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Using Big Data Technology to Establish an Intelligent Monitoring System for Graduate Education

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Abstract: The era of big data provides a new opportunity for the monitoring of graduate education. By integrating the relevant data in the process of graduate education, building a large database, and using big data technology to establish a graduate education monitoring system, we could carry out dynamic monitoring and analysis on the quality of graduate education, and use the supervision and feedback system to dynamically supervise the monitoring results, and constantly intelligently improve the monitoring system driven by big data. As a result, we could establish a mature intelligent monitoring system for graduate education, implement efficient real-time monitoring of graduate education, serve the graduate education, and constantly improve the quality of graduate education.

1. Introduction

Since 2000, the scale of graduate education in China has expanded rapidly. According to the data released by the Ministry of Education, in 2020, there were 827 graduate training units and 1.1066 million graduate students, an increase of 190000 over the previous year, an increase of 20.74 percent. Among them, there are 116000 doctoral students and 990500 master's degree students. In addition, the total scale of graduate education has reached 3.1396 million [1]. The surge in the scale of postgraduate education has brought new opportunities for the development of postgraduate education in China. With the basic completion of the extension development task characterized by scale expansion, the overall improvement of quality, connotative and high-quality development has become the core topic of Chinese postgraduate education in the new era. China's graduate education has entered a quality era, and strengthening the construction of quality assurance and supervision system plays an important role in the development of degree and graduate education. Expanding enrolment and a wide range of types of education and training make it more difficult to evaluate and monitor degree and postgraduate education [2].

Big data is a data collection characterized by large capacity, many types, fast access speed and high application value. For big data technology, international data company IDC (International Data Corporation) defines it as economically extracting value from extremely large and diverse data through the use of efficient collection, discovery and analysis. The industry generally uses "4V" to characterize big data's characteristics, that is, Volume, Variety, Velocity and Value [3,4].

The informationization of graduate education has produced a large amount of data. under the background of comprehensively improving the quality of graduate education and paying attention to

the connotative development of graduate education, combining and studying the role of big data technology in the evaluation of graduate education, relying more on big data technology to carry out graduate education monitoring is the inherent need to continuously improve the quality assurance and supervision system of graduate education and improve the quality of graduate education in an all-round way.

2. The Lag of the Existing Quality Monitoring System of Postgraduate Education

2.1. The Backward Monitoring System of Postgraduate Education

At present, the evaluation of graduate education in China is mainly summative evaluation, and the dynamic monitoring of normality and process is insufficient. Due to the limitations of the consistency of indicators and the comparability of data, the evaluation criteria mostly use static fixed indicators, and it is more common to evaluate different types of universities and disciplines with the same or similar indicators. Although different types of graduate education evaluation have set different weights, their data indicators are basically unchanged, which can easily lead to the neglect of the development diversity of evaluation objects [5].

2.2. The Lack of Pertinence in Monitoring System

At present, the monitoring work of graduate education in China paid more attention to the common problems of graduate education, did not carry out classified evaluation according to different disciplines and different universities, and paid little attention to the internal needs of graduate education. As a result, the current monitoring indicators of graduate education were seriously commonalized and personalized indicators are basically lost. this evaluation system seriously ignores the differences between different universities and different disciplines. It is difficult to objectively reflect the real level of graduate education in China, and it can mislead the future development of graduate education, leading to the assimilation of graduate education. In the long run, it will not be conducive to the development of characteristic disciplines and the improvement of graduate education [6].

2.3. The Indicators of Monitoring System with Unknown Targets

In the old monitoring system of graduate education in China, there are generally dozens of monitoring indicators, which are too cumbersome. Although there are so many monitoring indicators, not many indicators really play an important monitoring role. Some monitoring indicators can not be very good, some indicators are not so important, and even some indicators may be dispensable, so that the goal of the monitoring index of graduate education is unknown, which leads to the subjectivity of the judges in the monitoring process. Under the condition that we do not have a good grasp of the nature of graduate education, we should make inaccurate judgments and produce not enough objective monitoring results. Therefore, this old monitoring system must be reformed, otherwise it will have a serious impact on graduate education [7].

3. Establishing the Quality Monitoring System of Postgraduate Education by Using Big Data Technology

The connotative development of graduate education focuses on the improvement of education quality and gives higher requirements. Graduate education must comply with the call of the times and promote the quality of graduate education through further reform and innovation. The key to reform

and improve the quality of graduate education is to form an efficient quality monitoring system of graduate education, grasp the quality status of graduate education in time, and carry out the optimization and adjustment of policies related to graduate education on this basis. Today, with the rapid development of high technology, we can effectively integrate modern scientific and technological methods such as big data technology to form a graduate education monitoring system[8].

3.1. Establishing a Big Data Platform for Graduate Education

Big data in graduate education mainly includes teaching, academic activities, scientific research, social activities, scientific research data and graduate quality data. In addition to collecting the dimensions of graduate size, graduate employment, mentor team, professional degree training, internationalization and satisfaction, we could also obtain a lot of fine-grained data related to graduate study, research and employment. For example, the social activity data of graduate could be obtained from social media, and graduate practical activities could be gained from all aspects of universities and social organizations. The social evaluation of graduate students could get feedback from employers. In addition to the existing information systems, some data, such as graduate elective courses and graduate scholarships, might not necessarily build an information system, but these data have a good potential for data mining and require manual input to create an information system. Finally, a data set was formed, which was the basis of the whole research and collected all kinds of raw data related to graduate education. As far as possible to obtain a true and reliable, representative, a large amount of data to be studied big data collection. Finally, it was collected into a large data set, on which data integration and deep data mining are carried out.

3.2. Optimizing the Big Data of Graduate Education

The above big data platform related to graduate education was still in its infancy and couldnot be used directly. Because of the large volume and variety of data from various sources, these data were complex and redundant. If these data were directly used to carry out graduate education monitoring, some of these data would affect the monitoring results, become noise data in the monitoring process, and reduce the role of effective data. For this reason, it was necessary to use some data optimization processing methods to eliminate the noise data, to obtain the optimized big data, and to lay a solid foundation for the follow-up work. The optimized graduate education big data was still in a state of data accumulation, and there was no classification, which was not conducive to intelligent rapid retrieval and analysis. For this reason, in order to follow up and make efficient use of big data, big data also was needed to integrate and summarize the data collected from various sources, classify the data according to different standards, integrate them into different data tables, and put them into the database. The classification criteria included roles, the attributes of data and the content of personnel training, so as to create a structured big data platform for graduate education, which laid a good foundation for big data analysis and information mining.

3.3. The Formation of the Monitoring System of Graduate Education

It was necessary to select the monitoring index of graduate education to establish the intelligent monitoring system of graduate education. The monitoring index of graduate education was objective, comprehensive and representative. Objectivity required that the analysis should be carried out according to the actual indicators, which was the guarantee of the effectiveness of the monitoring results, otherwise the monitoring was difficult to have value. The comprehensiveness meant that the monitoring indicators was required to cover every link in the process of graduate education, which was the fundamental guarantee for the scientific construction of the whole monitoring system. The

representativeness said that although it was required to fully cover the whole process of graduate education, it couldnot simply intercept each link of graduate education. After selecting the monitoring index of graduate education, we also need to configure the monitoring system of graduate education, because the monitoring of graduate education ultimately reflected the situation of in-school education, although the situation of leaving school could reflect the situation of in-school education to a certain extent, but it was also caused by the indirect connection of in-school education, so the weight setting of the monitoring system should well deal with the situation of being in school and leaving school. On the one hand, it highlighted the importance of the school stage in graduate education, and introduced side evaluation factors to make the monitoring more accurate.

3.4. Establishing an Intelligent Monitoring System for Postgraduate Education

The graduate education monitoring system needed the assistance of the graduate education supervision and feedback system to determine whether it implemented high-quality monitoring on graduate education. The graduate education supervision system was a connecting link between the preceding and the next, which supervised the monitoring results, continuously acted on the monitoring indicators, and constantly improved and modified the indicators and their weight parameters, without human control and participation, so that the monitoring system could be intelligent. Supervising the monitoring results of graduate students could timely and efficiently grasp the specific current situation, real level and development trend of graduate education, support the monitoring system of graduate education through big data technology, and use the supervision system to supervise quality, mutual coordination and interaction, and finally promote the construction of graduate education monitoring system. In order to realize the accurate monitoring of graduate education, big data platform, efficient monitoring system and reasonable supervision and feedback system are indispensable. After the establishment of big data platform for graduate education, at the same time in-depth analysis of the current situation of graduate education, combined with the purpose of graduate education, the establishment of graduate education monitoring system, and then the use of graduate education big data to drive graduate education monitoring and analysis, and the use of effective supervision and feedback mechanism to carry out dynamic supervision of the monitoring results. At the same time, modern artificial intelligence technology was introduced to optimize the monitoring system based on big data technology. Finally, an efficient, reasonable and complete intelligent monitoring system for graduate education was formed.

4. The Function of the Monitoring System of Graduate Education under the Technical Background of Big Data

4.1. Ensuring the Immediacy of Graduate Education Monitoring

Big data not only emphasized the magnanimity of data, but also emphasized the rapid acquisition of valuable information from massive data. In addition to the powerful data acquisition function, the graduate education monitoring based on big data technology could quickly process, correlate and analyze the data according to the needs of the monitoring subject, presented the results intuitively, and greatly shortened the cycle of data collection and result feedback so that the original need to carry out after the end of all the work of the retrospective monitoring into the process of immediate monitoring. Monitoring collected data accumulated in usual teaching and management work, which did not need a lot of manual input, or even need to be monitored to provide monitoring materials, which reduced the time and cost of data collection and greatly improved the monitoring efficiency [5].

4.2. Enhance the Accuracy of Graduate Education Monitoring

The graduate education monitoring based on big data not only collected structured data about teachers' information, papers monographs, scientific research projects and other indicators, but also could obtain a large number of text and image unstructured data from the web pages of school science and technology, personnel and other departments. The big data management platform was used to collect the data generated by graduate students and mentors continuously, quickly, multi-level and multi-dimensional, and record the information comprehensively and objectively. These data truly recorded the academic activities, scientific research participation, life trajectory and psychological development of graduate students. Through the correlation analysis technology, we could mine the information contained in these data and the relationship between them, and obtain the behavior indicators that had a significant impact on the quality of graduate education, so as to enhance the accuracy of graduate education monitoring.

4.3. Strengthen the Early Forecasting Function of Monitoring

The monitoring system can continuously and dynamically collect and analyze relevant data such as graduate teaching and scientific research activities, objectively present the actual state of graduate education, and monitor and early warning whether the actual state develops in accordance with the scheduled plan and whether it is close to the predetermined goal, so as to establish a new mechanism of timely response. If the state of graduate education is close to the critical value, an early warning message will be issued to help the graduate education management department find the problems in teaching, scholarship and management in time, analyze the reasons and improve them, so as to correct the deviation of activity objectives and ensure that they develop towards the predetermined goals [5].

5. Conclusion

It was urgent to accurately and timely grasp the situation of graduate education. The rapid development of big data's technology provides a new idea for the establishment of graduate education monitoring system. We could use all kinds of data of graduate education to construct big data platform, in-depth analysis of the situation of graduate education, combined with the purpose of graduate education and other factors, to establish a monitoring system of graduate education, driven by big data to intelligently optimize the monitoring system, and finally build an intelligent monitoring system for the quality of graduate education, efficiently monitor graduate education, and intuitively show the status of graduate education. To provide an objective basis for multi-subject value judgment and scientific decision-making in universities, and finally improve the quality of graduate education.

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