

Research on Applying PBL Teaching Approach in Game Theory and Information Economics Course

Yunyan Peng, Jiqing Liu, Wei Han

Heilongjiang University of Science and Technology, Harbin, China

Keywords: PBL; game theory and information economics; teaching mode

Abstract: The cultivation of students' ability is focused in PBL teaching approach compared with traditional education mode. It is exactly what we lack in the traditional teaching of courses related to economics currently. The teaching of game theory and information economics under PBL teaching approach is designed from the perspective of game theory and information economics teaching mode, and corresponding solutions are proposed to the problems encountered under PBL education mode.

1. Introduction

The importance and application of game theory and information economics have attracted worldwide attention as one of the fastest growing fields in economic theory, and it becomes a compulsory course for undergraduate economics majors accordingly. The decision-making when the behaviors of decision-making subjects directly interact with each other and the equilibrium of such decision-making are mainly studied in game theory, and how decision-making subjects overcome the material state of some information related to their decision-making is studied in information economics studies, thereby designing a new information mechanism or a mechanism for avoiding some ignorance costs. Students will be able to use economic theories to analyze relevant issues in the field of information economy and lay a solid foundation for subsequent courses through the course. However, in the past teaching process of game theory and information economics, we found that the explanation and practice of basic knowledge are further focused in traditional teaching mode of game theory and information economics, while cultivation of students' ability to analyze and solve problems is ignored.

PBL mode was firstly proposed by Barrows-American neurology professor, which has become a popular teaching mode in the world. PBL mode is a set of teaching mode for learning situation design based on problem - orientation, and it is a teaching mode based on real world and centered on students. The teaching mode has the biggest advantage that it emphasizes the active learning of students instead of the teacher-centered teaching in traditional teaching compared with the traditional teaching mode. The essence of its teaching lies in "giving play to the guiding role of problems in the learning process" and mobilizing the enthusiasm and initiative of students. Therefore, it is also called problem-oriented teaching mode. PBL mode has been increasingly applied to professional course teaching in recent years.

The design of PBL teaching mode in game theory and information economics is divided into the following modules. The specific design is shown as follows:

2. Selection of teaching materials

We chose 'Game Theory and Information Economics -PBL Course ' compiled by Zhang Chengke and others in the textbook, which reflects the student-oriented and question-oriented PBL teaching philosophy. The compilation mode of traditional textbooks is changed in the textbook, case guidance and student guidance modules are regarded as the main clues, thereby helping students quickly form questions for group discussion, and various modes are utilized to consult literature for self-study, answer questions, and then solve problems.

3. Problem setting

Question setting is the most important block in the whole PBL teaching mode because it is often related to the depth of discussion and learning attention of students subsequently, and it is also the module that can best reflect the teacher's ability and level. Namely, the establishment of the problem is one of the important factors directly affecting the success of PBL teaching.

For example, the following cases are cited in the chapter 'Adverse Selection and Moral Hazard' of game theory and information economics: Taobao was established by Alibaba Group in 2003. It is currently one of the most popular online retail platforms in China with nearly 500 million registered users, including more than 120 million active users every day. Meanwhile, daily online goods number is more than 1 billion, Taobao accounted for 95.1% of the market in the C2C market. Taobao implements accumulative grade mode design aiming at member shopping in order to provide Taobao users with better shopping experience, members can at least obtain one scoring chance after they shop through Taobao once, namely "praise", "medium review" and "bad review", including 1 point for "praise", 0 point for "medium review" and -1 point for "bad review". Sellers get points based on reviews, points less than 250 points are indicated by red hearts, points from 251 points to 10000 points are indicated by blue diamonds, points from 10001 points to 50000 points are indicated by blue tiaras, and points more than 500,000 points are indicated by gold tiaras. Taobao credit evaluation system, as an important basis for comparison and selection during online shopping by buyers, has always been highly valued by online sellers. However, the system looks chaotic currently because of the emphasis. Some sellers hire other people to increase their reputation grade, the sellers harass the buyers to review bad reviews, and "professional poor evaluation blackmailers" become popular in order to combat the opponents.

Question 1: Is Taobao credit evaluation system reasonable?

Question 2: Can you use adverse selection and moral hazard theory to explain the reasons for the emergence of professional poor evaluation blackmailers?

Question 3: Please design a system for Alibaba to minimize the interference of professional poor evaluation blackmailers on Taobao credit evaluation system.

It can be seen that students can be guided for thinking independently through introduction of cases and the raising of questions, thereby improving their application ability.

4. Practice teaching design

4.1 Student grouping and assignment of tasks

Students are grouped based on classes as units with 4-6 members in each group according to previous studies, and free combination mode is adopted. The members in each group should not be too small in the process of grouping, thereby affecting the progress of group discussion and summary efficiency. The members in each group should not be too big in the process of grouping, thereby avoiding 'free riding' behavior of some students, and resulting in insufficient ability training. There is another problem faced by grouping. Students at the same level tend to cluster together, which may lead to too great disparity in students' ability among groups, and unfair evaluation is caused accordingly. Therefore, multiple evaluation mode of teachers according to students' scores and students' intentions are adopted in the process of grouping operation, thereby reducing the gap among groups fundamentally.

The instructor assigns the theories, basic concepts, etc. needed in the class to the students, and each group collects materials for the assigned tasks and makes preparations before class.

4.2 Discussion and opinion display

Students analyze instructor's questions according to the data collected in the early stage in the link, and they put forward their views in the group and form group suggestions. Group leaders summarize member suggestions into materials as basis for teacher grading. Group leaders form summary after discussion, thereby forming a comprehensive solution strategy.

4.3 Design of comprehensive evaluation system

A comprehensive evaluation system combining student evaluation and teacher evaluation should be formed in the evaluation to avoid single evaluation of teachers. The comprehensive evaluation system of PBL education mode is shown in figure 1:

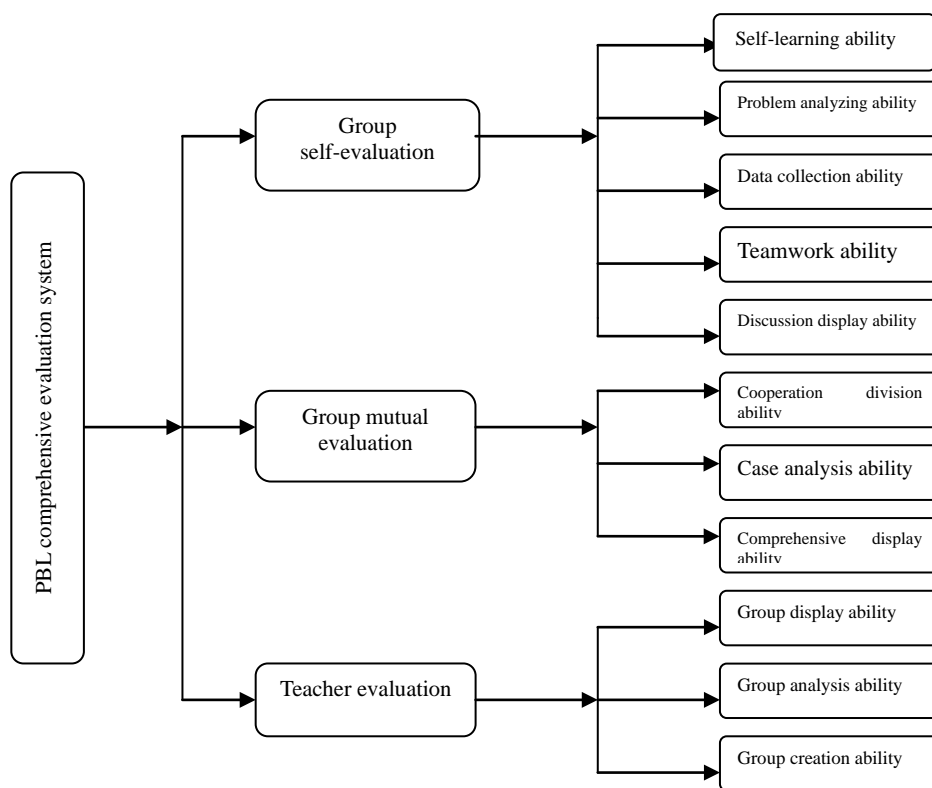


Figure 1. PBL comprehensive evaluation system

5. Some suggestions about PBL teaching approach

5.1 Change of teacher role

PBL teaching mode is different from the traditional teaching mode. It changes the situation of teachers' "monologue", and teachers change from traditional "teachers" to "guiders". The change of role requires teachers to break away from traditional teaching urgently. The focus of teachers' work moves forward, teachers should form a teacher team to effectively screen cases and design questions before PBL course. Teachers should spend much time in the work with teaching funds as support. Meanwhile, the construction of case set in the team is also the top priority. The selection of the case is directly related to the establishment of the question, and the establishment of the question is the key to the success of the course finally. Therefore, the school needs to increase the investment both in terms of teachers and funds, and more flexible teaching arrangements and examination reform rights can be provided for PBL teaching.

5.2 Change of student role

Cultivation and training of students' independent learning ability are further embodied in PBL teaching mode as far as students are concerned. Whether the students can deal with PBL teaching reform with a positive attitude or not is the key to its success. Student is often a receiver of information, and they passively "listen" in traditional teaching mode. PBL mode is the teaching embodiment organized according to students' "interactive learning". Students' ability level varies greatly. All students become silent once they encounter difficulties frequently. In the case, it may be caused by the problem itself on the one hand, which requires the instructor to timely adjust the problem. It may be caused by students themselves on the other hand, who may be too shy to express

themselves. Teachers should take advantage of the situation, encourage students more from the language, and combine the evaluation mechanism to encourage students to think more, and students can be good at expressing their ideas.

5.3 Case design

Case design can be regarded as the key point of PBL mode. It should not only focus on teaching objectives, but also reflect immediacy. The case is more fit with the textbook content, students are more interested in learning. There are a lot of materials that can meet the case conditions from the perspective of the course itself. However, how to select the materials meeting the requirements of teaching objectives and arouse students' interest exactly reflects the level of teachers. Meanwhile, a lot of time and energy are also required. Students may pay more attention to whether the case is interesting or not, while teachers tend to consider it from the perspective of applicability. Meanwhile, teachers also consider many issues such as the systematicness of the case, the extent of knowledge coverage, etc. Even time arrangement of cases is also a problem that teachers need to consider in case design.

5.4 Evaluation system

In addition, how to reflect the principle of fairness and justice in the evaluation is another major problem faced in PBL teaching mode. The traditional evaluation system is still limited in the "standardized" examination level, students wait for answer, thereby resulting in the "lazy mode". Students do not actively pursue the truth of the problem, consequence, cause and other essential problems. However, students are very concerned about grades at the same time. The evaluation by PBL teaching mode is more subjective compared with previous evaluation. If the instructors inject their own feelings into the evaluation process, the fairness and impartiality of the evaluation are directly affected. Therefore, multi-level evaluation, effective supervision, construction of reasonable evaluation system, formation of correct guidance and maximization of PBL mode effect will be the focus of the implementation work.

6. Research conclusions and prospects

From the perspective of game theory and information economics, this study designs the PBL teaching model and builds two modules. The three-dimensional evaluation system are teacher evaluation, student self-evaluation and group mutual evaluation system. In the past, the situation of single evaluation by teachers laid the foundation for building a more three-dimensional and reasonable student evaluation model. From the feedback results, more than 91.6% of students have a positive attitude towards this model, indicating that the PBL teaching method has further promotion significance. In general, students' hands-on ability, teamwork awareness, and ability to think and solve problems have been exercised and improved to varying degrees. The innovations of this research are: (1) Wide adaptability and commonality. This research is a common problem in the reform and development of economic undergraduate education in applied universities. It has practicality for all applied undergraduates in economics. By perfecting the teaching model, it further promotes the quality of economics professionals. (2) New perspective. The PBL education model is an innovation in the education and training model of medical undergraduate students. However, with the development of time, it is gradually found that this kind of humanistic care and team cooperation concept of PBL education model may bring different economic related courses. The unique concept, and the innovation of this perspective, may bring the teaching mode of the existing economic professional related courses to a new height, thus implementing the training mode of innovative talents. (3) The method is new. Through a large number of investigations and studies, students are absorbed into the project to understand the students' ideas on the setting of problem cases. The questionnaire can make the research more convincing. The members of the research team are all composed of teachers in the first-line economics-related courses, which can more effectively grasp the specific problems in the curriculum reform research for specific analysis. The shortcoming of the subject lies in the fact that the PBL teaching method requires a large number of

teaching cases to support the PBL teaching method in the process of game theory and information economics teaching. As far as the current situation is concerned, the number of cases is far from enough, and the quality of the case It also needs to be further improved. At the same time, the student evaluation system needs to be further refined. As far as the research results of the project are concerned, there are still some individual students who cannot integrate into the PBL teaching mode. How to improve their enthusiasm for participation will be a difficult point that we need to solve in the next stage.

Acknowledgement

Supported by Educational Commission of Heilongjiang Province of China (SJGY20180454); Supported by Education Foundation of Heilongjiang University of Science and Technology.

References

- [1] Daniel Wiznia, Robert Korom, Peter Marzuk, Joseph Safdieh & Bernice Grafstein (2012) PBL 2.0: enhancing problem-based learning through increased student participation, Medical Education Online, DOI: 10.3402/meo.v17i0.17375.
- [2] Tuğçe Günter (2017) Effectiveness of a Problem-Based Learning (PBL) Scenario for Enhancing Academic Achievement of Energy Metabolism. Research in Science Education.(1):1-25.
- [3] Young, Louise, Papinczak, Tracey(2013). Strategies for sustaining quality in PBL facilitation for large student cohorts. Advances in Health Sciences Education.18, (4):825–833
- [4] Erdogan, Tolga, Senemoglu, Nuray (2017). PBL in teacher education: its effects on achievement and self-regulation. Higher Education Research & Development. 36(6): 1152-1165
- [5] Mohsen Salari, Amrollah Roozbehi, Abdolvahed Zarifi , Rohani Ahmad Tarmizi(2018). Pure PBL, Hybrid PBL and Lecturing: which one is more effective in developing cognitive skills of undergraduate students in pediatric nursing course? BMC Medical Education.18 (195) <https://doi.org/10.1186/s12909-018-1305-0>
- [6] Fernando Marinez-Rodrigo, Luis Carlos Herrero-De Lucas, Santiago Depablo, Alexis B. Rey-Boué(2018). Using PBL to Improve Educational Outcomes and Student Satisfaction in the Teaching of DC/DC and DC/AC Converters Transactions on Education PP(99):1-9