in short supply. With the current situation of training less than 15,000 network security talents in 2015, by 2020, far from meeting the demand for 1.4 million network security talents, especially the lack of security talents with the ability to fight in real combat. Big data talents include data project management talents and data analysis talents, at present, these two types of big data talents in China are equally lacking, and in 2016, China began to set up big data majors to meet the needs of economic and social development [11].

3.5   Lack of Collaborative Innovation

The duplication of data center construction in China, including university data centers, is a common problem. As of 2013, only 173 out of 255 data centers planned for construction in China were put into use. Meanwhile, the annual power consumption of data centers in China is amazing, comparable to the annual power generation of three gorges of hydropower stations. At present, each department, unit and faculty of the university is an "independent kingdom", and each of them builds their own IT system according to their own needs, without a unified system, and there are various problems such as cost, performance, security and energy management, which bring great challenges and inconvenience to the management of university education. Finally the backend database built by each department, unit and faculty may cause the absence of old data once the data changes. It is imperative to establish a cloud-based data center that is process-oriented, manageable, scalable, reliable, secure, low-cost, and green and energy-saving.

3.6 Lack of Deep Cooperation

At present, the development of big data education management in colleges and universities still has the problem of insufficient in-depth cooperation between schools and enterprises, the lack of big data application products and not many active enterprises, such as Huawei, which cooperates with more than 85% of "211" colleges and universities to build intelligent campuses. In addition, there are not many mature educational software, and the cooperation between schools and enterprises is insufficient. Therefore, in the process of system implementation, technology enterprises should customize the development according to the specific business requirements of colleges and universities, and study the pain points of educational software users in educational practice and the root causes of urgent reforms and solutions. Of course, it is more advocated that relevant professional teachers in universities play the advantage of being familiar with the business and understanding the practical needs to develop the research system independently. Finally, there is also the problem of insufficient promotion of excellent wisdom education programs. Compared with international developed countries' wisdom education, China's wisdom education started late, and the effectiveness of wisdom education technology research and development is positively related to the degree of awakening and innovation strength, and the effectiveness of promotion and application is positively related to the emancipation of concepts and the ability to use technology. Of course, the concept of smart education is deeply rooted in people's hearts and minds, and the "unity of teaching and technology" of smart education technology must be a long-term process, but through effective publicity and promotion, the time of this process can be shortened.

3.7 Lack of Effective Motivation

Although most universities in China provide a certain amount of financial incentives, resource development tools, training and technical support for the construction of digital teaching resources, teachers are not highly motivated, which becomes another obstacle to the development of big data education management in China's universities [12]. Of course, in the face of the data "indigenous" college students, teachers as data "immigrants" need the courage to challenge and transcend the "old self", and only to comply with the development of the times and the trend of education reform In order to create new achievements and brilliance in the data era, teachers should improve their data literacy and information literacy.

4 Thinking and Countermeasures to Promote the Development of Big Data Education Management in China's Universities

At present, China's colleges and universities are in the stage of transformation from information-based education management to big data education management. In the process of constructing "intelligent campus" in colleges and universities, the concept of big data, big data system and big data mechanism must be linked in three dimensions, among which the concept is the precursor and the system mechanism is the key.

4.1   Establish the Concept of Big Data Education Management Development

4.1.1   Establish the Concept of Sharing

In the "ecosystem" of university data, all kinds of education management are "based on communication, sharing and mutual stimulation". IT in universities is the basic facility and guarantee of big data education management, and its mission is twofold: one is to connect teachers and students, people and resources, teachers and students and schools; the other is to support, to support "teaching" and "learning", to make it efficient and innovative. The second is to support "teaching" and "learning", making them efficient and innovative. The development of big data education management in colleges and universities in developed countries is earlier and the concept of data governance is more advanced, which highlights the integration of IT and people, which has important significance for the development of big data education management in colleges and universities in China. Colleges and universities should break the boundaries of departments, schools, industries, regions and countries, establish synergy mechanism and sharing mechanism, practice the concept of opening and sharing of big data to the greatest extent, and realize the common construction, sharing and integration of educational resources and data resources, so as to realize the fundamental change of classroom teaching structure in colleges and universities, and realize the significant improvement of educational management level and educational management efficiency.

4.1.2   Adhere to the "User-Centered" Orientation

The management of China's universities should take the "user-centered" management orientation, take the school's strategic development goals as the guide, take business fluency as the criterion, integrate software, hardware and services, provide easy-to-use, clear and unified integrated services for users, and promote the change of school management mode and education and teaching mode with big data technology and information.

Universities need to strengthen their infrastructure and find a flexible and scalable way to replace aging telecommunication network equipment, as well as find strategies to improve aging equipment, such as streamlining support, meeting student and faculty needs, and helping the university generate revenue. Converged devices, such as iPhones or iPads, are interactive hardware devices for the classroom, and these "integrated backpacks" will also minimize the number of academic tools students must carry, reducing the burden on students and increasing the reliability of teacher instruction. These "integrated backpacks" will also minimize the academic tools that students must carry, reduce the burden of students, and improve the reliability of teachers' teaching.

4.2   Establish a Big Data System

On the one hand, we should promote the standardization of big data utilization and transaction through laws and regulations, so as to protect personal privacy and data security; on the other hand, we should promote the construction and opening of educational resources sharing platform and data platform in colleges and universities through

laws and regulations. On the other hand, we should promote the construction and opening of education resource sharing platform and data leveling platform in colleges and universities through laws and regulations. "Promotion" and "standardization" are the two wheels and two wings of a bird, which is also true for the development of big data education management in colleges and universities.

Universities should take the development of big data system as an opportunity to promote the overall change of education management system. In the ecology of big data system in colleges and universities, it includes two types of systems, one is the regulation system and the other is the promotion system [13]. When formulating big data management methods in our university, colleges and universities should follow the national laws and regulations and formulate feasible and innovative systems based on the actual school and regional reality, and should consider the stability and special continuity of the management system, and actively promote the change of big data education management while regulating the behavior of big data education management.

4.3 Promote Synergistic Development of Big Data Education Management

Our colleges and universities must seize the opportunity, learn from others and know each other in order to realize the leapfrog development of education management. Foreign developed countries have inherent advantages in education, economy, science and technology, talents and national comprehensive strength, which makes them seize the opportunity of big data education management development and accumulate certain experience, which has important reference value for big data education management in Chinese universities. The United States has made big data play the magic of "turning stone into gold" in the business field, and is the first country to raise big data as a national strategy, and also the first country to start training future-oriented big data talents. Universities such as Stanford, University of California, Berkeley and Deakin University are offering new programs such as machine science to train the next generation of data scientists.

Our universities should also adhere to the principle of network sovereignty, actively participate in the construction of international rules system such as data security and cross-border data flow, promote open cooperation and build a good order [14]. Finally, the change of university education management is a systematic project, which involves one hair and moves the whole body. In the face of the global development trend of intelligent education, we must keep rational, neither follow the trend, nor lose the opportunity.

5   Summary and Outlook

Without information technology, there is no modernization. Data is reconstructing the real society with all aspects of morality, culture, industry and life. The data culture is the most important in this reconfiguration process. Culture is soft power, and to some extent, it is even more important than hard power such as economy, science and technology, and national defense. As the industrial civilization moves into the information civilization, China basically stands on the same starting line with the developed countries in the world. The future competition is not by artillery and tanks, but by data culture. Data culture is respecting facts, emphasizing precision.

A culture that is accurate and promotes rationality and logic. With the development of information technology, big data, as a brand new concept, has started to enter people's daily life, not only affecting their lifestyles, but also changing their ways of thinking. Since 2012, various countries have raised the development of big data to the height of national strategy, our government and enterprises must cooperate with universities to conduct scientific research, so as to better cope with the challenges and opportunities brought by the era of big data. For college education management, we need to discuss from multiple research perspectives, such as education, sociology and management, in order to facilitate college education managers to study the value and risk of big data management in a more comprehensive and detailed way. In the future, with the application of big data in college education management system, college education management is facing a change, which takes the comprehensive, free and personalized development of human as the basis, realizes the value reconstruction, structure reconstruction, procedure reconstruction, power reconstruction and culture reconstruction of traditional education through the deep integration of information technology and education, and improves the inner quality of education comprehensively. This change is ignited by the change of teaching and learning, fueled by the change of school management, and ultimately promotes the change of higher education.

"Technology is the way, society is the virtue", adhere to the principle of people-oriented, responsibility and freedom, prevention-oriented principle, looking for the way to play the value of big data in colleges and universities and avoid the risk of big data technology, is an important direction for the future development of big data integration education. In this paper, the research on big data education management in colleges and universities is more reflected in the theoretical level, with more conceptions of principles and less deep research on innovative countermeasures, and there are also more realistic and theoretical problems to be further deepened and solved, hoping that with the continuous deepening of the research on big data and college management education, the problems that are not yet deep can be effectively solved.

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