

BOPPPS Instructional Model Applied to a Basic Economics Course in Higher Education: Design and Assessment

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Abstract: ***Objective:** The purpose of this study is to investigate the effect of applying and evaluating the BOPPPS teaching model in the economic foundation courses of higher education. **Methods:** Through experimental methods, the BOPPPS model is compared with traditional teaching methods so as to test the teaching effectiveness of the BOPPPS model. **Conclusion:** 1) The BOPPPS model highlights the learner's subject position, triggers students' interest through interesting and challenging tasks or problems, clarifies the learning objectives, stimulates students' desire for inquiry, tests and feeds back students' learning outcomes in a timely manner and prompts them to self-evaluate the learning process. 2) The BOPPPS model enhances the educational quality of the basic economic theory course, and it fosters deeper learning and critical thinking skills, and also promotes the cultivation of innovation and problem-solving abilities. However, there are some challenges in applying the BOPPPS model, such as teachers need to spend more time and effort on instructional design and preparation, teachers need to have certain educational theories and practical experience, and students may need some time to adapt to this new teaching model. For this reason, this study puts forward some improvement strategies and suggestions, with a view to providing some reference and inspiration for the teaching reform of basic economic courses in higher education.*

Keywords: BOPPPS Teaching Model; Basic Economics Course; Teaching Design.

1. INTRODUCTION

Basic economic courses are of vital importance for students specializing in economics in institutions of higher education. Their main objective is to equip students with the basic principles and methods of economic phenomena and problems to understand the economy's nature and laws. However, due to their extensive and abstract content, as well as their perceived difficulty and possible monotony, students majoring in economics often find it difficult to develop interest and stay focused, which leads to a lack of initiative and in-depth inquiry (Kuang Xianglin, 2022; Jiang Shengming, 2022). Therefore, in the current reform of higher education, it has become urgent to reform the teaching mode of basic economic courses in order to improve teaching effectiveness and quality.

The BOPPPS teaching model is a learner-centered teaching method, whose name is composed of the initials of six teaching stages: Bridge-in, Objective/Outcome, Pre-test, Participatory Learning, Post-test, and Summary. The model is learner-centered and aims to assess students' learning effectiveness and competence by stimulating students' interests and needs, clarifying learning objectives and outcomes, testing students' preparatory knowledge and understanding, designing meaningful and challenging learning activities, as well as helping students to review and reflect on the main content and key points of the lesson (Liu Jinjun et al., 2021). Existing studies have demonstrated that the BOPPPS teaching model has been applied in certain courses to achieve good results (Zheng Yanlin & Ma Yun, 2021), and there is still a comparative lack of research on the design and evaluation of effectiveness in basic economic theory courses in higher education. How to effectively apply the BOPPPS teaching mode in the basic economic courses in higher education? It has become a hot issue in economic theory teaching. This paper will explore the principles and steps of applying the BOPPPS teaching model in economic foundation courses in higher education institutions; analyze the actual application effects of the BOPPPS teaching model in economic foundation courses; discuss the challenges that may be faced in the implementation of the BOPPPS model, and provide corresponding improvement strategies and suggestions. The study will focus on the six stages of the BOPPPS teaching model, exploring the design principles and steps of its application in basic economic courses in higher education respectively, with a view to providing teachers with reference and guidance in actual teaching.

2. THE APPLICATION DESIGN OF BOPPPS TEACHING MODE IN BASIC ECONOMIC THEORY COURSES IN HIGHER EDUCATION INSTITUTIONS

This section first summarizes the design principles based on the BOPPPS teaching model, and then according to the six links of the BOPPPS teaching model, discusses the design principles and steps of its application in the economic basic theory courses of higher education institutions respectively, with a view to providing some references and guidance for teachers' operation in actual teaching.

2.1 Design principles based on the BOPPPS teaching model

Table 1: Specific design of the six sessions based on the BOPPPS teaching model

teaching link	Design Principles	Specific content
Bridge-in	Closely related to the content to be learned	The initial phase of a teaching module should be directly or indirectly related to the content to be learned and be able to introduce or imply the main concepts, principles or methods of the content to be learned, rather than being irrelevant or far-fetched.
	Closely related to real life	The tasks or problems presented are capable of reflecting or modeling real-life economic phenomena or problems, rather than being abstract or fictional.
	Challenging and fun	The tasks or questions posed stimulate students' curiosity and inquisitiveness, their motivation and ability to actively participate and inquire deeply, rather than being overly simple or complex, boring or stimulating.
	Diversification of introduction methods	The introductory session can be designed in a variety of ways, such as case studies, situational simulations, video presentations, and Q&A interactions.
Objectives/ Outcomes	Compliance with learning content	Be able to reflect the main concepts, principles or methods of the content to be learned, rather than being irrelevant or deviating from them.
	Suitable for the level and ability of the student	Be able to provide some challenge and motivation for students, but not so much that they lose confidence or interest.
	Have observable and evaluable characteristics	Be able to measure and evaluate with some specific indicators or criteria that are not vague or subjective.
	Diversification of target-setting	Objectives or outcomes can be set in a variety of ways, such as written descriptions, oral presentations, graphic displays, etc.
Pre-test	Relevance to the content to be learned	Be able to reflect the extent to which students have mastered the basic concepts, principles, or methods of the content to be studied, rather than being irrelevant or out of scope.
	Suitable for the level and ability of the student	Ability to provide some challenge and feedback to students, but not so much that they lose confidence or interest.
	Have observable and evaluable characteristics	Be able to measure and evaluate with some specific indicators or criteria that are not vague or subjective.
	Diversification of test methods	Such as quizzes, questionnaires, discussions and exchanges.
Participatory learning	Compliance with learning content	Be able to reflect the main concepts, principles or methods of the content to be learned, rather than being irrelevant or deviating from them.
	Suitable for the level and ability of the student	Be able to provide some challenge and support for students, but not so much that they lose confidence or interest.
	Diversity and flexibility	Ability to adapt to different situations and conditions, as well as to adjust and change in response to different objectives and needs.
	Diversifying the way participatory learning activities are designed	Such as cooperative learning, inquiry learning, project-based learning, case studies, etc.
Post-test	Relevance to the content to be learned	Be able to reflect the extent to which students have mastered key concepts, principles, or methods of the content to be studied, rather than being irrelevant or out of scope.
	Suitable for the level and ability of the student	Ability to provide some challenge and feedback to students, but not so much that they lose confidence or interest.
	Have observable and evaluable	Be able to measure and evaluate with some specific indicators or criteria that are not vague or subjective.

	characteristics	
	Diversification of post-test design	Such as assignments, reports, presentations, feedback, etc.
Summary	Relevance to the content to be learned	Be able to summarize and generalize the main concepts, principles, or methods of the content to be learned, as well as the key points and difficulties associated with them, rather than being irrelevant or deviating from them.
	Matching the level and ability of students	Being able to provide students with some guidance and support, but not so simple or complex as to cause them to lose confidence or interest.
	Be autonomous and interactive	The review and reflection conducted in the summarization session should be self-directed and interactive, enabling students to take the initiative to assess and provide feedback on their own learning, as well as communicating and sharing with the teacher and their peers, rather than passively accepting the teacher's summary or evaluation.
	Diversification of summarization methods	The summarization session can be designed in a variety of ways, such as reviewing key points, asking questions to review, and summarizing and evaluating.

2.2 A case of course design optimization based on the BOPPPS model

The following is an example of a course design demonstration of microeconomics, a specialized basic course required for economics and management students, which involves the principle of supply and demand knowledge points in microeconomics.

Table 2: Cases of curriculum design optimization based on the BOPPPS model

link	Design	Specific content
Bridge-in	Case Study	<ul style="list-style-type: none"> Students are shown cases of rising prices of masks during the epidemic and the shortage of train tickets for the Spring Festival, and are guided to analyze what the reasons behind the cases are. After analyzing the case, ask a question related to the theory of supply and demand, such as, "How did the supply and demand curves change in this case? Why?" etc. and have students attempt to answer or discuss.
Objective/ Outcome	target setting	<ul style="list-style-type: none"> By the end of this lesson, students will be able to: <ul style="list-style-type: none"> Understand the meaning and characteristics of supply and demand curves; Analyze the causes and effects of changes in supply and demand curves; Apply supply and demand theory to solve real-world problems. Draw a diagram of a supply and demand curve on the PowerPoint or on the board and label it with arrows, symbols, and words to show the major concepts, principles, or methods to be covered in the lesson.
Pre-test	quiz	<ul style="list-style-type: none"> Ask trivia questions such as multiple choice or judgment questions to test students' mastery of the basic concepts and characteristics of supply and demand curves. Example: <ul style="list-style-type: none"> "The supply curve represents the quantity of a good that a seller is willing to offer at different prices, correct?" "How do the equilibrium price and quantity of a good change when the demand curve shifts to the right?" Have students use the Learning Access App to complete quizzes, visualize them on the big screen, and explain the answers.
Participatory Learning	Group work	<ul style="list-style-type: none"> Choose one of the two cases <ol style="list-style-type: none"> "In order to protect the interests of its farmers, the government of a certain country imposes high tariffs on imported rice, which causes the supply curve in the rice market to shift to the left, thus increasing the price and decreasing the quantity of rice." "Suppose you are the owner of a restaurant and you want to increase your revenue, would you choose to increase the price of your dishes or increase the variety of your dishes? Why? How would your choice affect supply and demand in the restaurant?" Have students break into groups and each group choose a case of a change in supply and demand in a market, describe graphically or in words the change in the supply and demand curves in that case and its causes and effects, and present and explain it to the class. Each group can use PPT, posters, videos, etc. to present and receive questions or comments from other groups or the teacher.
Post-test	question and answer	<ul style="list-style-type: none"> Ask students open-ended or applied questions that they can answer or discuss using what they have learned. <ul style="list-style-type: none"> e.g. If the government imposes a tax on a commodity, what effect will it have on the price and quantity of that commodity? Why? Allow students to think on their own for a minute, then invite a few students to come up to the stage to answer and invite other students to add

		or comment.
Summary	reassessment	<ul style="list-style-type: none"> • Have students summarize for themselves what they have learned and how to do it in this lesson and share their feelings and suggestions. • Have students use their cell phones or computers to scan a QR code to access an online feedback platform, fill out a short reflection report, and submit it to the instructor.

3. ANALYSIS OF THE EFFECTS OF INSTRUCTIONAL DESIGN BASED ON THE BOPPPS MODEL

3.1 Research design and implementation

This study adopts the randomized controlled experiment method to apply the BOPPPS teaching mode to the economic basic theory course in higher education institutions and compare it with the traditional teaching mode. This paper designs the following research program according to the principles and characteristics of BOPPPS teaching mode:

3.1.1 Subject of the study

In this paper, we chose freshmen majoring in international economics and trade in a university in Shandong Province, China, as the research subjects, with a total of 100 students. In order to ensure the experimental effect, we used the random grouping method to divide the research subjects into two classes of 50 students each, which ensured that there was no significant difference between the two groups in terms of gender, age, major, and grades.

3.1.2 Research subgroups

We take these two classes as experimental and control groups respectively. The experimental group received instruction in the BOPPPS teaching mode and the control group received instruction in the traditional teaching mode. Both groups had the same teaching content, teaching time and teachers, and the only difference was the different teaching modes.

3.1.3 Content of the study

We chose the microeconomics part of the basic economic theory course as the teaching content, which mainly involves the demand curve and supply curve, price elasticity, consumer surplus and producer surplus, market failure and government intervention.

3.1.4 Research time

This study was conducted during the Spring 2023 semester for a total of 36 credit hours for 18 weeks, 2 credit hours per week, 45 minutes per credit hour.

3.1.5 Research process and methodology

In this paper, data were collected and analyzed before, during and after the experiment to evaluate the effectiveness of the BOPPPS teaching model. The details are as follows:

- (1) Before the experiment: pre-testing the two classes to find out how their knowledge base and ability to grasp economic theory is, so as to make good adaptations for the subsequent teaching activities.
- (2) In the experiment: observe and record the two classes to understand their learning process and performance under different teaching modes, so as to provide a basis for subsequent teaching improvement.
- (3) Post-experiment: Post-test was conducted for the two classes to understand their knowledge and ability enhancement after the basic economic theory class, and compared with the pre-test results to assess the effect of the BOPPPS teaching mode. Meanwhile, questionnaires and interviews are conducted for the two classes to understand their learning satisfaction and experience with different teaching modes, which will provide reference for subsequent educational innovation.

3.2 Data collection methods

This paper utilizes a variety of data collection methods including pre-tests, post-tests, questionnaires and interviews to ensure the validity and diversity of the data. The details are as follows:

3.2.1 Pre-testing

The pretest is a small test for both classes before the start of the experiment, aiming to find out the students' mastery of the a priori knowledge and ability of the basic economic theory course, so as to make good adaptations for the subsequent teaching activities. The pretest consisted of 10 multiple-choice questions and 3 short-answer questions on basic concepts and principles such as the demand curve and the supply curve, and was worth 100 points out of a possible 30 minutes.

3.2.2 Post-testing

The post-test was an assignment given to both classes at the end of the lab to test the students' mastery of the post-test knowledge and competencies of the basic economic theory course and the degree of fit with the objectives or outcomes. The post-test consisted of 10 multiple-choice questions and 5 short-answer questions on key concepts and principles such as the demand curve and the supply curve, and was worth 100 points out of a possible 30 minutes.

3.2.3 Questionnaires

The questionnaire survey was an online survey conducted in two classes at the end of the experiment, aiming to find out students' learning satisfaction and learning experience with different teaching modes. The questionnaire included 10 single-choice questions and 5 open-ended questions about teaching content, teaching methods, teaching effects, and teaching feelings, and was scored using a five-point scale with a 15-minute time limit.

3.2.4 Interviews

The interview was an in-depth communication with 10 students selected from each of the two classes at the end of the experiment, aiming to find out the students' learning feelings and suggestions about different teaching modes. The interview consisted of five main questions and a number of random questions about teaching content, teaching methods, teaching effects, teaching feelings, etc. It was recorded using the semi-structured interview method and lasted for 30 minutes.

3.3 Descriptive statistical results

In this paper, descriptive statistics on the performance of the two classes in the pretest and posttest were conducted and the results are shown in Table 3.

Table 3: Descriptive statistics of the performance of the two classes in the pretest and posttest

Groups	Pre-test		Post-test	
	MEAN	SD	MEAN	SD
Experimental group	67.23	12.45	82.56	10.32
Control subjects	66.78	11.87	72.34	9.76

As can be seen from Table 3, there is no significant difference between the mean and standard deviation of the two classes' scores in the pre-test, which indicates that the two classes are comparable in terms of a priori knowledge and ability in the basic economic theory course; whereas, in the post-test, the experimental group's scores are higher than those of the control group in both the mean and standard deviation of their scores, which indicates that the experimental group has made a significant improvement in their a posteriori knowledge and ability in the basic economic theory course.

3.4 Discussion of results

This study explores the application and evaluation of BOPPPS teaching model in the economic foundation course of higher education through experimental method and interview survey. The results of the study show that the

BOPPPS teaching model can effectively enhance students' learning effectiveness and satisfaction. However, as far as practical application is concerned, the BOPPPS teaching model also has certain challenges and limitations.

3.4.1 The BOPPPS teaching model highlights the learner's subject position

The BOPPPS teaching model allows students to actively participate, explore and solve problems in the learning process instead of passively receiving knowledge. This can stimulate students' interest, motivation and ability to learn, and improve their independent learning ability and self-confidence. The BOPPPS teaching model is designed with six interconnected teaching links to form a complete teaching process. Each link has a clear goal, content and method, which ensures the coherence and effectiveness of teaching. At the same time, each link has a corresponding assessment method, which provides students with timely feedback and guidance and promotes students' understanding, consolidation and application of what they have learned.

3.4.2 The BOPPPS teaching model improves the quality of education in basic economic theory courses

The BOPPPS teaching model fosters deeper learning and critical thinking skills. Through interesting and challenging tasks or problems, the BOPPPS model guides students to apply basic economic theories to analyze real-world problems, and develops students' creativity and problem-solving skills. At the same time, through participatory learning, the BOPPPS model promotes communication and cooperation among students, and develops their communication and teamwork skills.

3.4.3 Realistic challenges in applying the BOPPPS teaching model

There are some challenges and limitations in applying the BOPPPS teaching model.

- (1) Teachers need to spend more time and effort on instructional design and preparation to ensure that all aspects run smoothly. This places higher demands on teachers' professionalism and workload.
- (2) Teachers need to have some educational theory and practical experience to effectively guide and manage classroom activities. This is a challenge for new or less experienced teachers.
- (3) It may take some time for students to adapt to this new mode of teaching, especially those who are accustomed to traditional teaching methods or lack the ability to learn independently. This requires adequate support and encouragement from teachers in the classroom.

4. STRATEGIES AND RECOMMENDATIONS FOR IMPROVEMENT

This study puts forward some improvement strategies and suggestions for the problems and difficulties in the teaching of basic economic courses in higher education, aiming to improve the teaching quality and effect of the courses, enhance the students' learning interest and ability, promote the overall development of the students, and provide some reference and inspiration for the teaching reform of basic economic courses in higher education.

4.1 Selection of introduction methods related to course specialization

The mode of introduction is an important means of stimulating students' interest and motivation in learning. Choosing appropriate and attractive introduction methods can be associated with the course or the specialty, so that students can feel the connection and value between the course content and their own specialty, thus enhancing their sense of identity and belonging to the course or the specialty. In this study, the following introduction methods were selected according to the subject content of different chapters:

Table 4: Ways of Introducing the Curriculum

<i>Introduction method</i>	Content	Purpose
<i>Start with a case</i>	By presenting some real or fictional cases related to economic fundamentals	To arouse students' attention and curiosity and motivate them to explore the economic principles and laws behind the problem
<i>start with a question</i>	By asking interesting or challenging questions related	Guide students to think about the causes of and solutions to problems, and motivate them to use economic thinking to analyze and solve

	to economic fundamentals	problems
<i>Start with data</i>	By presenting some statistics or graphs related to economic fundamentals	Draw students' attention to and reflect on the economic phenomena or trends behind the data, and motivate them to use economic tools to interpret the data and graphs
<i>Start with a celebrity</i>	By citing some famous quotes or ideas related to economic fundamentals	To arouse students' interest in and identification with economic ideas or concepts expressed by famous people, and to motivate them to study the history of economic thought and the contributions of economists

4.2 Establishment of specific measurable target indicators

Objective indicators are an important basis for guiding and assessing the teaching and learning process and outcomes. Formulating specific and measurable goal indicators can correspond to the course syllabus and learning outcomes, so that students know clearly what they have to learn, how to learn, and to what extent, thus improving learning efficiency and effectiveness. In this study, indicators of knowledge-based objectives, skill-based objectives and ideological and political objectives are formulated according to the main contents of different chapters.

4.3 Use of multiple participatory learning approaches

Participatory learning methods are an important way to improve the interactivity and effectiveness of teaching. By adopting a variety of participatory learning modes, individual reports, group discussions, role-playing, hands-on projections, seminars, case studies, etc. can be flexibly utilized according to different teaching contents and objectives so as to allow students to experience different learning roles and strategies in diversified learning situations, thus enhancing students' initiative and motivation.

4.4 Combining formative and summative assessment approaches

Evaluation methods are an important means of testing and giving feedback on the effectiveness of teaching. Combining formative and summative evaluation methods, we can understand students' a priori knowledge and ability through pre-assessment, test students' a posteriori knowledge and ability through post-assessment, and understand students' learning satisfaction and experience through questionnaires and interviews, so that we can give timely feedback and improve the teaching effect. This study adopts the following evaluation methods according to the target indicators of different chapters:

Table 5: Evaluation modalities

Evaluation method	Evaluation content	Evaluation purpose
Homework evaluation	By assigning some homework related to the content of the chapter, such as fill-in-the-blank, multiple-choice, short-answer, and calculation questions, etc., students are required to complete and submit them within a specified period of time, and then they will be graded and reviewed	It can check students' mastery of the knowledge points in this chapter, discover students' weaknesses and misconceptions, and provide timely correction and guidance.
test and evaluation	By arranging a number of quizzes related to the content of the chapter, such as quizzes, midterm exams, final exams, etc., which students are required to complete and hand in within a specified period of time, and then statistically and analytically	It can test students' understanding of the chapter's knowledge points, assess students' learning achievement and level, and give appropriate rewards and incentives
Interactive evaluation	By organizing some interactive activities related to the content of the chapter, such as question-and-answer sessions, debates, simulation games, etc., students are required to actively participate and express their opinions or ideas, and then make observations and evaluations	It can test students' application of the knowledge points in this chapter, develop students' critical and creative thinking, and promote communication and cooperation among students.
Feedback evaluation	By collecting some feedback information related to the content of this chapter, such as questionnaires, interview records, teachers' journals, etc., students or teachers are asked to reflect their feelings or suggestions truthfully, and then organize and analyze them	It can understand students' attitudes and values towards the knowledge points in this chapter, improve teachers' teaching methods and strategies, and enhance the quality and effectiveness of teaching.

This paper examines the application and evaluation of the BOPPPS teaching model in the economic foundation courses in higher education, and finds that the model can enhance students' learning effect and interest, and also

provides a new idea and example for teaching reform. This paper also points out some problems and challenges in the implementation of the model, and puts forward corresponding improvement strategies and suggestions. This paper hopes to contribute to the teaching reform of economic foundation courses in higher education, and to open a new window for my own study and research.

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