

INTEGRATING PROBLEM-BASED LEARNING INTO THE INCOME TAX THEORY AND SYSTEM COURSE AND EXAMINING ITS IMPROVEMENT ON LEARNING OUTCOMES

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ABSTRACT

This study examined the teaching of income tax theory and systems at Feng Chia University by introducing Problem-Based Learning (PBL). Using quantitative and qualitative methods, it evaluated whether PBL improved students' learning outcomes and problem-solving skills. Quantitative data included pre- and post-tests and feedback questionnaires, while qualitative data assessed changes in problem-solving ability. The results showed improvements in self-directed learning, time management, logical reasoning, and teamwork. More than 66% of students performed better on the post-test, supporting the effectiveness of the PBL design. However, students also reported uneven group collaboration, information overload, time constraints, and difficulties integrating PBL with traditional teaching. Overall, the findings provide empirical support for the value of PBL in enhancing problem-solving ability and offer implications for teaching and curriculum design.

KEYWORDS

Problem-Based Learning, Qualitative Research Method, Solving Problem Ability, Active Learning, Standard 8

RESEARCH MOTIVATION AND OBJECTIVES

This study addressed issues in the current educational environment by implementing Problem-Based Learning (PBL), a student-centered approach organized around authentic problems and collaborative inquiry. Its primary goal was to enhance student engagement and interest by integrating PBL into the “Income Tax Theory and System” curriculum. Through these PBL modules, students were expected to improve learning outcomes and develop essential problem-solving skills. Using a mixed-methods approach, the study examined whether students’ problem-solving abilities improved after participating in PBL.

For students in Taiwan, although the transition from the traditional unified entrance examination system to the current multifaceted admission system has occurred, reliance on testing as the primary measure of achievement remains. If university education continues to prioritize examinations, students may have limited motivation to develop problem-solving abilities. Even with the introduction of educational technologies such as Zuvio and Kahoot, it remains unclear whether these tools effectively foster higher-order problem-solving skills. In particular, the “Income Tax Theory and System” course faced two major challenges: (1) insufficient learning motivation, as students often perceived tax theory as distant from daily life, and (2) difficulty integrating theoretical knowledge with real-world contexts. Although many tax concepts can be illustrated through current news and real-world issues, the dynamic nature of taxation has not been sufficiently incorporated into the curriculum. Therefore, this study integrates current economic issues into PBL scenarios, enabling students to analyze contemporary tax policies and understand how theoretical knowledge is applied in real-world contexts.

As Halmos et al. (1975) noted, the best way to learn is to do, while the worst way to teach is to talk. Dale’s (1969) “Cone of Experience” likewise suggests that direct experience leads to stronger retention and learning effectiveness. Therefore, integrating PBL with real-world contexts aims to bridge the gap between theory and application and strengthen students’ practical competencies.

Research Questions

- (1). Does the implementation of PBL in the “Income Tax Theory and System” course improve students’ learning motivation?
- (2). Does PBL help students better connect theoretical knowledge with practical and real-world issues?
- (3). Does participation in PBL improve students’ problem-solving skills?
- (4). How do students perceive the learning process, instructional facilitation, and overall effectiveness of the PBL approach?

LITERATURE REVIEW

In recent years, Problem-Based Learning (PBL) has been widely adopted across educational levels, including higher education (Yew & Goh, 2016). At the university level, its application has expanded beyond medical education to fields such as business education. PBL emphasizes student-centered and active learning, encouraging students to identify problems, determine necessary knowledge, and engage in “learning by doing” (Gibbs, 1992; Barrows, 1986).

Previous studies have shown that PBL enhances students' ability to apply analytical skills more effectively than traditional lecture-based instruction (Maxwell et al., 2005). In addition, active learning approaches such as PBL are associated with improved academic performance and engagement (Freeman et al., 2014). Overall, the literature suggests that PBL promotes knowledge acquisition and higher-order cognitive skills, particularly problem-solving ability.

The Instructional Process of the PBL Model

If PBL is introduced into the "Income Tax Theory and System" course only as a superficial activity, it may become formalistic rather than meaningful. Therefore, instructional design plays a critical role. This study adopts a mixed-methods approach to examine how instructional design facilitates student learning. Through group discussions, critical thinking activities, and instructor guidance, students engage more deeply with course content and ethical issues. Discussion topics should be closely related to students' real-life experiences. Heterogeneous grouping further promotes interaction by enabling students to contribute diverse perspectives.

Delisle (1997) outlined the PBL process in six steps: (1) connecting with the problem, (2) setting the structure, (3) visiting the problem, (4) revisiting the problem, (5) producing a product or performance, and (6) evaluating performance and the problem.

In this process, instructors act as facilitators, providing guidance without excessive intervention. Learning outcomes can be demonstrated through presentations, reports, and peer or self-evaluation.

Tools for Assessing Learning Effectiveness

To evaluate the impact of PBL on learning, this study adopted both quantitative and qualitative assessment methods. Sim et al. (2011) suggested that post-course questionnaires should focus on instructional design, learning objectives, and group interaction to generate meaningful data. Quantitative tools included pre- and post-tests, feedback questionnaires, and learning-related scales, generally based on the dimensions proposed by Delisle (1997) using a four-point Likert scale. The Feedback Evaluation Scale was used to identify areas for instructional improvement.

Qualitative data provided deeper insights into students' learning experiences and included group discussion records, peer- and self-evaluations, classroom observations, student reports, and interviews. Follow-up interviews were conducted when necessary to clarify student responses.

Biggs (1996) emphasized that combining multiple assessment methods improves the reliability and validity of evaluating learning outcomes. Therefore, this study adopts a mixed-method approach to assess the effectiveness of PBL instruction.

Instructional Outcomes of the PBL Model

Hsin et al. (2011) emphasized that integrating ethical considerations into professional education through PBL helps students explore and discuss moral issues, thereby enhancing both knowledge and positive attitudes. Prior studies have also shown that PBL effectively develops essential soft skills, including critical thinking, communication, and teamwork.

Under this approach, students become more engaged and take greater initiative in learning. Heterogeneous grouping further promotes interaction and deeper understanding through the exchange of diverse perspectives. However, some studies have identified challenges

associated with PBL. Chen et al. (2009) noted issues such as group conflict, increased time demands, and unclear task boundaries, while Wang and Song (2004) pointed out that insufficient guidance may lead to student frustration.

Accordingly, a hybrid instructional approach combining traditional lectures with PBL is often considered more effective. Overall, the literature suggests that PBL promotes active learning, knowledge application, and the development of interpersonal competencies. These characteristics align with the CDIO framework (Crawley et al., 2007), particularly in relation to learning outcomes (Standard 2), design-implement experiences (Standard 5), active learning (Standard 8), and instructors' pedagogical competencies (Standard 10).

RESEARCH DESIGN AND IMPLEMENTATION

This study examined whether the PBL model enhanced students' problem-solving abilities in the "Income Tax Theory and System" course at Feng Chia University. As the instructor of the course, I designed the following research steps to evaluate the effectiveness of the PBL model.

A. Research Framework

This study adopted a hybrid model combining traditional lectures and PBL. The instructional process consisted of three stages: traditional instruction with a pre-test, PBL implementation through group inquiry and project work, and post-implementation evaluation through post-tests, the Problem-Solving Rubric, and feedback questionnaires. Quantitative and qualitative methods were used to examine whether students' problem-solving abilities improved.

B. Research Problem and Scope

"Income Tax Theory and System" was a compulsory course for third-year undergraduate students. This study implemented PBL in the course and examined its effects on learning achievement and problem-solving competence. After the traditional lecture phase, three PBL modules were introduced, and student progress was assessed using the Feng Chia University Problem-Solving Rubric.

C. Research Subjects and Setting

Participants were third-year undergraduate students enrolled in the course in the Department of Public Finance at Feng Chia University. The study was conducted in regular classroom settings.

D. Research Methods and Tools

A mixed-methods approach was used to evaluate students' professional knowledge, engagement, problem-solving ability, critical thinking, and communication skills. Quantitative tools included: (1) a pre-test; (2) post-tests; (3) the PBL Learning Effectiveness Scale; (4) the PBL Teaching Facilitation Feedback Scale; and (5) the Problem-Solving Rubric. Qualitative data were collected from group discussions, peer- and self-evaluations, and interviews.

E. Teaching Intervention

The teaching intervention was based on the PBL model and included group discussions, peer collaboration, poster production, and oral presentations. These activities aimed to promote

collaboration and facilitate the application of course knowledge. Quizzes and examinations were also used to assess individual learning outcomes and support instructional adjustment.

Summary of Teaching Outcomes and Reflections

This PBL course aimed to enhance students' professional knowledge, engagement, problem-solving, critical thinking, and communication skills, assessed through pre- and post-tests, questionnaires, presentation rubrics, and qualitative data.

The findings indicate that PBL promoted active learning and deeper engagement. Through role-based research, tax calculations, policy analysis, and presentations, students developed a stronger understanding of tax reform from multiple perspectives and improved their analytical, communication, collaboration, and critical thinking skills. Qualitative results also suggested greater awareness of stakeholder perspectives and challenges in tax policymaking.

Some limitations were identified, including uneven group collaboration, information overload, and time constraints. Future teaching should provide clearer guidance and better pacing of PBL activities.



Figure 1: Student Engagement and Participation in PBL Instructional Activities

During this phase, student groups conducted research and analysis based on assigned roles, presenting their findings and recommendations through posters and oral presentations, as illustrated in Figure 1.

EVALUATION OF INSTRUCTIONAL EFFECTIVENESS

Comprehensive Analysis of Pre-test and Post-test Results

This course adopted a PBL-based instructional design, and learning effectiveness was evaluated by comparing pre- and post-test scores. A total of 66 students were included; after excluding zero scores, 60 valid observations remained.

The results showed that 40 students (approximately 66%) achieved higher post-test scores, indicating improved understanding of core course content. The maximum gain was 47 points, with an average improvement of 8.33 points. Notably, 18 students improved by more than 20 points, suggesting substantial progress, particularly among those with weaker prior foundations.

In addition to test performance, student feedback indicated enhanced higher-order learning competencies. High agreement was observed for items such as “I can fully utilize resources” (mean = 3.33) and “I can observe and accept classmates’ learning outcomes” (mean = 3.31), reflecting improvements in critical thinking and reflective learning. Responses related to contributing personal insights (mean = 3.20) and engaging in group discussions (mean = 3.02) further suggest development in communication and collaborative problem-solving skills.

Overall, the results suggest that the PBL approach improved both academic performance and competencies such as logical reasoning, critical thinking, and communication skills.

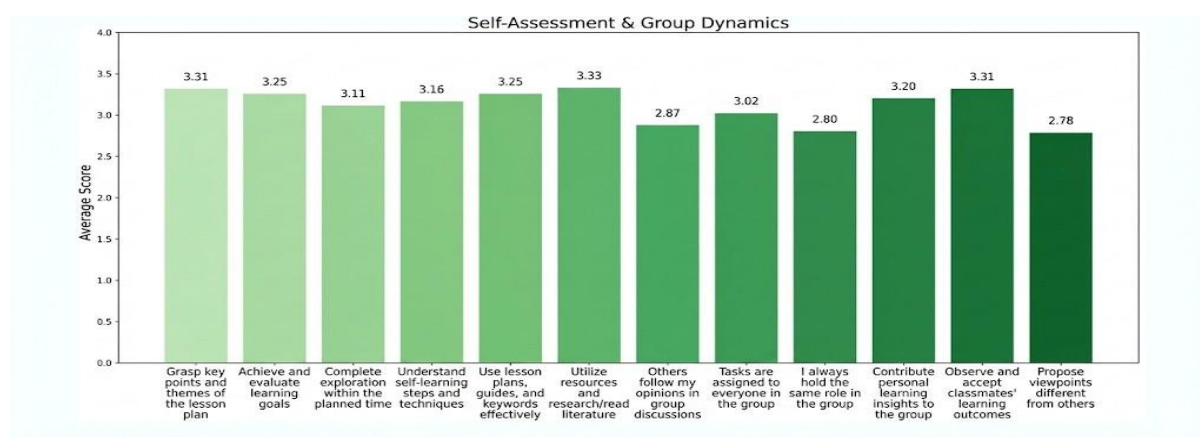


Figure 2: Feedback Evaluation Scale after PBL teaching

Student Learning Feedback :

As shown in Figure 2, on a 4-point scale, mean scores ranged from 2.78 to 3.33, indicating generally positive feedback. The highest-rated items were “I can fully utilize resources” (3.33) and “I can observe and accept classmates’ learning outcomes” (3.31), while most other items were around 3.25, suggesting support for structured and self-directed learning.

Lower scores were observed in group collaboration, particularly in fixed group roles (2.80), task allocation (3.02), and contribution of personal insights (3.20), indicating uneven participation. Overall, while the PBL model supported self-directed learning, future implementation should further strengthen group processes and role rotation.



Figure 3: Student Feedback on PBL Teaching Facilitation

Figure 3 shows that “Strongly Agree” and “Agree” accounted for the majority of responses across all items, while negative responses remained minimal (no more than five students per item), indicating positive feedback on instructional facilitation. These results suggest that the instructor effectively guided discussions, supported collaboration, and fostered a positive learning environment.

Future teaching should enhance the depth of student participation and increase the challenge of higher-order thinking tasks to further strengthen learning and policy analysis skills. While the PBL model improved engagement, collaboration, and practical application, differences in learning styles and adaptation should be considered. A hybrid approach is therefore recommended, in which traditional instruction establishes theoretical foundations and PBL modules reinforce practical application.

CONCLUSION

This study demonstrated that the PBL model can be effectively applied to the “Income Tax Theory and System” course to enhance students’ engagement, self-directed learning, teamwork, and problem-solving abilities. Evidence from pre- and post-tests, questionnaires, and qualitative data indicated improvements in both conceptual understanding and the application of knowledge to practical tax policy issues.

The findings also suggest that PBL supports higher-order learning by encouraging multi-perspective analysis, collaboration, and the development of reasoned policy recommendations, with notable gains among students with weaker initial foundations.

However, this study has several limitations, including the use of a single class, the absence of a control group, and the short duration of one semester.

Overall, PBL represents a meaningful pedagogical strategy in public finance education. Future research should consider broader samples, comparison groups, longer observation periods, and greater attention to individual differences and the pacing of PBL activities.

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BIOGRAPHICAL INFORMATION

Sheng-Tung Chen is Professor in the Department of Public Finance and the Ph.D. Program in Finance at Feng Chia University, served as Dean of the College of Finance since 2020. He has extensive experience in higher education leadership, teaching innovation, and curriculum development. His work has included leading initiatives in teaching practice research, organizing faculty workshops, and contributing to institutional teaching policy and quality enhancement. He was also involved in the AACSB accreditation process, through which PBL was further integrated into economics-related courses. In 2023, he completed a teaching practice research project and presented its outcomes.

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