STUDY ON IMPACT AND REFORM OF BIG DATA ON HIGHER EDUCATION IN CHINA

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STUDY ON IMPACT AND REFORM OF BIG DATA ON HIGHER EDUCATION IN CHINA

Thematic Certificate

To

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This Independent Study has been Approved as a Partial Fulfillment of the Requirement of International Master of Business Administration in International Business Management

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ABSTRACT

This paper aimed to explore the impact of big data on higher education in China and the reform measures through the application of big data in higher education. Research methods included literature research and expert discussion. By studying the application background of big data in higher education, the connotation of big data, the application status of big data in education, the impact of big data on higher education, and the construction measures of higher education based on big data, the following conclusions were drawn: 1) Research on the application of big data in education is still in its infancy; 2)Big data has a huge impact on higher education, and will have a subversive impact on the work content and mode of higher education. In the era of big data, higher education must be reformed, and reforms based on big data must be carried out so that higher education can develop steadily and healthily.

Keywords: higher education, big data, education reform, cloud computing

Declaration

I, HUANG ZHIQIN, hereby certify that the work embodied in this independent study entitled "STUDY ON IMPACT AND REFORM OF BIG DATA ON HIGHER EDUCATION IN CHINA" is result of original research and has not been submitted for a higher degree to any other university or institution.

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1. Introduction

1.1 Research Background

In recent years, with the rapid development of Internet, Internet of Things, Cloud computing and communication technology, the rapid growth of data are brought with severe challenges and precious opportunities to many industries (Wu, 2014). Therefore, the information society has entered the big data era.

Early big data technologies were mainly used in scientific computing, such as genomics, proteomics, aerospace, high-energy physics, etc. (Education Informatization Work Points, 2014). However, with the development of cloud computing, the Internet, the mobile Internet and the Internet of Things, big data technology has gradually been applied to all aspects of society, such as corporate marketing, social management, and education. Big data technology has an important role in the development and changes of higher education in China (Liu, 2014).

1.2 Research Problems

Internet, mobile Internet, cloud computing and Internet of Things provide a good platform for teaching, learning and management in the Higher Education in China. Massive Open Online Courses (MOOCS) are high-quality courses on the Internet platforms of world-renowned universities, which provide students with good teaching resources for online learning (Jiang, Zhao, Wang & Wang, 2015). The flipped classroom can change the teaching status of teachers in the classroom, let students know the content of the course in advance, and the interaction between teachers and students will be the main measure to improve students' autonomous learning and mutual cooperative learning ability (Wu, 2014). Weibo, WeChat, QQ and other platforms can not only facilitate the release of teaching information and teaching content, but also promote students' personalized learning and tutoring (Liu, 2014). These teaching activities generate large amounts of data. There are many decision-making and implementation plans in university management, such as the determination of student development goals, curriculum setting, teaching plans, quality control, teaching evaluation, teacher management, student management, scientific research management, equipment management, logistics support, etc. (Xu

et al., 2015). These colleges and universities education and teaching management work are based on a large amount of data.

1.3 Objective of the study

This paper will analyze the concept and characteristics of big data, study the impact and role of big data on higher education in college teaching, management, ideological education, and social evaluation, and propose construction measures for China's higher education reform in the era of big data.

1.4 Scope of the study

Big data refers to data sets that current mainstream software tools cannot collect, transmit, store and process within a reasonable time. Big data mainly includes four characteristics: Volume, Velocity, Variety and Value. Volume refers to the huge data capacity, and the unit of measurement even reaches the level of ZB, EB, YB and above (Xu et al., 2015). Speed means that the data generation and analysis speed is very fast. Generally, the analysis results of massive data can be calculated in seconds. Variety refers to the data type are very much, not only including structured data, such as text, digits, etc., but also including semi-structured data, such as XML documents, even more including non-structured data, such as record sites, blogs, pictures, animation, video, and geographic location of the information. Value refers to the value density of big data is low, but the value is big, big data analysis is focused on the discovery of massive amounts of data hidden behind valuable information (Wang, Yang & Yang, 2015). Big data has a profound impact on people's lives, work, and learning. The significance of the big data is that multiple types of data is analyzed and studied, extracted the valuables information, to help people to make a scientific decision-making (Wu, 2014).

1.5 Research Significance

Students’ speeches on social networking platforms basically reflect their real thoughts, which can be expressed in the form of text, voice, images, videos, and other data. Through the analysis of these data, the data can guide students’ thoughts and behaviors and improve their performance (Chen & Yang, 2014). their ideology. Today's higher education field is full of big data, how to analyze the impact of these data, find out the real factors affecting the quality of education, make forward-looking

decisions, improve students' moral level and comprehensive ability, and make society more satisfied and better with higher education to contribute to social and economic development is an important topic of significance (Wu, 2014).

2. Literatures Review

2.1 Embryonic stage of research

Although big data has been become a popular vocabulary from 2009, but its application in education was started from 2012. By the end of March 2012, the Obama administration announced that white house will invest $2 billion in R & D costs to promote the development of data technology (Zhang & Zhu, 2015). Its main goal is to make big data technology to better service to scientific research, environment, biomedicine, education, and national security, at the same time, to encourage technical development of data acquisition, storage, management, analysis and sharing, which directly stimulus to the world attention on the big data (Xu et al., 2015).

In 2012, big data has become an important trend in the development of the times, which also directly affect the education experts and scholars began to pay close attention to it. In China, the experts, and scholars in the field of education began to pay close attention to the big data application in education in 2012 (Education Informatization Work Points, 2014). Rightly face these complex relationships, structured, semi-structured and unstructured data, forming a comprehensive solution of covering business, technology and the IT infrastructure to storage, management, and analysis of educational data, this is the education informatization.

2.2 Starting stage of research

Since 2013, it is the starting stage of big data application in education. With rapid development of education informatization and the depth integration of information technology and education, education reform and development in our country is inseparable from the information technology support and guidance, has increasingly become a consensus in the educational field (Xu et al., 2015). 2013 is called the first year of China's big data by the media. It is from 2013 onwards, in the field of the domestic educational technology raised the research upsurge based on big data technology to promote education reform and innovation, application research of big data in education has been developing rapidly (Wang & Yu, 2015).

In March 2014, the general office of the Ministry of Education issued the 2014 education information work plan, it pointed out that strengthen the related data resources integration of dynamic monitoring, decision application and education prediction, to provide timely and accurate data support for educational decision-making, promote education basic data share. Thus, the application of education big data has been included in the working procedures of education informatization in our country (Education Informatization Work Points, 2014).

2.3 Big Data

In foreign countries, since 2012, big data has become a hot topic in many fields, including education. The Brookings Institution published a report stating that big data makes it possible to search for information on students' performance and learning styles, and tutors can analyze students' understanding and the most effective techniques for each student without relying on the exam stage (Jiang, Zhao, Wang & Wang, 2015). By focusing on big data Analytics allows teachers to study student learning in a more nuanced way. In October 2012, the U.S. Department of Education released the Educational Big Data Report "Advancing Teaching and Learning through Educational Data Mining and Learning Analytics" (Wu, 2014).

The report introduces the application areas, cases, and challenges of big data in American education, and illustrates the application of big data in adaptive learning systems (Xu, Wang, Liu & Zhang, 2013). Foreign education big data application research content mainly includes educational data mining, learning analysis, personalized education, improvement of education way, learning strategies discussion, reform of education management mode, data driven and library construction, the impact on teaching needs, learning needs and evaluation method, etc. Thus, although big data in foreign countries appeared earlier, but in the field of education, its application depth is still not enough (Xu et al., 2015).

To sum up, the research on the application of big data in education at home and abroad is still in its infancy. Although the relevant research content is extensive, it is not deep enough and even lacking specific practical application experience. Promote big data to really play its advantages and role in specific education and teaching practice.

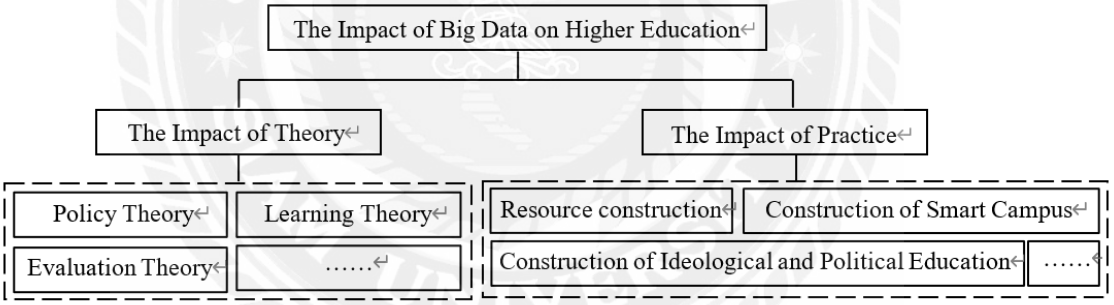
3. Research Methodology

Qualitative research is research on a small, carefully selected sample of individuals that does not require statistical significance, but with the researcher's experience, sensitivity, and the relevant techniques to gain effective insight into the behavior and motivations of the research subjects, the impact they may have, etc. The researcher uses historical review, documentary analysis, interviews, observations, participatory experiences, etc. to obtain information in natural contexts and analyses it by non-quantitative means to draw conclusions from the research (Moser & Korstjens, 2018). Qualitative research places more emphasis on meaning, experience (usually verbal descriptions), descriptions, etc.

4. Finding and Conclusion

The impacts of big data on higher education

The application of big data has brought far-reaching influence on education informatization, education reform and development. Educators will have the conditions to be closer to the objective reality of education and teaching, and could further explore



the true face of education and teaching. Figure 1 The impact system of big data on higher education.

Figure 1：The Impact System of Big Data on Higher Education

Big data bring new thinking and perspective for the innovation of educational theory

The arrival of the era of big data can provide unprecedented opportunities for educational theoretical innovation and education and teaching reform. Big data thinking and concepts can provide objective basis and new research perspectives for theoretical research such as optimizing educational policies, innovating educational and teaching models, and educational measurement and evaluation methods. Thus,

can better promote depth integration of education and technology (Chen & Yang, 2014).

Educational policy of more forward-looking and guidance

The traditional education policy formulation usually does not fully consider the actual situation, but the policy makers speculate the educational reality through the limited knowledge of themselves or some groups, which leads to the separation from reality and the poor effect of policy implementation. With the support of big data, the formulation of education policy is no longer a simple imitation of experience, nor is it a summary of policy makers' own experience and process, but a practical measure based on the mining of massive educational data. Therefore, the educational decision-making process is more scientific, and educational policies are more in line with the needs of educational development, so that the guiding role of educational policies can be better played.

Digital personality education mode

In the era of big data, students have left many digital fragments in the process of digital learning. Through the analysis of these digital fragments, students' learning behavior patterns can be found. The main role of big data in classroom teaching is to transform teachers' teaching from previous teaching experience to massive data analysis, and to transform students' awareness of development from reliance on teachers bounded rational judgments to data analysis of individual learning. Transition to Personalized Education for Students. Big data applications can realize large-scale online education while considering the individual needs of students. Rapid real-time processing of big data technology can support online education platforms to gain insight into students’ changes in real time, grasp students’ needs in real time, improve students’ learning effect, and conduct in-depth analysis of irrelevant data generated in the learning process, to predict and grasp changes in students’ needs. Big data can support students' personality development research, and data analysis can provide us with information about each student's learning needs, learning styles, learning attitudes, and learning styles, to provide learning content and learning guidance for different students, and promote their learning. Personality development, to achieve a truly personalized education.

Education evaluation more objective

With the promotion of education information, digital learning has become the normal way of the learners learning. Through MOOCs, China excellent course website, Microblog, WeChat, QQ and other platform, can issue teaching information and teaching content at any time, students can use PC, laptop, iPad, smart phones, and other terminal to learn their demand contents, these systems have produced a large amount of digital learning records. Educational big data technology can have the conditions to track and pay attention to the learning process of learners. The education research of big data technology support develops to analysis method of the whole data environment, which provides the most direct, objective, and accurate basis of education evaluation and analysis (Jiang, Zhao, Wang & Wang, 2015). In the education evaluation, teachers can also use big data to analyze their own teaching behavior, so find their teaching skills and teaching deficiencies. Educational evaluation of big data support can also change the traditional evaluation method for colleges and universities. Through big data, can track the trajectory of college graduates and work performance, which can record and analyze the contribution of college graduates to the society, develop social evaluation to the college talent cultivation mode and comprehensive work, to promote universities self-construction from social development and scientific view, improve teaching and educating quality.

The impacts of education reform practice

Big data applications in the field of practice mainly displays in data acquisition, analysis, and intelligent information mining, it can provide real-time data for the education and teaching, to help teaching scientific decision making, for the implementation of education and teaching activities provide an objective basis, to maximize play the function and value of the education and teaching activities (Wang & Yu, 2015). The application of big data in the field of educational practice mainly included education resources construction, construction of smart campus, analysis techniques and so on.

Provide new ideas for construction, sharing and application of educational resources

The traditional construction of teaching resources mainly includes the allocation of administrative departments and the independent development of teachers. The

allocation of administrative departments cannot fully meet the needs of individualized teaching and learning, and the independent development of teachers is prone to duplication of resources and poor overall quality of resources. The definition of high-quality resources also mainly depends on experience. The emergence of big data provides a new way for the construction of educational resources, and provides an objective basis for the definition of high-quality resources. Cloud computing and big data technology enable teachers and students not only to share educational resources stored in cloud servers, but also to mine hidden information value through the analysis of various unstructured data, to provide teachers with the most reasonable teaching resources and students. The combination of big data and cloud computing can grasp the dynamic needs of students' learning resources according to their running trajectories in the educational resource database. Through the analysis of the click, download and evaluation of learning resources, high-quality teaching resources can be defined objectively, the acquisition and storage of resources can be simplified, and repeated construction of resources and waste of high-quality resources can be avoided, so that high-quality teaching resources can be shared and utilized. on a large scale.

Provide a new method for the design and construction of smart campus

In recent years, the construction of smart campus has become an important part of the construction of education informatization. The idea of big data provides new ideas for the optimal design and construction of smart campuses. By embedding various sensors into each campus system, many campus software system platforms are integrated into the campus cloud server, realizing the interconnection and interoperability of cloud computing, network, and Internet of Things, and realizing real-time campus data collection, storage, processing, and analysis. The development and teaching applications provide effective decision-making. The smart campus also includes the construction of the big data standard system, the campus digital ecological environment, and the corresponding information organization and management system. In the smart campus environment, the application of big data based on cloud computing can realize the analysis and prediction of teachers' teaching behaviors, students' teaching behaviors, learning behaviors, and students' character characteristics, thereby providing timely guidance and help for promoting students' physical and mental development. At the same time, it also provides real-time dynamic data of school operation, school leaders and teachers can keep abreast of the

latest management and teaching information, helping education and teaching management to be more scientific and intelligent.

Provide technical solutions for processing of the unstructured data

With the popularization and application of mobile Internet technology, the explosive growth of educational data has resulted in a large amount of unstructured data that is difficult for computers to process and understand. How to mine valuable information from these educational big data is the biggest challenge facing current learning analysis. However, cloud computing-based big data applications make it easier to acquire, store and process data, especially for unstructured data processing technologies, which can solve problems in the field of learning and analysis.

Help to improve the quality of ideological and political education of college students

In the era of big data, to improve the quality of ideological and political education for college students, based on realizing big data and multi-dimensional student education data collection, storage, sorting and analysis, according to the results of data analysis, combined with changes in educational conditions and the characteristics of students, establish an educational model that integrates time and space and penetrates multiple dimensions. Use big data technology to establish an early warning mechanism for students' thinking and behavior, and effectively conduct targeted intervention and control mechanisms for students. By the students' campus card consumption, attendance and borrowing books records, and students' QQ, Renner Web, microblog, WeChat, search engines and other platforms' data collection, calculation, and analysis, timely forecast the dynamic status of students' thought and behaviors, carry out students' ideological education, psychological counseling, and behavioral intervention, to make students keep healthy psychology and good moral character (Wang & Yang, 2015).

5. Recommendation

Construction of cloud computing platform

In order to carry out unified analysis of educational data, a unified cloud computing platform must be established at the national level. Through the cloud computing platform, the education, management and service data of colleges and universities across the country are collected, stored, processed, and used. Teachers can

teach on this cloud computing platform, students can learn, and college administrators can also conduct comprehensive management. At the same time, the platform can carry out works in coordination with other platform, further track the graduates' work trajectory, work performance and social evaluation, also can automatically obtain the contribution data and feedback of universities to the society, to improve universities teaching reform target, provide data and decision-making basis for the evaluation and development of colleges and universities.

Database construction

Due to diversity of education big data, a comprehensive database system should be established, not only include relational databases, also non-Due to the diversity of big educational data, colleges and universities need to establish a comprehensive database system, including not only relational databases, but also non-relational databases, so that the database can effectively manage educational big data. -relational database, to make the database to effectively manage education big data.

Model base construction

To facilitate the acquisition, storage, analysis and utilization of big data, a model database must be established, including personalized course analysis, student learning behavior analysis, teaching evaluation, teacher teaching ability, student public opinion analysis, social evaluation, and collaborative system model, etc. Colleges and universities use big data to serve higher education teaching.

Institutions construction

In order to make university better use of big data to promote the comprehensive improvement of university work, a system must be set up to adapt to the big data. Through the system construction to ensure that the big data can be fully, objectively, and scientifically used, to play its greatest value. For examples, setting up the university chief information officer positions, teachers participate data mining works 2-3 times in every year and so on (Wang & Fu, 2014).

REFERENCES

Chen, Y. H. & Yang, X. N. (2014). Strategies of External Smart Education and the Enlightenment. *Modern Educational Technology.* 24(10), 5-11.

Education Informatization Work Points. (2014). *Ministry of Education of the People's Republic of China*. Retrieved from http://www.moe.edu.cn/publicfiles/business/htmlfiles/moe/s7062/201403/165870.html.

Jiang, Q., Zhao, W., Wang, P. G. & Wang, L. P. (2015). Realization of Individual Adaptive Online Learning Analysis Model Based Big Data. *China Educational Technology*, 01, 85-92.

Liu, F. J. (2014). Research Overview of the Big Data's Application in Education. *Modern Educational Technology*. 24(8), 13-19.

Moser, A., & Korstjens, I. (2018). Series: Practical guidance to qualitative research. Part 3: Sampling, data collection and analysis. *European Journal of General Practice*, *24*(1), 9-18.

Wang, L. Z. & Yu, W. H. (2015). An Overview of Learning Analysis from the perspective of Big Data. *Distance Education in China*, 03, 31-37.

Wang, P. & Fu, Z. L. (2014) Data-Driven Decision Making System: A Powerful Tool for American School Improvement in Big Data Age. *China Educational Technology*, 07, 105-112.

Wang, S., Yang, Y. & Yang, H. (2015). Review on the Study of Ideological and Political Education Based on Big Data. *University Education Science*, 03, 112-117.

Wu, H. Q. (2014). Thinking in Big Data. *Science and Society*. 4(1), 1-13.

Xu, P., Wang, Y. N., Liu, Y. H. & Zhang, H. (2013). The Learning Innovation from the Perspective of Big Data: An Analysis of the U.S. Report of Enhancing Teaching and Learning through Educational Data Mining and Learning Analytics and Its Enlightenment. *Journal of Distance Education*, 06, 11-17.

Zhang, L. X. & Zhu, H. Y. (2015). The New Development and Enlightenment of Smart Education Research and Practice. *Research in Educational Development*,05, 54-60.