**Construction of Digital Campus in the Era of Big Data**

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**ABSTRACT**

Under the background of big data resources, the management of colleges should transform from the traditional mode of experience management to building a digital campus to fit the needs of the times of big data resources. This study explains the existing problems in digital campus and how to construct of digital campus in the era of big data. Digital Campus make colleges full use of big data resources for the integration of internal big data resources. Big data makes the management of colleges from the general cognitive to the essence, and improve the management level and decision level.

**BIG DATA AND DIGITAL CAMPUS**

**Big Data**

With the rapid development of information technology, human society has entered the era of digital information. Big data is one of the important development direction of modern information technology, not only the sharing and analysis of big data will bring immeasurable economic value, but also it will give a boost to the society. Big data is a collection of data that is unable to use conventional software tools in a certain period of time to capture and manage the contents.

The characteristics of big data summed up as “4V”, which is Volume, Variety, Velocity, Value. In the era of big data, big data representation, data processing, query, analysis and visualization are the key problems to be solved urgently.

**Big Data in Digital Campus**

Digital campus is based on the computer technology to create a virtual education environment by collection, processing, integration, storage, transmission the information (information includes campus education and teaching, scientific research management, technical services and life service). Digital campus contains a large number of valuable data, both structured and unstructured data. Structured data

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comes from the conventional management business, such as teaching, personnel and financial data; unstructured data is generated by a large number of service and management, such as multimedia teaching resources. Due to the large number of data related to the campus, it is necessary to consider the construction of a unified digital campus data path, especially for comprehensive universities.

THE SIGNIFICANCE OF THE CONSTRUCTION OF DIGITAL CAMPUS

Under the background of big data resources and the era of knowledge economy, the management of colleges should transform from the traditional mode of experience management to building a digital campus to fit the needs of the times of big data resources.

The management of colleges makes full use of big data resources, the integration of internal big data resources to effectively implement data sharing. Big data makes the management of colleges from the general cognitive to the essence, gives a perspective of the whole process of university management, and improves the management level and decision-making level.

THE EXISTING PROBLEMS IN DIGITAL CAMPUS

With the continuous development of digital campus, the problems in the digital campus are exposed: the business system constantly generates new data, and the database of the total amount of data continues to expand. The construction of digital campus aims to promote the campus informatization and its impacts on colleges in the next ten years or even longer. Therefore, in the early design and construction of digital campus project need to understand the colleges long-term development needs.

However, many colleges in the early construction time is mainly to solve the immediate needs without systematic planning and deployment, resulting in a large number of public information resources not to share for real. Construction work has no clear responsibilities and rules, which lead to the construction of digital campus in the slow progress of the project, and seriously affect the efficiency of the use of information resources. The "heterogeneity" of the resource system in the digital campus is embodied in the following three aspects:

Heterogeneity of System Operation Platform

The big data resources lacks of effective interaction, and the departments of information resources is relatively independent, forming a plurality of sub system. Information resources are relatively closed and lack of organic integration, so that a rich variety of big data resources is difficult to produce synergistic effect and is a disadvantage to improve the quality of school management.

Heterogeneity of Database Management System

Due to the differences in the period of system development, developers, software platform and other aspects, many universities application systems are not built at the same time, resulting in the lack of necessary connection and unified interface between the application systems. The data of different systems can’t access each
other, which affects the timely exchange of management information. It is inconvenience for users to use systems of lacking a unified application portal and having a great difference in the interface.

**Heterogeneity of Data**

At present, the digital campus exists a widespread data quality problem: lack of unified data standards and data formats, and scientific data integration; there is no uniform processing method for historical data and the redundant data; structure degree is low, most of the data in the form of documents, multimedia, report forms, websites and other existing. Such semi-structured or unstructured information resources are difficult to form an effective resource chain for providing efficient decision support for the management of universities.

Therefore, the information systems in colleges store a large amount of data, but the use of the data is not sufficient. Data can’t be real-time query and browse, so that the user must enter the systems of various departments to query information. Digital campus accumulated large amounts of data, and the deep value behind the large number of data is not found. The majority of colleges remains in the stage of data query without depth analysis of data mining, and not provides the support for the decision-making.

**CONSTRUCTION OF DIGITAL CAMPUS**

**Guiding Ideology and Construction Strategy**

The guiding ideology of the construction of digital campus reflects the educational idea and the idea of running a school. This work needs to adhere to the construction of the guiding ideology, the use of advanced and mature technology, which promote the school system innovation and management innovation.

Through the use of modern system engineering and project management norms to unified planning, we construct a framework step by step for the sustainable development of digital campus construction, scientific and reasonable to promote the construction of digital campus. Finally, it can realize the construction of information teaching environment, information technology research environment, information management environment, information technology environment, which improve the core competitiveness of colleges and realize the leap forward development of colleges.

**Data Integration of Big Data**

Data integration is the basis of the information integration. If the data is not integrated, it can’t achieve data sharing and the applications integration, not to mention a unified user access. The nature of the data integration: Through certain technical means makes the heterogeneous data (data of different sources, different format, different characteristics, different nature) can be organically concentrated, and the difference of the data source can be shielded, and the sharing of the heterogeneous data can be achieved.

In order to avoid the "heterogeneity" of the resource systems, we must strengthen the data integration and realize the comprehensive sharing of information resources.
In the era of big data construction of digital campus, first of all, we need to carry out a global analysis of the data to the entire digital campus information systems, and then develop a set of efficient data integration program, including five parts: formulate unified data standards, establish a shared database, establish a data exchange center, unified user authentication and application system integration. So as to ensure the integrity, accuracy and authority of the data provided by different application systems, the data integration in the construction of digital campus should do the following works:

**UNIFIED DATA STANDARD**

When the big data is very rich, you need to let the data flow in order to let big data value reflect. If there is not a unified data standard construction, the data is difficult to flow between the various business systems, and the more data the more trouble. Therefore, colleges in the process of promoting the construction of digital campus should be according to certain standards, especially the criteria for public information (including information standard, coding standard, management standard, implementation specification, maintenance norms). The data information of unified standards for the construction can avoid data redundancy, inconsistency, which make the data between different departments of application systems flow into each other. This measure prevents the generation of "information isolated island" problem between the application systems, and realizes data integration and resource sharing between systems.

**ESTABLISH A SHARED DATABASE**

Building shared database is the key to the implementation of digital campus data integration. Through the establishment of a shared database, we realize data synchronization and integration. The shared database integrates the data of the various systems in the campus, provides centralized data exchange, and achieves the sharing of resources between the systems. The shared database mainly includes the collection layer, the logic business layer, the service layer and the management layer. The specific contents include:

1) The collection layer is the prerequisite to establish a shared database. Because of the different types of database, in order to ensure that the system data can be accurately entered, the data can be filtered through the XML format.

2) The logic business layer describes the characteristics and relationships of business data, and establishes the overall data specification.

3) The service layer makes an approach to work according to the object oriented, and then establishes a system of business model.

4) The management layer manages all user information, user access information, and data access security control strategy.

The shared database includes the basic information of the university and the data of each business departments. The shared database can collect, process and store data. The most of all, the shared database provide a platform for the integration of multiple systems and data sharing among different systems.

**SET UP DATA EXCHANGE CENTER**

Unified identity authentication system based on directory service uses the LDAP protocol. According to distributed characteristic of directory service, the information
in various application systems is organized into a logical tree, which greatly simplifies the communication between the authentication service center and the application system. The directory and LDAP technology in the storage, query data has a high efficiency, and achieve a unified identity authentication, single sign on, centralized authentication and unified management of network application resources.

In the process of digital campus construction, data exchange and sharing in heterogeneous database is the key problem to be solved. Data exchange center is the core technology support platform of digital campus. The upload and download of data is according to the demand of each subsystem through the data exchange center, then the shared data is allocated to the corresponding subsystem. Safe and reliable public data exchange center ensure the integrity, accuracy and consistency of e-data, and achieve data sharing. In short, data exchange center is the basis for big data integrated query and statistical analysis.

UNIFIED USER AUTHENTICATION

Identity authentication platform is the main component of the construction of digital campus information platform. The platform is the base of application integration, otherwise the digital campus can only be a simple combination of application portal. Identity authentication platform to solve the account of each subsystem is not unified and access to the user login process is too complex. In a unified authentication platform for identity authentication, need not enter the user name password, simplifying the entire login process. Finally, a unified user management and authority control is realized to ensure the authenticity, confidentiality and integrity of the user's identity, which provides a basic security.

INTEGRATION OF APPLICATION SYSTEMS

Big data era of digital campus, colleges have the advanced campus network and a solid data center, based on the use of portal technology to achieve application integration and single sign on the information portal system. The digital campus of university can adopt the method of loose coupling integration in order to facilitate the maintenance of the application systems. This will not only continue to use the original application systems for saving money and resources, but also can be a partial adjustment of the application systems to ensure that the application systems in a state of normal work. Under the premise of not changing the original application systems, each application is still running independently, keeping the loose coupling degree between each other, so that the local changes are not delivered to the whole. At the same time, each application provides a number of service calls to other applications, so that other applications can call these services through this layer and access the information within the application systems. The final goal of the application systems integration platform is to provide the basis for the comprehensive analysis of the data and the basis for the decision of the school leadership.

CONCLUSIONS AND OUTLOOK

The big data era promotes the deep fusion of the education information and information technology. Big data has brought opportunities for teaching reform and innovation personnel training mode. Digital campus network plays an important role in teaching, management and scientific research, and it is an indispensable and
important infrastructure for any university. The development of big data technology brings new technical means and basis for the construction of digital campus in colleges. According to the actual situation of the data, using a big data ideas and technology, mining, analysis the data hidden behind valuable information can effectively improve the quality of data management and work efficiency of the various functional departments of the school. All these works can provide support for university management decision making, and achieve the sustainable development of education information.

REFERENCES