Design and Development of Online Simulation Training System for Marketing Specialty under Web Technology

Benyu Zhao[1], Hainian Zhang[2], Yan Hu[3]*

Chongqing College of Architecture and Technology, Chongqing, China, 401331

[1]40684646@qq.com, [2]1025801092@qq.com, [3]*295738740@qq.com

Abstract. With the deepening of educational informatization, new educational concepts and technology applications are constantly integrated into the discipline system of marketing, which not only promotes the reform of traditional teaching mode, but also changes the training objectives of marketing professionals. In this regard, this paper will focus on the systematic, innovative and effective problems faced in the practice teaching process of marketing specialty, and put forward a set of construction scheme of online simulation training system based on Web technology, so as to promote the digital and network transformation of practice teaching and create a brand-new marketing practice teaching system. The system takes Javaweb technology as the core, and combines JSP pages with SSH server-side framework to form a Web application with B/S architecture, which is convenient for teachers and students to complete many teaching tasks such as remote login, simulation training and result evaluation through convenient and efficient online operation. Practice has proved that the functions of the system run smoothly, and the simulation training process is more suitable for the actual needs of current network marketing and digital marketing, which has certain value for the teaching reform of marketing specialty in colleges and universities.

Keywords: Web technology; Marketing; Simulation training; J2EE; Computer software application

1   Introduction

In the new economic era, Internet, big data, cloud computing, artificial intelligence and other technologies are accelerating the penetration and integration with all aspects and fields of economy and society, and giving birth to a brand-new economic development model of digital economy, which provides an important path for the digital and intelligent transformation and upgrading of traditional industries. [1] Digital economy, as an ecology and thinking, transforms massive data information into a key factor to promote the innovation and development of enterprises, and deconstructs and reshapes the business strategy, management mode, marketing decision-making and implementation methods of enterprises. Especially in the formulation and implementation of marketing decisions of enterprises, the importance of data information is self-evident. At the same

time, the demand for professional digital marketing talents with data analysis and technical ability has gradually expanded, which has aggravated the shortage of digital marketing talents. [2] However, the training methods of marketing professionals in colleges and universities are gradually lagging behind, and the disadvantages of attaching importance to theory and neglecting practice have seriously restricted the growth of students' professional and technical ability, so that there is a problem of disconnection between production and education. In view of this, this paper believes that under the background of educational informatization 2.0, colleges and universities should seize the key opportunity of the transformation and upgrading of higher education in the era of digital economy, take the training of professional digital marketing talents urgently needed by society as the goal, take practical teaching as the starting point, and take digital technology as the medium to realize the reform of teaching mode and improve the quality of personnel training. [3] The online simulation training system of marketing specialty can combine simulation training with online teaching, and take convenient and efficient Web application as the main form to create a brand-new training teaching ecology, promote the improvement of the teaching system of marketing specialty and help the development of college education informatization.

2   System construction

The online simulation training system of marketing specialty adopts B/S architecture design, and according to the development idea of "high cohesion and low coupling", the system is divided into three parts: presentation layer, business logic layer and data access layer. [4] The presentation layer directly faces the user, and generally takes the browser as the client, which is convenient for the user to send out interactive requests and obtain response results. The business logic layer is mainly aimed at the server side of the system, and its functions focus on the formulation of business rules and the realization of business processes. The data access layer directly faces the database, which can add, delete, modify and search data and provide data processing services for the business logic layer.

According to the structural framework and functional requirements of the system, the overall development of the system is based on Windows10.0-64 bit operating system, the development environment is Java, the JDK version is 1.8.0_181, and the integrated development tool is Eclipse Version: 2019-12 (4.14.0). Tomcat 8.5.34 is selected as the Web server, and the overall business logic is combed and designed with SSH framework. [5] Figure 1 shows the overall structure of SSH framework.
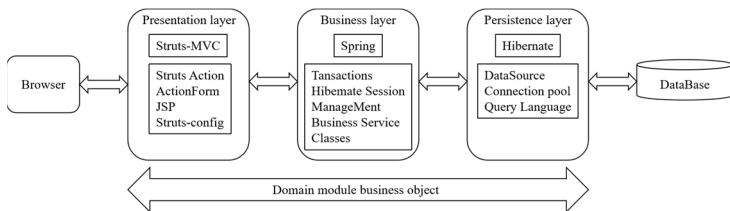

Fig. 1. SSH framework structure

In the process of SSH architecture integration, firstly, a Web project is created under Eclipse, and a web.xml file is generated. Then import the corresponding Jar package. Struts-2.3.30-apps, Spring-framework-4.2.2. RELEASE and Hibernate-release-5.2.2.Final are selected for this system development, and the corresponding configuration and variable declaration are completed. Finally, the Index.jsp page is created, and under this page, all data traversal cycles are displayed by defining iterator in Struts2 tag library. [6] After the system is fully developed, it will be packaged and distributed to the server. After configuring the corresponding ports, users can complete the use of the system from the client browser.

3   Functional implementation

3.1   Student side

A. Login and home page

The online simulation training system of marketing specialty is presented in the form of a web page, and student users can log in and use it from any client browser. The system has a unified interface. After the student user enters the account password, the platform uses MD5 encryption algorithm to encrypt the user password to ensure the security of the system user information. The key codes of the encryption algorithm are shown below. Students enter the homepage interface of the system after account and identity authentication, which contains the introduction of the training platform, training objectives, operating instructions, grading standards and other contents, so as to facilitate students' understanding.

```
public class MD5Example {
    public static void main(String[] args) {
        try {   MessageDigest md = MessageDigest.getInstance("MD5");
            String hexString = bytesToHex(digest);
            System.out.println("MD5 Digest: " + hexString);
    public static String bytesToHex(byte[] bytes) {
        StringBuilder hexString = new StringBuilder();
        for (byte b : bytes) { String hex = Integer.toHexString(0xff & b);
            if (hex.length() == 1) { hexString.append('0');    }
            hexString.append(hex);        }
        return hexString.toString();        }
```

B. Simulation training

Under this module, when students enter for the first time, they need to create their roles as manufacturers or enterprises according to their own personalities or preferences, and conduct competitive training with other students in the same market environment and capital strength. Figure 2 shows the system training process. The system combines traditional marketing theories and methods such as 4P, 4C, 4R and 4S with digital marketing forms to form a brand-new marketing method and communication concept, so that students' simulated training can be as close to the real situation as

possible, and the purpose of improving the system, innovation and effectiveness of training can be achieved. [7]
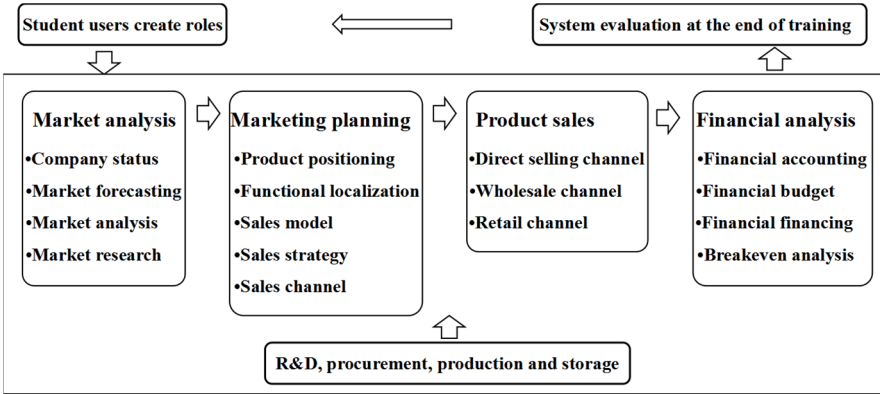

Fig. 2. Practical training process of marketing simulation

In addition, under the financial analysis function, the system will also integrate the data mining algorithm model to assist students to complete profit and loss analysis, financial forecasting and other operations. In the process of operation, student users can analyze and mine the current or historical financial data of the enterprise, and input them into the preset Logistic regression analysis model for enterprise financial prediction. The system will automatically select multiple financial characteristic indicators for model fitting, as shown in Formula 1, which is a Logistic regression model, and e is a natural logarithm, which is about 2.7182818. [8] As shown in Table 1, the variable values of the Logistic regression analysis model are defined, and the differences of each index are made clear through the significant difference values, which can provide positive feedback for the final recognition results. The final prediction model is shown in Formula 2. [9]

$$P = \frac{e^Z}{1+e^Z} \tag{1}$$

$$\log\left(\frac{P}{1-P}\right) = 2.588 - 13.574m_1 - 5.735m_2 - 3.281m_3 \tag{2}$$

Table 1. Logistic regression analysis model variable values

	Weight	Standard deviation	Wald value	Freedom	Significant difference
Return on assets m_1	-13.54	3.74	12.01	1	0.001
Profit growth rate m_2	-5.75	1.49	10.04	1	0.002
Income growth rate m_3	-3.81	0.94	6.84	1	0.000
Constant	2.58	1.03	5.54	1	0.011

Finally, at the end of the specified training time period, the system will automatically score according to the various types of operations of student users and the operating conditions of the manufacturers or enterprises they play, and complete the evaluation of student training.

3.2   Teacher side

On the teacher side, the role of the teacher user is the administrator. Compared with the detailed training function of the student's side, the teacher pays more attention to the assistance and guidance of marketing training. At the same time, teachers and users will also supervise the students' training process, and build user portraits according to the data of students' learning behavior, and choose authenticity, operability, effectiveness, interest and grade ranking as key characteristic indicators to build decision trees to evaluate the actual effectiveness of the training system. [10] The correlation coefficient analysis between key characteristic indicators is shown in Table 2. The decision tree model selects CART algorithm based on Gini index, and selects the attribute with the smallest Gain_GINI and its attribute value as the optimal split attribute and the optimal split attribute value. Formula 3 shows the calculation formula of GINI index in the sample set of student users' learning behavior. Where s represents the sample and P_k represents the frequency of the emergence of the k-th category in the classification results. Divide the sample set S into two parts according to the I-th attribute value of attribute W, and get the attribute value of Gain_GINI. The calculation formula is shown in Formula 4. [11] In the actual calculation process, the grade is selected as Gain_GINI, and the expected output value is divided into three intervals: excellent, good and poor. The simulation test results show that 79.368% of student users have obviously improved their grades, interest and effectiveness after using the system, and the overall practical utility of the system is good.

$$GINI(S) = 1 - \sum P_k^2 \tag{3}$$

$$Gain\_GINI_{W,i}(S) = \frac{n_1}{N} GINI(S_1) + \frac{n_2}{N} GINI(S_2) \tag{4}$$

Table 2. Correlation coefficient of key characteristic indicators

	Authenticity	Operability	Effectiveness	Interest degree	Grade ranking
Authenticity	1				
Operability	0.301	1			
Effectiveness	0.198	0.144	1		
Interest degree	0.215	0.403	0.486	1	
Grade ranking	0.019	0.187	0.123	0.031	1

4   Conclusions

In order to promote the reform of practical teaching mode of marketing specialty in colleges and universities, this paper puts forward a design scheme of simulated practical training platform based on many shortcomings in the current practical teaching process. The platform reshapes the whole process and all aspects of practical teaching, focusing on the combination of theoretical knowledge teaching and actual combat simulation, creating a new way to cultivate digital marketing professionals. In the follow-up research, the platform will further enhance the diversity of functional services, strengthen the abundance of simulated training projects, and open up a new direction for the modernization and intelligent construction of higher education.

References

1. Wang Na. Path Analysis of Digital Economy Innovation Enterprise Business Model[J]. Marketing Industry.2022.10.
2. Yan Fengying, Lin Changqing. Problems and Countermeasures of Digital Marketing Talents Training in Higher Vocational Colleges under the Background of "Internet Plus"[J]. China Internet Weekly.2022.06.
3. Feng Linjie. Exploration on the Training System of Marketing Talents from the Perspective of Digital Economy[J]. Science & Technology Ecnony Market.2019.06.
4. Wu Changzheng. Design of Web Development Framework Based on Front-end Separation Technology[D]. Nanjing University of Posts and Telecommunications.2020.12.
5. Gao Jin. Analysis of Java SSH Framework in Java Web[J]. Technology Wind.2018.08.
6. Zhang Mingjun. Analysis of Java Web Application Development Based on Struts Framework[J]. China Computer & Communication.2020.06.
7. Liang Yingyu. Comprehensive Training of Marketing Based on ITMC Sand Table[J]. Market Modernization.2018.10.
8. Gu Cuiling, Zhu Sifeng. Construction and Evaluation of Regression Analysis Model Based on Normal Fuzzy Numbers[J]. Statistics and Decision.2016.07.
9. Hu Rong. Application Analysis of Data Mining in Company Financial Analysis[J]. Tax Paying.2021.01.
10. Xiong Yan, Sun Tangwang. Decision Tree Model of Formative Evaluation and Countermeasures[J]. Journal of Mudanjiang College of Education.2023.01.
11. Lin Yifeng. The Application of Decision Tree Algorithm in the Prediction of Students' Achievement[D].Ningbo University.2018.11.