Design and Application of Mixed Teaching System of Pediatric Nursing Based on Web Technology

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Abstract. Based on Web technology and SSM framework set, we have completed the construction of online learning system of pediatric nursing network, and implemented in-depth reform of traditional teaching mode of pediatric nursing according to SPOC mixed teaching. Under the SPOC mixed teaching mode, higher requirements are put forward for students' admission standards, applicable groups, learning experience and course completion rate, which is in line with the training plan and training objectives of pediatric nursing specialty. Pediatric nursing online learning system provides convenience for college students' online self-learning courses through online learning, homework and testing, communication and feedback, data analysis and other functional modules, and emphasizes comprehensive mastery of theoretical knowledge and practical skills of pediatric nursing under online and offline mixed teaching mode. It has made a positive attempt to improve teaching efficiency, optimize the allocation of teaching resources, improve the construction of education system, and promote educational information reform.

Keywords: Web Technology · SSM Framework · Pediatric Nursing · Network Online Learning System · SPOC Mixed Teaching Model

1 Introduction

Pediatric nursing involves not only medical science, but also sociology, psychology, pedagogy and other disciplines [8]. In view of this development trend, new requirements are put forward for the education, teaching and personnel training of pediatric nursing specialty. In the current training plan of nursing major in colleges and universities, pediatric nursing is not only the main course of its discipline, but also an important part of nursing major. As a discipline to study children's growth and development rules, children's health care, disease prevention and clinical nursing, pediatric nursing has different characteristics and special needs from adults, because its service object is children who are constantly growing in physique and intelligence [7]. Therefore, pediatric nursing is highly professional, which requires students' ability to combine theory with practice. At present, there are still some shortcomings in the current situation of pediatric nursing education and teaching in colleges and universities. For example, the teaching system is not perfect, the setting of teaching objectives is out of touch with the actual social needs,

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the outdated teaching methods, the weak teaching staff, the single form of assessment and so on. The emergence of such a series of problems directly leads to the monotonous teaching process of pediatric nursing as a whole, students' low interest in learning and poor learning effect, which further aggravates the degree of maladjustment of students after graduation and entering the clinical work stage. Therefore, it is imperative to reform and update the teaching process, contents and methods of pediatric nursing [1].

In the current information age, network information technology has been widely used in all industries and fields of the whole society, setting off a new wave of innovation and development. Among them, the network information technology has changed the dissemination of learning content in the field of education, provided a fast learning method, and thus formed a new form of education, (online education) E-Learning. Compared with traditional education methods, online education has the characteristics of high efficiency, convenience, low threshold and abundant teaching resources with the help of network information technology [4]. Online Education In the university education environment, online education forms represented by MOOC and SPOC have appeared, which has increased the synergy of university education and realized the decentralization of education. It is beneficial to stimulate students' interest in learning, and more suitable for college students' learning style and "networking" living habits in the new era. However, it also weakens the supervision and control in the learning process. From the perspective of real teaching effect, it cannot completely replace the traditional classroom teaching. Therefore, a kind of "online" + "offline" hybrid teaching which combines the advantages of online teaching and classroom teaching. Through the organic combination of the two teaching organization forms, learners' learning can be led from shallow to deep learning. In view of the teaching characteristics of pediatric nursing specialty in colleges and universities, this paper holds that, based on Web technology, the online learning system of pediatric nursing under SPOC mixed teaching mode is constructed by SSM framework, which can realize that pediatric nursing specialty is based on small-scale specific learning groups, emphasizes the access and completion conditions of course learning, and focuses on highly mastering the theoretical and practical knowledge of pediatric nursing, which is helpful to improve the mixed learning effect.

2 Related Technical Introduction

2.1 Web Technology

Web technology is a collection of technologies used to develop Web applications based on the Internet environment. Since the 1990s, HTML technology, HTTP protocol and Internet browser have been born one after another, realizing that text content can be transmitted between different processes only by means of the network, and HTML returned from the server can be rendered and displayed in the browser, thus pushing out the primary stage of Web application development. In the primary stage, the browser and the server rely on the simple "request/response" mode to complete the presentation of static Web pages, that is, the web server will complete the whole process of returning the HTTP encapsulated response message to the browser after reading the corresponding URL according to the HTTP request sent by the user at the browser. The static webpage is a standard HTML file with the file extension of .Htm or .Html, which can contain text,

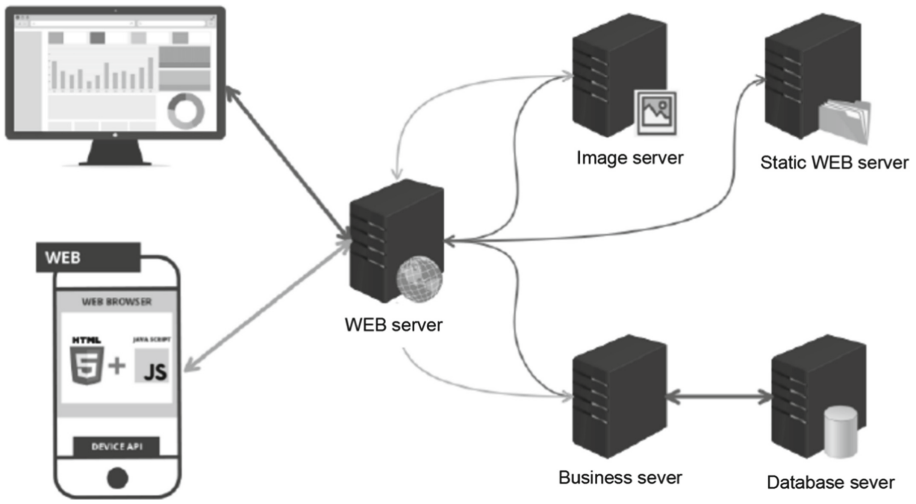

Fig. 1. Web server supports dynamic and static page rendering

images, sounds, FLASH animation, client scripts, ActiveX controls and Java applets, etc. This kind of webpage does not contain any scripts running on the server side, and only a single content server or static server completes rendering, as shown in the PC side in Fig. 1. With the change of users' demands, the development of the functions of the Web server presents a trend of complication and diversification, from the presentation of a single static text content or data information to the execution of scripts or external application calls. This technology of dynamically generating user requests using programs is called dynamic webpage technology. Dynamic webpage is the integration of basic Html syntax specification, advanced programming languages such as Java, VB, VC, database programming and other technologies, in order to realize efficient, dynamic and interactive management of website content and style, as shown in the mobile phone in Fig. 1. ASP, PHP, JSP and other technologies have appeared one after another, which can run programs written in different languages on the server side [6].

According to the different technical applications and architecture differences between Web server-side programming and Web client-side programming, Web technology is divided into two basic types: client-side technology and server-side technology. The combination of the two technologies forms Browser/Server programming, that is, B/S architecture.

2.2 SSM Architecture

SSM (Spring+SpringMVC+MyBatis) framework set is the integration of Spring and MyBatis open source frameworks. SSM framework is based on Java development, which is suitable for Web application development framework with simple data source. Compared with SSH (Spring+Struts+Hibernate) framework of the same type, SSM framework is lighter and more flexible. SSM architecture complies with J2EE development

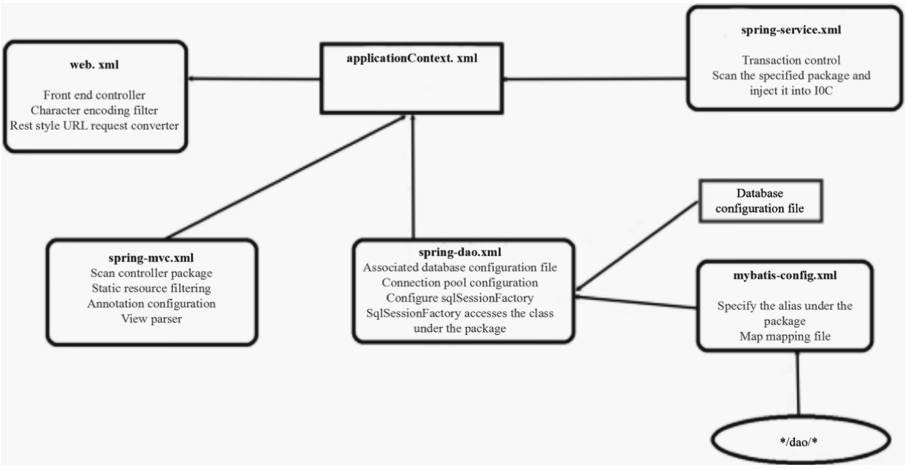

Fig. 2. Schematic diagram of SSM architecture working principle

specification, as shown in Fig. 2, it is a schematic diagram of the working principle of SSM architecture.

2.2.1 Spring

The core application of Spring framework is a container framework, which can accept the components of Web layer, business control layer, dao layer and data persistence layer. The application purpose of Spring framework is to manage the relationships between various objects or modules directly through configuration class description. Under the Spring framework, there are three core technologies, namely inversion of Control (IOC), dependency injection (DI) and aspect-oriented programming (AOP). The use of Spring is not limited to server-side development. From the perspective of simplicity, testability and loose coupling, any Java application can benefit from Spring.

2.2.2 Spring MVC

Spring MVC is a separate module under the Spring framework, and it is a Web framework based on MVC pattern. Spring MVC can split the traditional model layer into Service layer and data access layer. In practical application, Spring MVC mainly uses the central controller DispatcherServlet to complete the requests sent by clients. Upon receiving the request, query one or more HandlerMapping to match the Controller. After the operation is completed, the ModelAndView is returned to the DispatcherServlet, and then rendered to complete the response to the user request. Spring MVC has the characteristics of clear role division and division of labor, and can be well integrated with Spring framework, which has congenital advantages in application performance.

2.2.3 Mybatis

MyBatis is a Java-based persistence layer framework, which can encapsulate JDBC, eliminating a large number of manual settings of JDBC codes and parameters and retrieval of result sets. Mybatis configures various Statements to be executed by xml or annotations, and generates the final Sql statement by mapping Java objects and dynamic parameters of Sql in statements. Finally, Mybatis framework executes Sql and maps the results to Java objects and returns them, which greatly improves the operation convenience of data persistence layer [2].

2.3 Development Environment

According to the system development requirements and the use requirements of the above key technologies, we have completed the configuration and deployment of the development environment. The whole system development is based on Windows10.0 operating system, the basic development environment is Java, JDK version 1.6 and above, MyEclipse 2014 is the Java development environment, Tomcat 8.0 is the Web server, and MySQL 5.5 is the database server. And use the project object model (Maven) to manage the project structure. Maven chooses Apache-Maven-3.2.1 version. In the process of building the overall development environment, first of all, complete the installation of JDK and the configuration of environment variables to build the foundation of its Java application development. Secondly, the installation of MyEclipse and the installation of the Web server Tomcat, and the configuration of Tomcat is completed in the Preference option under MyEclipse. Then Maven is configured. Maven is a Jar package, which can be installed only by direct loading. In the process of modifying environment variables, it is necessary to create new variables first and then edit them, as shown in Fig. 3. Finally, after testing, it is proved that the overall development environment has been built.

Through the brief introduction of the above key technology theories, we have determined the overall environment of system development, the configuration of related software and tools, and also made clear the technical feasibility of the overall project of pediatric nursing online learning system based on Web technology.

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Java version: 1.7.0_51, vendor: Oracle Corporation
Java home: C: \ Program Files\ Java\ jdk1.7.0_51\jre
Default locale: zh_CN, platform encoding: GBK
OS name: "windows 7", version: "6.1", arch: "and64", family: "windows"
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Fig. 3. Maven configuration successful display page

3 Requirements Analysis

3.1 Functional Requirements Analysis

The online teaching system of pediatric nursing network based on SPOC mixed teaching mode can support users with different roles of teachers and students to log in and use. And it pays attention to realizing the "online teaching" function of SPOC mixed teaching mode, and cooperates with traditional offline classroom teaching to complete the teaching task of pediatric nursing major courses.

There is a certain difference between SPOC and MOOC. The core idea of SPOC refers to "s", that is, "Small", which is a small-scale and specific applicable group. "P" refers to "Private", that is, private, which is more specialized than the open MOOC, and it also imposes certain restrictions on the admission and launch standards of courses [3]. Therefore, the online learning system of pediatric nursing under SPOC mixed teaching mode should make corresponding functions to realize the restriction strategy in terms of the restriction of student users' access, the restriction of resource use and the restriction of course withdrawal.

On the student side, users need to pass the qualification application and review before they can get the system access. According to the common functions of online teaching, students' terminals are set up as online learning modules, homework and testing modules, communication and feedback modules and personal information modules. The whole function is more detailed and perfect than MOOC teaching system. On the teacher side, teachers can review students' applications for admission. In the teaching process of pediatric nursing, teachers can complete the design, production, upload management, update and maintenance of course contents and resources. At the same time, teachers can arrange and correct students' online homework, as well as conduct periodic online learning effect evaluation tests, and have completed the process assessment of students' learning effect. In addition, teachers can also communicate and interact with students online, and check the data summary results of students' learning at any time.

3.2 Global Design

In view of the functional requirements of online teaching system of pediatric nursing, combined with the application and configuration of related technologies mentioned above, we have completed the overall design of the system. The whole system design takes Web technology as the core, and uses B/S architecture to divide the whole system into three parts: application layer, business control layer and data service layer. In the business control layer, SSM framework further subdivides the business control layer to strengthen the functions of the Web server. Among them, Spring MVC corresponds to the Controller layer in MVC mode, and is responsible for the control of business module flow. Mybatis corresponds to the Mapper layer in MVC mode, and is responsible for interactive design with the database to handle data persistence. Spring layer, namely Service layer, is responsible for the logical application design of business modules. Finally, relying on MySQL database server to provide content storage and running space for the whole system, as shown in Fig. 4, it is the flow chart of the whole system operation.

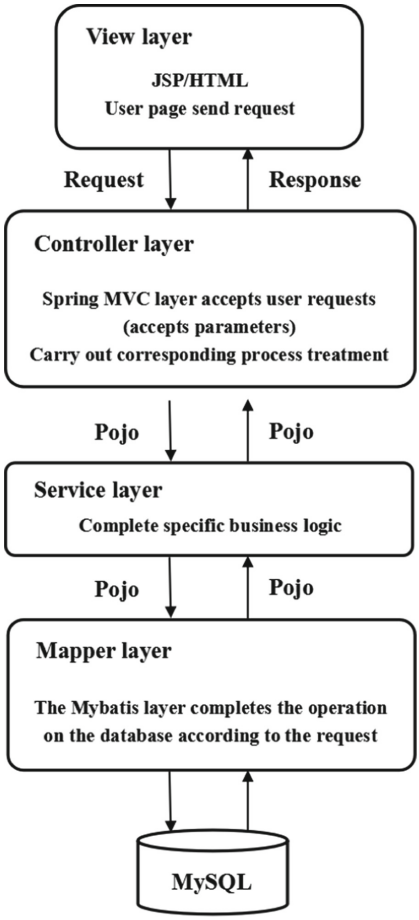

Fig. 4. System overall operation flow architecture diagram

4 Function Realization

4.1 Student Side

Under the online teaching system of pediatric nursing network, when the student users log in for the first time, they need to fill in the detailed information of the user account according to the registration guide, and send an audit application to the teacher. After the teacher confirms the student's identity and information, they can obtain the login permission of the system, so as to realize the access restriction. The student interface is presented in the form of webpage, which is convenient for student users to log in with various devices or terminals.

4.1.1 Online Learning

Under the online learning module, the system provides a variety of learning resources to facilitate students' learning. Among them, some teaching resources are synchronized with offline classroom teaching content, such as teaching materials, courseware and after-class review materials. The content is mainly based on e-book teaching materials and ppt combining graphics and text. The teaching content will be published in the online teaching system of pediatric nursing network ahead of classroom teaching, so that students can learn in advance, stimulate students' autonomy and complete the preview of the teaching content. In the process of learning, in order to ensure the progress and efficiency of learning, the system adopts SPOC teaching mode, and students need to complete learning according to the "learning path" formulated by teachers. That is, students are not allowed to enter at will, and they must be able to enter the follow-up study on the basis of completing the necessary prerequisite knowledge of a certain knowledge point [5]. In the system setting, the point system is introduced for students' learning behavior, and students accumulate points after learning, so as to ensure that students can unlock the learning of post-sequence resources only after completing the established learning tasks, thus motivating students to gain learning opportunities through continuous learning and accumulating points, and realizing the restriction of resource use.

In addition, the system also provides a large number of extracurricular expanding knowledge, including excellent pediatric nursing books such as "Practical Pediatric Nursing", "Diagnosis and Treatment Routine of Beijing Children's Hospital, Nursing Diagnosis and Treatment Routine", "Practical Handbook of Newborn Nursing", etc. There are also professional practical teaching videos of pediatric nursing and so on. With the richness and diversity of network resources, it can not only broaden students' horizons, improve their comprehensive quality, form a good supplement to the traditional classroom teaching content, but also conform to the current habits of college students' online study and life, stimulate students' learning enthusiasm and improve their learning effect.

4.1.2 Homework and Testing

Under this module, the system supports students to finish homework assigned by teachers online. As an important means to test students' learning effect, Homework can be presented in two forms. One is objective question-and-answer and multiple-choice questions, which focus on the key points and difficulties of current curriculum teaching. The other kind is task-based homework, that is, to give full play to the strength of study groups and teams, and to conduct scenario reappearance simulation exercises and collective discussions to complete targeted learning tasks for common problems in pediatric nursing, such as neonatal fever treatment, children's resistance to treatment, children's parents' intervention treatment, and then upload the completion of tasks and push them to the teachers' side to complete the evaluation. After phased learning, students can complete the online learning effect evaluation test organized by teachers. The test content not only involves the course content, but also includes the corresponding evaluation of students' learning objectives, learning self-control ability, learning autonomy and other abilities.

Based on this data, teachers set restrictive constraints for students to complete or launch courses.

4.1.3 Communication and Feedback

Under this module, student users and teacher users can communicate in an open chat room, all users can join or launch at any time, and the communication content is also open to all users. In addition, there is a small group chat room, which is convenient for different users in a group to communicate and exchange. The openness of chatting not only facilitates the exchange and sharing of learning experience among students, but also forms a strong learning atmosphere. It can also shorten the distance between students and teachers and reduce the embarrassment caused by identity differences. In addition, students can communicate directly with teachers, which not only enables teachers to help students with professional answering and counseling, but also can get students' real thoughts in time and understand their real needs. Students can also directly evaluate and give feedback to teachers and children's nursing courses as a whole, and further promote the improvement of children's nursing education system in colleges and universities.

4.2 Teacher Side

On the teacher side, teacher users also need to register their accounts and log in. Compared with the online learning function on the student side, the teacher side pays more attention to the overall management and process supervision of online teaching of pediatric nursing.

Under the resource management module, teachers can maintain and update all teaching resources and extracurricular development resources included in the online teaching system of pediatric nursing. According to SPOC model, teachers set up online learning path of pediatric nursing, complete the integral setting of corresponding learning tasks, and ensure the normal operation of online teaching system. Under the homework and testing module, teachers can release homework in time, and set the completion time of homework to urge students and users to finish it on time. The staged learning effect test is also held online, which greatly facilitates teachers' daily work and improves work efficiency. Under the communication and feedback module, teachers and students can communicate in time. The online communication mode eliminates the sense of distance between teachers and students, and improves the situation of insufficient communication between teachers and students in offline classroom education. In addition, under the data summary module, teachers can check the completion progress of students' learning courses and the acquisition of learning points at any time, and grasp the teaching effect of pediatric nursing in time according to the summary analysis results of points, which is convenient for teachers to adjust and implement the teaching plan and teaching activities in time.

5 Conclusions

The online teaching system of pediatric nursing network based on Web technology can effectively solve the problems existing in the traditional classroom teaching of pediatric

nursing, and realize the transformation from the teaching mode of pediatric nursing to SPOC mixed teaching mode. With the advantage of network information technology, it stimulates students' learning enthusiasm and subjective initiative, and ensures students' mastery of pediatric nursing professional knowledge and practical operation skills by setting restrictions on course access, resource use and course exit, which promotes the optimal teaching effect of pediatric nursing, achieves the purpose of cultivating qualified pediatric nursing talents for the society, and also provides new ideas for the educational informationization reform in colleges and universities.

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