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Pedagogical Exploration Practice of the Blended Course "E-commerce Development Technology"

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Abstract: With the rapid development of the e-commerce industry, higher requirements have been adopted for the cultivation of applied talents, and traditional teaching methods are no longer suitable for the needs of modern education. This article combines online teaching with face-to-face teaching using a blended learning approach to design and implement e-commerce development technology courses. Methods such as questionnaires, interviews, data collection, and analysis can be used to explore the impact of blended learning mode on students' learning motivation, participation, and technology application. In terms of user interaction ratings, Group 2 and Group 5 scored 8.3 and 8.4 respectively, indicating outstanding performance in the field of interaction design, despite their average performance in creativity and aesthetics ratings. The research results show that this model can effectively improve students' learning efficiency and technology application ability. This article explores the exploratory practice of blended learning mode, fully demonstrating its advantages in e-commerce applications, providing educators with an effective way to integrate online and offline teaching resources, and laying a practical basis for the further development and optimization of educational technology.

1. Introduction

Nowadays, e-commerce has played a crucial role worldwide. In particular, with the development of mobile Internet, cloud computing and other technologies, a variety of application scenarios have emerged on the e-commerce platform, providing a large number of professionals for the e-commerce industry. The traditional face-to-face teaching method is no longer suitable for the rapidly changing actual needs of enterprises. Therefore, this article explores the application of blended learning mode in the course of e-commerce development technology. This article aims to improve students' learning motivation and skill mastery, in order to provide a new model for the effective integration of online and offline teaching resources. This article not only enhances the flexibility and effectiveness of classroom teaching, but also provides empirical evidence for the in-depth development of educational technology courses. It has significant practical significance in promoting the popularization and improvement of modern educational technology

This article combines traditional classroom teaching with modern online education to achieve the best teaching results. Firstly, a review was conducted on the current research status, and an analysis was conducted on the current development of e-commerce in China. On this basis, quantitative and qualitative research methods are used to evaluate the actual effectiveness of this model through questionnaire surveys, interviews, and field investigations.

The main content of this article includes the following parts: Firstly, it elaborates on the research background of this topic, the training requirements for the development of e-commerce technology, and conducts a theoretical analysis of it. Secondly, a detailed explanation was provided on the research design and implementation, including course design, selection of teaching methods, and collection and analysis of data. Finally, this article explores the effectiveness of its application in e-commerce and its impact on educational practices and policies.

2. Related Work

In today's rapidly developing information technology, e-commerce has become an undeniable force. The need for education professionals to adapt to this change is growing day by day. Xu Mingliang explored the application strategy of blended learning in textile professional courses using the "Cross border E-commerce of Textiles" course as an example [1]. Liao Sha studied the reform technology of blended practical teaching under the cultivation of applied abilities [2]. Luo Zhonghui explored the application of blended learning in vocational three-dimensional design courses [3]. Zheng Jieru used the course "E-commerce Copywriting" as an example to design a blended learning approach based on the cultivation of applied talents [4]. Yang Fan explored the innovation and practical technology of blended teaching mode for "cross-border e-commerce" courses in vocational colleges based on the pilot certificate system [5]. However, existing research has mostly focused on theoretical teaching, with little exploration of its application and practical teaching, lacking an effective teaching model that combines theory with practice.

Blended learning is a teaching method that organically integrates online and offline teaching elements, especially suitable for courses related to e-commerce technology. Dhiman S B improved the academic performance of business students through blended e-learning [6]. Xi Y studied the reform strategy of cross order e-commerce legal and regulatory courses under the background of blended learning [7]. Chen L conducted a systematic review of the application of educational technology in online and mixed entrepreneurship education [8]. Xu H studied the impact of blended curriculum teaching evaluation design based on control value theory on learning motivation research strategies [9]. Short C R explored blended learning skills and abilities by analyzing blended learning artifacts [10]. However, in the development of e-commerce technology courses, the specific application of blended learning is still limited, especially in the in-depth analysis of the internal connection between teaching effectiveness and student ability improvement. On this basis, this article adopts a teaching method for e-commerce courses based on the network environment.

The preliminary research results of this article can serve as a theoretical basis for universities to carry out blended learning, and have certain reference significance for its implementation in applied undergraduate colleges. It not only enhances the interactivity and practicality of the course, but also enhances the communication between teachers and students, cultivating technical talents that meet the needs of today's society for e-commerce and related majors. In addition, the implementation of blended learning mode also provides new ideas and solutions for educational decision-makers in curriculum design, resource allocation, and other aspects.

3. Method

3.1 Course Design that Integrates Theory and Practice

The purpose of this article is to combine online and offline teaching resources to establish a complete learning process. Firstly, online platforms can be used to introduce the basic concepts, development process, and relevant laws and policies of e-commerce. At this stage, online resources are mainly used to consolidate the theoretical knowledge learned through online discussions, quizzes, and other means.

In the hybrid course of "E-commerce Development Technology", the evaluation of students' technical mastery is the core link. This article adopts a mathematical formula for accurately calculating students' total course grades, with a particular emphasis on the comprehensive evaluation of theoretical learning and practical skills. This method not only enhances the objectivity of evaluation, but also ensures the continuous improvement of teaching quality, providing students with a solid technical foundation. The comprehensive score used to calculate students is represented as Z_F:

$$Z_F = w_1 \times L_C + w_2 \times S_M \tag{1}$$

L_C is the theoretical score, S_M is the practical project score, w_1 and w_2 are weighting factors, corresponding to the importance of theoretical knowledge and practical skills in the overall score.

3.2 Implementing Offline Practical Activities

Offline teaching mainly focuses on hands-on operations, and a virtual e-commerce platform can be built to allow students to participate in website design, development, management, and other aspects in person. On this basis, this article designed a website front-end, established a backend server, managed a database, and completed a secure payment system. The courses are equipped with detailed homework instructions and technical support, enabling students to apply the theoretical knowledge they have learned in practice.

3.3 Case Analysis and Problem Solving

In the blended learning mode, emphasis is placed on cultivating case study and problem-solving abilities [11]. By analyzing successful and failed cases in real life, students can learn to face real-life problems. The teacher can guide students to explore the application and strategic choices of major technologies in various case studies, and explore their impact on the overall business model.

Participation Index C_D:

$$C_D = \left(\frac{X_H + X_D}{Z_H}\right) \times 100\% \tag{2}$$

The number of online interactions X_H includes the number of visits to the course webpage, the number of participation in online discussions, etc; The number of offline interactions X_D includes participation in face-to-face discussions, group activities, etc. Z_H is the total number of course interactions.

3.4 Technical Evaluation and Feedback

At each stage, it has a cycle of evaluation and feedback. This includes reviewing the daily work of students, reviewing project progress, and conducting technical demonstrations. The basis for evaluation is not only the mastery of theoretical knowledge, but also the cultivation of their skill

application ability and creative thinking.

3.5 Continuous Updates and Resource Sharing

Faced with the rapid development of e-commerce and technology, courses and teaching resources can also be constantly updated to adapt to market and technological developments. Meanwhile, this article can also encourage the sharing of learning materials, project codes, and practical experiences between teachers and students through the construction of a network resource library, thereby achieving interaction and deep exchange of knowledge within the learning community.

Technical skill improvement rate J_T:

$$J_T = \left(\frac{J_P - J_k}{J_k}\right) \times 100\% \tag{3}$$

J_P is the technical score at the end of the course, and J_k is the technical score at the beginning of the course.

4. Results and Discussion

4.1 Experimental Environment and Parameter Settings

This article takes the "E-commerce" major of a university as an example and adopts a blended learning model, with a total of 90 students. The experimental environment includes a well-equipped computer laboratory, professional e-commerce development software, and an online teaching platform. In order to ensure the accuracy of the experimental results, each class has the same teaching resources, teaching time, and teaching staff.

In this article, the experimental parameters are defined in detail to support the effective implementation of teaching activities. Specifically, teaching time is allocated in a ratio of 40% for online learning and 60% for offline practice. In addition, the evaluation cycle is defined as the middle and end of the course to ensure a comprehensive evaluation of student learning progress. In terms of technological applications, experiments involve front-end design, back-end development, database management, and network security, all of which are core areas in today's technological education. This comprehensive experimental design aims to provide a comprehensive learning environment to cultivate students' technical abilities and theoretical knowledge.

This article defines the main indicators for evaluating student learning outcomes. Firstly, mastery of theoretical knowledge is measured through online tests and final exam scores. Secondly, technical practical ability is reflected in the quality of project assignments and final project presentations. In addition, problem-solving ability is evaluated through the performance of case studies and the innovation and effectiveness demonstrated in solving practical problems. Finally, learning motivation and engagement are evaluated by analyzing students' online activity logs and classroom interaction frequency. This multidimensional evaluation method is not only comprehensive, but also specific, which helps to accurately depict the learning situation of students.

4.2 Experimental Results

(1) Front end design practice

The results of front-end design practice are shown in Figure 1. The number of students in each class is set at 15, for a total of six groups.

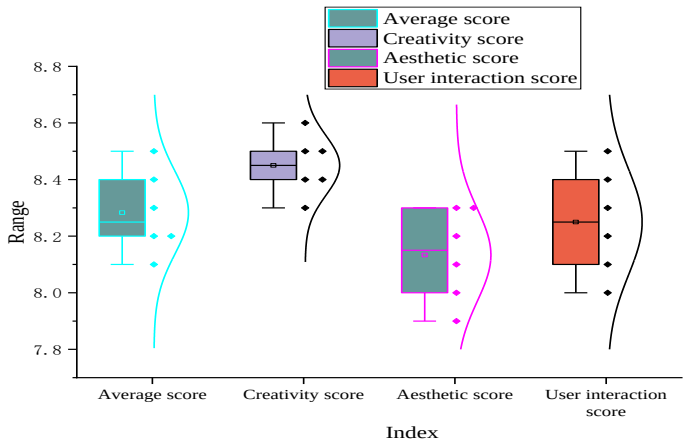

Figure 1: Results of front-end design practice

In the comprehensive evaluation of front-end design practice for six groups, it was found that the average score of all groups fell between 8.1 and 8.5, indicating a generally high design level and no significant low score phenomenon. In terms of creativity rating, Group 3 scored 8.6 points, while Group 4 scored slightly lower at 8.3 points, but the overall difference is not significant. In terms of aesthetic evaluation, Group 3 also had an advantage with a score of 8.3, while Group 4 had a slightly lower score of 7.9, which may be related to their visual design strategy. In terms of user interaction ratings, Group 2 and Group 5 scored 8.3 and 8.4 respectively, indicating outstanding performance in the field of interaction design, despite their average performance in creativity and aesthetics ratings.

Group 1 performed average in all scoring aspects, without showing any special advantages or significant weaknesses. Group 2 demonstrates that its design emphasizes user experience and smooth interaction in terms of user interaction. Group 3 has demonstrated excellence in creativity, aesthetics, and user interaction, making it the class with the highest overall score. Group 4 scored relatively low in creativity and aesthetics, indicating potential areas for improvement in design innovation and visual effects. The rating of Group 6 is also average in all aspects, with neither outstanding highlights nor obvious shortcomings.

(2) Backend development application

The backend development application results are shown in Figure 2.

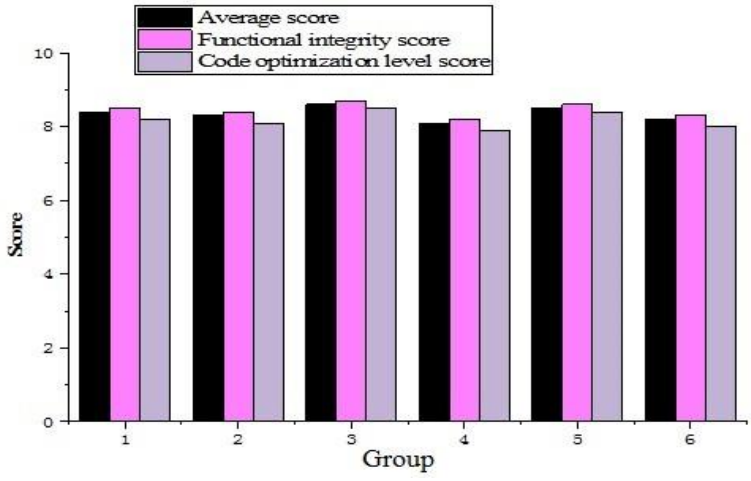

Figure 2: Backend development application results

After analyzing the front-end design practice projects of six groups, it was observed that the

average score ranged from 8.1 to 8.6, indicating that each class generally performed well. The functional integrity score is generally high, with Group 3 scoring the highest at 8.7, indicating its advantage in meeting the design functional requirements; Although Group 4 scored slightly lower at 8.2, it still belongs to a relatively high level. In terms of code optimization score, although generally high, there has been a slight decrease, indicating that while implementing functions, improving the quality and maintainability of the code is also the direction that each class is striving for. Group 3 leads with 8.5 points in this rating, while Group 4 has the lowest score of 7.9, indicating that there is room for improvement in code organization and optimization skills.

All six groups have shown certain abilities, but each has its own emphasis. Group 3 performed excellently in both functional integrity and code optimization, achieving the highest score, demonstrating its outstanding ability in front-end design practice. On the contrary, Group 4 has performed poorly in these two aspects and needs to improve its abilities by strengthening relevant learning and practice. The performance of other groups in terms of functional integrity and code optimization is relatively average, and they should take measures to improve and optimize according to their specific shortcomings.

(3) Integrated project implementation

The implementation results of the comprehensive project are shown in Figure 3.

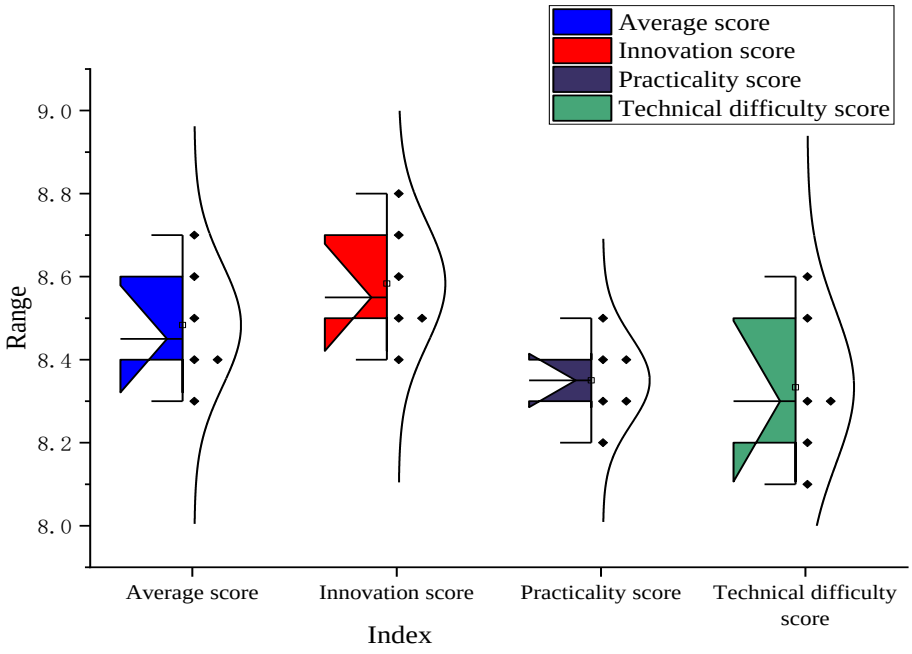

Figure 3: Comprehensive project implementation results

Group 3, with a high score of 8.8, is particularly outstanding in terms of innovation. Group 3 also performed excellently in practicality with a score of 8.5. Group 3 has the highest technical difficulty score (8.6 points), reflecting the complexity and high technical requirements of its project, highlighting its leading position in technical solutions.

In the project evaluation of front-end design practice, Group 1 showed stable performance in terms of innovation, practicality, and technical difficulty, but did not show obvious shortcomings. Group 2 needs to strengthen relevant skills training and practice. Group 3 received the highest scores in innovation, practicality, and technical difficulty, demonstrating its outstanding performance and comprehensive strength in front-end design practice. Group 4 also has lower scores in various aspects, especially in terms of innovation and practicality, which needs further strengthening. Although Group 5 performs evenly in three aspects, there is still a gap compared to

the optimal Group 3. Group 6 needs to explore and strengthen its own characteristics and highlights to enhance its competitive advantage.

(4) Security testing

The security test results are shown in Table 1.

Table 1: Security test results

Group	Number of projects	Average score	Defensive success times	Simulated attack types
1	4	8.2	3	SQL injection, XSS, CSRF(Cross-Site Request Forgery)
2	4	8.5	4	SQL injection,XSS, CSRF,weak password attack
3	4	8.7	5	SQL injection,XSS, CSRF, weak password attack, file upload vulnerability
4	4	7.9	2	SQL injection, XSS
5	4	8.4	4	SQL injection,XSS, CSRF, brute force
6	4	8.1	3	SQL injection, CSRF,weak password attack

The number of successful defenses serves as a key indicator to measure the defense ability of each group in security testing, demonstrating their performance. Group 3 has a high defense success rate of 5 times, reflecting the effectiveness of its security enhancement measures. However, Group 4 has only successfully defended twice, indicating its shortcomings in security design or implementation. The number of successful defense attempts for groups 1, 2, 5, and 6 ranges from 3 to 4, indicating that their safety performance is at a moderate level and indicating the possibility of further improvement. Especially for Group 3, its comprehensive and in-depth safety design may be the reason for its high success rate. For Group 4, strengthening safety related learning and practice has become a necessary step to enhance its defense effectiveness.

By analyzing the types of simulated attacks, it can be seen that most classes have addressed common web security threats such as SQL (Structured Query Language) injection and XSS (Cross-Site Scripting), while some classes also face additional security challenges such as weak password attacks, file upload vulnerabilities, and brute force attacks, reflecting the wide diversity of attack types. In this environment, Group 3 was able to successfully defend against five different types of attacks, demonstrating the comprehensiveness and effectiveness of its security design. On the contrary, Group 4 can only defend against two types of attacks, indicating the need for further enhancement in security design, especially in terms of the breadth and depth of defense strategies.

(5) Learning attitude and engagement

The results of learning attitude and engagement are shown in Table 2.

In the evaluation of participation activity and course satisfaction for each group, the participation activity rating range for all groups is 8.2 to 8.7, reflecting the high level of student participation in the classroom. Among them, Group 2 had the highest participation score (8.7), while Group 4 had the lowest score (8.2). The course satisfaction score is between 8.6 and 9.2, and all groups show a

high recognition of the blended learning model, especially Group 3, which has a score of 9.2, leading the other groups. Although Group 2 has the highest level of participation, it is slightly lacking in satisfaction. The high satisfaction score of Group 3 indicates the superiority of its course quality, despite slightly lower participation.

Table 2: Learning Attitude and Participation Results

Group	Number of students	Participation activity rating	Course satisfaction rating
1	15	8.5	9.0
2	15	8.7	8.8
3	15	8.4	9.2
4	15	8.2	8.6
5	15	8.6	9.1
6	15	8.3	8.9

5. Conclusions

This article explores and evaluates the course of e-commerce development technology, using a combination of online theory and offline practice to systematically evaluate students' theoretical knowledge mastery, technical application ability, and problem-solving ability. By evaluating the front-end design, back-end development, and student attitudes and levels of participation in blended learning, the article aims to gain a comprehensive understanding of the application prospects of this model. The blended teaching mode of e-commerce development technology courses can effectively enhance the learning efficiency and skill mastery of students. By utilizing online components, students can flexibly learn the required theoretical knowledge on their own, while offline learning can improve their hands-on ability and problem-solving ability. Especially in the integration of front-end and back-end topics, students have higher innovative abilities and professional skills. In addition, in security tests, middle school students can apply the knowledge they have learned to website security performance, in order to improve network security and demonstrate the superiority of blended learning in enhancing teachers' professional abilities. Although there have been certain achievements, there are still some shortcomings. Firstly, due to the small number of participants in the experiment and the fact that the research is limited to a particular school, there are certain limitations to the universality of the research findings. Secondly, existing evaluation methods are mostly based on short-term and thematic grades, and cannot fully reflect the long-term impact of blended education on student career development. In addition, the rapid development of technology can also have an impact on the long-term updating and correlation of teaching resources. Future research can be tailored to different students and educational backgrounds to increase the representativeness and universality of research findings.

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