Construction of Online Teaching System of College Mental Health Education in the Perspective of Internet plus

Yili Shi

87084341@qq.com

Chongqing Aerospace Polytechnic, Chongqing City, 400021

Abstract. Under the new situation of the development of modern education, facing the problems existing in the current classroom teaching mode of college students' mental health education, such as outdated teaching methods, single application service and one-sided teaching evaluation, colleges and universities urgently need to adopt the form of Internet+education to promote the digital transformation and upgrading of mental health education courses. In this regard, based on the psychological characteristics of contemporary college students, this paper will put forward a set of construction scheme of online teaching system for college students' mental health education, so as to enhance the effectiveness of the course and further optimize the mental health education system for college students. The system takes Javaweb technology as the core and is designed according to the B/S architecture. The overall function matrix includes remote login, network teaching, virtual scene training, test evaluation and other parts to meet the diverse learning needs of student users. Through the functional simulation test, the system meets the actual needs, and can enhance the practical significance of mental health education from theoretical teaching, simulation training, test guidance and other dimensions, which provides a new direction for the reform of teaching mode of mental health education in colleges and universities.

Keywords: Internet plus; college students' mental health; online teaching; Web technology; computer software application

1 Introduction

With the release of the Special Action Plan for Students' Mental Health Work in the New Era, the mental health education in colleges and universities will enter a new stage of all-round development and innovative practice under the guidance of brand-new educational concepts. At the same time, the substantial effect of mental health education will also be used as an important indicator to measure the level of modern education, the comprehensive ability of running and managing schools and the quality of personnel training in colleges and universities. [1] Under the guidance of this policy, colleges and universities should focus on the investigation and analysis of the mental health status of contemporary college students, and put forward reform and optimization programs in view of many problems existing in the current mental health education and teaching process in colleges and universities, effectively promote the reform of the teaching mode of mental health education courses, and promote the improvement of the mental health education system in colleges and universities.

NMDME 2023, October 13-15, Xi'an, People's Republic of China

DOI 10.4108/eai.13-10-2023.2341254

Contemporary college students belong to a high-risk group with psychological problems. Their mental health problems are complex and changeable, which are closely related to further studies and employment, surrounding environment, personality characteristics and interpersonal love. In addition, their world outlook, outlook on life and values have not yet taken shape, and their ideological cognition is prone to deviation, which leads to the outbreak of psychological obstacles and mental health problems. Facing the current severe forms of college students' mental health, colleges and universities often set up compulsory courses for college students' mental health education to carry out educational practice, but the actual results are little. The fundamental reason is that the teaching mode is mostly large class teaching, and the problems such as outdated teaching methods, lagging teaching content, one-sided teaching evaluation and lack of targeted guidance have greatly weakened the teaching effect of the course; Secondly, the daily psychological counseling service and psychological practice training are insufficient to help students solve their own practical psychological problems. [2] In view of this, this paper holds that the psychological health education of college students in the new era needs to change the traditional educational concept, adhere to the basic principles of all-round development, health first, strengthening ability and systematic governance, and complete the updating iteration of curriculum system, content structure and teaching methods with the help of digital educational technology and practical tools to realize the digital transformation and upgrading of the overall education model. [3] The construction of online teaching system for college students' mental health education gives full play to the practical advantages of "Internet+education", and improves the effectiveness of mental health courses from theoretical knowledge teaching, simulated scenario training, psychological testing and counseling, thus enriching the intervention methods of college students' mental health and providing reference for promoting college students' mental health.

2 Development process

According to the construction scheme of online teaching system for college students' mental health education, the overall design and development involves two parts. One is to complete the design and development of front-end interactive interface based on VUE framework. Secondly, in the Java development environment, the back-end server is built with the SpringMVC framework as the core, and the functional modules are combined and packaged according to the business logic order of the system to form an independent Web application system. [4] Figure 1 shows the overall architecture of the system.

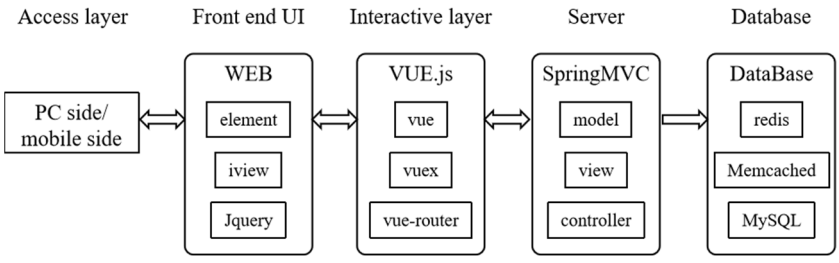

Fig. 1. Framework structure of the system

First of all, the overall design and development of the front-end interactive interface, that is, the front-end UI and interactive layer, needs the effective support of application framework, environmental foundation and coding tools. The front page of this system is based on the framework of VUE.js, and is designed and developed with Node environment and Visual Studio Code editor. Secondly, for the construction of back-end server, it is necessary to standardize the relationship between various data interfaces and functional levels with the help of SpringMVC framework under Javaweb technology to form a clear functional structure. [5] The development environment of the system server is Windows10.0 operating system, the Web server is Apache Tomcat 9.0, the JDK version is 1.8.0_251, the integrated development tool is Eclipse Neon 4.6.2, and the database server is MySQL 5.7.

In addition, the functional applications such as theoretical teaching, simulation training and test guidance within the system will be developed, adapted and packaged, and will be deployed in the background server, and the response of user requests will be realized through the call and control of the business logic layer. [6] Among them, in the process of constructing the simulation training module, the system integrates virtual reality technology, reproduces different types of training scenarios by virtual simulation, gives students an immersive experience, and strengthens the actual feelings and emotional perception of students' psychological environment. The construction of each scene needs to go through several steps, such as original material collection, 3ds Max modeling, scene combination production and Unity3D interactive operation design. [7] Figure 2 shows the scene effect diagram of psychological simulation training. Students can independently control the triggering or stopping of various training or tasks, and can complete interactive operations according to the prompts in the scene to achieve the purpose of simulation training.

Fig. 2. Simulation training scene effect diagram

3 Functional implementation

3.1 Student side

A. Registration login and platform homepage

The system has a unified initial login interface, which can support student users to log in through client browsers of different devices. When student users log in for the first time, they need to submit their personal information to complete the account application and registration, and they can complete the login and use of the system after review. After the student user

enters the account password, the platform uses SHA1 one-way HASH algorithm to encrypt the user password to ensure the security of the system user information. The key code of SHA1 encryption algorithm is shown below.

```
 public static void main(String[] args) throws Exception {
      String data = "Passwork";
                    MessageDigest sha1 = MessageDigest.getInstance("SHA-1");
                    sha1.update(data.getBytes());
byte[] digestByte =  sha1.digest();
System.out.println(Arrays.toString(digestByte));
                    BigInteger encData = new BigInteger(1,sha1.digest());
                    System.out.println(encData);
                    System.out.println("encData = "+ encData.toString(32));
   }
```

After the user logs in, the system will automatically jump to the homepage interface, which mainly contains Banner dynamic picture news, course information, recent course popularity ranking, new course recommendation and other modules.

B. Autonomous learning

Under this function module, the system supports student users to choose different courses to study independently according to their own preferences and interests. In terms of curriculum system, the system has got rid of the shackles of traditional paper textbooks and incorporated more digital teaching resources, which can not only better fit the teaching practice and improve the pertinence of teaching, but also greatly enhance the richness of curriculum content, which is beneficial to the personalized development of student users. When student users enter a course, they can first check the specific information of the course, including teaching plan, teacher information, curriculum outline and so on. Secondly, students can complete various learning tasks chapter by chapter or unit by unit according to the teaching plan. The teaching form of the course is mainly video lessons, and student users can click and watch directly online. At the same time, the system also provides ppt courseware materials, micro-lessons, electronic graphics and other auxiliary learning materials.

C. Simulated scenario training

The course of mental health education not only emphasizes students' learning and mastering theoretical knowledge, but also analyzes and handles psychological problems with practical skills. Facing the weak links in the traditional teaching mode, the system can give full play to the advantages of network virtualization and information interaction, organically integrate virtual reality technology, and construct a large number of simulation scenarios, which is convenient for student users to complete the analysis of psychological cases and is conducive to enhancing the effectiveness and operability of the course. [8]

Under this module, student users can choose different scenarios for practical training. The system shows the scene in the form of "naked eye 3D", and supports students to interact visually directly through input devices such as mouse, keyboard or touch screen. Table 1 shows some information about virtual training scenarios.

Table 1. Virtual training scene information

No.	Scene	Training focus	Events or tasks	Duration
XN001	Emotion management	Adjustment of negative emotions	Social anxiety—introduce yourself well	15min
			Overcoming Inferiority — a comprehensive self-evaluation	20min
XN002	Stress management	Coping with frustration and stress	Academic frustration—an appropriate goal of hard work	20min
			Emotional frustration—a healthy concept of love	25min

When the system is running simulated scenario training, the Web server and the application server need to have good concurrency control ability to meet the interactive requests of many student users, otherwise frequent virtual scenario rendering will increase the running load of the server, resulting in the problems of screen stuck and operation lag. In order to improve the running efficiency of the system, a three-dimensional scene slicing algorithm is added to this system to split and optimize the model data and material mapping data in the scene. [9] Formula 1 shows the calculation formula of system operation efficiency, where Q is the operation efficiency, T is the rendering time, C is the resource consumption value in the rendering process, x is the number of model slices, y is the number of mapping slices, a and b are coefficients. The comparison results before and after optimization are shown in Table 2.

$$Q = \frac{T}{C}, \quad T = \sum_{i=1}^{k} \left(a_i x_i + b_i y_i \right) \tag{1}$$

Table 2. The performance comparison of the system before and after the scenario optimization

	Group 1	Group 2	Group 3
The original efficiency value Q	19.1	33.6	51.2
Optimized efficiency value Q'	27.4	41.5	60.7
Promotion result	43.45%	23.51%	18.55%

D. Test and guidance

Under this functional module, students can simulate their own psychological status and find their own psychological abnormalities or risks in advance. Table 3 shows the social anxiety tendency test and scoring rules. Students can seek help from teachers in time according to their own situation and test results, and receive psychological counseling and psychological counseling to avoid serious psychological problems. [10] In addition, the system opens up online consultation channels to facilitate students to seek help online and cultivate their awareness of active help.

Table 3. Social anxiety tendency test

No.	Statement item	Never	Less	Sometimes	Often	Always
1	I'm also nervous when I attend a general party.	1	2	3	4	5
2	I feel uncomfortable among people I don't know.	1	2	3	4	5
3	I am very calm when talking to some members of the opposite sex.	5	4	3	2	1
4	I feel nervous talking to teachers or leaders.	1	2	3	4	5
5	Parties often make me feel anxious.	1	2	3	4	5
	...					

3.2 Teacher side

The orientation of teacher users in the system focuses on the organizer and manager of online teaching practice, and the functional authority includes three aspects: resource management, student management and data management.

A.Resource management

After logging in, teacher users can initiate online operations such as adding, querying, deleting and modifying network resources. Among them, adding digital teaching resources requires the system to preset the upload channel and resource storage address in advance. In the framework of SpringMVC, the code of uploading channel and resource storage address is as follows, and the corresponding digital teaching resource table needs to be built in the database to complete the resource storage operation, as shown in Table 4.

```
@PostMapping("/upfile")
public String upfile(MultipartFile file, HttpSession session) throws IOException {
    System.out.println(file);
    ServletContext servletContext = session.getServletContext();
    String reath = servletContext.getRealPath("static/img");
    String filename = file.getOriginalFilename();
    File fileDir = new File(reath);
    String finalPath = reath + File.separator +filename;
    File file_ = new File(finalPath)
    file.transferTo(file_);
    return "index";
```

Table 4. Digital teaching resources table

Field name	Data type	Restrain	Description
ID	int	Primarykey Auto_increment	Main key, identification
Name	varchar(50)		Common misunderstandings of mental health
Type ID	int		02-Video file
Format	varchar(20)		AVI
File size	int		17.33MB
Source	varchar(50)		Teacher upload
Contributor	varchar(50)		Teacher's name
Upload time	Datetime		-
Resource profile	varchar(100)		-

B. Student management

Under this function module, teacher users can view students' personal information and learning progress, and evaluate students' online learning behavior. The comprehensive evaluation system of learning effect is preset in the system, and the weight of each index is determined by AHP analytic hierarchy process algorithm to complete automatic scoring. Table 5 shows the teaching effect evaluation system.

Table 5. Teaching effect evaluation system

Evaluating indicator	Observation point
Learning attitude A_1	Login frequency A_{11}, learning durationA_{12}, cumulative timeA_{13}
Learning process A_2	Learning completion degree A_{21}, Simulated training completion degree A_{22}, Test completion degree A_{23}
Learning outcome A_3	Test results A_{31}, training scoreA_{32}, teacher score A_{33}

After the data of each observation point is normalized, it is directly input into the fuzzy comprehensive evaluation model for operation. The operation formula of the model is shown in Formula 2, where A represents the score judgment matrix composed of various learning behavior characteristics, M_i represents the product of each row element, W is the row sorting weight vector, and λ_{max} weight value. [11] The calculation results of the system simulation test are shown in Table 6. The results show that the system can automatically score the teaching effect of mental health courses, solve the one-sided problem of assessment and evaluation under the traditional mode, and strengthen the teaching management of college students' mental health education courses.

$$A=\begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix} \quad W_i=\frac{\overline{W}_i}{\sum_{j=1}^{n}\overline{W}_j} \quad \overline{W}_i=\sqrt[n]{M_i} \quad \lambda_{\max}=\sum_{i=1}^{n}\frac{(AW)_i}{nW_i} \tag{2}$$

Table 6. System simulation test calculation results

Evaluating indicator	Observation point	Weighted value	Average score	Final score
A_1	A_{11}	λ_{11}=0.064	2.66	2.27
	A_{12}	λ_{12}=0.131	2.34	
A_2	A_{21}	λ_{21}=0.087	2.51	
	A_{22}	λ_{22}=0.054	2.58	
A_3	A_{31}	λ_{31}=0.117	2.33	
	A_{32}	λ_{32}=0.092	2.97	

4 Conclusions

In order to promote the reform of college students' mental health education mode, this paper aims at many problems existing in current education and teaching practice, and constructs an online teaching system for college students' mental health education. The system gives full play to the practical advantages of "Internet+education", which can enhance the practical significance of mental health education from many dimensions such as theoretical teaching, simulation training and test guidance, and provides a new direction for the reform of teaching mode of mental health education in colleges and universities. In the follow-up research process, the platform will continue to enrich the course content, optimize the interactive means, increase the practical function of the system, promote the improvement of the mental health education system for college students, and help the modernization of higher education.

References

[1] Zhang Chong. Perfecting the Mental Health Work System of Students in the New Era[J]. The new education.06 (2023)

[2] Li Rui. Analysis on the Current Situation of Mental Health of Higher Vocational College Students and Its Solutions under the New Situation[J]. Art and Literature for the Masses.02 (2023)

[3] Shi Mingyue. Construction of a New Model of Students' Mental Health Education under the Network Education Environment[J]. Science & Technology Vision.04 (2022)

[4] Sadik Khan. Java Collections Framework and Their Applications in Software Development[J]. International Journal for Research in Applied Science and Engineering Technology.09 (2023)

[5] Xiao Zhigang. Teaching Management System Based on J2EE+SpringMVC Framework[D]. Xidian University.05 (2019)

[6] Shen Jiehong. Thinking and Practice of School Mental Health Education in Online Teaching[J]. Shanghai Education.08 (2022)

[7] Song Chuanlei, Hou Shizhong. Unity3D Virtual Reality Scene Analysis and Design[J]. China Market.06 (2017)

[8] Adam D. Brown Nicole Ross. Transforming mental healthcare in higher education through scalable mental health interventions[J].Cambridge Prisms Global Mental Health.06 (2023)

[9] Liu Wenxiao. Rendering Optimization of Large Volume 3D Model Based on WebGL[D]. Huazhong University of Science and Technology.12 (2018)

[10] Kadejaya Muhammad. Research and Design of College Students' Mental Health Consultation Platform Based on Mobile Internet Environment[J]. Computer Knowledge and Technology.12 (2020)
[11] Zhou Kaiquan. Comprehensive Evaluation of Learning Effect of Mixed Teaching Based on Data Mining[J]. China Educational Technology & Equipment.11 (2019)