

Exploration of the Application of the Ministry of Education's Shared Data Interface in Universities under the Background of Big Data

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Abstract

In recent years, with the continuous development of information technology, massive amounts of data have emerged, and the correct sharing and use of data have become an important aspect of modernization. Combining social administrative management data with data generated during the operation of universities can empower scientific management and improve the quality of information technology. This article analyzes the guidance provided by the government on data governance, combined with the informatization situation of our university, and explores the significance and implementation process of data shared by the Ministry of Education, as well as the direction for future optimization.

Keywords

Data Sharing, Big Data, Informatization, University

1. Introduction

In recent years, the widespread application of high-tech such as big data, cloud computing, and artificial intelligence has generated massive amounts of data. The use and analysis of data can provide support for decision-making, optimize business processes, improve production efficiency, promote innovation and change, and have extremely high value. In April 2020, the Central Committee of the Communist Party of China and the State Council issued the "Opinions on Building a More Comprehensive System and Mechanism for Market based Allocation of Factors", which mentioned the need to promote the open sharing of government data, enhance the value of social data resources, and support the construction of a standardized data utilization environment in education and other fields [1]. Uni-

versities are the leading battlefield for technology and talent. Actively introducing social public data into the business operation of universities will effectively enhance the level of informatization, improve the university's data governance capabilities, and enhance the management level, this is a powerful lever for achieving educational modernization.

2. Analysis of Data Status

2.1. Current Situation of Data Construction in Universities

After years of development, the informationization construction of universities has entered a relatively mature state. It is common for various secondary departments on campus to build information systems for their own businesses. Each information system includes independent databases, and common types of databases such as Oracle, MySQL, and MS SQL Server are used. University information departments generally have university level data centers, which extract, clean, and exchange the most core and shared data from various business systems, aggregate them into public database resources, and establish a unified standard interface access method to provide data services to the campus. If other information systems need to retrieve resources from public databases, they need to use standard interfaces to interface with university level data centers [2].

Generally speaking, the data that the university data center provides access come from information systems operated by various secondary departments, which belong to internal resources. However, with the development of overall information technology in society, the mutual access between internal and external application systems is gradually increasing, and the demand for access to social government data resources by internal information systems is also gradually increasing. Especially with the increasing influence of mobile devices in handling affairs, users have higher requirements for the time limit of transaction progress. In university affairs, common problems are reflected in the following two aspects.

1) Universities have a high demand for government data.

Part of the work in university operations requires access to government data to complete, such as verifying personal identity and educational qualifications when students enroll, verifying the educational background, research information, and dishonesty information of applicants when recruiting faculty and staff, verifying the financial situation of impoverished students, verifying the identity of external personnel when entering the university, and verifying enterprise qualifications for cooperation. Similar inspection and verification work requires accessing government resources through fixed channels in order to obtain them, resulting in a long overall business processing time, the efficiency of handling affairs is not ideal.

2) There is no unified platform for accessing government data

When accessing government data, personnel often need to visit different management websites, and the application methods for obtaining data are also different, such as different login usernames and passwords, different qualification certificates provided, different presentation methods for obtaining results, and so on.

This difference in operation has also become a content that we hope can be improved.

2.2. The Significance of Data Sharing Services

From the Guiding Opinions of the State Council on Accelerating the Work of “Internet plus Government Service” in 2016, the Implementation Plan for the Integration and Sharing of Government Information System in 2017, to the Guiding Opinions of the State Council on Accelerating the Construction of the National Integrated Online Government Service Platform in 2018, the country issued a series of policies to support the development of government big data, to improve the efficiency of government administration and promote the unified and standardized use of data [3]. In 2024, the General Office of the Communist Party of China Central Committee and the General Office of the State Council issued the “Opinions on Accelerating the Development and Utilization of Public Data Resources”, stating that data resources have become a new factor of production, and accelerating the development of public data resources has become an important measure for digitalization to support high-quality economic and social development [4].

The university affairs and data resources of universities are actually important components of national public governance and data resources. In the field of education, a series of measures have been introduced to accelerate development, such as the “13th Five Year Plan for Education Informatization” in 2016 and the “China Education Modernization 2035” in 2019. In 2022, the Ministry of Education launched the National Education Digitalization Strategy Action, proposing to fully utilize the advantages of massive data, empower the modernization level of education governance system and governance capacity with data, and serve national smart education.

Under this goal, the Ministry of Education has established a university data sharing application platform, which gathers relevant data resources from more than 20 ministries including the Ministry of Education, the Ministry of Public Security, and the Ministry of Civil Affairs, providing data sharing services to various educational units within the ministry. The goal is to promote the orderly sharing and scientific governance of university data, and it has been launched and used in the second half of 2022. This data service ensures the authenticity and effectiveness of data sources, unified data standards, comprehensive coverage of data types, secure and reliable data access, and rich application scenarios, providing universities with an efficient way to access government data. It can promote precise management of universities, assist in data mining, and greatly improve the information governance level of universities.

3. Construction Plan

3.1. Sort out the Business Needs

Based on the current usage status and requirements of various business infor-

mation systems in our university, refer to the shared data interface directory provided by the Ministry of Education, select interfaces that are suitable for our university's business, coordinate with the business system administrator, and determine the construction process plan. The construction plan should be designed from the top level, systematically planned, and avoid duplication of work when expanding construction in the future.

After conducting research on the informatization situation of various functional departments, our university has preliminarily determined that the demand for interfaces is concentrated on student work and personnel information. The key focus is student identity verification, degree and education verification, inquiry of subsistence allowance recipients, inquiry of impoverished individuals, and employment registration status in the field of student work. The identity verification, degree verification, overseas degree certification, and teacher qualification recognition of applicants in personnel business are also the key focuses, and the direction of interface usage is mainly considered from these two aspects.

3.2. Docking According to Requirements

The Ministry of Education's shared data platform has multiple certifications, high security factors, unified docking standards, and can view the number of applications for each interface on the platform, which can be used as a reference for university applications. After passing the comprehensive qualification review by the Ministry of Education, the university needs to sign a data sharing strategy agreement and apply for interface use according to the requirements of the shared data platform. The application materials need to explain the scenarios of the university's application interface, the basis of policy documents, and other information. After the application review is approved, the environment of the university level usage platform will be built according to the unified technical indicators of the Ministry of Education. The university level platform will then perform program docking for personnel access and information system access in need. During the process, network, permission and other qualification authentication will be carried out to ensure usage security.

The university will analyze where and how to use the interface based on the most practical needs, and then apply. During the environment construction process, the existing information system operation status should be fully considered to avoid redundant construction. At the same time, it is also necessary to consider the issues related to the secure operation of shared data during use, in order to prevent data leakage accidents.

3.3. Establish a Guarantee Operation System

In terms of system, in compliance with relevant national laws such as the Data Security Law and the Personal Information Protection Law, the university has established various management measures for system operation and maintenance, clarifying various standards for data ownership, usage rules, and storage manage-

ment. Technically, strengthen the network control of shared data interfaces, implement real name authorization management for access personnel and computer devices, ensure that data is only accessed within a limited range, and safeguard data security. On the network, methods such as vulnerability scanning, firewall protection, and server database network isolation control are adopted for protection. In terms of team building, the university has established information posts in various secondary departments to unify the management of the university's information equipment and systems, ensuring the personnel foundation for interface implementation [5].

4. Practical Process

4.1. Interface Application

In the stage of determining the project construction plan, after thorough research and discussion, it was finally decided that the first interfaces to be implemented would be the population query of the Ministry of Public Security, the employment query of the Ministry of Human Resources and Social Security, and the minimum living allowance query of the Ministry of Civil Affairs. These three interfaces have a wide range of applications and can be used by students, personnel, or other functional departments to query according to business needs. The application scenarios can include verifying the registration of new students, verifying the identity of off-campus personnel entering the university, querying the employment situation of graduates, querying the situation of applicants, and providing accurate student assistance. After the interface is confirmed, upload all materials according to the requirements of the Ministry of Education until they are approved.

4.2. Platform Architecture

According to the requirements of the Ministry of Education for interface deployment, universities need to build a university level platform for docking and obtain technical certification from the Ministry of Education before accessing government data through the interface. When personnel and information systems on campus need to access shared data, they should first dock with the university level platform, authenticate the campus network, equipment, and permissions, then enter the whitelist of accessible list, and then obtain shared data through the university level platform. The overall platform architecture is shown in **Figure 1**.

4.3. Technical Proposal

The server hardware for building the university level platform uses one virtual machine, which is set up on the university level virtual machine cluster platform and has the advantages of fast establishment, convenient configuration, fast backup, and security and reliability. According to the instructions of the Ministry of Education, hardware content configuration and software program deployment should be carried out. The fixed IP of the university level platform should be clearly reported to the Ministry of Education as the only access point for the uni-

versity.

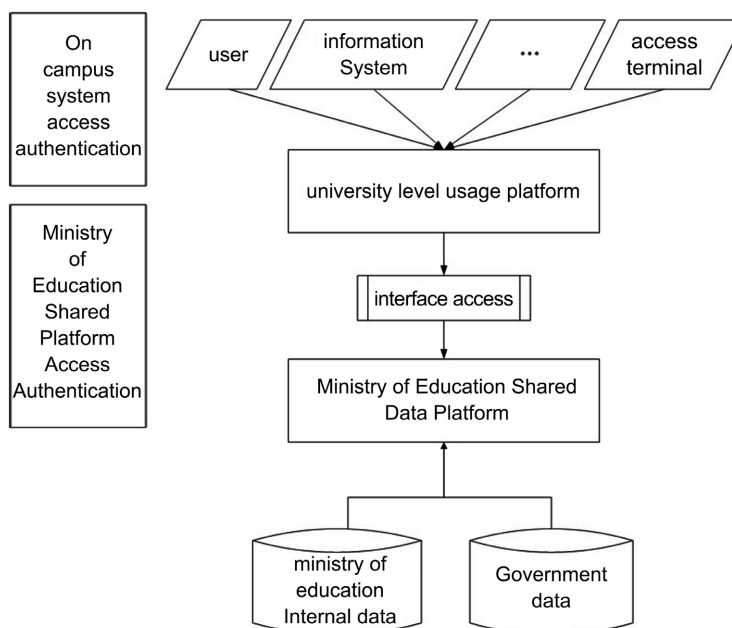


Figure 1. Platform architecture diagram.

The Ministry of Education provides parameters and feedback instructions for each interface of shared data. Users can query through the interface based on the parameters provided by the instructions, and the interface will return the query results, which will then be displayed on the user page. Technically speaking, the Ministry of Education provides the currently common API interface, and universities can use common development languages such as Java, PHP, etc. to call the interface. It can be conducted on the existing system functions of our university in order to be used quickly and efficiently.

The existing operating platforms of our university can choose to load and use interfaces in the student engineering system, personnel system, and data platform system. The student engineering system and personnel system have established mature usage patterns. If interface transformation is carried out, there will be no direct page function correspondence, and both require secondary development, with high budget costs and long cycles. If we choose a data platform system, as the data center itself is also in the construction cycle, the government data obtained through the interface is an important collection item, which can enrich the resources of the data platform and meet the needs of many departments besides the current Student Affairs Office and Human Resources Office. It has great scalability and is more efficient than the secondary development and construction of a single business system. Therefore, we decided our data platform system as the interface usage platform for program development and docking.

4.4. Establishing a Service Platform

The interface usage platform needs to design and develop based on our data plat-

form system website. At present, the data platform adopts unified identity authentication for real name login, and has common functions such as user management and user authorization. Using the page design of the data platform, integrate the interface into the data query page. After entering the authorized interface page, users can fill in parameter conditions and query business results in real time.

4.5. Safe Operation

After the construction of the service platform, a series of management measures were taken to ensure long-term stable operation. Promote the refinement of various management systems, clarify the responsibilities of all parties involved in the data and raise awareness among users to strengthen self-monitoring and management. Standardize the reasonable scope of shared activities and ensure the moderate use of data minimization. Strengthen technical management, regularly scan service platforms for vulnerabilities, use bastion host management for technical personnel, and strictly authorize access personnel. Improve personnel capability training, regularly conduct technical personnel skill training, user safety training and publicity, etc.

4.6. Promoting Business Development

When using government data, there will be cross authentication with campus data in various aspects, which can supervise the timely improvement of data quality. If any abnormal phenomena are found, the data generation process of the business system can be traced back to explore optimization measures, which has a supervisory role in the improvement of the business system. The ultimate goal of data sharing is to serve business applications, achieve effective circulation and two-way improvement of data and business, and promote the intelligent governance of universities [5].

5. Achievements and Reflections

5.1. Operating Status

After initial construction, three interfaces for sharing data, namely the Ministry of Public Security's population query, the Ministry of Civil Affairs' subsistence allowance query, and the Ministry of Human Resources and Social Security's employment query, have been implemented and put into use, providing a fast and efficient way for business departments to access government data. The operating page is shown in **Figure 2**.

At present, the relevant verification services of the Human Resources Department and the Student Affairs Department, such as identity inquiry for new students, low-income status inquiry for current students applying for national subsidies, employment status inquiry in graduate file management, and identity verification for applicants in human resources business, have authorized teachers to use interfaces to handle work, no longer requiring multi-party verification. By directly querying the interface, the required data can be obtained. The actual speed is fast,

the data quality is good, and it can quickly respond to campus needs. The processing time has been calculated from days in the past to hours now, and has achieved very good application results.

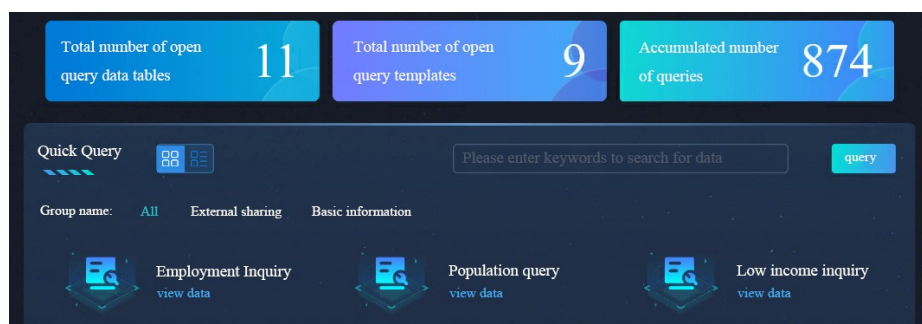


Figure 2. Operation effect diagram.

After promoting the sharing of data by the Ministry of Education on campus and experiencing the implementation of the interface, practical research has been conducted on the needs of other business departments. For example, visitors and alumni can verify their entry status in the access control mini program, graduates can verify their educational identity in the archives when viewing and copying their files, and personal information can be verified when registering with the university's WeChat enterprise service account. In these application scenarios, the frequency of departmental verification is high, and it will consume mechanical manpower to do such work. In the trend of informatization, it is urgent to adopt an efficient work mode. The Ministry of Education's shared data interface provides an excellent technical solution to solve such work problems.

The use of shared data liberates manpower from tedious process transactions, improves work enthusiasm, and promotes university efficiency. In terms of data platform construction, under the guidance of the Ministry of Education, a good digital office atmosphere has been created. Through the demonstration effect of the landing interface, more teachers and staff can focus on exploring digital offices and integrate digital concepts into all aspects of daily work, helping to enhance the information technology strength.

5.2. Identified Issues

Some typical issues have also been reported from the current application situation. Shared data is mainly used by functional departments' business systems. Business system users are very welcoming of government data in terms of willingness and are willing to actively use it. However, when it comes to modifying existing pages and code of the business system, they have psychological concerns and are afraid of system vulnerabilities or functional risks caused by secondary development, which may affect the current stable use. In terms of practical operation, after the completion of the construction cycle, the information system needs to undergo secondary development for further integration. If the interface scalability of the original system is poor, personalized development also requires a certain amount

of work, and funding is also a difficulty. Both of the above reasons have led to subjective and objective difficulties in connecting shared data with completed business systems, which need to be comprehensively considered based on the university's information technology situation. Such issues should be given sufficient attention in future system construction.

Another aspect that needs attention is the data management system. At the university level, based on the operation of relevant national laws and regulations, various documents and regulations related to system operation and maintenance have also been established. However, in the new situation of data sharing and data governance, many work processes will feedback that the management requirements are not detailed enough, such as data classification, data privacy management, data application effect evaluation schemes, etc., which appear somewhat crude in the current mode. How to carry out detailed, complete, and standardized management according to actual work is a key long-term consideration for leaders and technical personnel [6].

6. Summary

The integration of internal data and external government data in universities has greatly improved work efficiency and digital management capabilities. In the future, there will be more application scenarios worth trying and exploring, such as portrait comparison, enterprise information query, scientific research project information query, overseas education degree query, etc. under the Ministry of Education's shared data platform. In particular, it can be considered to combine with data aggregation projects such as "One Table", "One Network Office", and teacher-student portraits in university information centers to strengthen the construction of data resources and explore the value of data. In this process, we can further promote the construction of data platform, improve the data management system, and establish a data quality evaluation mechanism. At present, most universities have entered the stage of "data governance". In the context of digital education transformation, taking the data sharing of the Ministry of Education as an opportunity, various types of data are aggregated, shared, and analyzed, and data are used to provide good services and support innovation. This will definitely provide strong data support for the overall development and construction of universities, improve their modern governance capabilities, and empower them to develop with high quality.

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Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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