Construction of E-commerce Visual Network Online Teaching System Based on Web

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Abstract. Under the background of digital economy, the integration trend of e-commerce and digital marketing is obvious, which leads to the new demand of e-commerce talents' compounding and specialization. Among them, visual marketing, as the key link of e-commerce digital marketing, is facing a huge talent gap. In this regard, this paper will put forward a set of Web-based online teaching system for e-commerce in visual marketing, aiming at the problems of target deviation, weak systematicness and disconnection between production and teaching in the current talent training process of e-commerce in visual marketing, so as to realize the reform and innovation of teaching concept and teaching form and improve the efficiency of talent training. The whole system is B/S architecture, the client is built by JSP pages, and the server is deployed by SSM composite framework, forming a comprehensive software application integrating data information and functional services. Practice has proved that the system has clearly defined the business process relationships of the functional modules such as remote login, online teaching, simulation training and teaching evaluation under the SOA service system, highlighted the advantages of application in teaching practice, and provided technical support for the transformation of the talent training mode of e-commerce in visual marketing.

Keywords: Web technology; E-commerce; Visual marketing; Online teaching system; software application

1 Introduction

With the improvement of China's information infrastructure and the development of digital information technology, the digital economy has changed from a rapid development period to a mature development period. At the same time, as an important part of the digital economy, e-commerce has also ushered in a new stage of intensive innovation and collaborative integration, and the overall operating environment has gradually divided into three directions: digital scene, digital retail and digital marketing, which not only changed the original development model, but also spawned new professional posts and talent needs. [1] Among them, visual marketing, as one of the core competencies in e-commerce, has an important influence on brand image building, user experience improvement, product display and promotion, and marketing promotion, so that the demand for compound professionals is increasing, thus highlighting the training defects of visual marketing talents in e-commerce in colleges and universities. [2] In view of this, this paper believes that colleges and universities should actively adopt digital education technology, promote the reform of teaching mode and

reshape the integrated talent training system in view of the difficulties faced by the current e-commerce visual marketing talent training in colleges and universities, such as deviation of educational objectives, lagging teaching content, insufficient practical training, lack of teachers and lack of evaluation standards. [3] The online teaching system of e-commerce in visual marketing will be able to optimize and challenge the teaching process by relying on online teaching, digital teaching resources, simulated innovative training and other functional services. And the data statistical analysis module is introduced into the system, which provides a brand-new implementation approach for teaching management and evaluation, and then sets up a new paradigm for the independent training of visual marketing compound professionals in e-commerce in colleges and universities.

2 System construction

E-commerce online teaching system in visual marketing is based on B/S architecture, which consists of front-end browser and back-end server. B/S is a hierarchical architecture, which can divide all business applications of the system into presentation layer, business logic layer and data access layer, so as to reduce the coupling in the system development process. [4] At the same time, in order to improve the system's support for SOA service system, MVC mode is integrated into the presentation layer to reduce the development difficulty of user service interface and improve the control ability of business logic layer and data access layer. The overall architecture of the system is shown in Figure 1.
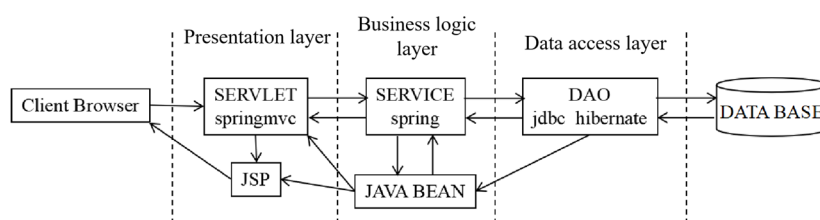

Fig. 1. Overall architecture diagram of the system

The overall development of the system is based on Windows10.0 operating system, with Java as the basic development environment, JDK version 1.8 and above, MyEclipse V2022.1 as the Java development environment, and Tomcat 9.0.78 as the Web server. The database server adopts MySQL 8.0, and uses the project object model (Maven) to manage the project structure. Maven chooses Apache-Maven-3.6.1 version. [5] In the process of building the overall development environment, the types of Web applications are determined by building a new Maven Project, and various Jar packages required by SSM framework are downloaded and introduced into Maven projects through codes under pom.xml files, including Spring5.0.6, Mybatis3.4.5 and MySQL dependencies. Then, the corresponding Java files in MVC mode are created in the project directory, which are Controller layer, Dao layer, Service layer and entity layer respectively, and the corresponding configuration is completed in turn. [6] After all the configurations are completed, you can start the project in Tomcat to complete the running test. After the test passes, you can complete the design and development of the core business processes and functional modules of the Web application.

3 Functional implementation

3.1 Student side

Online teaching. The system aims at cultivating compound professionals of e-commerce in visual marketing, and completes the curriculum system planning by integrating the teaching emphasis, content difficulty, training arrangement and other factors, and formulates a unified curriculum standard. The teaching form adopts "SPOC" online teaching, and autonomous learning is realized with the support of various forms of online teaching resources such as videos, micro-courses, words and pictures. [7]

In addition, the system also aims at the ability requirements of e-commerce operation, data analysis and processing, art design, customer service, etc., and incorporates relevant online teaching resources into it to form a three-dimensional and expanded teaching resource pool, which stimulates students' learning motivation from multiple dimensions and promotes students' personalized development.

Simulation training. Aiming at the problem of insufficient practical training under the traditional teaching mode, the system can give students and users the opportunity of online simulation training. Students can choose their own propositions or training projects that meet their own ability level, and can complete them independently or invite students to form a team. The training contents include homepage design, copywriting vision, Banner design, main picture design, detail page design, short video design, poster design, interactive design and so on. [8] Student users will go through many links of visual marketing project, such as task analysis, demand determination, creative conception, sample drawing, standardized treatment, perfect release and so on, and upload the final design results to the system to complete the display and evaluation. The following is the code for designing the image upload function. [9]

```
<form id="orgLogoAddrUploadForm" method="post" target="upload_result"
 action="${webRoot}/articlePush/uploadImage"    class="form-horizontal
col-sm-12 form"
 style="margin-left: 0;  display: none;" enctype="Multipart/form-data">
      <div class="form-group" style="margin-bottom: 0;">
            <div id="thumbnailUploadContainer" class="col-sm-10">
                  <span    style="font-weight:    bolder;">picture
upload:</span>
                  <input  id="orgLogoAddrImageFile"  name="imageFile"
type="file"  class="form-  control"  style="width:  180px;  display:
inline;" />
```

In addition, the system will also support the grading of students' simulated training results by means of composite evaluation. The evaluation subjects include students, teachers and tutors of off-campus enterprises. The evaluation criteria are shown in Table 1 (taking Banner design as an example), and the evaluation formula is shown in Formula (1), where P is the final score and A-E is the percentage of each score.

Table 1. Scoring criteria of practical training results

Project	Positioning compliance	Reasonable typesetting	Color matching	Copywriting orientation	Visual effect
Banner design	5~1 Points	5~1 Points	5~1 Points	5~1 Points	5~1 Points

$$P = 5A + 4B + 3C + 2D + E \qquad (1)$$

After completing the simulation training, student users can participate in the evaluation of other students in the system, and also can view their own training results. Table 2 shows the score results of a student user Banner's design training project. The results show that student users need to further improve their color matching and visual effects in Banner project design, and this score is lower than the other three standards.

Table 2. Score of training project simulation

	Positioning compliance	Reasonable typesetting	Color matching	Copywriting orientation	Visual effect
5 Points	122	120	90	72	51
4 Points	19	13	17	31	33
3 Points	6	5	25	27	39
2 Points	0	1	6	10	13
1 Points	0	1	0	1	2
Final score	4.789	4.785	3.850	4.185	3.800

Communication. Under this module, students or teachers and students can have free forum-style communication, and the communication content is open to all users, which can attract different users to join. At the same time, the system also supports class or group chat rooms, and the chat content is limited to the public in the group. The opening of communication channels is convenient for students to communicate and share their new learning experiences, and can also discuss and study learning problems, so as to build a good learning atmosphere. In addition, students can communicate directly with teachers, which not only enables teachers to help students with professional questions and counseling, but also can get students' real inner thoughts and understand their real needs in time.

3.2 Teacher side

On the teacher side, the functional authority of teacher users focuses on the management and maintenance of the system, which can support teacher users to upload, modify and remove teaching resources and training projects, and can also assist and guide students through online communication. In addition, teacher users can also evaluate the learning effect according to the characteristics of students' online learning behavior. As a key means to verify the effectiveness of online teaching of e-commerce visual merchandising course, assessment is also a key indicator to test the actual effectiveness of the system. In the actual operation process, when the teacher user initiates the evaluation of students' learning effect online, the system will automatically select the CSV log file and the data records in the system database as the data sources, and preprocess the data according to the rules to obtain the data of students' learning behavior characteristics that meet the calculation requirements. Table 3 shows the evaluation indicators of learning effect. [10]

Table 3. Teaching effect evaluation system

Evaluating indicator	Learning behavior characteristics
Learning attitude C_1	Login frequency C_{11}, Cumulative time C_{12}, Study duration C_{13}
Learning ability C_2	Course completion degree C_{21}, Homework completion degree C_{22}, Team participation degree C_{23}
Knowledge and skill mastery C_3	Resources utilization degree C_{31}, Training completion degree C_{32}
Academic achievement C_4	Test results C_{41}, Training results C_{42}
Multiple evaluation C_5	Student evaluation C_{51}, Teacher evaluation C_{52}, Off-campus tutor evaluation C_{53}

As shown in Table 3, the values of learning behavior characteristics are different in the expressed meaning and measurement unit, and further operations such as cleaning, integration, change and reduction are needed to keep the data in a certain standard and specification. As shown in Formula (2), it is a normalized calculation formula, where x represents the original data, X_1 and X_2 represent the minimum and maximum values in the original data set respectively, and X' represents the normalized value.

$$X' = \frac{X - X_2}{X_2 - X_1} \tag{2}$$

After the data of learning behavior characteristics are normalized, the data are input into the preset fuzzy comprehensive evaluation model in the system to complete the automatic evaluation of students' learning effect. The evaluation criteria and simulation results are shown in Table 4. Among them, *C* 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 the formula for calculating λ_{max} weight value is shown in Formula (3). [11] The results show that the platform can realize the automatic evaluation of online teaching effect, solve the difficult problem of online teaching evaluation, and strengthen the management of e-commerce visual marketing teaching by teacher users.

Table 4. Evaluation criteria and simulation results

Target	Learning behavior characteristics	Total ranking of the feature vectors	Weighted value	Item score	Score
Evaluation of learning effect	Course completion degree	W_{11}=0.136	λ_{11}=0.174	9.7	1.687
	Homework completion degree	W_{12}=0.060	λ_{12}=0.132	8.1	1.069
	Resources utilization degree	W_{13}=0.075	λ_{13}=0.049	8.8	0.075
	Team participation degree	W_{21}=0.099	λ_{21}=0.104	6.9	0.861
	Training completion degree	W_{22}=0.178	λ_{22}=0.115	8.4	0.966
	Training score	W_{23}=0.135	λ_{23}=0.149	7.7	1.147
	Student evaluation	W_{31}=0.091	λ_{31}=0.002	7.9	0.015
	Teacher evaluation	W_{32}=0.062	λ_{32}=0.110	6.9	0.759
	Off-campus tutor evaluation	W_{33}=0.241	λ_{33}=0.191	6.8	1.298

$$C = \begin{bmatrix} c_{11} & c_{12} & c_{13} \\ c_{21} & c_{22} & c_{23} \\ c_{31} & c_{32} & c_{33} \end{bmatrix} \quad W_i = \frac{\bar{W}_i}{\sum\limits_{j=1}^{n} \bar{W}_j} \quad \bar{W}_i = \sqrt[n]{M_i} \quad \lambda_{\max} = \sum_{i=1}^{n} \frac{(CW)_i}{nW_i} \tag{3}$$

4 Conclusions

In order to promote the reform and innovation of the teaching concept and teaching form of e-commerce visual marketing in colleges and universities, this paper aims at many problems faced by the traditional teaching mode, and constructs a web-based online teaching system of e-commerce visual marketing, aiming at reshaping the teaching process by using the practical advantages of digital education technology, and then establishing an integrated training system for compound professionals. In the follow-up research, the system will strengthen the abundance of simulated training projects and the interactive ability of the system on the basis of school-enterprise cooperation, and make contributions to promoting the integration of Internet+education and e-commerce specialty.

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