Exploration and Research on One-Stop Online Service Mode in Universities

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Abstract: With the continuous acceleration of the digital campus construction and the integration of information technology in universities, the reform of university management and services has been deepening. The one-stop online service mode has become the main mode and means of the construction of smart campuses in universities. This paper studies and expounds the current situation and problems of the construction of the existing one-stop online service mode in domestic universities. Combining with the construction and exploration of our university's one-stop online service hall, by changing the concept, strengthening top-level design, promoting resource integration and sharing, we have summarized a more efficient and long-term construction ideas and methods, and achieved good results in practice. Through standardized operation and maintenance, the quality and efficiency of management and services have been improved.

1. Introduction

With the accelerating process of digital campus construction and the integration of information technology in universities, the campus network and hardware infrastructure have been basically completed, and although various management information systems have been built and put into use, there still exist "information islands" problems such as isolation between systems, non-uniform data standards, and different management service concepts [1, 2]. With the changes in the internal governance structure and management mode reform in universities, the transformation of management to service has become an inevitable trend, but the collaborative service and scheduling mechanisms among various management information systems have not been truly established [3].

The construction of informationization in universities should take big data management as the core, and build an integrated information service platform that integrates system integration and interconnection, data fusion and sharing, collaborative office affairs, one-stop access to business services, automatic report generation, and data-supported management decision-making [4]. Connecting data exchange and data sharing in various business application systems to eliminate information islands and integrating and reconstructing processes to build a one-stop service hall is a key means to reduce coordination and communication costs between functional departments and organizational units, and to improve efficiency and service level.

2. The overall idea of the one-stop online service mode

Universities have begun to focus on improving user experience and optimizing business processes in informationization, while promoting the research of integrated information functions that deeply integrate across systems [5]. Informationization in universities has shifted from the application problems of information technology itself to the research on how to use information technology and big data to provide more convenient applications and services for teaching, research, and management in universities. By building three informationization software basic support platforms, namely unified identity authentication, unified data exchange, and unified information portal, the online one-stop service hall provides unified data and a unified entrance, and the successful application of the one-stop online service mode breaks the time and space limitations of service provision and greatly satisfies the humanized needs of teachers and students.

Due to the complexity of the one-stop online service mode with multiple businesses and processes, the shortcomings of monolithic applications continue to emerge. Therefore, the one-stop online service mode in universities is mostly built in a microservices manner for user-facing applications, showing its advanced nature in technical architecture [6, 7]. The core idea of the microservices architecture is to decompose a large and complex application into multiple small applications according to the independence of business requirements and the frequency of repeated use. Each small application focuses only on completing its own functional requirements, not only realizing independent deployment but also communicating or calling each other through APIs and other means [8].

3. The problems and challenges of the one-stop online service mode

The university one-stop online service mode based on microservices architecture is usually implemented in a way of launching one service item at a time when it matures, which has significant drawbacks in management, mainly manifested in the following aspects:

1) Lack of top-level design and unified planning. The coordination of departments, personnel, and matters entering the platform is limited, and the top-level design is not in place, making it difficult to achieve unified planning. Functional departments operate independently and only build their own management systems from the perspective of convenient management of their own department. Some management systems are difficult to be compatible with other departments, resulting in repeated investment and waste of resources.

2) Insufficient unified data standards among various management information systems. The independent and non-uniform data architecture standards of each system make it impossible to share data, resulting in data barriers between various systems on campus. Only some systems can share data or share part of the data between systems, and some cannot even achieve data sharing at all.

3) Weak user perception and high entry barriers. Although the unified information portal platform and one-stop service hall have achieved application integration and unified presentation at the front end, the back-end systems of both are still independently and disconnected from each other. Before the construction of the service hall, some management information systems' detachable and class-process services had already been deeply integrated with the information portal. The cost of re-integrating these services in the service hall is high, so these services still retain their original access methods. This causes the applications and services to be scattered between the information portal and the service hall, and there is a lack of a unified access channel, which causes confusion and inconvenience for users during the use process.

4) Insufficient driving force for informationization promotion in functional departments. The online service hall service mode lacks a handle when functional departments have weak

informationization willingness. For service items that can already be handled online, functional departments do not have a strong enough willingness to move offline services online.

5) The coupling degree between business and technology is too high, and the responsibility boundary is unclear. Business management personnel in functional departments will use their lack of understanding of technology as an excuse to evade their responsibilities for managing service items. If the technical department gets involved, it needs to undertake a lot of business management work, which is exhausting. It is impossible to know all the demands of all functional departments, causing the business department to rely on the technical department but also be dissatisfied with the technical department.

4. Exploration and research on the one-stop online service mode

After more than 20 years of development, our university's informationization construction has achieved preliminary results. In terms of network environment construction, a complete network information point has been built, covering teaching areas, office areas, and living areas, which facilitates users' network access needs. In terms of system construction, the construction of various application systems such as the information portal platform, unified identity authentication, online office system, student affairs management system, academic management system, asset management system, one-card system, and scientific research management system has been completed.

In order to provide better informationization services to all teachers and students, improve the efficiency of daily office approvals across multiple campuses, ensure the "interconnection" of data across the university, realize the "process reengineering" of all business, and enhance the service experience of teachers and students as a phased goal, we have launched the construction of a one-stop online service portal, promoting the deep integration of information technology with teaching and management, and focusing on building a smart management service platform with the online one-stop service hall as the main feature. We are promoting the transformation of functional departments in universities from independent management to a collaborative work service platform under the whole-school perspective, basically achieving the management service goal of "letting data run more and teachers and students run less".

We establish a unified form of online information service, while integrating with the university's unified identity authentication, data center platform, special database, mobile APP information service platform, and other systems. We establish standardized business flows, work flows, and approval flows, eliminate fragmented management among information systems and information islands between systems, solve the problem of repeated reporting by teachers and students, and improve mobile applications, providing rich process operations and management functions for the daily management and service of the university.

By establishing a universal, flexible, and scalable one-stop online service mode, we can not only meet the current process management needs of various departments but also adapt to the future business development needs of the university. System administrators need to be able to modify existing processes and deploy new processes flexibly and conveniently. The following are some of our explorations and research in the construction of the one-stop online service mode.

1) Principle of institutional priority. The root cause of informationization issues ultimately lies in management issues, and the effectiveness of construction depends on the recognition, understanding, emphasis, and support of informationization by university leaders and various business departments. Therefore, the construction and improvement of management systems must come before information system construction. Our initiatives include: formulating regulations for information resource sharing management, clarifying information resource management rights and

responsibilities, establishing corresponding information resource catalogs and service item preparation standards, clarifying service item management responsibilities for corresponding business personnel in functional departments, setting service item access standards, and requiring strict implementation by various management information systems. Determining the online handling rate of service items as one of the core indicators for assessing the performance of university informationization construction.

2) Guided by top-level design. We established a construction management committee to gather the wisdom and resources of the entire university for top-level design and unified planning. In terms of software planning and construction for the one-stop service hall, we included sorting out public service items, establishing departmental responsibility lists, revising management systems, simplifying and optimizing processes, and determining the departments, posts, personnel, rights, and responsibilities of those who enter. We planned and designed a unified identity authentication platform, mobile portal platform, information release platform, process platform, campus card platform, and data exchange platform for the whole university. Led by university leaders, with the leadership of the university office and the educational technology and information technology center as the main implementing unit, we developed and constructed the online one-stop service platform, aiming to make up for the poor organizational and coordination capabilities across business departments of the educational technology and information technology center, lack of regulatory mechanisms, and fully coordinate and utilize internal resources to comprehensively improve the awareness and concept of various business departments in using information technology to serve teachers and students, and achieve unified construction standards, overall planning, and comprehensive promotion.

3) Principle of Separation of Service Item Business Management and Technical Development Configuration. Customized development of service item management functions is implemented in the system, supporting the business personnel of various functional departments to manage service items, including revising the basic elements and service guides of service items, managing the approval node composition of the approval process, and viewing the revision records, processing status, browsing history, consultation and response, and evaluation of service items in all aspects. This effectively measures the workload of service items and the improvement of service quality and efficiency brought about by online services.

4) Promoting Information Resource Sharing. The construction of the data center is the key to information resource sharing and also the data support for school management decisions. By constructing a standardized and accurate data sharing platform, we coordinate the relevant departments to provide relevant data in a timely and accurate manner according to unified data standards, and link the data to achieve interconnectivity. This not only meets the data extraction needs of various business departments but also ensures the information security of various types of data, which is an important foundation for the construction of the one-stop service platform. By establishing unified data standards and specifications, we meet the school's needs in data integration, data sharing, and data display, fully solve practical problems such as low data quality, low utilization rate, missing links, and lack of traceability, and strongly support the data integrity of the sharing platform and an efficient data governance system.

5) Multi-department collaboration simplifies and optimizes service processes, implementing a satisfaction evaluation system. We have opened up a green channel for teachers and students to evaluate services. After completing the service process, teachers and students can evaluate it to understand their actual experience and gradually optimize it, comprehensively improving the quality and efficiency of the service process, as shown in Figure 1.
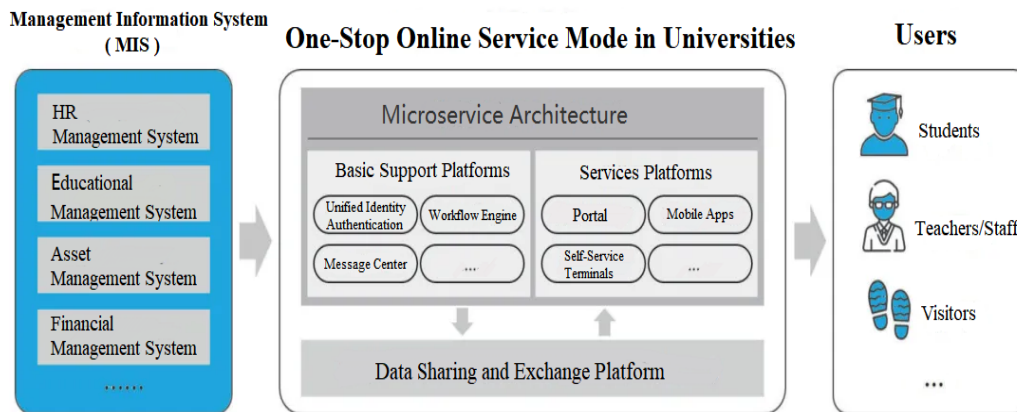
Figure 1: One-Stop Online Service Mode in Universities

5. Application and practice of one-stop online service mode

Our university's one-stop online service mode mainly includes the following aspects:

1) The optimization of service processes. During the project construction period, we collected and sorted 512 service items, of which 429 can be handled online.

2) The one-stop service center includes four parts: the service portal, process platform, mobile platform, and data management platform. The service portal provides teachers and students with a unified entrance to access the one-stop online service platform, providing one-stop services. The service portal includes a homepage, service hall, personal center, and process monitoring. The process platform is a functional platform with form development and processing engines, which can develop any type of form visually and with zero code. Through integration with the data management platform, it can achieve unified management, monitoring, optimization, and analysis of all school processes. The mobile platform is the presentation of the one-stop online service platform based on a mobile app. The data management platform has the management function of all business data, including a series of data themes and their corresponding functions such as add, delete, modify, query, monitoring, and statistics. The one-stop online service mode essentially reflects the "middle platform" capability system construction thinking in the construction of university informationization. It needs to sustainably solve the difficult and painful problems in university work and continuously improve its basic support capabilities. It also requires continuous coordination and supplementation with other business "middle platform" capabilities.

3) Empowering digital transformation of universities with data by construction of campus data center platform and specialized databases. The university is constructing a campus data center platform and specialized databases, with the bottom layer being a traditional database, including management information system databases, formatted file collection systems, and various log data. All data is integrated, stored, analyzed, and ultimately provided as data services for front-end applications. Through data synchronization technology and API interfaces, data exchange is shared, providing support for efficient interconnection of data between core management information systems of various functional departments in the university. Up to now, the platform has published a total of 123 data lists, collecting and displaying data directories of over 30 departments of the university.

Based on the research conclusions, we have issued a series of institutional documents, such as the "Interim Measures for Information Resource Sharing Management" and the "Construction Specification for Informationization Systems", which define the standards for service item compilation and access, and require functional departments to compile and report more than 500

service items that meet the standards. After completing the preliminary work, our university has built a one-stop online service hall system called "Yi Wang Tong Ban". This platform has created an integrated online service platform for school administrative services and a campus-wide information resource sharing and exchange center, eliminating information and business silos, and improving the sense of acquisition for teachers and students. Since its online trial operation on June 2019, more than 500 service items have been entered, of which 429 can be handled all online. More than 2,340,000 people have browsed the service items on the platform, and nearly 22,500,000 service items have been handled all online. The information resources exchanged through the Yi Wang Tong Ban data center have reached over 130 items. Roughly estimated, for every time a service item is handled online, it saves one trip, or workload of 0.1 man day, which is equivalent 40,000,000 fewer trips, or workload of over 2,000 full-time staff, greatly improving the efficiency of university work. The data center has completed the construction of five data themes and has connected with more than 30 management information systems. The data of the basic theme library shared and exchanged has reached over 142,460,000 records, solving the problem of multiple data sources in various management information systems, as shown in Figure 2.
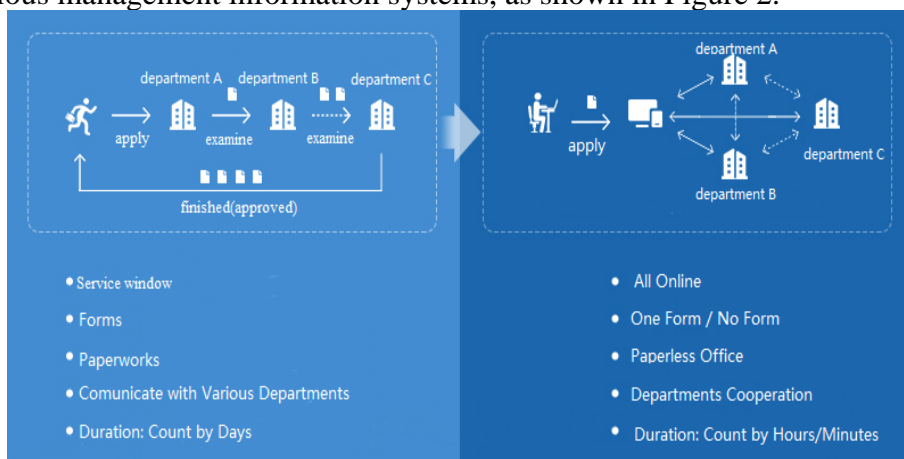

Figure 2: Effect of One-Stop Online Service Mode

6. Conclusion

The data center has established a clear data sharing and exchange mode of responsibility, ensuring the validity, accuracy, and integrity of data. Combined with the one-stop online service hall, the departmental boundaries and information silos are broken, and the online and offline service resources of the school are fully integrated, eliminating the data isolation and process fragmentation problems of the existing school management information systems, reducing the manpower and repetitive labor of relevant departments, saving costs, promoting the improvement of university service levels, and providing strong guarantees for the development and professional construction of universities.

This integrated approach to data management and service delivery has been essential in promoting the development of smart campuses and the digital transformation of higher education institutions. By leveraging advanced technologies and innovative solutions, universities can streamline their operations, reduce costs, and improve the quality of services they provide to students, faculty, and staff. As such, it is a critical area of focus for any university looking to remain competitive and relevant in today's rapidly-evolving educational landscape.

References

[1] Liu Hailong, Gong Dongwei, Zhang Tai. Exploration and Practice of Smart Campus Construction in Vocational Colleges [J]. Science and Technology Information, 2021, 19(01): 32~34.

[2] Zhu Xin. Research and Thinking on the Application Construction of Smart Campus in Vocational Colleges [J]. Software Guide (Education Technology), 2019, 18(08): 36~37.

[3] Sun Qichang. Research on the Construction of One-stop Online Office Hall in Vocational Colleges [J]. Journal of Yan'an Vocational and Technical College, 2020, 34(01): 48~50.

[4] Han Xibin, Cui Yiran, Luo Yangyang. Connotation, Framework and Requirements of Digital Campus in Vocational Colleges: Interpretation of "Specification for Digital Campus in Vocational Colleges" (Part 1) [J]. China Vocational and Technical Education, 2020(34): 5~9.

[5] Liu Xiangyu, Zou Yunlong, Xu Hongyan, et al. Exploration of One-stop Service Mode for Informationization of Colleges and Universities under the Background of Internet+[J]. Modernization of Education, 2018, 5(46): 271~273.

[6] Tan Yiming. Design and Implementation of Platformized Service Framework Based on Microservice Architecture [D]. Beijing Jiaotong University, 2017.

[7] Xu Nannan, Hu Chenguang, Wang Huilin. Breaking the Tradition, Building Smart Campus Platform Based on Microservices [J]. China Education Network, 2020(01): 65~67.

[8] Ma Xiong. System Design and Development Based on Microservice Architecture [D]. Nanjing University of Posts and Telecommunications, 2017.