The Role of Blended Teaching Models Based on Empirical Teaching Theory in Enhancing Students' Autonomous Learning Ability

Zhongbao Ma[1,2,a], Prasert Ruannakarn[2,b*], Wei Li[1,c], Gujuan Jiang[1,d], Chunqing Li[1,e]

Email: 63010563016@msu.ac.th [a]; prasert.rua@msu.ac.th [b*]; 67404350@qq.com [c]; jgj1108@163.com [d]; 99001622@qq.com [e]

Heilongjiang Agricultural Economics Vocational College, Mudanjiang China[1]
Faculty of Education, Mahasarakham University, Mahasarakham, Thailand[2]

Abstract. Autonomous learning ability is a crucial ability to adapt to the development of social productivity in lifelong learning. Based on empirical pedagogy, a blended teaching model with a cloud classroom as the carrier was developed, and a Likert scale was used to investigate its effect on the cultivation of college students' autonomous learning ability. The results showed that college students' autonomous learning ability was significantly improved in five dimensions: learning motivation, learning strategy, self-monitoring, self-regulation, and learning environment, and students had high satisfaction with the teaching model and their academic performance was significantly improved ($P<0.05$). This blended teaching model significantly promotes autonomous learning ability.

Keywords: empirical pedagogy; blended teaching; autonomous learning

1 Introduction

The 21st century is a lifelong learning society, and autonomous learning ability is a necessary skill in the era of lifelong learning, as well as a key ability for students to adapt to the development of social production[1]. However, the autonomous learning ability of most college students is poor, and it is necessary to focus on improving the autonomous learning ability in teaching. In blended teaching, teachers can provide more ways and design finer links to guide students' autonomous learning than ever before[2]. Based on the theoretical foundation of empirical pedagogy, this study designed a blended teaching model with a cloud classroom as the carrier, conducted a quasi-experimental study to evaluate students' satisfaction with this teaching model and the impact of autonomous learning ability cultivation, and aimed to improve student's learning efficiency and autonomous learning ability.

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2 Theoretical basis and teaching model development

2.1 Empirical teaching theory

John Dewey believes that education is a complex process of learning from book knowledge to personal knowledge, from the world of knowledge to the real world, and back to the world of knowledge. John Dewey's learning process maps the development of learners from the shallow learning of "knowledge acquisition" to the deep learning of "knowledge transfer and application". Guo Yuanxiang (2016) summarised John Dewey's view as a U-shaped process of "reduction and sinking, experience and exploration, reflection and elevation": 1) reduction and sinking before the lesson; 2) experience and inquiry during the lesson; 3) reflection and uplift after the lesson[3].

2.2 Joyce,Weil,and Calhoun's Model of Teaching

According to Joyce, Weil, and Calhoun's Models of Teaching (2011), the well-designated model should qualify in six areas. In this study, the six components presented by Joyce Weil(2011) were adapted in developing the instructional model namely (1) objectives, (2) syntax, (3) social system, (4) principle of reaction，(5) support system， and(6)Application.

2.3 Development of a Blended Teaching Model

Based on the U-shaped learning process of experiential teaching theory according to Joyce, Weil, and Calhoun's Models of Teaching (2011), a blended teaching model is developed, which is divided into three phases of pre-course, in-course, and post-course, with a total of nine steps. The pre-course phase includes: Step 1 Task Driven, Step 2 Online Learning, Step 3 Learning Diagnosis; The In-Course Phase includes: Step 4 Contextual Experience, Step 5 Negotiating Mutual Aid, Step 6 Show and Share; The Post-class phase includes: Step 7 Consolidation and Conclusion, Step 8: Multi-evaluation, Step 9. The post-class phase includes Step 7: Consolidation and Conclusion, Step 8: Multi-evaluation, Step 9: Reflection and Improvement.

The blended teaching mode embodies the blending of multiple dimensions in the whole process of "teaching and learning" between teachers and students, gives full play to the dual subjectivity of teachers and students, organically integrates the elements of students, teachers, environment and multiple learning modes through the use of various online technologies, embodies the complementary advantages of online teaching and traditional teaching, and focuses on cultivating students' higher-order thinking to promote the improvement of students' autonomous learning ability[4].

3 Research method

3.1 Research participants and implementation process

The students of Heilongjiang Agricultural Economics Vocational College, class 2022, were the research participants, and in the teaching of mental health education course, class 1 (control group, 83 students) used the traditional teaching mode, and class 2 (experimental group, 83 students) used the mixed teaching mode. The teaching effect was evaluated at the

end of the period through closed-book exams, both of which had a full score of 100 points, and the experimental group investigated the students' autonomous learning ability and satisfaction with the teaching mode through questionnaires.

3.2 Questionnaire Design and Quality Control

Based on the Autonomous Learning Scale developed by Pang Weiguo, a questionnaire to test autonomous learning ability was developed with 5 dimensions totaling 33 questions[5]. Based on Cardozo's theory of customer satisfaction and transferring it to students' learning satisfaction, the learning satisfaction scale was developed with 5 variables and a total of 18 questions. A five-point Likert scale was used, with five scoring levels from 1 to 5, namely very poorly met, relatively poorly met, somewhat met, relatively met, and very well met, in that order. Demographic questions such as gender, age, and place of birth were also included in the scales.

Prior to formal administration, the researcher conducted a trial on a sample of 50 students, i.e. 50 studies outside the formal sample. Reliability and validity tests were conducted, and the Cronbach's alpha coefficient of the Autonomous Learning Ability Test questionnaire was 0.985, which was higher than 0.80, and the reliability was high. In terms of structural validity, the correlation coefficients between the dimensions and the correlation coefficients between each dimension and the scale as a whole were calculated, and the structural validity was judged to be qualified or not according to whether the calculated correlation coefficients reached the significant level. The correlation between the dimensions of the Autonomous Learning Ability Test questionnaire and the total score ranged from 0.7 to 0.8, and the correlation between the dimensions ranged from 0.4 to 0.6, all of which reached the significant level ($P < 0.01$). The Cronbach's alpha coefficient of the Learning Satisfaction Scale is 0.98, which indicates high reliability. When analysing the structural validity of the Learning Satisfaction Scale, the correlation between the dimensions and the total score ranged from 0.7 to 0.8, and the correlation between the dimensions ranged from 0.5 to 0.6, all of which reached the significant level ($P < 0.01$). This indicates that the structural validity of the questionnaire is high.

3.3 Data collection

At the end of the course, questionnaires were distributed to the students of class 2 to find out their satisfaction with the blended mode of teaching and learning and the degree of influence on their autonomous learning ability; 83 questionnaires were distributed and 83 were returned for each of the 2 scales.

3.4 Data analysis

All data were statistically analyzed using Statistical Software for Social Sciences. Comparisons of learning performance were made using independent samples t-test, and the results of each measurement dimension of satisfaction with the autonomous learning ability scale and blended teaching mode were analyzed using a one-sample t-test with a constant of 3. Measurement data were expressed as mean ± standard deviation. Differences in autonomous learning ability between different groups of students, such as gender, age, and place of origin, were analyzed by t-test and one-way ANOVA, with a test level of $\alpha = 0.05$ for all hypothesis tests.

4 Results of the study

4.1 Encouraging autonomous learning among students

The results of the impact of the blended teaching mode on the cultivation of college students' autonomous learning ability are shown in Table 1.The mean value of college students' scores on the five dimensions of autonomous learning ability is greater than 3, Data are normally distributed and a one-sample t-test shows that all five dimensions are statistically significant (P<0.01), and the differences between the factors are obvious, indicating that the indicators are well selected. The blended teaching mode has a certain positive effect on the cultivation of college students' autonomous learning ability in all of them, with the highest score in the learning motivation dimension (mean score 4.28), and the in-depth blended teaching mode can significantly enhance the internal driving force of students' learning. However, the Likert scale of autonomous learning ability did not show statistical differences between different groups of students such as gender, age and hometown (P>0.05).

Table 1. Results of students' autonomous learning assessment (n=83)

Dimension	Likert value	T-test	Confidence interval 95 per cent	
	Average + std	T-value (P-value)	lower limit	upper limit
learning motivation,	4.28±0.74	28.69（P<0.01）	1.09	1.25
learning strategy	4.06±0.86	22.13（P<0.01）	0.96	1.14
self-monitoring	3.96±0.84	21.94（P<0.01）	0.95	1.12
self-regulation	4.12±0.87	21.87（P<0.01）	0.97	1.15
learning environment	3.88±0.30	22.69（P<0.01）	0.93	1.13

4.2 Improving the academic performance of university students

The 2 classes in the experimental group and the control group used the same final examination mode. The examination scores of the blended teaching mode were all significantly higher than those of the traditional teaching method, and the difference was statistically significant (P<0.05), in which 65.06% (54/83) of the students scored over 85 points in the in-depth blended teaching mode, and 31.33% (26/83) of the students scored over 85 points in the traditional lecture method, which was statistically different (P<0.01). The number of students who mastered the knowledge of the course through the blended teaching mode based on experiential pedagogy increased by 50%, and the blended teaching mode based on experiential pedagogy significantly improved the students' learning and mastery of the knowledge related to the course.

4.3 Satisfaction with the blended teaching mode

Through the questionnaire survey of college students' satisfaction with blended teaching mode, data are normally distributed, and the results of a single sample t-test show (Table 2), college students' satisfaction with blended teaching mode in the five dimensions of students' expectations, value perception, quality perception, students' learning satisfaction, and students' loyalty scores mean value is greater than 3, the degree of satisfaction is generally high, and the difference between factors is obvious. It is statistically significant (P<0.01) and the difference

between the factors is obvious, which indicates that the choice of indicators is good. The highest rating value in the learning loyalty dimension (mean value 4.17) suggests that blended teaching based on empirical pedagogy is a teaching model worth promoting.

Table 2. Evaluation of student satisfaction with the blended teaching model (n=83)

Dimension	Likert value	T-test	Confidence interval 95 per cent	
	Average + std	T-value (P-value)	lower limit	upper limit
student expectation	3.96±0.89	21.00（P<0.01）	0.87	1.05
value perception	4.00±0.89	21.92（P<0.01）	0.91	1.09
quality perception	4.10±0.86	24.98（P<0.01）	1.02	1.19
learning satisfaction	4.06±0.88	23.45（P<0.01）	0.97	1.15
student loyalty	4.17±0.90	23.93（P<0.01）	1.07	1.20

5 Conclusion and discussion

5.1 Promoting the development of college students' autonomous learning ability

The blended teaching mode can significantly improve college students' autonomous learning ability and promote the development of all aspects of autonomous learning. The use of blended teaching practice improves students' initiative in learning, cultivates students' self-responsibility for learning, enhances their sense of self-efficacy, promotes students' use of learning methods such as refining strategies and retelling strategies, and develops good habits of self-checking and self-reflection, while blended teaching creates a good social learning environment.

5.2 Improving students' academic performance

The blended teaching mode takes the convenient and simple cloud classroom as the external online support, deeply integrates the learning elements, and students can freely arrange the online learning time according to their actual situation, which improves the learning motivation, and also reflects the idea of students' active exploration and discovery advocated by the theory of empirical teaching, and gives full play to the advantages of offline-online and in-class and out-of-class learning, and greatly stimulates students' initiative, exploration and creativity, improving the learning efficiency and quality of college students.

5.3 Improvement of college students' satisfaction in learning

The blended teaching mode embodies the advantages of the in-depth mix of online and offline, in-class and out-of-class teaching, which not only motivates students to participate interactively and stimulates their desire to learn, but also facilitates their free arrangement of study time and place, and enhances the efficiency and effectiveness of learning. It embodies the theory of empirical teaching which emphasizes that the acquisition of knowledge is not passively accepted by students but discovered by the cognitive subject and that the process recording through the online platform can help students to better self-manage and teachers to obtain effective feedback and guidance, which is a convenient and easy-to-use teaching mode worth promoting.

This study was only one semester long, with fewer students and a single discipline of practice. In the future, the scope of practice can be expanded to further explore the impact of blended teaching on students' autonomous learning ability in terms of number of participants, year levels and different courses.

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