



# The Contradiction and Relationship Between PBL Education Concept and Psychological Behaviors

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**Abstract.** Project-based learning (PBL), an innovative student-centered model, has called for improving the cramming in current education, which caters to the demands for diversified well-rounded talents in social market. To better understand the application of PBL in current Chinese education, this paper summarizes and analyzes current circumstances, issues and causes from a psychological perspective. Major arguments were: (1) Educational psychology is the product of the combination of educational activities and psychology. It is a science to explore the psychological laws of middle school and teaching during the process of education; (2) PBL education model is a series of teaching methods to design learning situations, which refers to the teaching method of problem-based learning or project-based learning; (3) PBL emphasizes students' active learning rather than teachers' imparted teaching in traditional teaching; (4) College students have better self-discipline than primary and middle school students. Combined with teaching methods, PBL teaching can perform better than traditional teaching; (5) The negative emotion and cognitive state of both students and teachers along with the examination-oriented talent selection system are the challenges of PBL teaching design. These arguments illustrated the interrelationship and contradiction between PBL educational concept and students' psychological behavior, sought to find the most appropriate way for achieving the greatest benefits for Chinese students and education developments.

**Keywords:** Educational Psychology · PBL · Implementation of PBL · Psychological Analysis

## 1 Introduction

Education plays a fundamental role in promoting economic development, social stability and national prosperity. However, to keep in line with social development, the traditional

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test-centered and teacher-dominated education mode is no longer appropriate in the contemporary background but demanding for the PBL education reform.

Since the 1980s, many Chinese researchers have proposed that PBL teaching that could replace cramming education. To illustrate the student's psychological interrelationship of PBL, finding out which method can maximize the benefits of the student whose learning mode has been solidified—to introduce PBL to students when they begin learning, or intersperse PBL teaching in traditional education. Besides, the establishment of a more sound and fair student education evaluation system under the background of PBL education philosophy is also highly crucial mainly for the limitation of test-oriented evaluation.

## 2 Educational Concepts

### 2.1 Basic Concepts of Educational Psychology

Educational psychology is social psychology that studies human learning, the effect of educational intervention, teaching psychology, and school organization under the educational situation. The focus of educational psychology is to apply the theory or research results of psychology to education. Educational psychology can be applied to designing courses, improving teaching methods, promoting learning motivation, and helping students face various difficulties and challenges in the process of growth. Educational psychology pays attention to how students learn and develop, and focuses on students with special educational needs in practical work. Through the relationship with other disciplines, it is also helpful to understand educational psychology.

First of all, educational psychology is based on psychology. The relationship between the two disciplines is similar to the relationship between medicine and biology, or engineering and physics. Then, from educational psychology, many special fields can be developed to study educational problems, including instructional design, educational technology, curriculum development, organizational learning, special education, and classroom management.

Educational psychology is the product of the integration and development of contemporary education and psychological science theory. It mainly solves all psychological activities produced by various subjects in the bilateral activities of teaching and learning. In current multi-cultural integration and development, college students' bodies and minds are impacted by various viewpoints and factors. Mental health problems have gradually become the key contradiction of college education. Strengthening mental health education is not only the internal requirement to improve the management level of colleges and universities, but also the inevitable demand to promote the lifelong development of students [1]. "Educational psychology" not only has strong theoretical nature, but also can provide a certain theoretical basis or scientific basis for the development of pedagogy and other related disciplines; It is also very practical, which helps teachers understand various psychological and behavioral phenomena in the process of teaching and learning, and improve the efficiency and quality of education and teaching. In the process of Ideological and political construction of "educational psychology", it is necessary to formulate relevant curriculum objectives based on the three dimensions of "who, how and for whom" to cultivate people. Then, it is recommended to fully tap the elements

of Ideological and political education on the basis of the original knowledge objectives, ability objectives and emotional objectives. The course of “educational psychology” is regarded as an important node connecting “value shaping” and “scientific ability” [2].

Educational psychology is a psychological theory put forward to serve the teaching reform. It has an important theoretical and practical value in promoting the deepening reform of higher education. Many students have limited learning ability and cannot bear the high-pressure learning environment, resulting in learning weariness. Educational psychology can manage students from the psychological level, help students solve psychological problems through appropriate psychological counseling, and guide students to actively face various challenges in study and life.

As a positive educational concept, educational psychology can effectively cultivate students’ collective consciousness and make students become clear about their value orientation in the team by combining it with teaching management, so as to effectively cultivate students’ excellent character. Finally, it can achieve the outcome of developing students’ potential. Under the background of building morality and developing students’ ability, value education has become an important direction of talent training in universities. As a positive and innovative educational theory, educational psychology can help students enhance their courage to overcome difficulties and form tenacious character. The combination of educational psychology and teaching management can effectively cultivate students’ values [3].

Educational psychology is a course of both theory and application, which can cultivate students’ basic psychological skills and practical application ability. Good psychological teaching can help students improve their overall quality, contribute to their physical and mental health, and alleviate the pressure on students’ studies [4]. Educational psychology is a science that studies the operating mechanism and basic laws of various psychological activities and their interactions in school teaching situations. Although it has a history of fewer than 100 years since its birth in the early 20th century, it has made great achievements [5].

## 2.2 The Classification of Educational Psychology

According to the different age grades between the students from preschool stage to higher education stage, this paper simply divides the types of educational psychology into four main conditions: preprimary psychology, primary psychology, secondary educational psychology, and higher educational psychology. In addition, each part has its characteristics and need specialized research technique. Thus, a great number of scholars put their effort into different fields of the psychological concept of education.

Preschool psychology originally originated in Western countries. As educational psychology has gradually developed into an independent discipline; preschool psychology gradually had a preliminary systematic outline. Psychology of preschool education is mainly involved in the internal research of preschool children aged 0 to 6 years old, which is considered a critical period for individual intellectual growth [6]. Under this circumstance, the theories tend to pay more attention to the guidance of internal factors on the one hand. On the other hand, it is necessary to gradually strengthen psychological research so that preschool children can grow up healthily and smoothly. At this original

stage, due to the immature personality of kids and their lack of self-awareness, their parents or grandparents take more responsibility for nurturing them with much time than teachers in school.

During the process of primary education, the main task of educational psychology is to serve teaching practice. In short, educational psychology should explain the causes of phenomena such as the law of primary school students' Ideological and moral cultivation, the process of students' knowledge construction, the formation of skills and learning characteristics. However, when analyzing the educational psychology in primary school which aims at the kids' education from 6 to 12 old, it is interesting to figure out that the children themselves gradually form their own sense of autonomy and have their own understanding of subjects [7]. Consequently, teachers should properly use the knowledge of educational psychology by analyzing students' behavior according to their individual situation, carry out effective education and teaching activities, and avoid directly requiring students with adult moral standards and cognitive standards. Meanwhile, teachers should respect students' individual differences and take students' different aptitudes into account when making lesson plans, trying to figure out the best method to greatly balance the collision between unified learning or single strategy for all the kids with single customization mode when outstanding student appears.

Secondary education refers to the education after primary one, including middle school, high school, polytechnic school, and secondary normal school. Traditionally, teachers mainly put more emphasis on cultivating students' abilities. Nevertheless, teachers should also brunch some psychological method to guide the students for better learning effects. Qi designed a case combining the knowledge of psychological education with Chinese learning in a high school [8]. She found that under this new method of learning, students could be able to be in participating to the class more actively [9]. It definitely promotes their enthusiasm and the sense of fulfillment of the course, resulting in a better mastery and a more efficient training method for the induction and expression of knowledge. From Lv's perspective, she believes that with the help of psychological theory, teachers could perform a better mathematical class by leading students from authentic problems to attract students' attention [9]. She called it a successful leading part to do a favor for deepening students' impression of the learning [9]. It is of great importance for teachers to focus more on the skills of transferring and summarizing about the knowledge rather than blindly or directly applying practical problems to the course to avoid the students' superficial comprehension.

Higher education, also known as university education, is professional education and vocational education based on the completion of secondary education. It is the main social activity to train senior professionals and professionals. From Liu's point of view, he thinks that teachers should link the teaching content with students' real life, integrate theoretical knowledge with social practice, pay more attention to the innovation of educational psychology against the traditional teaching mode, find an orientation of free education style in teaching evaluation towards students [10]. Peng found that with limited class hours and may-be inappropriate curriculum content, it is difficult to meet the needs for teaching and standards for career [11]. In order to solve those problems based on psychological theories, teachers should comprehensively apply different teaching methods throughout the whole process according to students' reactions during the

lecture. At the same time, we need to formulate new evaluation standards gathering students' information from multi-angle to do a fairer judgment.

### 3 Project-Based Learning

PBL originated in the 1950s. It is a set of problem-oriented teaching methods designed by American neurology Professor Barrows [12]. It is a student-centered education method, and it is also a popular teaching method in the world. This method can improve students' learning initiative, improve students' participation in the teaching process, easily arouse students' thirst for knowledge and activate their thinking. This teaching method has high requirements for teachers, and teachers must have strong classroom control ability and guidance ability. PBL is a set of teaching methods to design learning situations. It refers to problem-based learning or project-based learning. It originated from medical education in the 1950s [12]. PBL teaching method is "student-centered and problem-based". Through the form of group discussion, students independently collect data around problems, find and solve problems, and cultivate students' autonomous learning ability and innovation ability.

#### 3.1 The Origins and Development of PBL

In 1969, the medical school of McMaster University in Canada officially launched the PBL teaching mode at the level of the whole school [12]. Subsequently, the concept began to gradually extend from medical education to engineering education and vocational education, and then into more universities and even primary and secondary education. For many years, PBL, project-based learning, has been concerned and studied by many educational experts and scholars at home and abroad. In September 1918, Dewey's student, the famous educator Qu Burke, published the article "project (Design) teaching method: the application of purposeful activities in the teaching process", which put forward the concept of project-based learning. In the 1920s and 1930s, project-based teaching method was widely used in primary schools and lower grades of middle schools in the United States. In the United States, project-based learning is one of the main learning modes of research-based learning.

From the perspective of its research and development, it initially focuses on project-based learning itself and its application, and then focuses on the application of information technology in project-based learning. At present, PBL project-based learning method is widely used in primary and secondary schools in the United States. Domestic research on project-based learning started late, most of the cognitive concepts are introduced from abroad, and the theoretical research mainly focuses on the basic concepts, characteristics, elements and implementation links. In real life, PBL is more applied to enterprises or vocational training institutions, and there are few practical cases that are really applied to the classroom.

#### 3.2 Existing PBL Model and Development Direction

At present, there are many papers on PBL teaching methods, especially in the past decade, there have been a large number of articles on PBL teaching methods in China.

This fully shows that PBL teaching method has been widely valued and used by educators. PBL teaching method has also been applied to the teaching practice by more and more teachers. PBL teaching method gradually shows its advantages, and it is gradually recognized by more and more people. However, the current research of PBL teaching methods in major colleges and universities of China is still concentrated in the field of medical and health education, which leads to the relatively mature application of PBL teaching methods in the field of medical and health, while the research of PBL in other fields of education is relatively weak, mainly concentrated in the research on the basic theory of PBL, the studies on the practical application are few and the research strength is insufficient [13].

## **4 The Application and Feedback of PBL in Different Age Groups**

### **4.1 Preschool and Primary Period**

Due to the immaturity of mental and physical growth in preschool children, most teachers tend to obey the traditional teaching method which is teacher-centered. Teachers have the duty of formulating the content during the whole process. In addition, it is not the key concept of knowledge itself that preschoolers have to memorize, but the feelings of emerging themselves into the studying atmosphere that truly matters. Therefore, the one particular thing teachers have to handle is just to let their students enjoy the process as well as trying to accelerate their consciousness awakening process combining education with recreation.

Looking into current teaching mode in primary school, it seems that there is a tendency to implement problem-based learning with traditional teaching mode constantly. Moreover, there is an urgent need for a new teaching mode with openness, symbiosis, innovation, practice and reform, so that students can face open problems, practice operation, resource collection, feedback and evaluation, obtain knowledge through a variety of information technology means, enhance innovation ability. Applying the learned knowledge to practice the teaching mode of “problem-based learning” is a new inquiry learning mode which turns out to be an effective way to inspire students’ interest in learning.

### **4.2 Intermediate Period**

When it comes to the application and feedback of PBL mode in intermediate stages, it is a common phenomenon for teachers to combine other kinds of innovative teaching methods in order to gain a better effect. One of the most working teaching methods in recent years is Science-Technology-Engineering-Math (STEM) which attracts much attention a.

Focusing on the application of PBL teaching mode in junior middle school science under stem concept, Qian divided his science course into several parts including project construction, decomposition, design scheme, production, optimization, display of products, evaluation and communication [14]. With more emphasis on practical development and abilities to create, he found out that students gain a deeper understanding of activities and improvement of comprehensive ability.

However, a sudden input of a totally different teaching method may cause students' negative behaviors such as a bad gap and utilize of generated problems, for they have already used to cramming teaching. For teachers, their evaluation of students may not be incisive enough. At the same time, it is obvious to find that most of the STEM classes with PBL teaching method relate to science courses in most cases.

All in all, not all the curriculum in junior high school is applicable to fit in this teaching mode. On one hand, to build an appropriate project, teachers should make choice from several aspects, such as whether the project is close enough to life or whether it is attractive to students. On another hand, it is of equal significance for teachers to establish a new evaluation system instead of only focusing on the final exam score.

### 4.3 Advanced Period

Undergraduates, who are commonly regarded as more mature individuals relatively, need multi-improvement including Ideological and moral quality and physical quality, sense of innovation and other virtue to shape them into qualified citizens. Thus, it is a common phenomenon for teachers to combine other kinds of innovative teaching methods in order to gain a better effect.

According to its popular application nowadays, students could do a better academic job especially when their teachers integrate different design which is more flexible. Zhang designed an inorganic chemistry lecture based on PBL teaching method [15]. As she mentioned, this kind of specific teaching method does great benefit to students for more than mastering the theory of primary battery itself, but it also cultivated their ability of critical thinking and fostered their interest in learning with their skills [15]. Meanwhile, this positive effect was able to extend especially when she combined the concept of PAD learning at the same time. As the result, in the final selection score of teachers, Zhang won the favorite teacher nomination award of Northeastern University while her students' performance had gained an obvious development with the extinction of failing grades and more than 66.7% of them had reached the line of great performance in experimental class which exceeded her expectations [15].

Furthermore, with the rapid growth of the Internet, applying PBL online even make it more portable to put reform in education. In Hefei, Anhui, Liu carried out a course combining online learning using a specific Wechat applet for students with exact field learning to substantially utilize educational resources, such as releasing teaching courseware, video, background information and other materials before course [16]. In addition, teachers may also publish practice text or exam questions online for further reviewing in a more convenient way. In this international finance course, students were required to figure out the hidden logical relationship behind the problems they found in their groups. Apart from that, through students' analysis and summary of relevant literature, their ability of independent thinking and independent learning is improved to a large extent.

Thus, we could simply draw a conclusion that with combined teaching methods applied among undergraduate students who are considered as people with great self-control ability as a premise, PBL teaching could show better performance in contrast to traditional one.

## 5 The Problems of PBL Implementation

There are a series of issues regarding the implementation of problem-based learning in China from different perspectives of students, teachers and infrastructures, which mostly reveal the contradiction between current China's educational circumstances and the high demand for Problem-based learning.

From the students' aspect, the main issues lie in the children's lack of capabilities and initiative to Problem-based Learning. As the basis of PBL educational psychology, Dewey's participant epistemology and constructivist learning theory emphasize the significance of the initiative in learning, and to achieve academic competence, students' self-agency and self-awareness is highly valued [17]. However, most cases have implied that when applying the PBL to actual practice, the traditional education children received since childhood has gradually formed the passive knowledge-gaining model, thus leading to the lack of self-directed learning skills of PBL. Therefore, such a passive way of learning would easily result in students' frustration, dullness and even compulsion, feeling that they are forced to achieve the task impossible while actually are not equipped with such capabilities and skills. Additionally, some scholars have argued that most children have too few social experiences to handle all those complicated problems, and their limited scope of thinking would multiply the burden shouldering on their studying process [18]. Thirdly, with China's exam-oriented education, the high tension of gaining a high score would seize students' attention, and the relatively low efficiency in achieving a top mark in problem-based learning would not be perfectly suitable for Chinese students nowadays under the test-centered evaluation system [18].

From the teachers' aspect, they mostly encounter problems like unqualified professional PBL instructional skills and practical issues such as the establishment of evaluation or monitoring systems. Firstly, in the trial period of problem-based learning, most teachers in China are actually not equipped with such high proficiency in PBL instructional design since they hardly receive the corresponding expertise training that PBL has demanded for. In addition, due to the low salary issues among Chinese teachers, many of them are still living in poverty and it would be particularly difficult for them to improve their professional teaching quality level without additional financial or intellectual support [18]. Also, long-term learning goals can be very hard to monitor and evaluate. With the high population density in China, it could be difficult to micro-lecturing, and the teachers' limited time and energy would hardly allow them to notice every student's learning progress in such open learning environment of PBL teaching.

### 5.1 The Psychological Analysis

There are several psychological factors that would be attributed to the issues mentioned above. And mostly concentrates on the potentials of the negative emotion and cognitive status from both sides, the students and teachers.

Firstly, from students' perspective, there are different psychological issues for different age groups, but they both are associated with learning dispositions and learning autonomy [20]. For those pre-school or primary school kids, under the circumstances of the immaturity of most cognitive abilities and the self-motivation, to cope with those abstract complicated problem-based issues that require clear-guided deconstruction would be a



huge challenge for them even with the facilitator's guidance, and they would be reluctant and confused to accomplish those heavy cognitive loads. As for those students of higher school age, many of them in China will encounter some practical social anxiety issues like peer assessment or group work [19]. They mostly would go through psychosocial issues like lack of confidence and some emotional issues.

Secondly, from teachers' perspective, the instructional design under the unchanged test-oriented talents selection system in China is the biggest challenge for them, the confusion, the sense of insecurity and even the relative reluctance of mismatching labor and payment would all be psychological attributor to the smooth implementation of PBL.

## 5.2 Possible Suggestions

From the educational perspective, according to the studies, in the PBL context, it is highly important for teachers to establish a non-threatening and non-judgmental environment where learners are liberal to delve into their own experiences and seek answers to their own issues [19]. Apart from the pleasant learning environment, appropriate monitoring is also valued. Teachers should be aware of the degree of interference that makes students have a sense of agency and ownership of learning, that they are not manipulated and forced to study. Thirdly, teachers are required to provide Cognitive scaffolding which refers to giving clear-structured activity and social norms of participation setting [20]. In this way, students' cognitive loads could be reduced and better promote the self-efficacy and learning process. All considered, it is important to build mutual trust between students and teachers, and establish a student-centered learning environment, breaking the cognitive and emotional barriers of problem-based learning.

## 6 Conclusion

The definition of educational psychology is to manage students from the psychological level, help students solve psychological problems through appropriate psychological counseling, and guide students to actively face various challenges in study and life. The combination of educational psychology and teaching management can effectively cultivate students' collective consciousness, make students clear their value orientation in the team, and thus effectively cultivate students' excellent qualities.

As a student-centered education concept that originated in the United States, PBL has been widely used in primary and secondary education in the United States. However, in China, PBL teaching methods are mainly applied in the medical field, other fields remain at the level of theoretical research, and the practical application is lacking.

Based on research, this paper has found there are three main differences between PBL and traditional education, namely the learning mode, the subject and the course construction. The passive way of knowledge acquisition would partly cause cramping and negative learning dispositions and habits. While with the current promotion of PBL implementation, several study cases have proven that the PBL does have a better effect on students' overall development in different age groups.

The current implementation has also revealed some issues, such as the integration of the subject mostly focusing on science, while the liberal arts are left for exploration, particularly in the intermediate period. And the sudden implementation also causes confusion and maladjustment. The students' capabilities and initiative, the teachers' unqualified professional PBL instructional skills, and the lack of infrastructural support are all the problems left for solving. And there are two main psychological factors affecting the current tendency, namely the negative emotion and cognitive status from both sides, the students and teachers. From students' perspective, it may be more related to their learning dispositions and autonomy, while teachers' aspect, the instructional design under the unchanged test-oriented talents selection system in China is the biggest challenge for them, the confusion, the sense of insecurity would all be the psychological attributor to the smooth implementation of PBL. It is highly important for the establishment of a non-threatening and non-judgmental environment, as well as positive cognitive scaffolding. Last but not least with combined teaching methods, the PBL has greater potential to develop further.

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