

Application of Reverse Instructional Design in Investment

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Abstract—Taking the utility indifference curve of investment course as an example, this paper studies the application of reverse instructional design in the teaching of investment course. Firstly, it determines the teaching objectives, secondly, it designs the evaluation rules of teaching according to the teaching objectives, finally, it designs teaching activities by using the evaluation rules, the application results show that the reverse teaching can be applied to the teaching of investment courses, it is conducive to improving students' participation and learning autonomy, at the same time, the application of reverse teaching design to teaching practice is discussed.

Keywords—reverse instructional design, investment, utility function

I. INTRODUCTION

Since its inception in 1998, the design of reverse teaching has received special attention from the American Academy of Curriculum and Visual Studies. Now it has been quite influential. It has been tested and promoted in many schools in the United States and has achieved certain results. In 2003, Wiggins and MacTighe's "Comprehensive Cultivation and Instructional Design" was introduced to China[1]. The reverse teaching design proposed in the article attracted the attention of some scholars in China. Scholars point out that the reverse instructional design follows the design idea of "teaching objectives-evaluation design-teaching implementation", and is a cyclical system. At the same time, some scholars combine reverse design with specific courses and apply it in teaching practice to improve the teaching quality of the course.

At present, scholars have applied "reverse teaching design" to translation, medicine, history and sports, western economics, development economics and other disciplines. Gong Rong (2015) studied the reverse design of undergraduate academic English literacy courses and demonstrated the three-step design process[2]. Wu Jia and Lu Lijie (2012) explored the framework of reverse teaching design and combined it with the teaching of high school biology class, explored the application of reverse teaching in this course, and achieved the success of teaching and the recognition of biology teachers[3]. Fan Shuxun (2015) applied reverse thinking to the design of badminton courses and improved the quality of teaching[4]. Fu Xiuyun (2014) applied reverse design to the teaching of development economics and achieved certain results[5].

Based on the previous research results and years of investment teaching experience, the author puts forward the research of investment teaching reform based on Reverse

Design for the first time. The teaching idea of "reverse design" is applied to the teaching of investment. Firstly, the teaching

objectives are determined. Secondly, the evaluation criteria of teaching are designed according to the teaching objectives. Finally, the teaching activities are designed by using the evaluation criteria to form the teaching mode of "curriculum objectives, evaluation design and teaching implementation"[6]. The teaching method has clear teaching objectives, various scientific evaluation means and reasonable evaluation standards, which enhances the pertinence of teachers' teaching and learning, ensures the expected learning effect, and enhances the effectiveness of teaching. Improve the quality of personnel training.

II. APPLICATION OF REVERSE TEACHING DESIGN

Investment is a very practical course, which focuses on cultivating students' investment analysis skills. The textbook we choose is "Principles and Applications of Investments", which is compiled by He Xiannan. Chapter 5, Section 3, Utility Non-difference Curve of Portfolio, It is the content that students need to focus on. In order to explain the teaching process of reverse design, this paper takes the utility indifference curve as an example[7].

A. Teaching Thought

Based on the reverse teaching design idea of "curriculum objective-evaluation design-teaching implementation", and on the principle of taking students as the center to improve students' teaching participation and autonomous learning ability. The teaching method adopts heuristic teaching, problem guiding, metaphor analysis, induction and carries out teaching around Teaching objectives.

B. Teaching Objectives

Before the lecture, the teacher conducted a front-end analysis of the key points and difficulties of the lesson, the academic situation and the teaching objectives.

1) *Teaching key points and difficulties*: This section focuses on the application of utility function and the formation of utility indifference curve. The difficulty is to understand the movement of utility indifference curve and to determine the optimal portfolio of investors.

2) *Learning situation analysis*: The teaching object of this course is the sophomores of investment major in the university. Before this, they has a certain knowledge reserve.

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a) *Consumer utility indifference curve*: Students have learned the relevant knowledge of the consumer utility indifference curve in Microeconomics. Therefore, students in this course can have a good understanding of the investor utility indifference curve in connection with the knowledge they have learned.

b) *The expected return $E(R)$ and risk of the portfolio*: In the course of Principles and Applications of Investment, The first section of chapter 5 is about the expected return rate of investment portfolio, and the second section is about the effective boundary of investment portfolio. Through the study of the previous contents, students have learned about the feasible set of market portfolio and the effective boundary of

investment portfolio, so as to further determine the optimal investment of investors portfolio lays the foundation.

3) *Teaching objectives*: This course uses the Bloom Education Objective Classification Table, which focuses on the teaching focus and difficulty, and decomposes the teaching objectives into six levels of cognitive dimensions, covering remember, understanding, application, analysis, evaluation, and creation; The four levels of knowledge dimension are factual knowledge, conceptual knowledge, procedural knowledge, and metacognitive knowledge[8]. In the face of different teaching contents, the teaching objectives are decomposed, and the teaching objectives are drawn in the target classification table[9], as shown in Table I.

TABLE I. UTILITY INDIFFERENCE CURVE TARGET CLASSIFICATION

Cognitive dimensions	knowledge dimension					
	1. Remember	2. Understand	3. Apply	4. Analyze	5. Evaluate	6. Create
A factual knowledge	Goal 1					
B conceptual knowledge		Goal 1				
C procedural knowledge		Goal 2 Goal 3	Goal 1	Goal 2 Goal 3	Goal 1	
D metacognitive knowledge			Goal 2		Goal 3	

Goal 1: Students can remember the meaning of utility, understand the role of utility in portfolio selection, master the expression of utility function, and use utility function to evaluate the utility of limited portfolio.

Goal 2: Students can understand the formation process of indifference curve, summarize the characteristics of indifference curve, understand the movement of indifference curve, and summarize the characteristics of indifference curve cluster.

Goal3: Students can find out the best investment portfolio of investors by applying the movement of indifference curve and combining the effective boundary of the market. They can also use their knowledge to find their own optimal investment portfolio.

C. Evaluation Standard Design

The evaluation criteria for this lesson include procedural and summative evaluations. Process evaluations are completed through classroom questions, class participation, and small tests. Summary evaluations are completed through group projects. For the teaching objectives of the third section of the utility indifference curve in Chapter 5, the evaluation criteria we designed are shown in Table II.

The evaluation questions we designed are as follows:

Evaluation 1: Evaluate the portfolio using a utility function.

Small test = Determine the choice of Xiao Li and Xiao Zhao for the portfolio by calculating the utility values of Xiao Li and Xiao Zhao in selecting portfolio M and portfolio N respectively.

Evaluation 2: Summarize the characteristics of the indifference curve.

TABLE II. UTILITY INDIFFERENCE CURVE EVALUATION CRITERIA

	Excellent (5 points)	Normal (4-3 points)	To be improved (2-1 points)	Score
Classroom questions	Students can accurately understand the teacher's problems and answer questions accurately and clearly.	Students can understand the teacher's problems and basically answer questions.	Students understand the teachers' problems are biased and cannot answer questions completely.	
Class participation	Students can concentrate on listening to classes, actively thinking, and answering questions actively.	Students can concentrate on listening to classes, thinking and answering questions.	Students can't concentrate on listening to classes, they can't take the initiative to think, and they rarely answer questions.	
Small tests	The students worked out the answers accurately.	Students can basically work out the answers.	Students are less likely to work out the right answers.	
Group projects	Team members can cooperate with each other to accomplish the tasks assigned by teachers accurately	Team members can cooperate with each other and basically accomplish the tasks assigned by teachers.	Team members are not cooperative and can not fulfill the tasks assigned by teachers.	

Question in class = Which parameter determines the steepness of the indifference curve.

Class participation = D portfolio, K portfolio brings the same effect to Xiao Wang, how will Xiao Wang choose?

Class participation = Will the utility value of the investor change?

Evaluation 3: Identify the investor's optimal portfolio.

Group project = 8 people as a group, members cooperate with each other, using the stock information of the Shanghai Stock Exchange to determine the optimal portfolio of a certain member of the group.

D. Teaching Implementation

1) *Teaching methods and strategies:* This course focuses on the teaching content, and adopts different teaching methods in the face of different teaching objectives and teaching requirements.

a) *Analogy method:* Goal 1 of the course uses a fruit platter analogy portfolio to enable students to recall the meaning of utility and understand the role of utility in portfolio selection. At the same time, in teaching Goal 3, students can understand the movement of the indifference curve through the fruit plate and The analogy of portfolio utility makes the abstract problem concrete.

b) *Teaching method:* In the course of the lecture, the course focuses on problem guidance, funnel-style problem design, guided questioning, inquiring questioning, inspiration and improvement of students' participation in teaching. The teaching method is used to accomplish many teaching objectives in the course.

c) *Graphic method:* In this course, the indifference curve is taught, and the core theory is presented intuitively by using diagrams, which simplifies complex problems and concretizes abstract problems.

d) *Case analysis method:* This course sets the case for Xiao Li and Xiao Zhao to use the utility function to evaluate the effectiveness of the portfolio, and complete the teaching task of "Goal 1 can apply the utility function to evaluate the effectiveness of the limited portfolio" to improve students' understanding and application of knowledge.

2) *Teaching arrangements:* This lesson includes three parts: first, utility function; second, utility indifference curve; third, optimal investment portfolio of investors. Before the lecture, we use the portfolio of fruit platter analogy to introduce the new course. At the same time, we emphasize the key points and difficulties of the course when introducing the course structure.

When teaching the first part of the content utility function, we focus on the evaluation 1, from the concept of the utility function, introduce the utility function expression $U = E(R) - 0.5 A\sigma^2$, through case analysis, we set up investor Xiao Li and Xiao Zhao's utility function to evaluate the utility of portfolio and complete the teaching of "Goal 1".

When we teach the second part of the content utility indifference curve, we focus on the evaluation 2, using guided questions, inquiring questions, inspiring and improving students' classroom participation, and by explaining the formation process of the indifference curve, we conclude the characteristics of indifference curve and complete the teaching "Goal 2".

When teaching the third part of the content investor's optimal portfolio, we focus on the evaluation 3, after demonstrating the process of investor optimal portfolio formation, the project research content is arranged in groups, and the team members need to cooperate with each other to use the information of Shanghai Stock Exchange. The stock information helps student to determine the optimal portfolio of a member of the group and completes the teaching "Goal 3".

III. RESULT

A. Score Analysis

At the end of the course, we summarized the evaluation results and found the following phenomena. Phenomenon 1: The proportion of excellent students in the small test is 82%. This shows that in the implementation of reverse teaching, when students clearly know the subject of measurement, they will listen to and learn pertinently, so as to master the content. Therefore, the evaluation criteria designed by teachers must be distributed to the students before the class, so that students can understand the evaluation criteria first, and then participate in the classroom teaching pertinently. The second phenomenon is that in the item to be improved, the group project has the largest proportion, which is 12%, indicating that students are not particularly ideal when participating in group projects. Therefore, teachers need to refine the measurement criteria of the group project and stimulate the participation and cooperation of team members from various angles. Phenomenon 3 is class participation, which shows the most common students. The reason may be that the design of teachers' measurement standards is not reasonable enough to better stimulate students' participation. It may also be that it is difficult to collect data on classroom participation, because teachers can not always pay attention to all students' listening status. Therefore, there may be deviations when teachers give scores. Therefore, we need to better design the evaluation criteria of classroom participation in order to improve the scientificity of the evaluation., as shown in Table III.

TABLE III. SUMMARY OF RETURN INSTRUCTIONAL DESIGN ASSESSMENT ACHIEVEMENTS (UNIT%)

	Excellent (5 points)	Normal (4-3 points)	To be improved (2-1 points)
Classroom questions	78	18	4
Class participation	63	25	12
Small tests	82	10	8
Group projects	72	16	12

B. Satisfaction Analysis

In order to investigate the teaching satisfaction of reverse design, we designed questionnaires around the teaching objectives, measurement standards and teaching implementation, and used Likert Five-Point Scale for quantitative investigation. Five scales of "very satisfied", "relatively satisfied", "general", "unsatisfactory" and "very unsatisfactory" were set up. The validity of 85 questionnaires and the reliability coefficient of the questionnaires are 0.914 and more than 0.9, which shows that the quality of the research data is very high. The corresponding commonality values are higher than 0.4, which indicates that the information of research items can be extracted effectively. In addition, the KMO value is 0.671, greater than 0.6, which means that the data is valid.

According to the survey results, 71% of the students are satisfied with the reverse instructional design of Investments this semester, and only a few students are not satisfied with the reverse instructional design. 80% of the students are satisfied with the design of teaching objectives. 70% of the students are satisfied with the implementation of teaching in class.

However, 10% of the students are still not satisfied with the current evaluation standard design. They questioned the scores of classroom participation. They believed that teachers could not pay attention to every student during the lecture. Therefore, when giving the scores of classroom performance, it could not reflect the fairness of all students. Therefore, teachers' assessment scale still needs to be refined and improved continuously. 7% of the students are not satisfied with the process of teaching implementation. They hope that teachers can flexibly grasp the classroom situation, flexibly adjust the classroom rhythm and not be too rigid. Therefore, in the process of teaching, teachers should not only design teaching links, but also discover students' classroom demands in time and give timely responses as long as teachers and students cooperate with each other, can truly stimulate the students' enthusiasm for learning and improve the teaching effect.

IV. DISCUSSION

In this semester, according to the idea of reverse instructional design, we carry out teaching activities from "teaching objectives-evaluation design-teaching implementation". Through teaching practice, students can accurately understand and clearly answer, the accuracy rate of small test reaches 93%, the group project is completed well, and students are more satisfied with the design of reverse teaching. To a certain extent, it reflects the scientific and rational design of reverse teaching. However, in the process of reverse design, we must pay attention to the following issues.

A. Scientific Decomposition of Teaching Objectives

In the teaching process, we must scientifically decompose the teaching objectives. In this lesson, we draw on the Bloom's educational goal classification method, decompose the teaching objectives from the six cognitive dimensions and four knowledge dimensions, and decompose the teaching objectives. The decomposed teaching objectives cover multiple levels of knowledge dimensions and cognitive dimensions. The teaching

objectives not only reflect the clarity and clarity of the teaching objectives, but also reflect the rich and diverse teaching content.

B. Correspondence between Evaluation Criteria and Teaching Objectives

In the process of teaching, we design the evaluation criteria of teaching according to the teaching objectives, so as to make the teaching objectives correspond with the teaching evaluation, thus enhancing the pertinence of teaching and learning. At the same time, after defining the teaching evaluation criteria, teachers can choose suitable teaching methods and strategies in the teaching process to ensure the high quality of teaching. In this lesson, in the design of evaluation criteria, we choose the evaluation methods as classroom questioning, classroom participation, small test and group project. Classroom questioning and classroom participation are used to test students' remember and understanding of factual knowledge and conceptual knowledge, small test is used to test students' application of conceptual knowledge, and the group project measures the analysis and evaluation of procedural knowledge and metacognitive knowledge. However, whether these methods can stimulate students' enthusiasm and initiative in learning, whether there are better evaluation methods, whether the evaluation criteria can be further refined, we still need to further explore.

C. Correspondence between Evaluation Criteria and Teaching Implementation

In the process of teaching, our evaluation criteria are consistent with the implementation of teaching. This design has an important two-way promoting effect on teachers and students. From the perspective of students' learning, it can make students clear the evaluation criteria and teachers' expectations, provide support for students' self-evaluation and mutual evaluation, and promote students' reflection and improvement of their learning. From the perspective of teachers' teaching, it can make the evaluation criteria clear, help teachers get useful teaching feedback, promote teachers' reflection and improve their own teaching design.

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