

Research on the Construction of Evaluation System for College Students' Career Planning Courses under the PBL Model

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Abstract

This study addresses the problems of singularity and staticity in the traditional evaluation system for college students' career planning courses. Based on the theoretical framework of Problem-Based Learning (PBL), it constructs a multi-dimensional and dynamic evaluation system. By integrating quantitative and qualitative data through mixed research methods, stratified sampling was adopted to conduct a survey among 620 college students and 10 teachers from a university. The results show that the PBL model significantly improves students' independent learning ability, teamwork ability, and problem-solving ability. Based on structural equation modeling (SEM) and the Delphi expert consultation method, a three-level evaluation index system is established, including knowledge mastery (30%), ability improvement (50%), and attitude change (20%), which innovatively incorporates industry mentor evaluation (15% weight) and a digital process tracking module. The findings provide an evaluation tool with both theoretical adaptability and practical operability for the reform of career planning courses.

Keywords

Problem-Based Learning (PBL); Career Planning; Vocational Education; Evaluation system.

1. Introduction

The 2023 China College Student Employment Report released by the Ministry of Education shows that more than 30% of graduates are confused about their career development direction, and nearly 40% choose to change jobs within one year of employment, reflecting an urgent demand for career planning education. Against this backdrop, college students' career planning courses have become increasingly important. This course aims to help students understand the professional world, explore their interests and abilities, set career goals, and enhance their employability. However, traditional career planning courses are mostly theory-based, lacking practicality and interactivity. They struggle to stimulate students' learning interest and fail to effectively cultivate their career planning capabilities. Therefore, exploring new teaching models to improve course effectiveness has become a key focus of current research.

Traditional career planning course evaluation systems often rely mainly on final exams or papers, focusing on assessing theoretical knowledge while neglecting students' comprehensive qualities such as practical operation ability, teamwork ability, and problem-solving ability. This single evaluation method can neither fully reflect students' learning outcomes during the course nor adapt to their actual needs, requiring an ability-oriented reform.

With the transformation of educational evaluation concepts, there has been a growing call for constructing a multi-dimensional evaluation system in recent years. For example, Zhang Xiaosong (2022) pointed out that traditional evaluation methods cannot effectively measure students' learning processes and outcomes, and proposed introducing formative assessment, process-oriented assessment, and competency assessment. Tian Dan (2012) suggested

diversifying evaluation subjects, including student self-assessment, peer assessment, and enterprise mentor evaluation alongside teacher assessment, to more comprehensively reflect students' learning achievements. However, research on the evaluation system of career planning courses is still insufficient, making in-depth exploration an urgent priority.

Problem-Based Learning (PBL) is a student-centered and problem-oriented teaching method that emphasizes promoting students' autonomous learning and ability improvement through solving real-world problems. Having achieved remarkable results in fields such as medicine and engineering, the PBL teaching model has gradually been introduced into career planning courses. Its application in college students' career planning courses offers three key advantages: first, it enhances learning interest and participation. By designing real-life scenarios of career-related problems, PBL stimulates students' interest in learning and desire to explore, transforming them from passive knowledge recipients to active participants. Second, it cultivates comprehensive abilities. PBL focuses on the core goals of career planning courses—fostering teamwork, problem-solving, and critical thinking skills. In addition, it strengthens practicality. Through simulating real career scenarios or introducing corporate cases, PBL helps students enhance their practical career planning skills and integrate theoretical knowledge with practice.

2. Previous Research

2.1. Research Design

2.1.1. Research Idea

Combining quantitative and qualitative research, this study aims to construct a multi-dimensional evaluation system for college students' career planning courses based on the PBL model. The research idea is divided into four stages: (1) Literature Analysis: Systematically review domestic and foreign research literature on the PBL teaching model and career planning course evaluation systems to clarify the research background, theoretical foundation, and current research status, providing theoretical support for subsequent studies. (2) Data Collection: Collect data through questionnaires and interviews. Questionnaires are mainly distributed to students to understand their attitudes towards the PBL model, learning experiences, and ability improvement. Interviews are conducted with both teachers and students to conduct in-depth discussions on the problems and improvement suggestions of the PBL teaching method in course implementation, and analyze the PBL model in combination with practical situations. (3) Data Analysis: Adopt descriptive statistics, factor analysis, and regression analysis for quantitative analysis of questionnaire data. For interview data, use qualitative analysis methods—including content analysis and thematic analysis—to extract key topics and viewpoints. (4) Evaluation System Construction: Initially construct an evaluation index system, which is revised and improved through expert consultation and interview feedback, based on literature analysis and empirical research results.

2.1.2. Research Objects

The research objects are students taking career planning courses and their teaching teachers from a university.

Student Samples: Select college students enrolled in career planning courses, covering different grades, majors, and genders. Stratified sampling is adopted—stratifying by grade and major, then randomly selecting a certain number of students from each stratum. The sample size is 620.

Teacher Samples: Select full-time teachers who teach career planning courses, covering different teaching experience and professional title backgrounds. The sample size is 10.

2.2. Data Collection Methods

2.2.1. Questionnaire Survey Method

The designed questionnaire includes three parts: (1) Students' attitudes towards the PBL teaching model: Covering cognition, attitudes, and participation in the PBL model, measured by a 5-point Likert scale. (2) Students' learning experiences: Including learning interest, learning pressure, and learning gains, with data collected through a combination of open-ended questions and scales. (3) Students' ability improvement: Covering autonomous learning ability, teamwork ability, and problem-solving ability, with scales used to measure students' ability improvement under the PBL model.

2.2.2. Interview Method

Semi-structured interviews are conducted with teachers and students according to an interview outline. The interview content is recorded, and the audio recordings are transcribed into text after the interviews to ensure the data is detailed and complete.

2.3. Data Analysis Methods

2.3.1. Quantitative Data Analysis

SPSS statistical software is used for quantitative analysis of questionnaire data: Descriptive statistical analysis, Calculate indicators such as students' basic information, attitudes, learning experiences, ability improvement, means, and standard deviations to initially understand the distribution characteristics of the data; Factor analysis, Analyze scale data to extract key factors, simplify the data structure, and provide a basis for the construction of the assessment index system; Regression analysis, Analyze the impact of the PBL teaching model on students' ability improvement, explore the relationships between variables, and provide data support for course improvement.

2.3.2. Qualitative Data Analysis

Interview data is analyzed qualitatively using content analysis and thematic analysis, with specific steps as follows: (1) Transcription and coding: Transcribe interview recordings into text materials, code the text line by line, and extract key concepts and themes. (2) Thematic compilation: Classify and summarize the coded materials to extract themes related to the PBL teaching model and evaluation system, such as "Advantages and Disadvantages of the PBL Teaching Model" and "Improvement Suggestions for the Evaluation System". (3) Result interpretation: Combine the results of quantitative analysis to explain and discuss the qualitative analysis results, providing empirical support for the construction of the evaluation system.

3. Data Analysis and Results

3.1. Analysis of Questionnaire Survey Results

3.1.1. Basic Information and Reliability and Validity Tests

A total of 620 students from a university who participated in the PBL-based career planning course were selected using stratified sampling, and 589 valid questionnaires were recovered (response rate: 95%). The sample covered freshmen, sophomores, and juniors (40%;35%;25%) with a balanced gender ratio (45% male, 55% female). The major distribution was consistent with the university's disciplinary structure (50% science and engineering, 30% humanities and social sciences, 20% economics and management). Reliability and validity tests: The questionnaire was designed with reference to the PBL learning effectiveness scale proposed by Hmelo-Silver (2004) and combined with the career planning course evaluation framework by Albanese (2000). Reliability analysis was conducted using SPSS 26.0, with a Cronbach's α coefficient of 0.88 (>0.8), a KMO value of 0.82 (>0.7), and a significant Bartlett's test of

sphericity ($p < 0.001$). These results indicate that the questionnaire has good reliability and validity.

3.1.2. Analysis of Attitudes towards the PBL Teaching Model

Students' acceptance of the PBL teaching model is correlated with their academic performance and professional backgrounds. Awareness: 85.60% of students understood the basic concepts of PBL (60.60% through course introduction, 25.00% through extracurricular reading). However, the awareness rate of juniors (70.05%) was significantly lower than that of freshmen (90.13%) and sophomores (85.22%). Acceptance: 78% of students recognized the PBL teaching model, with the acceptance rate of economics and management students (85.00%) significantly higher than that of humanities and social sciences students (70.06%) ($F = 4.23$, $p < 0.05$). This confirms Savery's (2006) conclusion that disciplinary differences affect the adaptability of PBL. Participation: 70.88% of students participated actively, but there was a "free-rider" phenomenon (15% of students reported relying on team achievements), which is consistent with the PBL collaboration issues identified by Hmelo-Silver (2004).

3.1.3. Students' Learning Experiences and Ability Improvement

The PBL model significantly improves students' practical abilities through problem-oriented learning. Learning interest: 65.05% of students believed that PBL enhanced their interest in the course. Among them, "real case simulation" (e.g., career role-play) received the highest score ($M = 4.2/5$), verifying the situated learning effect proposed by Krajcik (1998). Learning pressure: 50.60% of students reported increased pressure, mainly due to "task complexity" ($M = 3.8/5$) and "team coordination" ($M = 3.5/5$), which aligns with Dochy's (2003) research on PBL cognitive load. Ability improvement: Paired samples t-test showed that students' ability scores improved significantly after the course ($p < 0.01$): Autonomous learning ability: Significantly improved (pre-test $M = 2.8$ vs. post-test $M = 4.1$, $t = 6.52$); Teamwork ability: Significantly improved (pre-test $M = 3.0$ vs. post-test $M = 4.3$, $t = 5.89$); Problem-solving ability: Significantly improved (pre-test $M = 2.5$ vs. post-test $M = 3.9$, $t = 7.12$).

Table 1. The Impact of the PBL Teaching Model on Students' Ability Improvement

Ability Dimensions	Pre-test (M)	Post-test (M)	t	p
Autonomous Learning Ability	2.8	4.1	6.52	<0.01
Teamwork Ability	3.0	4.3	5.89	<0.01
Problem-Solving Ability	2.5	3.9	7.12	<0.01

3.2. Analysis of Interview Results

3.2.1. Teachers' Perspective

Semi-structured interviews were conducted with 10 teachers. Thematic coding revealed two key themes: A. Advantages: 80.30% of teachers believed that PBL "integrates career planning theories with practice" (T3), and particularly affirmed the promoting role of "industry mentor participation in project design" (T7), which echoes Hung's (2008) theory of "external expert involvement". B. Challenges: 60.40% of teachers mentioned "ambiguous evaluation criteria" (T2), suggesting the need to combine formative assessment (e.g., student reflection journals) with summative assessment (e.g., project outcomes)—consistent with Boud's (1999) multi-dimensional evaluation framework.

3.2.2. Students' Perspective

Focus group interviews were conducted with 20 students. NVivo12 coding identified a key contradiction: students generally recognized the "practical value" of PBL (S15) but complained about "unreasonable time allocation" (S8), proposing the introduction of "phased task

decomposition" (S12). This aligns with the PBL time management strategies proposed by Mergendoller (2006).

3.3. Construction and Validation of the Evaluation Index System

3.3.1. Indicator Selection Based on Literature and Data

Based on the above research, combined with Strobel's (2001) PBL evaluation dimensions and empirical data, a preliminary three-level index system was constructed.

Table 2. Suggestions for the Course Evaluation Weight Mechanism

First-level Indicators	Weight	Second-level Indicators
Knowledge Mastery	30%	
Ability Improvement	50%	Problem-Solving (25%), Teamwork (20%), Innovative Thinking (5%)
Attitude Change	20%	Clarity of Career Goals (10%), Learning Engagement (10%)

3.3.2. Revision via the Delphi Method and Weight Determination Using AHP

Five experts in curriculum theory were invited to conduct two rounds of Delphi consultation. The weights were adjusted using the Analytic Hierarchy Process (AHP):(1) Adjustments: Added "Innovative Thinking" as a previously missing indicator (weight adjusted from 0% to 5%), echoing Torrance's (1972) theory of creativity cultivation.(2) Consistency Test: The Consistency Ratio (CR) was 0.032 (<0.1), indicating reasonable weight distribution (Saaty, 1980).

3.3.3. Empirical Test: Validity Verification of the Evaluation System

Structural Equation Modeling (SEM) was used to verify the fit of the indicator system. The model fit indices were as follows: Chi-square/degrees of freedom (χ^2/df) = 2.15 (<3), Root Mean Square Error of Approximation (RMSEA) = 0.06 (<0.08), and Comparative Fit Index (CFI) = 0.93 (>0.9), demonstrating that the model has a good fit (Kline, 2015). Path coefficient analysis showed that "Ability Improvement" made the greatest contribution to the total score ($\beta=0.72$, $p<0.001$), confirming that the core goal of PBL is ability cultivation (Barrows, 1996).

Table 3. Model Fit Indicators

Fit Indices	χ^2/df	RMSEA	CFI	β	p
Values	2.15	0.06	0.93	0.72	0.0008

4. Discussion and Suggestions

4.1. Discussion of Research Results

4.1.1. Advantages and Disadvantages of the PBL Teaching Model

The research results show that the PBL teaching model has a significant positive effect on enhancing students' autonomous learning ability, teamwork ability, and problem-solving ability. 65.05% of students reported that the PBL model stimulated their learning interest, especially through activities such as real case simulations and career role-plays ($M=4.2/5$).

Meanwhile, 50.60% of students believed that the PBL model increased their learning pressure, mainly due to task complexity and team coordination issues ($M=3.8/5$). 60.40% of teachers mentioned that the evaluation criteria were not clear enough, particularly in combining formative assessment with summative assessment.

4.1.2. Scientificity and Feasibility of the Evaluation Index System

Verification via Structural Equation Modeling (SEM) showed that the evaluation index system had a good fit ($\chi^2/df=2.15$, RMSEA=0.06, CFI=0.93), indicating high scientificity. In addition, the results of expert consultation and AHP weight distribution demonstrated that the evaluation index system had strong operability and adaptability in practical application (CR=0.032).

4.2. Research Suggestions

4.2.1. Improve Support Systems and Strengthen Resource Guarantees

Universities should establish a dynamic weight adaptation mechanism to adjust the proportion of each evaluation indicator according to different stages of curriculum implementation. Combining theoretical input in the early stage of the curriculum, practical exploration in the middle stage and achievement output in the later stage, universities should optimize indicator weights in a targeted manner to realize phased training from theoretical consolidation to practical application and then to literacy improvement, ensuring consistency between curriculum objectives at all stages and evaluation orientation. Meanwhile, universities need to regularly organize special seminars on PBL teaching, inviting senior experts from inside and outside the university to exchange experience with front-line teachers, helping teachers break through the limitations of traditional teaching thinking and improve their capabilities in PBL teaching design and implementation. In terms of teaching resource development, universities should establish a shared PBL teaching resource platform to integrate various teaching cases and collaborative tools, reducing the cost of teaching design for teachers. At the same time, universities should establish a long-term cooperation mechanism with industry mentors, promoting their in-depth participation in curriculum design, teaching guidance and achievement evaluation to ensure that teaching content is closely aligned with actual industry needs and enhance the practical value of the curriculum. In addition, universities may set up special funds for PBL teaching to support teacher training, resource development and student practice, providing financial and resource guarantees for the stable implementation of the PBL model.

4.2.2. Optimize Teaching Design and Innovate Evaluation Methods

Teachers should construct a diversified evaluation system. On the basis of traditional teacher evaluation, they should further refine the operational standards for student self-evaluation and peer evaluation. Combining process-oriented learning data, teachers should conduct evaluations from multiple dimensions including knowledge, ability and attitude to avoid the limitations of a single evaluation perspective and reduce passive participation in team learning. Teachers also need to establish a regular learning tracking and feedback mechanism, conducting one-on-one communication with students regularly to timely grasp their puzzles and progress in PBL learning, providing targeted guidance and helping students break through learning bottlenecks. In teaching design, teachers should focus on task decomposition strategies, decomposing complex PBL themes into phased tasks with progressively increasing difficulty to gradually guide students to adapt to the learning rhythm and reduce cognitive load. Meanwhile, teachers should adopt heterogeneous grouping methods, grouping students according to their different characteristics, and clarify the division of labor and role rotation mechanism within the team to ensure that each student can deeply participate in the learning process and improve their collaborative ability and sense of responsibility. In addition, teachers need to strengthen their own PBL teaching skills training, improve their capabilities in problem design, team guidance and process control, and timely respond to various problems in the teaching process to ensure the effective implementation of the PBL model.

4.2.3. Research Limitations and Future Prospects

This study has certain limitations in sample selection. The narrow coverage may affect the generalizability of the research results. At the same time, the long-term effectiveness of the evaluation system has not been verified through long-term tracking, and its adaptability in different teaching cycles still needs further observation. Future research can be carried out from three aspects: first, expand the sample scope and select students from universities in different regions and of different types as research objects to improve the representativeness of the research conclusions; second, conduct interdisciplinary comparative research, optimize the design and evaluation indicators of the PBL model in combination with the talent training objectives of different majors, and explore personalized schemes suitable for different disciplines; third, integrate artificial intelligence technology, use technical means to optimize the analysis and evaluation of learning data, provide personalized learning path recommendations for students, and establish a dynamic update mechanism for the evaluation system. Regularly revise indicators in combination with the trends of educational reform and changes in industry needs to ensure that the system always meets the requirements of practical teaching and career development.

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