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Research on the Application of Blended Teaching Mode Based on Rain Classroom—An Example of the Course "Data Analysis for E-Commerce"

Yao Ma[1,a,*], Qiong Wang[1,b], Qing Shen[1,c]

[1]*College of Economics and Trade, Haojing College of Shaanxi University of Science and Technology, Xi'an, Shaanxi, 712046, China*
[a]*1194351167@qq.com*, [b]*1285287672@qq.com*, [c]*446351179@qq.com*
[*]*Corresponding author*

Abstract: *This dissertation takes the course of E-commerce Data Analysis as the research object, focuses on the drawbacks of lagging knowledge updating, weak practical teaching, and insufficient teacher-student interaction that exist in the traditional teaching mode, and discusses in depth the application of blended teaching mode based on rain classroom. Through the systematic elaboration of blended teaching online and offline integration, personalized learning and other characteristics, combined with the development trend of data in the e-commerce industry, analyze the necessity of using this mode in the course. The study describes in detail the practice process of teaching design, teaching implementation and evaluation based on rain classroom, shows the teaching effectiveness from two aspects of student satisfaction survey and course performance comparison, and reflects deeply on the problems existing in practice and puts forward optimization strategies, aiming at providing reference for the teaching reform of e-commerce data analysis course, promoting the improvement of teaching quality, and helping to cultivate high-quality e-commerce talents adapted to the industry needs.*

Keywords: *Rain Classroom, Blended Teaching, E-Commerce Data Analytics, Teaching Practice, Teaching Effectiveness*

1. Introduction

1.1 Background of the study

In the context of the era of rapid development of digital economy, the e-commerce industry is booming, and data has become an important asset for business decision-making and development. As a core course for e-commerce majors, the course "E-Commerce Data Analysis" aims to cultivate students' ability to collect, process and analyze e-commerce data and make business decisions based on data insights. However, the traditional teaching mode in the face of the course's complex and rapidly updating knowledge system, a high degree of practicality of the teaching requirements, gradually exposed a number of problems, it is difficult to meet the industry's demand for high-quality data analysis talents, the course teaching reform is imminent.

1.2 Research significance

In terms of theoretical significance, this study enriches the theory of the application of hybrid teaching mode in the teaching of professional courses, providing new perspectives and ideas for related teaching research. In terms of practical significance, by exploring the application of hybrid teaching mode based on rain classroom in the course of E-commerce Data Analysis, it optimizes the teaching process, improves the teaching quality, cultivates professionals who are more in line with the industry's needs, and at the same time provides practical examples and experiences for the teaching reform of other similar courses.

1.3 Research Objectives and Methods

This study aims to construct a hybrid teaching mode of E-Commerce Data Analysis course based on rain classroom, and verify its teaching effectiveness and propose optimization strategies. The study

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adopts the literature research method to sort out the relevant theories and the current status of research, uses the case study method to deeply analyze the process of teaching practice, and collects student satisfaction and achievement data through the survey research method to comprehensively analyze the teaching effectiveness.

2. The Shortcomings of the Traditional Teaching Mode and the Overview of Blended Learning

2.1 The shortcomings of traditional teaching mode

2.1.1 Rigid teaching mode

The traditional teaching mode is based on the teacher's lecture, and the classroom presents a "duck-filling" teaching state. In the "e-commerce data analysis" course teaching, teachers tend to follow the sequence of the textbook, one-way to instill students with data analysis theory and methodology, students passively accept the knowledge, lack of active thinking and exploration opportunities. This teaching method inhibits students' learning enthusiasm and creativity, and it is difficult to cultivate students' ability to solve practical problems.

2.1.2 Serious lack of interactivity

Classroom interaction is limited to the simple mode of teachers asking questions and students answering, and the frequency of interaction is low and the participation surface is narrow. Due to the large number of students in the class, it is difficult for teachers to pay attention to the learning status and questions of each student, and there is a lack of in-depth communication between teachers and students. At the same time, there is less collaborative learning and discussion among students, which is not conducive to the collision of students' thinking and knowledge sharing[1].

2.1.3 Single teaching resources

Teaching resources mainly rely on textbooks and teachers' courseware, which are single-form and slow to update. The e-commerce industry is developing rapidly, and the data analysis technology and methods are constantly updated, while the traditional teaching resources are difficult to keep pace with the development of the industry, resulting in a disconnect between the knowledge learned by students and the actual application, and failing to meet the industry's skills requirements for data analysis talents.

2.2 Connotation and characteristics of blended teaching mode

2.2.1 Definition of blended teaching

Blended teaching, first proposed by Cooney in 2000, is an "online + offline" teaching method that combines the advantages of online teaching and traditional classroom teaching. It gives full play to the leading role of teachers in guiding, inspiring and monitoring the teaching process, while fully realizing the initiative, enthusiasm and creativity of students as the main body of the learning process.

2.2.2 Characteristics of blended learning

Blended teaching is characterized by flexibility, personalization and strong interaction. Students can independently arrange online learning content and time according to their own time and learning progress, breaking through the limitations of time and space. At the same time, teachers are able to push personalized learning resources and tasks according to the students' learning situation to meet the learning needs of different students. Diversified forms of online and offline interactions, such as online discussions, group collaboration, classroom presentations, etc., promote in-depth exchanges and cooperation between teachers and students, and are conducive to the internalization of knowledge and the enhancement of competence[2].

3. The Necessity of Using Blended Teaching Mode in E-commerce Data Analysis Course

3.1 Analysis of course characteristics

The course of E-commerce Data Analysis is characterized by comprehensiveness, practicability and timeliness. The course integrates multidisciplinary knowledge of statistics, computer science, e-commerce, etc., and requires students to comprehensively use a variety of theories and methods for

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data analysis. At the same time, the course focuses on practical operation, and students need to master the skills of data acquisition, cleaning, analysis and visualization, and be able to apply the results of data analysis to e-commerce operation decision-making[3]. In addition, data in the e-commerce industry is changing rapidly, and data analysis techniques and methods are constantly being updated, so the course content needs to reflect the latest industry news in a timely manner.

3.2 Misfit between traditional teaching mode and the course

The traditional teaching mode is difficult to meet the teaching requirements of the course with strong practicality. In classroom teaching, the practical part is often based on simple case demonstrations and after-class assignments. Students lack real project operation experience and cannot effectively transform theoretical knowledge into practical abilities. Due to the lagging update of teaching resources, there is a gap between the data analysis techniques and methodologies that students have learned and their actual applications in the industry. It is difficult for students to adapt to the demands of the workplace quickly after graduation.

3.3 Advantages of blended teaching mode for the course

The blended teaching mode can fully integrate online and offline teaching resources to provide students with rich learning materials and practice opportunities. The online learning platform can push the latest industry cases, data analysis tutorials and tool usage guides to broaden students' knowledge. The offline classroom, on the other hand, allows students to apply what they have learned in practice and improve their ability to solve real-world problems through group projects, case studies and other activities. Meanwhile, the real-time interaction and feedback functions of the blended teaching mode help teachers understand students' learning situation in time, adjust teaching strategies and realize personalized teaching[4].

4. Rain Classroom-based Blended Teaching Practices for E-Commerce Data Analysis Course

4.1 Pre-course pre-study stage

4.1.1 Push teaching resources

Teachers carefully select and upload teaching resources such as micro-lesson videos, e-teaching materials, industry cases and other teaching resources related to the course content on the Rain Classroom platform. The micro-lesson video explains the key points and difficult knowledge of the course, and its length is controlled at 10 - 15 minutes, which is convenient for students to study with fragmented time. The e-textbook provides detailed theoretical knowledge and operational steps, while the industry case shows the application of data analysis in real e-commerce scenarios to stimulate students' interest in learning.

4.1.2 Design of pre-study tasks

Diversified pre-study tasks are designed, including reading the textbook, watching videos and completing online tests. The online test questions cover multiple-choice questions, judgment questions and short-answer questions, and the difficulty of the questions ranges from shallow to deep, aiming at testing students' mastery of the content of the pre-study. At the same time, the teacher clarifies the learning objectives and requirements in the task description to guide students to do the pre-study in a targeted way.

4.1.3 Students' Independent Learning and Feedback

Students receive pre-study tasks and resources through the Rain Classroom platform, and independently arrange their study time and progress. During the learning process, students can raise questions on the platform at any time and communicate with teachers and classmates. Teachers can check students' learning progress, test scores and feedback on questions in real time through the background statistics function of Rain Classroom, so as to understand students' pre-study situation and prepare for classroom teaching, as shown in Figure 1.

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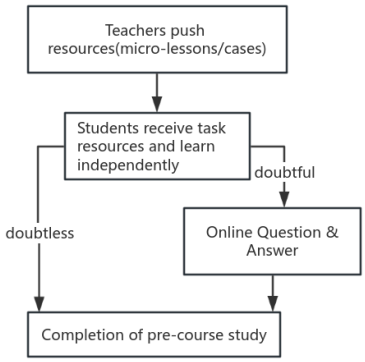

Figure 1 Pre-lesson preview

4.2 Classroom learning phase

4.2.1 Knowledge explanation and interaction

The teacher combines the students' pre-study with the key and difficult knowledge of the course to give a concise lecture. In the process of explanation, the Rain Classroom's functions such as pop-ups, polls and random naming are utilized to increase classroom interactivity. For example, for a certain data analysis concept, the teacher initiates a poll to understand the students' level of understanding; by randomly naming students to answer questions, students' attention and participation are increased. At the same time, students are encouraged to raise questions and insights in the pop-up area to create an active classroom atmosphere[5].

4.2.2 Case Analysis and Practical Operation

The teacher introduced real e-commerce data analysis cases of enterprises and organized students to analyze and discuss in groups. Students put forward data analysis ideas around the cases, select appropriate analysis methods and tools, and process and visualize the data. Teachers in the group discussion process circuit guidance, answer students' questions, guide students to in-depth thinking. At the end of the discussion, each group will report the results, other groups will comment and ask questions, and finally the teacher will summarize and evaluate.

In addition, a special practical operation session is arranged for students to use data analysis tools (e.g., Excel, SPSS, power bi, etc.) in the machine room to carry out practical operation. Teachers monitor the operation process of students in real time through the rain classroom, find problems in time and give guidance to ensure that students master the use of data analysis tools[6].

4.2.3 Real-time feedback and personalized guidance

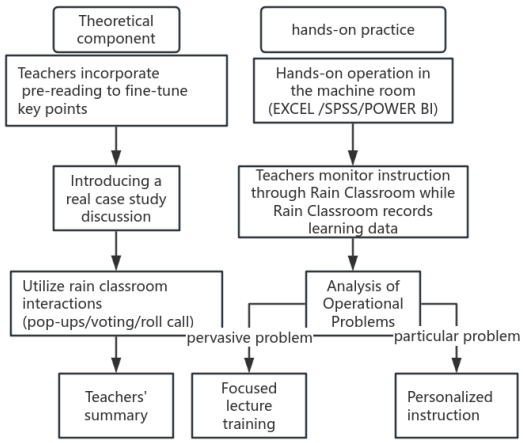

Figure 2 Classroom Learning

The rain classroom platform can record students' learning behavior data in real time in the

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classroom, such as question answering, interactive participation, etc. Teachers can use these data to understand students' learning status and knowledge mastery. Teachers can understand students' learning status and knowledge mastery based on these data, and provide personalized guidance to students with learning difficulties. For common problems, teachers will focus on explaining and strengthening training in class to improve the relevance and effectiveness of teaching, as shown in Figure 2.

4.3 Post-course consolidation stage

4.3.1 Homework Assignment and Correction

The rainy classroom assigns graded homework, including basic homework and extension homework. The basic assignments mainly test students' mastery of classroom knowledge, such as the application of data analysis methods and the operation of data processing steps, etc. The extension assignments require students to combine practical cases with data analysis and business decision-making proposal writing to cultivate students' comprehensive application ability and innovative thinking.

Rain Classroom automatically corrects objective questions and generates detailed grade statistics and analysis reports, so that teachers can visualize the completion of students' assignments. For subjective questions, teachers make manual corrections and give detailed comments and feedback on the platform, pointing out students' strengths and weaknesses to help them improve and enhance[7,8].

4.3.2 Recommendation of extended learning resources

According to the course content and students' learning needs, relevant extended learning resources are recommended on the Rainy Classroom platform, such as academic papers, industry reports, online courses and so on. Academic papers help students understand the cutting-edge research results in the field of data analysis, industry reports allow students to grasp the latest developments in the e-commerce industry, and online courses provide more learning perspectives and methods to meet students' needs for personalized and in-depth learning.

4.3.3 Learning Achievement Exchange and Presentation

Regularly organize students to exchange and display their learning achievements. Students can display their homework results, course project results, research learning results, etc. on the platform and share their learning experience and insights. Other students can observe, learn and evaluate, and teachers also participate in it to comment and guide. In this way, it promotes mutual learning and common progress among students, and stimulates students' learning motivation and innovative consciousness, as shown in Figure 3.

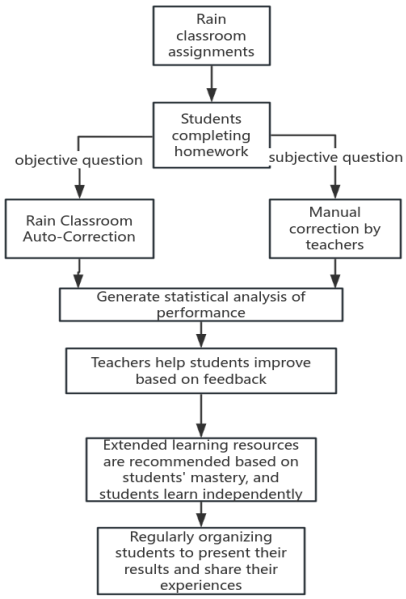

Figure 3 Post-course consolidation

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5. Effectiveness of blended teaching of e-commerce data analysis course based on rainy classroom

5.1 Student Satisfaction Survey

Students' satisfaction was surveyed by distributing 200 anonymous questionnaires. The survey covered teaching content, teaching methods, use of the rainy classroom platform, and learning effects, as shown in Table 1.

Table 1 Results of blended instruction satisfaction survey for e-commerce data analytics course

concern	options	sample size	percentage
1) Are you satisfied with the abundance of e-commerce data analytics course prep materials (e.g., micro-lesson videos, case studies, e-textbooks, etc.) pushed through Rain Classroom?	extremely satisfied	60	30%
	satisfied	80	40%
	ordinary	40	20%
	dissatisfied	15	7.5%
	Highly unsatisfactory	5	2.5%
2) How effective do you think the forms of classroom interaction (e.g., pop-up questions, polls, group contests, etc.) conducted based on Rain Classroom have been in increasing your classroom engagement?	It works very well.	50	25%
	more effective	70	35%
	ordinary	50	25%
	less effective	20	10%
	No effect at all.	10	5%
3) In the process of using Rain Classroom to complete your e-commerce data analysis course assignments, are you satisfied with the platform's assignment submission and correction feedback functions?	extremely satisfied	45	22.5%
	satisfied	75	37.5%
	ordinary	50	25%
	dissatisfied	25	12.5%
	Highly unsatisfactory	5	2.5%
4) How much do you feel you have improved your hands-on skills in e-commerce data analytics after learning from the Rain Classroom-based blended learning model?	It's a big upgrade.	40	20%
	significant improvement	80	40%
	ordinary	50	25%
	Less elevation	20	10%
	Little to no lift	10	5%
5) Are you comfortable with the instructor's teaching method of combining online previews with offline classroom lectures through Rain Classroom?	Fully adapted	55	27.5%
	more adaptive	70	35%
	ordinary	45	22.5%
	Not really adapting.	20	10%
	Totally out of place.	10	5%
6) To what extent do you think the extended learning resources (e.g., academic papers, industry reports, links to online courses, etc.) provided by RainClassroom have helped you learn more about e-commerce data analytics?	It helps a lot.	40	20%
	more helpful	75	37.5%
	ordinary	55	27.5%
	Less helpful	25	12.5%
	Hardly helps.	5	2.5%

From the overall survey results, students' overall satisfaction with the hybrid teaching model based on rainy classroom is high, with more than half of the students giving positive evaluations in the areas of preview materials, classroom interaction, homework function, practical ability enhancement, adaptation of teaching methods, and expansion of resources. However, there is also a certain percentage of negative feedback in all aspects, reflecting that there is still room for improvement in the teaching process. In the subsequent teaching, teachers can optimize teaching resources, innovate teaching methods and improve platform functions to further enhance teaching quality and student satisfaction.

5.2 Analysis of achievements

In order to show more intuitively the teaching of traditional teaching mode and rain classroom-based hybrid teaching mode in the course of E-commerce Data Analysis, class A (traditional teaching) and class B (hybrid teaching) are selected for comparative analysis, and the results are shown in Table 2. Compared with the students' performance in the traditional and rainy classroom-based hybrid teaching modes, the average score of the class in the traditional mode was 72, and that of the hybrid mode reached 80. The number of students scoring above 90 points increased from 6% to 16%, and the number of students scoring below 60 points decreased from 10% to 6%. It can be seen that the hybrid teaching mode significantly improves the average class score, optimizes the distribution of

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grades, stimulates the potential of students, and helps the progress of the weak students, and the teaching results are outstanding. This shows that the hybrid teaching mode based on RainClassroom has fully stimulated students' motivation for independent learning by pushing diversified pre-study resources before class, strengthening the internalization of knowledge by using interactive functions during class, and consolidating the learning results through homework after class. Teachers utilize the background data of the rain classroom to accurately grasp the learning situation, and provide targeted guidance on case analysis and practical operation in class, which effectively improves students' knowledge application and practical operation ability[9].

Table 2 Comparative analysis of results

mark	Average Class Score	number of people				
		90 and above	80-89	70-79	60-69	Below 60
Traditional teaching model	72	3	4	22	16	5
A hybrid teaching model based on the rain classroom	80	8	7	18	14	3

6. Teaching Reflection and Improvement Strategies

6.1 Problems and challenges in the teaching process

In the process of teaching practice, some students do not pay enough attention to online learning tasks due to their weak independent learning ability or poor learning habits, and there are delays and perfunctory phenomena, which affect the learning effect. The rainy classroom platform occasionally has problems such as network lagging and functional failures in the process of using it, which affects the smooth implementation of teaching activities. In addition, the integration and development of teaching resources require a lot of time and effort, and the current teaching resources cannot fully meet the diverse learning needs of students.

6.2 Improvement Measures and Recommendations

In view of the above problems, the following improvement measures are proposed. Colleges and universities strengthen the cultivation of students' autonomous learning ability by providing guidance on learning methods, formulating study plan templates, and establishing study groups, etc., to guide students to develop good study habits. Meanwhile, colleges and universities establish incentive mechanisms to recognize and reward students who actively participate in online learning and perform well.

Colleges and universities should enhance communication and cooperation with the Rain Classroom technical team, promptly feedback problems that occur during the use of the platform, and ensure its stable operation. Schools and teachers can also increase their investment in teaching technology equipment and improve the level of network bandwidth and hardware facilities.

Colleges and universities form course teaching teams to jointly develop and integrate high-quality teaching resources. Colleges and universities encourage teachers to create personalized teaching courseware, micro-course videos and case libraries in combination with the actual situation of the industry and the needs of students. At the same time, it actively introduces excellent teaching resources at home and abroad to enrich the content and form of teaching.

7. Conclusion

This study constructs a complete set of teaching modes through the research on the application of rain classroom-based hybrid teaching mode in the course of E-commerce Data Analysis, and verifies the effectiveness of the mode through teaching practice. The study shows that the hybrid teaching mode based on rain classroom can effectively make up for the shortcomings of the traditional teaching mode, improve students' learning interest and independent learning ability, and enhance the teaching quality and teaching effect. However, teaching reform is a continuous process, and in the future teaching, it is necessary to summarize the experience, improve the teaching methods and strategies, and further optimize the hybrid teaching mode based on rainy classroom to adapt to the development of the e-commerce industry and the needs of talent training. At the same time, it is hoped that the results of this research can provide useful references and lessons for the teaching reform of other similar courses

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and promote the innovation and development of education and teaching.

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