Design and Application of Web-Based Campus Safety Facilities Management Information System in Higher Vocational Colleges

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Abstract. In the traditional working mode, campus safety facilities management relies heavily on scattered stand-alone or manual methods to achieve registration, maintenance, inspection and other operations, which is not only inefficient, but also prone to human omissions. In this regard, this paper aims at promoting the reform of the management mode of campus safety facilities in higher vocational colleges, puts forward a set of construction scheme of campus safety facilities management information system in higher vocational colleges to realize the scientific and standardized management of campus safety facilities. The whole system adopts B/S architecture. On the Web Server side, WebGIS and Ajax technologies will be integrated to form an electronic map of campus security facilities, which will integrate the map with the data of security facilities and provide convenience for the subsequent management work. In addition, the system also has the function of data analysis and processing, which provides necessary data support for the evaluation of campus safety facilities management in higher vocational colleges. After simulation test, the functions of the system are running normally, which is of positive significance to improve the level and efficiency of safety facilities management in higher vocational colleges.

Keywords: Web technology · campus safety facilities · management information system · computer software application

1 Introduction

Campus safety is the fundamental guarantee for the smooth development of education and teaching work in higher vocational colleges. With the enrollment expansion and expansion of higher vocational colleges, problems such as dense campus personnel, complex campus and surrounding environment, and diversified security risks put forward higher requirements for safety facilities in higher vocational colleges, which also makes campus safety work more difficult [1]. Faced with this situation, the campus safety management in higher vocational colleges should not only improve ideological awareness, but also step up the publicity and study of safety knowledge, and make changes in the management of campus safety facilities and emergency handling. However, under the traditional working mode, the management of campus safety facilities is not paid

enough attention, and the working methods tend to be conventional, resulting in loop-holes and lags in the necessary maintenance and repair work. The aging and failure of some campus safety facilities directly aggravate the risk of campus safety hazards [2]. In view of this, this paper believes that higher vocational colleges should recognize the seriousness of the management of safety facilities, actively use the practical advantages of Internet technology, database technology and computer software technology, build a Web-based campus safety facilities management information system, and put forward a set of practical and comprehensive application solutions to realize the scientific and standardized management of campus safety facilities. The system innovatively integrates WebGIS technology into the daily management of security facilities. With the help of campus security electronic map, it not only clearly and intuitively marks the location and status of various types of security facilities on campus, but also effectively improves the level and efficiency of campus security facilities management, thus promoting the process of information development in colleges and universities [3].

2 Development Process

Campus safety facilities management information system is a B/S architecture as a whole. The design and development of the system mainly involves two technical lines: client interaction and server control. Among them, client-side interactive pages are mainly realized by technologies such as div + css, JavaScript, Ajax, HTML and general handlers [4]. Div + css is mainly aimed at page layout; JavaScript is responsible for the implementation of specific interactive operations; Ajax defines the data interface; HTML, as the main development language, aims to present page content. The server-side development is mainly aimed at the construction and deployment of the Web Server of the system. In the development environment of ASP.NET, the underlying operating system of the system is Windows10.0 x86-64bit. The development framework of. NET Framework 4.7 and Visual Studio 2019 are used to provide project development tools for C# language [5]. Select SQL Server 2019 as the database platform, and download SQL Server Management Studio to complete the configuration and management of the database. For the application of WebGIS technology, ArcGIS Server will be installed and deployed in the system development environment. After creating the site under ArcGIS Server Manager, according to the requirements of WebGIS service, create a new connection to the server, obtain the base address of WebGIS service, and complete the publishing of WebGIS service [6]. After the system design and development is completed, the system will be published by IIS 10.0 server under Windows, so as to support system users to log in and use the system through Web browser. Through the introduction of the above key technical theories, the overall environment of system development, the configuration of related software and tools are determined, and the technical feasibility of the overall project of campus safety facilities management information system in higher vocational colleges is also clarified.

3   Functional Implementation

3.1   System Homepage

Under the homepage interface, users can intuitively see the distribution and location information of major buildings, affiliated water supply, power supply, gas supply and heating places, internal roads, safety signs and fire-fighting facilities in higher vocational colleges from the campus safety electronic map. At the same time, users can drag, enlarge, shrink or rotate the electronic map without affecting the realistic effect. In addition, the system also gives users the function of online query, that is, users can enter the names of landmarks, roads, buildings and facilities to be queried in the search box, and the electronic map will be automatically marked and positioned [7].

3.2   Safety Facility Management

Under this function, users can add information, manage daily and make statistical inquiries about all safety facilities on campus. In information addition, it mainly includes number, name, category, location information. In the daily management of campus safety facilities, it mainly includes patrol inspection, maintenance and disposal [8]. For example, the fences, speed bumps and signal lights involved in campus road safety facilities should be inspected many times, and the losses should be repaired in time. For the fire-fighting facilities on campus, the system can also bring the information such as shelf life, manufacturers and maintenance units into the management scope, and provide automatic reminder function. For example, the shelf life of portable dry powder fire extinguishers is 8 years, and the maintenance cycle is 1 year. When the deadline is 3 months or 1 month, the system will automatically initiate maintenance reminders [9].

3.3   Data Statistics Management

Under this function module, users can use the system to automatically count the number of various campus safety facilities, the number of maintenance and repair, and the number of safety accidents, and analyze and process the corresponding data, and display the results in the form of visual data charts, providing necessary data support for the evaluation of campus safety facilities management. As shown in Table 1, it is the recent statistics of campus safety information in higher vocational colleges.

The system will complete the calculation according to the statistical data of safety information combined with the correlation algorithm, and the calculation formula is shown in Formula 1. Among them, P is the correlation between the maintenance of campus safety facilities and the occurrence of safety accidents, A represents the number of completed maintenance and repair of various campus safety facilities in the whole year, and B represents the number of campus safety accidents in the whole year [10]. The P-value of the simulation result is -0.6973. The result shows that the maintenance of campus safety facilities is negatively related to the occurrence of safety accidents, and strengthening the management of campus safety facilities is of positive significance to

Table 1. Campus security information statistics table

No.	Safety equipment	Department	Location	Maintenance times	Safety accident details
001	Peripheral guardrail	Property center	East side	5	-
002	Speed bump	Property center	Parking	19	Twice, the vehicle rear-ended
003	Dry powder fire extinguisher	Accommodation center	1#, 2#	7	Once, fire
	…	…	…	…	…

Table 2. Simulated test results

	Traditional single engine, manual mode	Campus security facility management information system
100 facility information registration time	1296s	791s
100 information query time	906s	349s
Inspection and maintenance process processing time	309s	66s

the promotion of campus safety.

$$P = \frac{\sum\limits_{i=1}^{n}\left(A_i - \overline{A}\right)\left(B_i - \overline{B}\right)}{\sqrt{\sum\limits_{i=1}^{n}\left(A_i - \overline{A}\right)^2}\sqrt{\sum\limits_{i=1}^{n}\left(B_i - \overline{B}\right)^2}} \tag{1}$$

In addition, a simulation test is set up for the practicability and performance stability of the system. The test selection information registration time, query time and patrol maintenance process processing time are described, and the test results are shown in Table 2. The results show that the overall operating efficiency of the system far exceeds the traditional single machine and manual mode, and the system functions meet the design requirements.

4   Conclusion

In order to improve the efficiency of campus safety facilities management, this paper actively uses the practical advantages of Internet technology, database technology and computer software technology to build a campus safety facilities management information system based on Web. It puts forward a set of practical comprehensive application

solutions to realize the scientific and standardized management of campus safety facilities. In the follow-up research, it will further enrich the functional application of the system, expand the application scenarios of the system, and further promote the process of informatization development in colleges and universities.

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