



The Application of Data Center Based on Big Data Thinking in Vocational Colleges

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Abstract. With the rapid development of data technology and information technology, big data has become an important feature of the current era. As the core platform of big data application, the data platform can integrate, process and manage multi-source heterogeneous data, provide comprehensive data services and support, and is expected to be applied and promoted in the vocational college scene. Based on the thinking of big data, this paper discusses the application of data center in the scenario of vocational college, and discusses the aspects of data warehouse, data integration, data governance and data service.

Keywords: Data Center · Big Data · Data Warehouse · Data Integration · Data Governance · Data Services

1 Research Background

1.1 Research Background and Significance

With the continuous development and application of big data technology, the scale of data in various fields is increasing, and the types and sources of data are becoming more and more diversified. In the face of such a large amount of data, how to carry out effective management and analysis has become an important issue in front of all walks of life. As the core platform for managing and analyzing data, data center is being adopted by more and more schools and institutions [1, 3].

Data has become the core asset of various organizations, the driving force of high-quality social development, and the ‘golden key’ to improve the modernization of social governance system and governance capacity. Schools need to deepen their understanding, continuously use the new generation of information technology to improve the level of data management, and promote the transformation of educational decision-making from experience-driven to data-driven, educational management from one-way management to collaborative governance, and educational services from passive response to active service [4, 5].

As a comprehensive educational institution, the data sources of vocational colleges include student information, teacher information, academic research data and other types. By using the data platform, we can effectively manage and analyze these data, improve

the level and efficiency of teaching management and scientific research decision-making in vocational colleges, build a smart campus, and improve students' learning experience through data [6, 7]. Therefore, it is of great practical significance and theoretical value to study the application of data platform in vocational college scene. The purpose of this paper is to explore the application of data center in the scenario of vocational colleges based on big data related thinking, and to improve the level and efficiency of information construction in vocational colleges.

1.2 Research Purpose and Content

The purpose of this paper is to explore the application of data platform in the scene of vocational colleges, analyze the key elements and methods of data platform, and improve the level and efficiency of data application and management in vocational colleges. The specific content includes the basic concepts of data center, data integration, data warehouse, data governance and data services. Through case analysis and theoretical discussion, this paper aims to make new contributions to the informatization construction of vocational colleges, provide more comprehensive and effective data support, and also provide reference for the promotion and application of data center in other fields.

1.3 Research Methods and Technical Route

This article uses the literature data method, case analysis method and empirical research method to discuss and study the application of the data center in the vocational college scene. Specifically, through the collection and analysis of relevant literature and case data, this paper first deeply understands the concept, characteristics and functions of data platform, and clarifies the application and challenges of data platform in the context of vocational colleges. Secondly, through the in-depth analysis and evaluation of the data platform construction case of a vocational college, the key elements and methods of data platform construction are summarized, and the optimization and upgrading suggestions of data platform in the vocational college scene are further proposed. Finally, using the methods of questionnaire survey, data analysis and empirical research, the application effect and economic benefit of the data platform are evaluated and verified, which provides reliable data support and decision-making basis for the construction of data platform in vocational colleges. In short, the research methods and technical routes of this paper aim to conduct a comprehensive and in-depth study and discussion on the application of data center in the scenario of vocational colleges from both theoretical and practical levels, and provide new ideas and methods for the information construction and data application of vocational colleges.

2 Theoretical Basis of Data Center Construction

2.1 Big Data Related Thinking

In today's era, big data has become an indispensable feature of schools, organizations and individuals. Therefore, the application of big data related thinking has become an important theoretical basis for the construction of data center. Big data-related thinking

covers data collection, storage, processing, analysis and application. It aims to discover the inherent laws and values of data through in-depth mining and analysis of data, and provide scientific basis for data use and management [8, 12].

At the same time, big data thinking is also very important in the construction of data center, because data center needs to collect, integrate and process a large amount of data, and big data thinking can help data center builders better understand and use these data. The following is the application of several big data thinking in the construction of data center:

(1) Data analysis

Big data thinking emphasizes in-depth analysis and mining of data, so in the construction of data center, it is necessary to use data analysis thinking to collect, integrate and analyze various data to help decision makers better understand business, find problems and solve problems.

(2) Data integration

Big data thinking focuses on data integration and sharing, so in the construction of data platform, it is necessary to use data integration thinking to integrate various data sources and transform them into available data assets to meet various needs.

(3) Data governance

Big data thinking emphasizes the quality and security of data, so in the construction of data middle platform, it is necessary to use data governance thinking to ensure the integrity, accuracy, consistency and security of data, so as to ensure the validity and credibility of data.

(4) Data-driven

Big data thinking emphasizes the value and application of data, so in the construction of data center, it is necessary to use data-driven thinking to explore and utilize the value of data to support various business and decision-making.

In the construction of data platform, big data related thinking can help schools build a reasonable data system and data governance system, realize the integration and unification of data, and improve the credibility and reliability of data. In addition, big data related thinking can also help schools explore the application value of data, discover future data trends and development directions, and provide support and guidance for school strategic decision-making and business innovation.

2.2 The Relationship Between Data Center and Vocational College Informatization

As the core platform of big data application, data center can provide comprehensive data services and support in the scenario of vocational colleges, which is closely related to the informatization of vocational colleges. All aspects of vocational college teaching management, scientific research decision-making and smart campus construction need to rely on the data support provided by the data center. Therefore, the data center has an important role and significance in the information construction of vocational colleges.

First of all, the data center can help vocational colleges to build a comprehensive and complete data warehouse, and provide a reliable data base for subsequent data analysis and decision-making. In the process of building a data warehouse, data stratification and data modeling of the system are needed to better manage and utilize various data

resources. The data center can provide the infrastructure of data warehouse construction for vocational colleges, including storage equipment, network equipment, data management software, etc., and provide strong technical support for the information construction of vocational colleges.

Secondly, the data center can help vocational colleges to integrate and unify data, reduce data islands and redundancy, and improve data utilization and value. There are various application systems and databases in the information system of vocational colleges. There are complex data relationships and data flow patterns between these systems and databases. Data center can use ETL and other technical means to integrate these scattered data resources together, unified management and utilization, so that the data process is more smooth and efficient.

In addition, the data center can also deeply mine and develop the data to explore the intrinsic value and potential applications of the data. With the continuous development of big data technology, the value and application scenarios of various data resources are also expanding and updating. The data platform can use data mining and artificial intelligence to accelerate the process of data mining and development, and provide more comprehensive and effective data support for the information construction of vocational colleges.

3 The Application of Data Center in the Scene of Vocational College

3.1 Construction and Design of Data Warehouse

In the scenario of vocational college, the construction and design of data warehouse is an important part of the application of data center. Data warehouse is a comprehensive, subject-oriented, stable and time-related data set, which is used to support the data analysis, query and online transaction processing of managers in the decision-making process. Therefore, in the process of data center construction, the construction of data warehouse is very important, which can provide reliable data support for the data application and management of vocational colleges.

The construction of data warehouse needs data stratification and data modeling, which is also the infrastructure of data application. Data stratification includes data mart, data storage, data backup, etc. Data modeling is to logically analyze and design data, determine data patterns and data structures, and provide reliable data support for data analysis and decision-making. At the same time, the construction of data warehouse also needs to consider the quality of data, data security and other issues to ensure the credibility and reliability of data.

The design of data warehouse also needs to consider the actual needs and characteristics of vocational colleges, including data sources, data formats, data processing and so on. Data sources can include student information system, teaching management system, scientific research management system and other systems, which need to be extracted and cleaned to ensure the accuracy and integrity of data. In terms of data format, it is necessary to consider the relationship and data structure between different data, so as to provide convenient data query and operation for data analysis and decision-making.

Data processing needs to consider the large amount of data and fast speed. ETL and other technical means are used to integrate and unify the scattered data to improve the utilization and efficiency of data.

Therefore, the construction of data warehouse in the application of data platform in the scene of vocational college is a complex task covering various needs. It is necessary to fully consider the quality and safety of data, and pay attention to the deep mining and development of data. The successful implementation of the data center needs to fully investigate and analyze the practical application needs of vocational colleges, in order to provide scientific, reasonable and reliable data support for the information construction of vocational colleges.

3.2 Data Integration and Preprocessing

Data integration and preprocessing is a necessary part of the construction of data center. The purpose of data integration is to integrate and unify data from different data sources for subsequent analysis and decision-making. In the process of data integration, data warehouse, ETL and data integration are needed to integrate and unify scattered data, reduce data islands and redundancy, and provide good pre-service for data flow and data application.

Data preprocessing is carried out after data integration, and its purpose is to preliminarily clean, transform and standardize the data for subsequent analysis and mining. The steps of data preprocessing include data cleaning, data transformation, data normalization and data integration. Through data preprocessing, data quality problems and data analysis errors can be effectively reduced, and data reliability and effectiveness can be improved.

The specific steps of data integration and preprocessing include the following aspects:

- (1) Identification and selection of data sources
Universities need to identify and select data sources that need to be integrated and preprocessed, including internal and external data sources.
- (2) Data collection and cleaning
Universities need to collect data from data sources and clean them, including removing duplicate data, processing missing values and outliers.
- (3) Data conversion and standardization
Universities need to convert and standardize data, including converting data into unified formats and standards for integration and analysis.
- (4) Data integration and storage
Universities need to integrate the preprocessed data and store it in the database or data warehouse.
- (5) Data quality control
Universities need to control the quality of integrated and pre-processed data, including the accuracy, integrity, consistency and reliability of data.

In the application of data center in the scenario of vocational college, the implementation of data integration and preprocessing plays an important role in improving the quality and credibility of data. By using data warehouse and data integration technology, we can quickly integrate and unify data from different data sources,

reduce data islands and redundancy problems, and provide reliable data support for subsequent data mining and applications. At the same time, through the implementation of data preprocessing, it can effectively clean, transform and standardize data, reduce data analysis errors and data quality problems, and improve the accuracy and effectiveness of data analysis.

The success of data center application is not only closely related to the management level of data governance and data security, but also closely related to the construction progress of data warehouse and data integration. It is of great practical significance and theoretical value for the teaching management, scientific research decision-making and intelligent campus construction of vocational colleges to build an efficient, safe and reliable data center by comprehensively using data warehouse, data integration, data governance and data security.

3.3 Data Service and Application Development

Data service is an important part of data center. Its main purpose is to provide reliable, efficient and available data services for data consumers. In the context of vocational colleges, the application of data services is of great significance and value, which can provide more comprehensive and effective data support for teaching management, scientific research decision-making and smart campus construction of vocational colleges.

First of all, data services need to provide comprehensive and detailed data interfaces and data query functions, so that data consumers can easily obtain and use data. To achieve this goal, it is necessary to take into account the different data consumers' needs and usage scenarios, and provide diversified data services.

Secondly, data services need to ensure data reliability and real-time. The data center needs to monitor data quality and data security in real time, detect and deal with data anomalies and data leakage in time, and provide efficient data synchronization and data backup functions to ensure that data is reliable and available.

Finally, the application development of data services is also one of the focuses of the data center. In the context of vocational colleges, the development of data applications needs to take into account the needs of teaching, scientific research, student management, campus security and other aspects. Therefore, it is necessary to provide diversified data application development tools and platforms to facilitate vocational college staff to quickly customize, develop and deploy data applications to achieve rapid iteration and optimization of data applications.

In a word, data service and application development are important applications of data center in the scenario of vocational colleges. Its role is not only to improve the quality and reliability of data in vocational colleges, but also to provide more comprehensive, efficient and intelligent data support for the information construction and management of vocational colleges.

3.4 Case Summary Analysis and Effect Evaluation

This paper combines some practical cases for analysis and evaluation when discussing the application of big data related thinking data in the scenario of vocational colleges.

In a data center construction of a vocational college in Liuzhou, the school relies on data warehouse and data integration technology to integrate multiple related data sources in the school, and realizes data sharing and application in equipment monitoring, teaching management, and material procurement. Through data governance, the school has greatly improved the accuracy and reliability of data. In terms of teaching management, teaching staff can grasp the situation of classroom teaching in real time and give targeted guidance, which improves the comprehensive quality of students. In terms of material procurement, through data analysis, the school has saved nearly 10% of procurement costs. At the same time, the school also explored new models such as smart campus construction based on the data services and analysis results provided by the data center.

The data center construction scheme of this case realizes the in-depth data mining of students, teachers, courses, management and other aspects, and improves the teaching effect and management level. The following is the experience summarized in this paper based on practical cases:

First of all, data acquisition is the basis of data center, which needs to consider the integration of multiple data sources and the guarantee of data quality. We adopt the methods of obtaining data from various systems of the school, manually inputting data and third-party data access to ensure the comprehensiveness and accuracy of the data.

Secondly, data cleaning is an important step to ensure data credibility and availability. In the cleaning process, it is necessary to fully consider the accuracy and integrity of data in various situations, and add corresponding rules and algorithms to obtain high-quality data.

Third, the design of data warehouse needs to be structured and stored according to different types of data. We adopt the combination of relational database and NoSQL database, and realize the unified management and query of data through the integration of data warehouse.

Fourth, data analysis is to analyze the rules and trends behind the data. We use machine learning algorithms and statistical analysis methods to process a large amount of data and mine the data value of students, teachers, and courses to help schools optimize teaching and management.

Finally, data visualization is to ensure that the presentation of data is more intuitive and easy to understand. We adopt the common visualization methods such as charts and dashboards in the industry, and present the analysis results to the management and teachers in an intuitive form to further strengthen the effect of data analysis.

In the process of data center construction, data governance and privacy protection also need special attention. We use data management specifications, data protection mechanisms and other means to ensure the security and legal use of data. At the same time, we use data collection and use specifications, encrypted data, and anonymous processing to protect the personal privacy rights of students and teachers.

4 Conclusion

In summary, the data center can help schools achieve data sharing and integration, reduce data islands and redundancy, and improve the overall utilization efficiency of data. Secondly, the data platform can provide more comprehensive and effective data support for

the teaching management, scientific research decision-making and intelligent campus construction of vocational colleges, and promote the informatization construction and efficiency improvement of vocational colleges. Finally, the construction of data middle platform also provides more reliable and credible data guarantee for schools, and improves the level and ability of data governance. Only through reasonable construction and management can we achieve better use and service of data.

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References

1. Yuan Yang, Xiao Hong. The construction of subject decision-making information service system in university libraries based on data governance [J]. *Library*, 2022 (12): 57–64. https://kns.cnki.net/kcms2/article/abstract?v=3uoqIhG8C44YLTIOAiTRKibYIV5Vjs7ioT0BO4yQ4m_mOgeS2ml3UDFORI4_LARdcfLEmxUa4sqsIYc8L_xNk3pdlvH0Cm&uniplatform=NZKPT.
2. Wang Tingting, Yang Li, Cui Can, et al. Research on the governance path of scientific research data in university libraries under the background of open science [J]. *Henan Science and Technology*, 2022, 41(21): 155–158. <https://doi.org/10.19968/j.cnki.hnkj.1003-5168.2022.21.033>.
3. Chen Qing, Chen Longji, Lin Lin. Research on the construction of university archives data governance system under the big data environment [J]. *Yunnan Archives*, 2022 (04): 53–56. <https://doi.org/10.14074/j.cnki.yunnan.archives.2022.04.026>.
4. Dong Xiaohui, Ma Wei. The value and characteristics of university data governance [J]. *Network security and data governance*, 2023, 42(02): 43–47. <https://doi.org/10.19358/j.issn.2097-1788.2023.02.007>
5. Wang Hailiang, Liang Hong. Research on data governance problems and countermeasures in universities [J]. *Network security technology and application*, 2022 (12): 65–67. https://kns.cnki.net/kcms2/article/abstract?v=3uoqIhG8C44YLTIOAiTRKibYIV5Vjs7ioT0BO4yQ4m_mOgeS2ml3UFBbBBjF8uureXkwxHLkDZDYRxx-_bp8JyVRAAnEHUV4&uniplatform=NZKPT.
6. Lu Huiling. Research on university data governance in the construction of smart campus [D]. Jiangsu University, 2022. <https://doi.org/10.27170/d.cnki.gjsuu.2022.000850>
7. Cao Lin. Research on the data governance path of university archives in the construction of smart campus [J]. *Zhejiang Archives*, 2020 (05): 25–27. <https://doi.org/10.16033/j.cnki.33-1055/g2.2020.05.010>.
8. Cao Jiao, Zhou Zhizhong, Yang Lianmian. Research on university data governance system in the era of big data [J]. *Science and technology information*, 2022, 20 (22): 177–181. <https://doi.org/10.16661/j.cnki.1672-3791.2203-5042-5576>.
9. Hu Mercury, Jingzhou, Wang Huijun. Research on the key elements and optimization path of big data governance system in colleges and universities in China-Based on the research perspective of DEMATEL-ISM [J]. *Electrified education research*, 2022,43 (11): 38–44 + 52, <https://doi.org/10.13811/j.cnki.eer.2022.11.005>.
10. Zhang Guobao. Application and Research on the Evaluation of University Data Governance Capability Based on DCMM [J]. *Network Security and Data Governance*, 2022,41 (10): 26–30. <https://doi.org/10.19358/j.issn.2097-1788.2022.04.004>.

11. Wu satisfied, Goldman Nan. Research on Data Governance of Ideological and Political Education in Colleges and Universities [J]. Research on Marxist Theory, 2022, 8(09): 99–107. https://kns.cnki.net/kcms2/article/abstract?v=3uoqIhG8C44YLTIOAiTRKibY1V5Vjs7iJTKGjg9uTdeTsOI_ra5_XTwn-G0bs3qDuUkjMA2kgPcPR-qnwq_PufZoFisR-_EW&uniplatform=NZKPT.
12. Zhang Hui, Li Jianming, Yang Qiang. Research and practice of university data governance system from the perspective of big data [J]. China Higher Education, 2022 (Z2): 16–18. https://kns.cnki.net/kcms2/article/abstract?v=3uoqIhG8C44YLTIOAiTRKibY1V5Vjs7iJTKGjg9uTdeTsOI_ra5_Xcc3kG3pAFDMCGmD3Cuqc7vcTVhNnIUg32hIOQuU-ALF&uniplatform=NZKPT.

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