

Application and Effectiveness Evaluation of the Project-Based Teaching Method in the Experimental Psychology Course

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Abstract: The aim of this study was to assess the effectiveness of project-based teaching methodology in an experimental psychology course, especially its impact on students' academic performance, satisfaction, creativity and problem-solving skills. By comparing the performance of Applied Psychology students in the classes of 2020 (traditional teaching, control group) and 2021 (project-based teaching method, experimental group), theoretical exam scores, classroom questionnaires, and research and competition results were used as assessment tools. The experimental group significantly outperformed the control group in terms of theoretical exam scores, teaching satisfaction, goal identification and achievement, and out-of-class study time. In addition, the experimental group obtained more results in research projects and competitions, indicating that the project teaching method can significantly improve students' comprehensive ability and practical skills. By encouraging students' active participation and exploration, the project teaching method effectively enhances students' learning effectiveness and innovation ability, while the change of teacher's role provides more interaction and guidance opportunities for students.

Keywords: Project Teaching Method; Experimental Psychology; Application, Effectiveness Evaluation

1. Introduction

With the continuous development of education in the 21st century and the increase in the demand for the cultivation of innovative talents, the traditional teaching mode is facing unprecedented challenges (Shu-hua et al., 2020). The Modernization of China's Education 2035 points out the importance of cultivating innovative talents, with special emphasis on

increasing the proportion of applied and compound talents training, which provides a new direction for the reform of higher education courses (Qi et al., 2020). As one of the important branches in the field of psychology, experimental psychology plays an important role in the cultivation of students' practical ability and the enhancement of their research ability (Peng et al., 2013). However, the traditional classroom teaching mode is cured, theory-oriented and practical insufficient, which limits the teaching effect of experimental psychology courses (Zhao, 2020). Therefore, how to use effective teaching methods to improve students' practical ability and scientific research ability has become an urgent need for the current education reform. [1-4]

The project approach to teaching, which originated in the United States in the early 20th century, was first proposed by Kirkpatrick, a disciple of the pragmatist educator Dewey (Xin et al., 2009). This method emphasizes students' interests and needs in the learning process, and believes that learning progress can be effectively promoted through hands-on activities (Zhylybay et al., 2014). The method has been widely used in education around the world and has demonstrated excellent results in enhancing students' practical, creative and teamwork skills. Although the project approach has been gradually introduced in China since the 1990s and has been applied in many educational fields, the practical application and effectiveness of the project approach in experimental psychology courses still need to be further deepened (Guo, 2021). [5-7]

The goal of this paper is to explore the application of project teaching method in experimental psychology courses and its effect on the improvement of students' practical and scientific ability. First, the definition and characteristics of project teaching method will

be sorted out to clarify its theoretical basis and objectives. Then, by analyzing the application of project teaching method in experimental psychology courses, its effects on students' knowledge application, innovative thinking and higher-order abilities will be studied. the focus of the study is to explore how to creatively implement project-based pedagogy in an experimental psychology course and to assess its specific impact on student learning outcomes. This paper will present strategies for implementing project-based pedagogy in an experimental psychology course and demonstrate its practical application through case studies. Finally, based on the analysis of practical case studies and feedback from student evaluations, the application of project pedagogy in an experimental psychology course will be summarized and evaluated.

This study aims to further explore effective teaching methods to enhance the teaching effect of experimental psychology courses, to cultivate students' scientific research ability, and to provide useful experiences and insights for educational reform.

2. the Application of Project-Based Teaching Method in Experimental Psychology Courses

According to the training objectives for applied psychology talents, the teaching purpose, and characteristics of the experimental psychology course, the reform of research-based teaching mainly starts from the following aspects:

2.1 Project-Based Teaching Method as the Core

The project-based teaching method aims to achieve comprehensive quality education that encompasses students' knowledge acquisition, ability enhancement, and personality development. Students form groups of four to five members and undertake course-related research projects over the course of an academic year (the experimental psychology course spans one academic year). Under the guidance of teachers, students independently identify psychological issues in current Chinese society, consult relevant materials, focus on research themes, propose hypotheses, design and execute research plans, and finally write research reports. In addition, students are required to create PowerPoint presentations for

classroom sharing, and write research reports, academic papers, or popular science articles for publication on platforms. Teachers provide timely guidance at each stage to help students advance their projects, ultimately achieving the goal of co-creating new knowledge with students.

2.2 Restructuring Teaching Content and Classroom Design

Traditional teaching content in experimental psychology covers various variables in psychological experiments, experimental design patterns, traditional psychophysical methods, reaction time methods, signal detection theory, and experimental research on perception, memory, thinking, and other aspects. These fundamentals are the core and focus of theoretical and experimental teaching in experimental psychology. With the rapid development of experimental research in various fields of psychology, many new experimental methods, technologies, and tools have emerged. It is necessary to integrate these into the theoretical and experimental teaching content of experimental psychology timely. Teachers can upload the latest literature collected in advance to the "Teaching Materials" module of the online teaching platform and inform students to download and review in advance through "Course Notifications. " Furthermore, organizing students to discuss related topics in the "Q&A Discussion" section not only improves the efficiency of classroom teaching but also facilitates students' post-class thinking and learning. In the experimental teaching module, we should continuously introduce cutting-edge experiments in current psychological research and increase the proportion of comprehensive design and research innovation experiments.

In terms of classroom design, we should break away from the traditional teacher-led teaching model and adopt a split-half class mode, dividing the class equally between teacher explanations and student learning. For basic knowledge and frontier research in the course, teachers should use a detailed teaching method to help students establish a framework for independent learning. Students should engage in knowledge understanding, case analysis, and group sharing during their independent learning time to cultivate their critical thinking skills.

2.3 Improving Teaching Evaluation

Combining formative and summative evaluation methods to cultivate students' growth mindset, communication, and collaboration skills.

According to the stages of the project-based teaching method and combining with the steps of psychological scientific research, the course project process is divided into topic selection, proposal, implementation, summary report, and comprehensive evaluation. Students keep comprehensive work records, uploading their learning outcomes or questions to the teaching support platform at any time. During the project outcome presentation phase, a "triadic evaluation method" involving self-evaluation, peer evaluation, and expert critique is used, and group project awards are given to the best. Due to the presence of peer evaluation and process evaluation, every student needs to actively participate in group cooperation, thereby cultivating their communication and collaboration skills, critical thinking skills, experiential and expressive abilities, and other higher-order learning capabilities.

2.4 Building a Cross-disciplinary Cooperative Project Teaching Team

Experimental psychology is an interdisciplinary subject that possesses both the attributes of humanities and social sciences and natural sciences, closely related to psychology, sociology, management, and other disciplines. This project will build a cross-disciplinary cooperative teaching team to collaborate in training more outstanding students.

3. Evaluation of the Effectiveness of Project-Based Teaching Method in Experimental Psychology Courses

To evaluate the effectiveness of the project-based teaching method in experimental

psychology courses, students from the Applied Psychology major of the 2020 and 2021 cohorts were selected. the 2020 cohort, taught through traditional teaching methods, served as the control group, while the 2021 cohort, which was introduced to the project-based teaching method, acted as the experimental group.

The evaluation questionnaire for experimental psychology teaching was designed based on the key contents of teaching evaluation and the characteristics of experimental psychology teaching. the questionnaire is divided into two parts. the first part consists of multiple-choice questions covering dimensions such as the content of experimental psychology teaching, teaching methods, teaching resources, faculty, and overall satisfaction. It employs a Likert five-point scale for quantitative evaluation, ranging from very dissatisfied (or very unreasonable) to very satisfied (or very reasonable), with scores from 1 to 5, where higher scores indicate greater satisfaction with the item. the second part includes two open-ended questions about suggestions for course arrangements.

After the completion of the course, students from each grade in Applied Psychology completed the questionnaire in a group testing format. the teaching faculty did not adjust after the implementation of the project-based teaching method and lectured according to a consistent syllabus to ensure the homogeneity of the implementation of the research teaching model.

(A) Comparison of Theoretical Exam Scores

The overall scores of the experimental group were significantly higher than those of the control group, with $P < 0.05$. Furthermore, the rates of excellence and good grades in the experimental group were significantly greater than those in the control group, with $P < 0.05$. As shown in **Table 1**.

Table 1: Theoretical Exam Scores

Final Score	Numbers	90 points and above	80-90	70-80	60-70	Less than 60 points
Experimental Group	123	18%	32%	40%	10%	0
Control Group	112	8%	20%	45%	27%	0

(B) Results of Classroom Survey Questionnaire

The experimental group scored significantly higher than the control group in terms of goal identification, goal attainment, time spent on learning outside of class, and overall

satisfaction. Furthermore, under the split-half classroom teaching model, despite an increase in the amount of homework and difficulty, 89% of students in the experimental group still considered the workload to be appropriate, significantly higher than the control group. As

shown in **Table 2**.

Table 2: Results of Classroom Survey Questionnaire

Investigating Dimensions	Experimental Group	Control Group	t
Teaching Content	4.11±0.48	3.82±0.51	4.16**
Teaching Methods	3.89±0.51	3.51±0.56	3.38**
Teaching Resources	4.03±0.58	3.71±0.53	4.86**
Teachers' Evaluation	4.43±0.47	4.18±0.49	4.08**
Overall Satisfaction	4.32±0.56	3.98±0.59	4.37**

(C) Results in Other Aspects

Students in the experimental group achieved historic breakthroughs through the project-based teaching method, which significantly enhanced their comprehensive abilities. They secured 1 national-level innovation project approval, 1 university-level project approval, won 1 provincial-level award in the "Internet+" competition, and received awards in two psychological professional skill academic competitions.

4. Discussion

4.1 The Impact of Teaching Methods on Learning Outcomes

The results of this study indicate that the application of project-based teaching methods in experimental psychology courses significantly enhances students' learning outcomes. Students in the experimental group exhibited higher performance in final exams and coursework, which can be attributed to the emphasis on practical and inquiry-based learning inherent in project-based teaching. This approach encourages active participation and exploration by students, facilitating a deeper understanding and application of experimental psychology concepts. Compared to traditional lecture-based teaching, project-based teaching more effectively stimulates students' interest in learning and promotes the internalization of knowledge.

4.2 Enhancement of Innovation Abilities and Problem-Solving Skills

Both questionnaire surveys and teacher observation records show that students who participated in project-based teaching demonstrated superior innovation abilities and problem-solving skills. This finding supports previous research that project-based teaching can effectively foster students' innovative thinking and practical skills development. Through the analysis of actual cases and

collaborative group projects, students have the opportunity to apply theoretical knowledge to solve real-world problems, thereby enhancing their innovation capabilities and experimental design skills.

4.3 The Transformation of Teacher Roles and Its Impact

This study also examines the changing role of the teacher under the project-based pedagogy. In the project-based pedagogy, the teacher plays more of a mentor and facilitator role rather than a knowledge transmitter in the traditional sense. This role change helps to promote interaction between teachers and students.

In this study, we explored the application of project-based pedagogy in an experimental psychology course and the evaluation of its effectiveness. However, there are some limitations of this study. First, the sample size of this study was relatively small, which may limit the generalizability and replicability of the results. Future research could attempt to expand the sample size to improve the representativeness of the study. Second, this study only applied the project-based approach in an experimental psychology course, and therefore it is not possible to determine the applicability of its effects in other psychology courses or disciplines. Future research could explore the effects of the project-based pedagogy in different types of courses and disciplines. Finally, this study did not consider individual student differences, such as learning background and motivation, which may have an impact on the effectiveness of the project-based pedagogy. Future research could consider incorporating these factors into the research design to more fully assess the impact of project-based pedagogy. In summary, although this study revealed to some extent the application and assessment of the effects of project-based pedagogy in an experimental psychology course, further research is needed

to overcome these limitations in order to improve the reliability and validity of the findings.

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