Practical analysis of data warehouse technology in college education management

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Abstract: *The application of data warehouse technology in college education management has received more and more attention. This article analyzes the practice of data warehouse technology in college education management. First, it introduces the basic concepts of data warehouse technology, then analyzes the challenges faced by higher education management, and puts forward the advantages of data warehouse technology in higher education management. Then it discusses the application of data warehouse technology in higher education management, including student management. , course management, teacher management, etc., and finally summarized the current development trends of data warehouse technology in college education management, and put forward future research directions and suggestions.*

Keywords: *data warehouse technology; college education management; practice*

1. Introduction

With the rapid development of information technology, college education management is facing more and more challenges and demands. In traditional education management, due to problems such as data dispersion and information islands, decision-making efficiency is low and information sharing is difficult. As a technical means to integrate, store and analyze various types of data, data warehouse technology provides new ideas and solutions for university education management. By building a data warehouse, centralized management and analysis of various educational data can be achieved, decision support and business insights can be provided, and the efficiency and quality of education management in colleges and universities can be improved.

2. Overview of data warehouse technology

Data warehouse (Data Warehouse) is a technology used to integrate, store and manage large of data. It extracts data from different data sources, converts it into a standard format, and then loads it into a unified, structured implemented in the data store. Data warehouses are widely used in decision support systems to help with complex data analysis and decision-making by providing reliable, consistent, and integrated data. The main goal of data warehouse technology is to provide high-performance data access and analysis capabilities to support the decision-making process. It can help analyze data from multiple dimensions, discover potential opportunities and problems, and make relevant decisions. Data warehouse technology also involves data storage and indexing, the use of ETL (Extract, Transform, Load) tools, data warehouse architecture design and optimization, etc. Through rational design and use of data warehouse technology, data resources can be better utilized and the accuracy and efficiency of decision-making can be improved, and competitive advantages can be gained.

3. Challenges faced by higher education management

3.1 Insufficient course resources

First, there are insufficient teachers. Colleges and universities need to have a high-level teaching with excellent quality, complete knowledge structure and rich teaching experience to ensure the quality of teaching. However, many colleges and universities currently face the dilemma of insufficient On the one hand, due to imperfect recruitment systems and remuneration mechanisms, the

of attracting talents to colleges and universities to engage in teaching work is relatively low; on the other hand, the teacher structure of some colleges and universities is unreasonable, and there is a lack of professional teachers, making it difficult to provide Curriculum resources that meet subject characteristics and development needs. Secondly, teaching methods and means are insufficient. Traditional teaching methods and means have gradually been unable to meet the needs of modern college education. With the development of information technology and the application of artificial intelligence, big data and other technologies in the field of education, new teaching methods and methods are constantly emerging. However, due to the lack of relevant training and research by college teachers, they are unable to integrate new teaching concepts and technologies in a timely manner, resulting in insufficient utilization of course resources in the teaching process.

3.2 Teaching quality needs to be improved

The improvement of teaching quality refers to the efforts to improve teachers' teaching level and student learning outcomes through a series of measures and reforms. At present, educational management in colleges and universities faces the following specific problems in improving teaching quality: First, the talent training model needs to be reformed. The traditional education model places too much emphasis on the infusion of knowledge and examinations, resulting in students lacking innovative thinking and practical abilities. In order to improve the quality of teaching, college education management needs to advocate the concept of students' active learning and cooperative learning, and cultivate innovative awareness and practical ability. This involves the scientific nature and pertinence of the curriculum, as well as the improvement and innovation of teachers' education and teaching methods. Secondly, teaching facilities and technical support are also key factors. Modern teaching facilities and advanced technical support can effectively improve the quality of teaching. However, there are problems in the education management of some colleges and universities such as aging classroom facilities and backward laboratory conditions, which limit the improvement of teaching effects.

3.3 Difficulty meeting the diverse needs of students

With the continuous development and progress of society, students' needs have become more and more complex and changeable. Traditional education management methods are often unable to adapt to students' individual needs, resulting in a decline in students' satisfaction with the quality of education. First, students' diversified subject choices and professional interests are a major challenge. With the development of social diversification, students' demand for different disciplines has also increased, hoping to choose majors that interest them and have development prospects. In this case, university education managers need to provide a wider range of major choices and related teaching resources to meet the needs of students [1]. Secondly, there are obvious individual differences in students' learning styles and learning rhythms. Each student's learning style and learning pace may be different. Some students like to study alone and independently, some students like to study cooperatively, some students learn faster, and some students learn slower. This requires university education managers to provide flexible learning environments and diverse teaching methods so that each student can get a learning style and pace that suits him or her.

3.4 Lack of a complete teaching evaluation system

Teaching evaluation is an important means of measuring teacher teaching effectiveness and student learning outcomes, and is of great significance for improving teaching quality. However, there are currently the following problems related to the teaching evaluation system in my country's higher education institutions: First, the teaching evaluation indicators are not scientific and accurate enough. The existing teaching evaluation system is often based on students' test scores and ignores the comprehensive development of students' knowledge and skills and the cultivation of innovative abilities. Evaluating teachers' teaching effectiveness solely based on test scores can easily lead to the tendency of "exam-oriented education" and affect the improvement of teaching quality. Secondly, teachers' teaching evaluation and incentive mechanisms are not perfect enough. At present, most university teacher evaluations mainly use the number of papers published and the status of scientific research projects as core indicators, while ignoring the comprehensive consideration of teaching effectiveness. This evaluation method that focuses on scientific research can easily lead to insufficient investment in teaching by teachers and affect the improvement of teaching quality. At the same time, there is a lack of incentives that match the quality of teaching, and it is difficult to mobilize teachers'

enthusiasm and creativity.

4. Advantages of data warehouse technology in college education management

First, data warehouse technology can perform data integration and centralized management. Data warehouse technology can integrate and centrally manage data scattered in different systems. There are a wide range of data sources involved in college education management, including student information, teacher information, course information, performance information, etc. By using data warehouse technology, these data from different systems can be integrated into a unified database, providing one-stop data access and management to facilitate university managers to obtain and analyze the required information. Second, data warehouse technology can provide data decision support. Data warehouse technology can provide university managers with accurate and timely data analysis and decision-making support. Through multi-dimensional analysis, data mining, data visualization and other technical means of data in the data warehouse, valuable information and patterns hidden in massive data can be mined to guide university managers to make scientific decisions. For example, it analyzes student learning conditions based on student performance data to help formulate personalized learning plans; analyzes teacher teaching quality based on course evaluation data, and provides basis for teacher training and evaluation. Third, data warehouse technology can support accurate forecasting and planning. Data warehouse technology can predict and plan the future development trends of colleges and universities through data models and algorithms. Through the analysis and modeling of historical data, corresponding development models and laws can be derived to help university managers formulate reasonable development strategies and plans [2]. For example, by analyzing enrollment data and employment rate data in previous years, we can predict future enrollment situations and job market trends, and provide a basis for college enrollment policies and major settings.

5. The practice of data warehouse technology in college education management

5.1 Enrollment management

First, data warehouse technology can support colleges and universities in collecting, integrating and analyzing enrollment data. Universities can use data warehouse technology to integrate data from various enrollment information sources (such as registration systems, college entrance examination score systems, etc.), and clean and convert them to ensure the accuracy and consistency of the data. Through the data warehouse, colleges and universities can obtain enrollment information in real time and conduct comprehensive analysis, such as analyzing the changing trends in the number of applicants and the application status of students in different provinces. Secondly, data warehouse technology can provide decision-making support for colleges and universities to formulate enrollment policies and plans. Through the analysis of enrollment data over the years, colleges and universities can understand the enrollment situation of different batches, different majors, and different regions, so as to more accurately predict future enrollment trends and needs. Based on these analysis results, colleges and universities can formulate reasonable enrollment policies and plans, including setting enrollment indicators, adjusting admission scores, etc., to better meet social needs and the development needs of colleges and universities. Third, data warehouse technology can monitor and optimize key links in the enrollment process. Through the data warehouse, colleges and universities can understand the situation of each link in the admissions process in real time, including registration progress, qualification review, interview scoring, etc. Colleges and universities can use data warehouse technology to conduct data mining and analysis to identify bottlenecks and problems in the enrollment process, and take corresponding optimization measures in a timely manner to improve enrollment efficiency and quality. Finally, data warehouse technology can support colleges and universities in monitoring and evaluating enrollment results. Colleges and universities can use the data warehouse to conduct statistics and analysis on the situation of admitted students, including the students' provincial origin, major distribution, performance status, etc. This information can help colleges and universities understand the characteristics, strengths and weaknesses of their own enrollment results, and provide a basis for decision-making, such as adjusting enrollment strategies, optimizing major settings, etc.

5.2 Student information management

Student information management in college education management is a complex and important task. The application of data warehouse technology can effectively support college managers in the

collection, storage, analysis and management of student information. First of all, data warehouse technology can be used as a unified data storage platform to integrate various student information data sources, such as student files, student status information, course results, reward and punishment records, etc. By integrating student information from different systems and databases into a data warehouse, the problems of information islands and data redundancy can be avoided, repeated data entry and management costs can be reduced, and data accuracy and consistency can be improved [3]. Secondly, data warehouse technology can support university administrators to conduct in-depth analysis and mining of student information. By using data mining and analysis tools in the data warehouse, managers can find hidden patterns and trends from large-scale student information data, understand students' learning conditions, behavioral characteristics and development trends, and provide scientific basis for college education management and decision support. For example, it can help university administrators predict and plan students' academic development by analyzing students' historical scores and course selections, identify students with learning difficulties in advance, and provide precise teaching.

5.3 Course resource management

Course resource management refers to the process of effectively integrating, sharing and managing various teaching resources owned by colleges and universities. First, data warehouse technology can help colleges and universities establish a comprehensive course resource library. Through data warehouse technology, various forms of course resources including textbooks, handouts, test questions, teaching videos, etc. can be stored and managed uniformly. At the same time, data warehouse technology can also provide resource retrieval and query functions, allowing teachers and students to search and obtain required course resources conveniently and quickly. Secondly, data warehouse technology can classify and label management of course resources. There are a large number of course resources in college education management, and the classification and labeling management of these resources can greatly improve the efficiency of resource utilization. Through data warehouse technology, course resources can be classified according to subjects, grades, teaching objectives, etc., and each resource can be labeled accordingly. In this way, teachers and students can quickly locate and obtain course resources that meet their requirements in the data warehouse according to their own needs. Third, data warehouse technology can also support version management and updates of course resources. As time goes by, university course resources will be updated and improved, and data warehouse technology can help universities achieve version management and historical records of course resources. In this way, teachers and students can clearly understand the version information of each course resource and obtain the latest resource content in a timely manner to ensure the continuity and update of teaching.

5.4 Faculty and staff management

Faculty and staff are the core resources of higher education. How to effectively manage and utilize this resource is directly related to the improvement of the quality and efficiency of higher education. First of all, the application of data warehouse technology in faculty recruitment management can provide historical data and statistical analysis to provide a reference for university recruitment decisions. Through the analysis of recruitment data in the data warehouse, we can learn about the recruitment situation in the past few years, changing trends in job demand, and the effectiveness of recruitment channels. At the same time, through data tracking and monitoring of the faculty and staff recruitment process, problems in the recruitment process can be discovered and solved in a timely manner, and recruitment efficiency and quality can be improved. Secondly, the application of data warehouse technology in faculty and staff personnel management can achieve centralized storage and management of faculty and staff information. Faculty and staff information includes basic personal information, academic qualifications, professional titles, work experience, assessment status, etc. Through data warehouse technology, this information can be centrally stored in a unified database and enable rapid query and update. At the same time, by establishing a data model of the data warehouse, multi-dimensional analysis of faculty and staff information can be realized, providing comprehensive and accurate personnel information for university managers to make scientific and reasonable personnel decisions. Finally, the application of data warehouse technology in faculty performance management can provide data support and analysis for faculty performance evaluation. Through the entry and storage of faculty performance indicator data, the integration and analysis of faculty performance data can be achieved. The multi-dimensional analysis function based on data warehouse technology can comprehensively evaluate and compare the performance of faculty and staff, discover

outstanding performers and areas that need improvement, and take corresponding measures in a timely manner.

5.5 Teaching quality evaluation

In the education management of colleges and universities, data warehouse technology plays an important role in the practice of teaching quality assessment. Teaching quality evaluation is a process of comprehensive, objective and scientific evaluation of teaching effects, aiming to improve the quality of education and teaching level. Through the application of data warehouse technology, various teaching-related data can be effectively collected, organized and analyzed, thereby providing strong support for teaching quality assessment. First, data warehouse technology supports multidimensional analysis and decision support. Teaching quality assessment requires evaluation of the teaching process and results from multiple perspectives, such as teacher teaching, student learning performance, etc. Data warehouse technology adopts a multi-dimensional data model, which can achieve flexible and diverse analysis of teaching data by constructing appropriate dimensions and indicators. At the same time, data warehouse technology also provides powerful reporting and query functions, allowing managers to conduct various decision support analyzes as needed. Secondly, data warehouse technology can also realize data mining and predictive analysis. Through the mining and analysis of teaching quality evaluation data, potential patterns and trends can be discovered, providing scientific basis for improving teaching quality [4]. For example, data mining technology can be used to identify key factors that affect teaching quality, and then formulate targeted improvement measures. Through predictive analysis, future teaching quality can be predicted, which is conducive to timely adjustment of teaching strategies and early discovery and solution of potential problems. question. Finally, data warehouse technology can also support the visual display of teaching quality assessment results. Through data warehouse technology, complex teaching data can be transformed into intuitive and easy-to-understand charts, reports and other forms for display. This not only makes it easier for managers to view and understand the evaluation results, but also provides a better basis for decision-making.

6. Analysis of the application prospects of data warehouse technology in college education management

First, the application of data warehouse technology in college education management will be more intelligent and personalized. With the rapid development of the Internet and artificial intelligence technology, university education management systems can acquire, process and analyze large amounts of student and teacher data. Through data warehouse technology, universities can establish cross-department and cross-disciplinary data integration platforms to achieve comprehensive summary and integrated management of education management information. On this basis, using data mining and machine learning algorithms, personalized education management analysis and decision-making can be carried out to provide teachers and students with more precise teaching and learning support. Secondly, data warehouse technology will pay more attention to data security and privacy protection in college education management. With the improvement of informatization, the amount of sensitive data involved in college education management systems is increasing, such as student grades, test scores, and personal privacy. Therefore, universities need to establish a sound data security system, strengthen access control to data warehouses and apply data encryption technology. At the same time, colleges and universities must also comply with relevant privacy protection regulations, strengthen compliance management of personal information of teachers and students, and ensure data security and privacy. Third, data warehouse technology will pay more attention to system integration and application innovation in college education management. College education management involves multiple functional modules and systems, such as student status management, course management, teaching evaluation, etc. Through data warehouse technology, the integration and interoperability of these systems can be achieved, improving work efficiency and data utilization value. In addition, data warehouse technology will also promote innovative applications in college education management, such as intelligent recommendation systems and student portrait analysis based on data warehouses, providing teachers and students with better teaching support and personalized services.

7. Conclusion

This article analyzes the practice of data warehouse technology in college education management

and finds that data warehouse technology has important significance and value in college education management. It can help college managers better understand all aspects of data and conduct scientific research. Decision-making and management. However, data warehouse technology still has some challenges in university education management, such as data quality issues, privacy protection, etc. Therefore, in future research, it is necessary to further explore the optimization strategies and application models of data warehouse technology in college education management, and improve the effect and value of data warehouse technology in college education management.

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