



Research on teaching effect and evaluation of electronic commerce course

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Abstract. In order to evaluate the effect of logical mind mapping combined with PBL teaching method in e-commerce logistics management course, 178 students from accounting majors in grade 2020 and 2021 were selected for group experiment. 81 accounting students of grade 2021 were set as the experimental group, and 97 accounting students of grade 2020 were set as the control group. Logical mind mapping combined with PBL teaching method and traditional teaching method were used in the teaching process of e-commerce logistics management, and the experimental results were compared. The research results show that after adopting logical mind mapping and PBL teaching method in e-commerce courses, students' satisfaction with professional courses and teachers' teaching quality have been improved.

Keywords: logical mind map; PBL teaching method; E-commerce course

1 Introduction

E-commerce course has strong application. In the teaching process, it is necessary to closely follow the cutting-edge knowledge points of e-commerce industry^[1], design the teaching content with the workflow of e-commerce logistics distribution enterprises as the main line^[2], and adopt a variety of interactive teaching methods to organize teaching with students as the center^[3]. Therefore, improving the teaching level of e-commerce course, improving the teaching method, and further strengthening the practical and operational training of e-commerce course have a key role in stimulating and mobilizing students' enthusiasm for active learning.

The Mind Map and PBL (Problem-Based Learning) are two different task-oriented teaching models^[4]. Logical mind map, also known as mind map, brain map or mind map, is an effective graphical thinking tool for expressing divergent thinking proposed by Buzan in the 1970s^[5]. Its core idea is to use pictures, words, attachments and other forms to show the hierarchy and subordination of subjects at all levels in a graphical way^[6,7]. It attempts to describe the laws of human brain memory, reading and thinking, achieve the balance between logic, imagination and memory, and exert the potential of human brain to a greater extent^[8,9]. PBL teaching and learning method is problem-based learning^[10]. Different from traditional subject-based teaching method, PBL

emphasizes students' active learning and is a student-centered education method ^[11]. The PBL teaching method was pioneered by Barrows, an American professor of neurology ^[12]. In 1969, Professor Barrows proposed that students should go to the ward for internship at an early stage, and teachers contacted the actual clinical cases to design problems ^[13,14]. Students put forward questions around the teachers to study on their own, and through group discussion, solve problems and acquire new knowledge, and gradually formed the PBL teaching method in the long-term practice process ^[15]. PBL teaching method is a relatively advanced teaching method, but many scholars find that it has some limitations in course teaching practice, and put forward that PBL teaching method should be combined with other teaching methods in teaching ^[16]. Based on this, this paper believes that the logical mind map and PBL teaching methods can be combined in the teaching of e-commerce courses, and the teaching level of e-commerce courses can be improved through the complementarity of logical mind map and PBL teaching methods ^[17]. In 2022, the author applied the logical mind map combined with PBL teaching method to the teaching of e-commerce course, and evaluated the teaching effect after its application. The research results show that after adopting logical mind mapping combined with PBL teaching method in e-commerce course, students' satisfaction with professional courses and teachers' teaching quality have been improved.

2 Research object and method

2.1 Research objects

The e-commerce courses offered by the School of Economics and Business Administration of Heilongjiang University are arranged in the third semester after each grade enters the school. In this study, 178 students from the accounting major of the school in grade 2021 and grade 2020 were selected as the research objects, and 81 students (37 male and 48 female) from the accounting major of the school in grade 2021 were set as the experimental group. The average age of students in the experimental group was 19.24 years old (2022). The average score at the end of the previous year was 83.0; A total of 97 students (41 male and 63 female) majoring in human resource management in 2020 were set as the control group. The average age of the students in the control group was 19.53 years old (in 2022), and their average score at the end of the previous year was 86.3. The result of statistical data analysis is that the P-value is greater than 0.05, that is, the above two groups of data have comparable characteristics, indicating that the difference between the two groups of students in the three aspects of age, gender and final grade point is statistically significant.

2.2 Teaching Methods

According to the requirements of the 2022 talent training program of the School of Economics and Business Administration of Heilongjiang University, the e-commerce course is offered in the third semester, with a total of 34 hours.

1. Control Group (Grade 2020)

The control group was taught in a two-step way. The theory course is mainly carried out by traditional teaching methods, including PPT, video materials, case discussion and homework. FLEXSIM software and Butterfly 3D interactive experiential teaching platform are used to carry out specific experiment operations in the laboratory computer room of the school. Students practice according to the operation steps of the above software during the experiment, and the teachers give instructions in class, and comment on the students' experimental projects after the experiment.

2. Experimental Group (Class 2021)

The experimental group was taught by mind mapping combined with PBL. Teaching implementation. First, the teacher asked the students to draw the framework of knowledge mapping according to the content of the e-commerce course. Before the class, the teacher put forward 1-3 specific questions according to the knowledge points in the book, and then the students drew a detailed mind map after group discussion based on the knowledge points in this chapter. Secondly, after class, students further supplement and improve the above mind map according to the content learned in class. Finally, the teacher summarized, evaluated and revised the works made by each group of students, and listed specific opinions in detail.

In order to better understand the teaching effect of the two teaching methods of e-commerce course, the experimental group adopted the logical mind map combined with PBL teaching method for each class, and summarized and evaluated the teaching effect after the course was over.

2.3 Observation indicators

In order to compare the training effect of logical thinking ability of students in the experimental group (grade 2021) and the control group (grade 2020) of e-commerce major, the research group asked experts to score the teaching effect quantitatively according to the teaching performance of the two groups of students respectively during the research process. Through SPSS software analysis, it is concluded that the content validity result of students in grade 2021 after using logical mind mapping combined with PBL teaching method is 0.917, and the internal consistency result of Cronbach's α is 0.958. The content validity of students in grade 2020 after using traditional teaching methods is 0.721, and the internal consistency of Cronbach's α is 0.559. The results of quantified scores have good reliability and validity.

The evaluation index includes 7 aspects, such as learning enthusiasm, class participation, teamwork ability, course satisfaction, students' test scores, homework completion and class attendance rate. and its score is between 60 and 100 points. The average score of the scale is more than 60 points, which proves that the teaching method has a positive impact, and vice versa. 5 experts were invited to evaluate the sample data in this paper, all of whom are professional teachers with more than 5 years of teaching experience and are from the marketing teaching and research department of our institute. According to the data of class attendance, class evaluation, homework, student roster, exam results and other basic information of different groups, the score is quantified. In the process of scoring each indicator, experts are required to use the same

guiding standard to determine the score value of each indicator anonymously, and the recovery rate of the scoring table is 100%. The scores of experts are shown in Table 1 and 2.

Table 1. The scores of the expert scoring results in the control group

Evaluation indicators (weight)	expert1	expert2	expert3	expert4	expert5	average	Final score
Learning enthusiasm 10%	77.5	81.2	83.6	81.7	92.4	83.28	8.328
Project engagement 10%	86.5	95.9	87.3	91.4	89.8	90.18	9.018
Job completion 5%	92.1	89.8	86.7	88.4	84.8	88.36	4.418
Classroom satisfaction 10%	79.2	83.3	82.1	87.3	86.3	83.64	8.364
Teamwork level 10%	85.4	87.1	83.7	92.1	82.6	86.18	8.618
Class attendance rate 5%	94.5	97.2	97.8	91.7	92.6	94.76	4.738
Study result 50%	84.2	77.3	90.2	73.7	89.7	83.02	41.510

Table 2. The scores of the expert scoring results in the experimental group

Evaluation indicators (weight)	expert1	expert2	expert3	expert4	expert5	average	Final score
Learning enthusiasm 10%	91.3	84.6	82.7	90.2	86.3	87.02	8.702
Project engagement 10%	91.2	84.4	87.7	93.2	90.6	89.42	8.942
Job completion 5%	93.8	90.7	87.9	84.6	82.5	87.90	4.395
Classroom satisfaction 10%	86.7	83.5	86.4	88.7	84.6	85.98	8.598
Teamwork level 10%	92.6	92.5	90.8	96.5	92.7	93.02	9.302
Class attendance rate 5%	97.4	93.9	97.8	96.7	92.4	95.64	4.782
Study result 50%	83.1	88.2	94.5	83.3	82.5	86.30	43.150

3 Evaluation of the implementation effect of logical mind mapping combined with PBL teaching method

3.1 Comprehensive comparative analysis between the control group and the experimental group

Through a comprehensive comparative analysis of accounting major students in grade 2020 and grade 2021 from seven dimensions, including learning enthusiasm, class participation, teamwork ability, course satisfaction, average score of students' examination scores, homework completion, and class attendance rate, it can be seen that the average scores of students in the experimental group with logical mind mapping combined with PBL were higher than those in the control group with traditional teaching methods in learning enthusiasm, project participation, team cooperation, class satisfaction, final grade, homework completion and class attendance. It can be seen that the combination of logical mind mapping and PBL teaching method has better effect on the teaching of e-commerce logistics management course (see Table 3).

Table 3. Comparison table of comprehensive teaching effect score after using two teaching methods

group	Learning enthusiasm	Project engagement	Job completion	Classroom satisfaction	Teamwork level	Class attendance rate	Study result	Final score
control	8.328	9.018	4.418	8.364	8.618	4.738	41.510	84.994
experimental	8.702	8.942	4.395	8.598	9.302	4.782	43.150	87.871

3.2 Comparison analysis of e-commerce logistics management course theory and experimental test scores between control group and experimental group

Students in the experimental group scored higher on the test than those in the control group. The control group had 97 participants, and the average score of the final theoretical examination was 83.5 points, with a floating range of ± 4.15 points. The average score of the experimental examination was 84.6 points, with a floating range of ± 4.97 points. The experimental group had 81 participants, and the average score of the final theory exam was 87.9, the score of the floating range is ± 6.46 points, the average test score is 85.8 points, the score of the floating range is ± 5.49 points. The scores of the experimental group were higher than those of the control group. It can be concluded that the test scores of the experimental group are better. The comparative analysis of the results of the two groups found that $p < 0.05$, indicating that the difference of the results after comparison was obvious and had statistical significance (see Table 4).

Table 4. Comparison table of theoretical and experimental test scores between control group and experimental group

group	Sample size (persons)	Theory test score	Laboratory test score	T-value	P-value
control	97	83.5±4.15	84.6±4.97	4.063	0.03
experimental	81	87.9±6.46	85.8±5.49	1.697	0.03

3.3 Analysis of results of logical mind mapping combined with PBL teaching method in the experimental group

As can be seen from Table 5, in the two groups of samples, the learning effect of students in the experimental group is significantly higher than that of students in the control group. Therefore, this paper believes that the combination of logical mind mapping and PBL teaching method can effectively enhance students' enthusiasm, and the number of students who can achieve good results accounts for the vast majority.

Table 5. Comparison table of teaching effect between experimental group and control group

Evaluation item	Experimental group teaching effect		Control group teaching effect	
	Promotion(person)	Ratio (%)	Promotion(person)	Ratio(%)
Learning enthusiasm	78	96.30	80	82.47
Project engagement	76	93.83	78	80.41
Job completion	79	97.53	79	81.44
Classroom satisfaction	77	95.06	81	83.51
Teamwork level	80	98.77	80	82.47
Class attendance rate	81	100	82	84.54
Study result	75	92.59	77	79.38

4 Conclusion

Due to the rapid development of e-commerce in China, the number of students studying e-commerce logistics management courses is continuously increasing, which also puts forward higher requirements for teachers' teaching quality. Students' academic performance directly affects teachers' teaching reputation and professional development prospects. Students' professional ability has a positive relationship with the teaching level of e-commerce major. How to improve the teaching quality and teaching effect of e-commerce logistics management course has become the key problem to be faced in the

teaching reform of e-commerce major. In the course teaching of e-commerce logistics management, the advantages of using mind mapping combined with PBL to carry out teaching activities are mainly reflected in the following two aspects:

First, it improves students' satisfaction with the teaching of professional courses. The course of e-commerce logistics management involves a wide range of knowledge and a variety of contents. If the traditional teaching method is adopted, it is difficult to stimulate students' learning initiative. The combination of logical mind mapping and PBL teaching method can help students establish a complete knowledge framework and guide students to take the initiative to participate in the course teaching, so as to effectively stimulate students' learning enthusiasm and enhance students' learning interest. The final comprehensive score of the students of grade 2021 (experimental group) who used the logical mind mapping combined with PBL teaching method was 87.871, while the average score of the students of grade 2020 (control group) who used the traditional teaching method was 84.994, which fully verified the above conclusions.

The second is to improve the quality of teachers' teaching. The teaching purpose of e-commerce logistics management course is to enhance students' knowledge reserve of e-commerce logistics management through teaching activities of professional courses, so as to enhance students' professional level. Through the comparison of the assessment items between the experimental group and the control group, it was found that the experimental group students scored higher than the control group in seven aspects, such as learning enthusiasm, class participation, teamwork ability, course satisfaction, student test scores, homework completion, class attendance rate, and so on. The scores of non-significance were all lower than the control group, which fully verified the above conclusions.

To sum up, through the combination of mind mapping and PBL teaching method, the teaching quality of e-commerce major can be further improved, students' professional knowledge reserve and logical thinking ability can be improved, and rich professional theoretical knowledge can be provided for them to participate in the work related to e-commerce major and logistics management in the future.

Funding

Heilongjiang Province Philosophy and Social Sciences Research Plan Youth Project (Project No.: 22JYC336);

Heilongjiang University Special Fund Project of Fundamental Research Funds for Colleges and Universities in Heilongjiang Province (Project No.: 2022- KYYWF - 1209).

Heilongjiang University Higher Education Teaching Reform Project General Project (Project No.: 2021C30)

Heilongjiang University Higher Education Teaching Reform Project General Project (Project No.: 2022C28)

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