

An Empirical Study on the Integration of MOOC into Online Teaching of *Modern Educational Technology* Public Course

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Abstract. The study takes 102 college students majoring in normal education as research objects, uses Likert 5-level scale and SPSSPRO statistical software as research tools, and relies on the public course of *modern educational technology* in normal universities to carry out an empirical study on the function and value of the teaching mode of Online Class+MOOC. The study found that compared with the traditional online classroom, the Online Class+MOOC helps improve students' learning attitude and helps enhance students' learning effectiveness, which provides new ideas for college education reform.

Keywords: MOOC, online teaching, learning attitudes, learning effectiveness

1 Introduction

MOOC was first proposed in the United States in 2012 and started in China's universities in 2013. 2020 saw the first World MOOC Congress and the establishment of the World Mootools Consortium to widely disseminate China's online education proposition and promote the learning revolution and the transformation of higher education. By the end of February 2022, the number of online MOOC in China exceeded 52, 500.^[1] Providing rich learning resources for universities. The Online Class+MOOC integrates the advantages of two teaching modes, and some studies show that the hybrid mode of Online Class+MOOC shows greater learning effectiveness compared with the traditional online mode.^[2] The Online Class+MOOC hybrid teaching provides educators with the opportunity to revisit and reconfigure online teaching practices.

Online teaching became the main teaching mode of major institutions nationwide during the COVID-19, but after several years of promotion, pure online teaching has exposed many problems. *Modern educational technology* is a compulsory public course offered to teacher training students in higher teacher training colleges and universities, which is both theoretical and practical, and is an important course for developing the professional skills of future teachers. The online teaching during the epidemic, even in the form of real-time synchronous classroom, has seriously weakened the enthusiasm of student-teacher interaction due to the lack of campus learning atmosphere as teachers and students are located in different places, and the physical and psychological destruction of students during the epidemic has led to problems in students' learning attitudes and greatly reduced learning effectiveness.^[3] In order to solve the above problems, the authors try to introduce MOOC into the online class to

optimize the teaching mode by integrating it with *modern educational technology* public course.

2 Research design

In order to deeply investigate the effect of MOOC on the online teaching of *modern educational technology* public course, the authors conducted an empirical study on Online Class+MOOC. MOOC in this study are mainly from high-quality MOOC websites such as China University MOOC Network and Xuetang Online.^[4] After strict selection by researchers, high-quality MOOC fragments suitable for this course are selected and integrated into the teaching process.^[5] The MOOC covers a wide range of content, including course knowledge, emotional needs, and the role of educational technology in future work.

The purpose of this study is to investigate the learning mechanism and the function and value of MOOC integration in online teaching of *modern educational technology* public course. The hypothesis of the study is that the integration of MOOC into online teaching of *modern educational technology* public course will help optimize students' learning attitudes and enhance learning effectiveness.

2.1 Research objects

In this study, four classes of math education majors in the 21st grade of G college in Jinzhou city were selected to participate in this study, forming an experimental group consisting of 51 students (26 students in the first class and 25 students in the third class) and a control group with the same number of students (26 students in the second class and 25 students in the fourth class).

The class mode of both experimental and control group students was a digital online classroom in an online environment; and both were taught *modern educational technology* public course by the same experienced teacher; in order to highlight the function of MOOC, the teaching method, teaching content, and teaching time were kept the same, except for the experimental group where the online classroom teaching was integrated into MOOC. In addition, to ensure the rigor of the experiment, before the experiment, the instructor tested the students in the experimental and control groups, recorded the scores and analyzed them for the determination of the scientific validity and usability of the subjects. During the semester-long experiment, students in the experimental group used the MOOC provided by the researcher for pre-course pre-reading and post-course review. Students in the control group continued to use the school-issued paper book for pre-course pre-reading and post-course review.

2.2 Research methodology

Design and test of learning attitudes questionnaire. In this study, a learning attitude questionnaire consisting of five dimensions: disciplinary values, learning cognition, learning emotions, learning behavior and learning context was designed based on the results of studies related to the factors influencing learning attitude in online classrooms in the existing literature.^[6] The learning attitude questionnaire consisted of 20 questions, each of which was coded and measured using a 5-point Likert scale, and was classified as: 1 - Strongly disagree, 2 - Disagree, 3 - neither agree nor disagree, 4 - Agree, and 5 - Strongly Agree.^[7] Before the

official implementation of the test, 20 students were invited to test-fill the questionnaire and revise their responses to issues such as word expression and language order.

The outline of the in-class test of learning effectiveness. In this study, three test questions were selected to test the learning effectiveness of Online Class+MOOC teaching mode. Three questions were closely related to the learning objectives of *modern educational technology* public class, with appropriate difficulty and rigorous questions.

Experimental steps. All of the following experiments are conducted in the online *modern educational technology* public course (C_1). The experimental treatment includes two parts: one is to integrate the MOOC in the pre-class preview stage of the online teaching of *modern educational technology* public course(X_1); the other is to integrate the MOOC in the after-class review stage of the online teaching of *modern educational technology* public course(X_2). Table 1 shows that.

Table 1. Experimental steps

Group	Pre-experimental state	Experimental treatment	Post-experimental state
Control group	Y_{10}	—	Y_1
Experimental group	Y_{20}	X_1 and X_2	Y_2
Conditions		C_1	

The first step, at the beginning of the semester, students in the control and experimental groups were asked to answer the learning attitudes questionnaire. Then, F-test and t-test were conducted on the disciplinary values, learning cognition, learning emotions, learning behavior and learning context, as well as the total score of learning attitudes, so as to judge the differences between the pre-experiment state (Y_{10}) of the control group and the pre-experiment state (Y_{20}) of the experimental group in learning attitudes. The second step, at the beginning of the semester, students in the control group and the experimental group were asked to take a follow-up test of learning effectiveness. Then, F-test and t-test were conducted on the total scores to determine the differences between the pre-experimental state (Y_{10}) of the control group and the pre-experimental state (Y_{20}) of the experimental group in terms of learning effectiveness. Next, at the end of the semester, students in the control and experimental groups were asked to answer the learning attitudes questionnaire. Then, F-test and t-test were conducted on the disciplinary values, learning cognition, learning emotions, learning behavior and learning context, as well as the total score of learning attitudes, so as to judge the differences between the post-experiment state (Y_1) of the control group and the post-experiment state (Y_2) of the experimental group in learning attitudes. Finally, at the end of the semester, students in the control group and the experimental group were asked to take a follow-up test of learning effectiveness. Then, F-test and t-test were conducted on the total scores to determine the differences between the post-experimental state (Y_1) of the control group and the post-experimental state (Y_2) of the experimental group in terms of learning effectiveness.

3 Research data analysis and discussion

3.1 Learning attitudes

Pre-test. The analysis of the results of the F-test showed that: the significance P-value of disciplinary values were 0.603, the significance P-value of learning cognition was 0.863, the significance P-value of learning emotions were 0.370, the significance P-value of learning behavior was 0.197, the significance P-value of learning context was 0.143, and the significance P-value of the total score of learning attitudes were 0.281. None of the above P-values were significant.^[8]

The table 2 shows the results of the independent samples t-test, including the results of the mean standard deviation, the t-test results, and the significance P-value.

Table 2. the results of the independent samples t-test

Vectors	Group	N	M	SD	t	P
Disciplinary values	Control group	51	8.098	0.944	-0.330	0.742
	Experimental group	51	8.157	0.857		
Learning cognition	Control group	51	10.882	0.952	0.414	0.679
	Experimental group	51	10.804	0.960		
Learning emotions	Control group	51	10.078	1.181	-0.432	0.666
	Experimental group	51	10.176	1.108		
Learning behavior	Control group	51	16.020	0.905	-0.732	0.466
	Experimental group	51	16.157	0.987		
Learning context	Control group	51	11.902	0.300	-0.731	0.466
	Experimental group	51	11.941	0.238		
Total score of learning attitudes	Control group	51	56.980	2.064	-0.652	0.516
	Experimental group	51	57.235	1.882		

Analysis of the results of the independent samples t-test showed that the mean values of the control group and the experimental group on the total score of disciplinary values were 8.098/8.157; the P-value of the F-test result was 0.742. The mean values of the control group and the experimental group on the total score of learning cognition were 10.882/10.804; the F-test result P-value was 0.679. The mean values of the control group and the experimental group on the total score of learning emotions were 10.078/10.176; the F-test result P-value was 0.666. The mean values of the control group and the experimental group on the total score of learning behaviors were 16.020/16.157; the F-test result P-value was 0.466. The mean values of the control group and the experimental group on the total score of learning context were 11.902/11.941; the F-test result P-value was 0.466. The mean values of the control group and the experimental group on the total score of learning attitudes were 56.980/57.235; the P-value of the F-test result was 0.516. So the statistical results were not significant, indicating that there was no significant difference between the control group and the experimental group on the total score of learning attitudes.

Post-test. The results of the F-test show that, the significance P-value of discipline values was 0.701, the significance P-value of learning cognition was 0.804, the significance P-value of learning emotions was 0.061, the significance P-value of learning behavior was 0.921, the significance P-value of learning context was 0.055. The significance P-value of the total score of learning attitudes was 0.478. All the above P-values do not show significance, so the data meet the homogeneity of variance.

The table 3 shows the results of the independent samples t-test, including the results of the mean standard deviation, the t-test results, and the significance P-value.

Table 3. the independent samples t-test

Vectors	Group	N	M	SD	t	P
Disciplinary values	Control group	51	9.196	0.895	-5.733	0.000
	Experimental group	51	10.216	0.901		
Learning cognition	Control group	51	11.941	0.904	-4.514	0.000
	Experimental group	51	12.725	0.850		
Learning emotions	Control group	51	11.176	1.126	-3.973	0.000
	Experimental group	51	11.980	0.905		
Learning behavior	Control group	51	17.098	0.900	-6.169	0.000
	Experimental group	51	18.176	0.865		
Learning context	Control group	51	12.843	0.367	-10.966	0.000
	Experimental group	51	13.941	0.614		
Total score of learning attitudes	Control group	51	62.255	1.978	-12.499	0.000
	Experimental group	51	67.039	1.886		

The results of the independent samples t-test were analyzed as follows. The mean total scores of disciplinary values in the control group and the experimental group were 9.196 and 10.216, respectively, and the P-value of F-test results was 0.000. The mean total scores of learning cognition in the control group and the experimental group were 11.941 and 12.725, respectively, and the P-value of F-test results was 0.000. The mean total scores of learning emotions in the control group and the experimental group were 11.176 and 11.980, respectively, and the P-value of F-test results was 0.000. The mean total scores of learning behaviors in the control group and the experimental group were 17.098 and 18.176, respectively, and the P-value of F-test results was 0.000. The mean total scores of learning context in the control group and the experimental group were 12.843 and 13.941, respectively, and the P-value of F-test results was 0.000. The mean total scores of total score of learning attitudes in the control group and the experimental group were 62.255 and 67.039, respectively, and the P-value of F-test results was 0.000. Therefore the statistical results were significant, indicating that there was a significant difference between the control group and the experimental group on the total score of learning attitudes. ^[9]

3.2 Learning effectiveness

Pre-test. The analysis of the results of the F-test showed that for the total score, the significance P-value was 0.229, the level does not present significance, the sample test,

whether it meets the requirements, so the control and experimental groups selected for the experiment can be used as experimental subjects.

The table 4 shows the results of the independent samples t-test, including the results of the mean standard deviation, the t-test results, the significance P-value.

Table 4. the results of the independent samples t-test

Vectors	Group	N	M	SD	t	P
Total score	Control group	51	10.196	1.600	-0.113	0.910
	Experimental group	51	10.235	1.882		
	Total	102	10.216	1.738		

The results of independent samples t-test analysis showed that the mean values of the control group and the experimental group on the total score were 10.196/10.235; the P-value of the F-test result was 0.910, so the statistical result was not significant, indicating that there was no significant difference between the control group and the experimental group on the total score. It means that the experimental group and the control group for the *modern educational technology* public course, the two groups of students have basically the same learning starting point and are suitable as subjects.

Post-test. The analysis of the results of the F-test showed that for the total score, the significance P-value was 0.254, which did not present significance at the level, so the data meet the requirements of F-test.

The table 5 shows the results of the independent samples t-test, including the results of the mean standard deviation, the t-test results, the significance P-value.

Table 5. the results of the independent samples t-test

Vectors	Group	N	M	SD	t	P
Total score	Control group	51	19.784	1.747	-3.771	0.000
	Experimental group	51	21.020	1.556		
	Total	102	20.402	1.759		

The analysis of the results of the independent samples t-test analysis revealed that the average scores of the control group and the experimental group were 19.784 and 21.020, respectively, and the scores of the experimental group were higher than the control group. F-test result P-value is 0.000, so the statistical result is significant, indicating that there is a significant difference between the control group and the experimental group in total score.

4 Conclusions

From the above analysis of the experimental results, this study draws the following conclusions. The integration of MOOC into the online teaching of *modern educational technology* public course is conducive to optimizing students' learning attitudes, including the five dimensions of disciplinary values, learning cognition, learning emotions, learning behavior and learning context. The integration of MOOC into the online teaching of *modern educational technology* public course is conducive to improving learning effectiveness.

Expand the integration mode in all aspects to help improve the quality of talent training. On the basis of fully understanding and profoundly grasping the historical development and connotation characteristics of different education methods, we should continuously explore and innovate the integration mode of both sides, so that they can play their respective advantages in education practice and create a new pattern of "1+1>2".^[10]

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