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Design and Development of Scientific Research Management System in Colleges and Universities

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ABSTRACT. *This paper mainly analyzes the design and development of the scientific research management system in colleges and universities. Combining with the function of the scientific research management system in colleges and universities, it makes in-depth research and exploration on the design technology of the scientific research management system in colleges and universities and the realization of the scientific research management system in colleges and universities. The main purpose is to better promote the development and improvement of the scientific research management system in colleges and universities.*

Keywords: *Colleges and Universities; Scientific Research Management; Management System; Design and Development*

1. Introduction

The scientific research management system in colleges and universities is a software system that serves the research and development of scientific research projects and information management in colleges and universities. Through viewing the data model, it can provide accurate information related to scientific research projects and views from different perspectives. And through the intuitive form, it can reflect the real scientific research status in a timely manner to the scientific research management personnel, so as to allocate appropriate scientific research resources. The system can carry out periodicity management for each project to ensure timely update and processing of scientific research achievement information. The system can face the school researchers, scientific research managers and school leaders, organically combine the scientific research personnel, scientific research achievements and scientific research project management of our school, form a unified data storage, centralized processing and a management platform that can provide convenient information communication, and further realize the systematic management of scientific research work of our school.

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2. Scientific research management system in colleges and universities

2.1 Significance of systematic compilation

Carrying out the system documentation can ensure that all university researchers can better operate the system during the use of scientific research management. Its main target audience is university scientific research management personnel and scientific research application personnel.

2.2 System objective

According to the actual needs, the management of scientific research projects, authorities and researchers should be organically integrated so as to form a relatively perfect management platform for colleges and universities and to solve various problems to a certain extent, such as the heavy burden on scientific research managers, the informatization management of scientific research projects, the improvement of the accuracy and timeliness of scientific research data, the sharing of scientific research information, and the statistical and analytical capabilities of data [1]. To ensure that the shortcomings in the traditional scientific research management work in colleges and universities are well solved, effectively demonstrate the advantages of information technology, and promote the efficiency and ability of scientific research management in colleges and universities to be comprehensively improved.

The scientific research management system is relatively convenient to operate. Both non-technical personnel and technical personnel can quickly master and operate it. Based on the concept of developing a simple and efficient management system for scientific research management personnel, it is ensured that advanced technologies are applied to solve various problems [2]. At the same time, the use of advanced server and browser architecture and the use of Web technology for scientific development can also effectively promote the continuous improvement of system operation efficiency, thus ensuring that the scientific research management system meets the needs of scientific research management in colleges and universities. In addition, through the use of efficient database, it can also realize the effective management of rich scientific research data and ensure the data information has strong security.

3. Design technology of scientific research management system in colleges and universities

3.1 Database design

In the information management system, the database plays a more important role and position, which can effectively promote the security and stability of the

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information system. Usually, the database is mainly used for data information collection, storage, processing, extraction, query and integration. Therefore, in the process of designing the scientific research management system in colleges and universities, it is necessary to ensure that the database is scientific and create conditions for the good operation of the scientific research management system [3]. Because the scientific research work in our school has huge data information and relatively simple business logic, and the data information mainly comes from researchers, managers and scientific research project information, SQL2018 can be used as a database, which is relatively strong in stability, safety, practicability and programmability, and can be used in the scientific research management system of colleges and universities to effectively meet office requirements.

3.2 System security

The scientific research management system in colleges and universities is mainly designed and developed based on Web programs. JSP is used to ensure the effective connection of data and information, which makes the scientific research management system more open. However, during the sharing of data and information resources, there are also serious security threats. In order to effectively avoid tampering with data and information [4], SQL permissions need to be applied during the design of scientific research system. Only senior management personnel can control and allocate permissions while the input, execution and selection are relatively simple.

4. Analysis of scientific research management system in colleges and universities

4.1 Server pattern analysis

At present, the B/S platform mode is widely used. It transforms the C/S mode server into a data information server and several application servers, creating favorable conditions for forming a three-tier structure and realizing the goals of system development, maintenance and simplification of clients. At the same time, the user's actual operation is relatively simple and can be applied quickly without training [5]. B/S platform mode can also publish data information on the Internet, which effectively promotes the rapid development of MIS function. In addition, the B/S structure mainly uses WWW mode to realize the data information transmission, the client uses the browser to send the Web request, then through the server to carry on the processing, according to the actual demand and the database real-time information transmission, Web information can be quickly transferred to the browser client, so that the client can grasp the required information.

4.2 System structure

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First of all, the server is mainly composed of software platform and hardware platform. The hardware platform is CPU (above i3550) and 4GB RAM, while the software platform can be composed of Windows7, SQL database development kit, browser and JSP server.

Secondly, in the process of configuring the Web site, the main running program of the Web server is JSP. If you want to improve its running efficiency, the server should also support Java virtual machine, JSP and other software to run [6].

Thirdly, Apache enterprise has developed Tomcat, which is also one of JSP engines and also has a Web server, so it can provide conditions for the implementation of independent Web servers, and can be downloaded and installed directly through relevant websites. The free download website is: http://www.apache.org. The latest version of Tomcat can be downloaded directly and freely through this website.

Finally, create the SQL data information base according to actual requirements and named.

4.3 SQL 2018 analysis

Based on the above in-depth study of SOL 2018, SQL is a relational database operation management system, while the latest version is 2018, with relatively stable performance. By downloading, SQL can run well on the computer operating system.

During the design of the database of scientific research management system in colleges and universities, it is necessary to understand that the database plays an important role in the management system. When the database structure is reasonable, it can effectively promote the development and design efficiency of scientific research management system programs to rapidly improve [7]. Therefore, four aspects should be paid attention to when designing data: first, according to the needs of scientific research management in colleges and universities, the types of data information stored in the database should be clarified; secondly, a conceptual model of data information is established; thirdly, design a scientific logical computing structure; finally, maintain and manage the database regularly.

4.4 Network programming language

JSP is currently the main technical standard for dynamic web page design, and JSP interface and HTML file have strong similarity to a certain extent, that is, Java, HTML and XML are combined together with JSP elements [8]. When the staff applies for the JSP interface, the Web server will send the specific JSP interface to the JSP engine at the first time, and then process the interface according to the actual needs through the engine. That is, the JSP engine converts all Java codes, JSP tags, HTML, etc. in the page into Java codes by request, and then the JSP engine integrates the Java codes and sends them to Java servlet [9]. Finally, it is converted by servlet and programmed into Java bytes.

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HTML is also hypertext markup language, which is one of the common languages on the internet. When using super text language to develop files, the file extension name is mainly htm or html. These files can be viewed and analyzed directly by using a browser. At the same time, designers can also directly use hypertext markup language to make pages combining pictures and text. However, everyone on the Internet can preview the produced pages, regardless of the browser and computer used by the browser.

Under the influence of apache formation, Sun enterprises developed server-side Java technology, namely Tomcat platform. Tomcat is usually an open source code, that is, a Java-based software container running in various software of JSP Web, and it is also a sub-project of the open source protocol.

4.5 Database access technology

JDBC is usually called Java Database Connectivity, which mainly belongs to JavaAPI that executes SQL language and can better realize the same access of various relational databases. At the same time, JDBC is also composed of classes and interfaces written by Java language. Database access technology is an API package that analyzes and uses SQL language, which provides a better programming port for database operation to a certain extent [10]. The database access technology is based on the effective connection between the driver and the database, so many development enterprises and third-party platforms use the database access technology standards to varying degrees, and have also studied rich database drivers. The scientific research management system in colleges and universities can use standard drivers according to actual needs. For example, the local API semi-drive engine is used to access the database through Java language and API.

5. Implementation of Scientific Research Management System in Colleges and Universities

5.1 Implementation of administrative authority

When staff members log into the scientific research management system of colleges and universities, they can be divided into two kinds of identity forms, namely, management personnel and declaration personnel [11]. When logging into the system as a manager, different administrative authority will be formed according to the work content to be carried out. For example, when managers enter scientific research data information, they will have different identities as scientific research managers of different departments. If you enter the system as a senior manager, you can input scientific research projects, research results, personnel data and information of all departments and colleges of the university according to actual needs. If you enter the system as a scientific research manager of a college, you can only control and manage the scientific research data information of that college

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5.2 Backup and Security Measures

Scientific project management system has a high demand for data information security because it contains user data information, scientific research project data information, system operation and management rights, etc. At this time, Script Encoder software can be used to encrypt JSP pages, which can prevent JSP source code from leaking. The JSP session control function can also be used to register and verify the user data information of the scientific research management system to prevent unregistered users from directly entering the system through illegal means. In addition, the scientific research management system of colleges and universities can regularly backup the database according to the actual situation to better promote the rapid improvement of data information security and stability.

5.3 System plate and function analysis

First of all, the project application and establishment section. According to the development needs of colleges and universities, the scientific research management system can be divided into six major sections during the design period. It not only has a system maintenance section and a user information section, but also should start with scientific research project application, project initiation, scientific research funds, scientific research achievements, Research Assessment Exercise and other projects, and conduct in-depth research and design in combination with scientific research management [13]. Among them, the application section for scientific research projects is extremely important in research project management system and belongs to the basic function section. Due to the differences in the application contents of scientific research projects, they can be divided into two structures: off-campus projects and on-campus projects. Due to the differences in the application contents of scientific research projects, they can be divided into two structures: off-campus projects and on-campus projects. College judges examine and approve the on-campus application projects, register the projects after passing the examination and approval, and then scientifically input data and information such as the input time of scientific researchers to create conditions for the next project. However, when applying for off-campus projects, there is no need for on-campus judges to examine and deal with them, and the projects are directly approved and registered, and then the management process projects are carried out according to actual needs.

The examination and approval of scientific research projects and the establishment of scientific research projects both play an extremely important role. After the project has passed the examination and approval, the project initiation work should be carried out in a timely manner, and the project initiation is also the main operation process of the scientific research management system in colleges and universities [14]. Scientific research project management has strong similarity with scientific research project application, which can be divided into on-campus application and off-campus application. After inputting data information such as research time, researchers will obtain good data information on research progress of the project, which is also a favorable condition for deciding the suspension and

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termination of scientific research projects, and is also the basic power for promoting the effective operation of scientific research projects. When the scientific research project is completed, the application for acceptance shall be submitted, and the results and progress of the scientific research project are also the acceptance criteria of the scientific research project. Finally, the registration data input of the project shall be completed regardless of whether the acceptance results meet the scientific research objectives.

Secondly, the results evaluation section. Identification and evaluation of research achievements of teachers, students and researchers in colleges and universities are the basic contents of scientific research management. Identification of research achievements can effectively ensure the authenticity of scientific research projects, create scientific conditions for clarifying the grade of scientific research achievements, and realize the good application efficiency of research achievements in real life, such as: as the conditions for students to apply for scholarships and teachers to employ professional titles [15]. During the design of the scientific research management system in colleges and universities, the input of data and information on research results can be divided into three structures. The author of the paper needs the approval of relevant departments or the examination and approval of the results management personnel. After meeting the relevant standards, the information of the article can be input. The scientific research personnel only need the examination and approval of the results management personnel to input the article. When meeting the examination and approval standards, the scientific research article can be directly input.

Thirdly, scientific research fund management section. In the process of scientific research management in colleges and universities, the management of funds is also more important, which can ensure that all scientific research funds are actually put into practice, promote the maximum use of scientific research funds, and prevent corruption and waste of scientific research funds to a certain extent. Therefore, during the development of the scientific research management system in colleges and universities, the scientific research fund management section has the same importance as other sections of the management system.

Combined with the actual demand, scientific research funds can be divided into fund management and funds query, and funds management plays an important role. The management of funds can be divided into three parts, such as input of funds, transfer of funds, expenditure of funds, extraction of funds and annual carry-over of funds of scientific research projects. During the design period of funding, scientific research project funding ratio should be designed according to different needs and types to provide scientific impetus for the good operation of horizontal research projects with market as the goal and vertical research projects based on scientific research. At the same time, during the design of funds extraction, it is also necessary to make scientific and reasonable research funds extraction ratio based on vertical and horizontal research projects.

Finally, the evaluation section of scientific research results. Evaluation of scientific research achievements plays an important role in scientific research

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management in colleges and universities, which can ensure the rapid improvement of scientific research management efficiency in colleges and universities. Perfect and reasonable results evaluation system can not only better reflect the work performance ability and research results of scientific researchers, but also combine with the reward system to carry out effective reward activities to promote the enthusiasm of scientific researchers in colleges and universities. Therefore, during the design of the scientific research management system in colleges and universities, it is necessary to pay more attention to the design of the scientific research achievement evaluation section. According to the actual situation, it is divided into two subsystems with strong correlation, namely scientific research reward analysis and scientific research workload analysis. Among them, the analysis of scientific research workload is based on the design conditions of calculation engineering formula, calculation coefficient, base number, etc., so as to obtain more accurate scientific research workload data information; The analysis of scientific research award results is based on the condition of calculation measures and combined with calculation measures to obtain scientific scientific research award data information, and then obtain reasonable scientific research award results. During the analysis of scientific research awards, the main analysis and calculation standard is scientific research workload. As the workload continues to increase, the greater the awards will be.

6. Concluding

To sum up, with the rapid development of society, the traditional scientific research management in colleges and universities can no longer meet the needs of scientific research. Therefore, it is necessary to make full use of Internet technology and computer technology to carry out information transformation of scientific research management, to ensure that scientific research management has strong signs of modernization, automation and networking, to fundamentally reduce the task pressure of managers, and to promote the rapid improvement of management efficiency.

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