



# Exploring the Challenges and Applications of the PBL Approach in Chinese High School Through a Comparison of Chinese and American Cases

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**Abstract.** In the 21st century, the traditional learner-centered teaching model has encountered difficulties in satisfying the expectations of improving students' general and individual skills, and PBL as an innovative teaching approach has played a significant role in well-preparing students with teaching and learning than the traditional teaching model. This research identifies some of the challenges and obstacles affecting the development of PBL instruction in the Chinese high school field from the perspective of two American cases and several Chinese cases. In addition, by analysing the literature related to traditional education policies and curriculum practices in China, this study endeavors to provide both ideas and suggestions for solving some of the problems in high school teaching practices, attempting to construct some perspectives on the development of project-based teaching and learning approaches in the Chinese high school field from different perspectives of theory and practice.

**Keywords:** PBL · Chinese high school education · Challenges · Application

## 1 Introduction

### 1.1 Research Background

Project-based learning (PBL) is a constructivist-based instructional strategy that promotes improved student achievement and integrated development of individual skills [1]. PBL was first adopted at McMaster University in the 1960s and gradually introduced as a pedagogical approach to curriculum design in North American and European institutions [2]. On the one hand, PBL is in line with learner-centered pedagogy that allows students to define problems, create hypotheses and analyze data in a collaborative process, and ultimately generate appropriate solutions to solve difficulties [3]. On the other hand, as an innovative teaching strategy, PBL can develop and improve students' critical thinking and group collaboration skills [4, 5]. Even though project-based

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learning has become increasingly unfamiliar in the Chinese education sector in recent years, there are still a lot of challenges for PBL in the traditional Chinese educational context.

## **1.2 Research Gaps and Objectives**

The PBL method is widely used in many European countries and has been incorporated into the curriculum requirements of many schools. However, most of the research on PBL in China has focused on teaching practices in medical schools [4, 5]. There are a few studies of the practice and application of PBL at the high school stage, and there are still some gaps in the comparative studies of American and Chinese high school curricula in particular. Therefore, this study is of practical and theoretical value to the development of teaching and learning in China.

In addition, this study will analyze the comparison of PBL high school teaching in China and the USA from a range of relevant theoretical and literature perspectives, including interdisciplinary learning. In addition, the study endeavors to identify some of the impediments affecting PBL teaching in the Chinese high school field and tries to provide some ideas for applying PBL in China from the education of teaching practices.

## **2 The Comparison of PBL Cases in China and the U.S.**

### **2.1 Two Case of PBL in US High School**

PBL is a cutting-edge teaching strategy that improves students' higher-order thinking abilities, learning skills, and online learning environments for critical analysis and group collaboration [6, 7]. Higher-order thinking refers to mental activities or higher-level cognitive abilities occurring at a higher level of cognition. Compared to high schools in the United States, PBL application challenges in Chinese high schools are different. This paper reviews cases from the U.S. and China.

The technical side of PBL implementation is where the difficulties lie in U.S. high schools. First, in the case of the United States, it is challenging to integrate online technologies with PBL educational classes. After utilizing PBL to teach math, science, and social studies subjects, 331 instructors were interviewed by Jason Ravitz [8]. Online collaboration tools are the way principles can make PBL work better. Students can submit their work online and get feedback from teachers or other students. Teachers can use online resources to help them plan classrooms and manage projects. The study's results revealed that a teacher's PBL classroom significantly improved when using online technology extensively. The teacher was also best prepared to plan the lessons. For teachers serving in different types of schools, online collaboration tools may be a key solution for educators to address the difficulties associated with PBL implementation.

Second, in addition to online technology, the formation of learning communities can make PBL implementation more effective. Based on numerous public high schools in the US, Jason Ravitz investigated the connection between PBL and learning communities in 2009 [9]. The teachers who participated in this study had some background in PBL, either from participation in PBL workshops or employment at organizations that promoted

PBL. Learning communities are made up of students and teachers who cooperate in a division of labor to become one under the condition that the school is the community and shares a common interest or objective. Members take on varied responsibilities and can be critics, learners, or supporters. According to research, learning communities are necessary for successful PBL necessity for PBL to be successful. In other words, creating the creation of a learning community and PBL are mutually beneficial. When PBL working successfully, the development of a learning community is also close to completion. The best way to implement PBL is at the school level, where it should serve as a framework for instruction.

## 2.2 A Case Analysis of PBL in High Schools in China

Zhou and Leydesdorff point out that China has gradually become the second largest economy in the world [10]. In order to ensure the stable development of the country, Chinese education needs to introduce a new model. Although PBL has received more and more attention and achieved some success in China, the development of PBL has faced many obstacles.

The experiential aspect is the main barrier to PBL implementation in Chinese high schools. First, even experienced teachers often don't give students adequate information. Li and Zhou researched two Suzhou public high schools adopting a PBL course [11]. Most of the participants in this study were students who were participating in PBL for the first time. They discovered that several students exhibited nervousness while attempting to research the system independently and obtain pertinent material. The instructor failed to explain the subject to the class during the PBL implementation. This situation made it a challenge for students to find information. The survey also revealed that Chinese students have excessively high expectations for PBL courses. The majority of complained that the finished product was too simple. The fact that PBL emphasizes the project over the product did not register with the students. Additionally, students' perspectives did not change from teacher- to student-centered.

Additionally, group work is also one of the obstacles to the implementation of PBL in China. According to a comparable survey, only 55% of groups in Chinese high school information classes finished their job, and some students lacked the drive and passion for working together [12]. On the other hand, students' communication issues may impact how actively they participate in cooperative group learning [13]. Lack of timely communication and a clear division of labor, where each person may be unsure of their tasks and responsibilities, also impair teamwork. When working in groups, many pupils lack the aptitude or habit of learning alongside others [14, 15]. It might be connected to high school pupils' education under the conventional Chinese examination-based model. However, interaction or discussion within the same group encourages students to be open to learning, as demonstrated by precise quantitative data from studies of PBL courses [7, 14]. In other words, students who can plan and conduct project research with their peers tend to invest more energy in group collaboration.

### **2.3 Comparison and Summary of the Findings of Chinese and American Cases**

The differences between the Chinese and American education systems make the challenges of PBL different in both countries. The educational objectives, as well as the delivery methods of the two countries, are very different. Chinese education is a modular education that emphasizes developing a knowledge base and relatively neglects the development of students' creativity and thinking skills. Chinese teachers are good at solving students' problems by providing summaries. But American education is elitist, contrary to Chinese education's goals. It emphasizes less on learning "basic knowledge" and more on developing creativity. American teachers are good at inspiring students and expecting them to ask new questions in the classroom. It is important to note that the two countries also differ in class size. Chinese classrooms generally have no more than 45 students per class. In the United States, the class size is no more than 30 students. With large class sizes, building school-based learning communities in China is more challenging than in the United States.

Compared to the U.S., the challenges of implementing PBL in China are mainly in terms of teacher and student skills or implementation experience. In contrast, the challenges in the U.S. are more in terms of technology and learning communities. In contrast, Chinese high schools lack experience implementing PBL. It manifests in teachers' lack of awareness to provide detailed information for first-time students. Then, it may also represent a failure for some teachers to analyze and design classroom content differently for different students. In addition, due to the Chinese educational model, there are few opportunities for students to join some group activities or communicate their opinions within the group. As there may be fewer group activities in the classroom, this leads to a lack of student's ability to work or communicate in small groups and their motivation to participate.

## **3 The Application of PBL in Teaching Practice in Chinese High Schools**

### **3.1 Instructional Design Approach**

Through the analysis of different cases and literature, the researchers found that better findings to promote the teaching practice of PBL in the Chinese high school sector can be facilitated in three ways.

First of all, in terms of pedagogical design, the focus on the authenticity of the instructional design facilitates the advancement of PBL in the high school classroom. The research questionnaire found that 61% of the student sample preferred instructional introduction methods based on life-related situations, and when students are in a learning environment related to their own life situations, they largely increase their own learning initiatives and motivation [16]. In other words, the way teachers introduce new curriculum may affect students' interest in learning new knowledge. Therefore, when the teacher combines the textbook content with things related to life, the students' attention will be more attracted. This is an expression of the learner-centered concept, where the teacher meets the needs of different students by providing a diverse range of roles or learning environments.

### **3.2 Student Motivation in the Classroom**

Secondly, teachers should emphasize the subjective motivation of students' learning. As the main body of learning, students' motivation for independent learning will influence the implementation of PBL [3]. Therefore, the development of learners' motivation and interest in learning should be particularly emphasized in the project-based teaching process. In addition, from a humanist perspective, teachers should value students' active thinking and exploration of knowledge rather than simply teaching fixed knowledge [16]. In other words, if students lack the idea of active research and exploration of learning, the results of PBL in the classroom may also be greatly reduced.

### **3.3 The Role of the Teacher in Group Work**

Finally, in the teaching and learning process of PBL, it is also important to pay attention to the teacher's guiding function in group work. It is important to allow students to be the main actors in group work. The study from Tseng et al. indicated that the teacher's more important function in teaching practice is to guide or assist students in the learning process, and to let students become the real owners of the classroom [17]. In addition, lectures are possible for students who are not strongly engaged in group activities. Introduce students to what group work is and how to communicate well and think about it. In this way students can be provided with the necessary guidance to better master the skills of cooperation. Additionally, focus specifically on these students in the PBL course and ensure that teachers can create more opportunities for them to express themselves [18].

It is worth noting that for students who have not participated in PBL courses before, teachers can provide more specific and detailed information about them. It is important to make the common learning objectives of the group clearer to the students. For instance, the teacher can set a common expectation among the students at the beginning of the PBL session and actively discuss the expectations of the final research outcome with them during the course of the PBL class.

## **4 Conclusion**

In this study, through the analysis of the relevant literature, the two researchers found that there are still some challenges for the implementation of PBL in the Chinese high school sector. This is not only due to the context of the educational system in the wider Chinese educational environment, but also involves some classrooms' understanding of the relevant experiences. The lack of relevant experience in some classrooms. In general, the lack of educational resources related to PBL; poor motivation of students and the lack of knowledge on how to improve group work in PBL are some of the obstacles in the Chinese high school education field. Additionally, from the perspective of teaching practice: emphasis on the authenticity of instructional design; emphasis on students' subjective motivation; and emphasis on the teacher's guiding role can better facilitate the development of PBL teaching in the Chinese high school field.

It is worth mentioning that this study also has some limitations. Because of the limited number of cases involved, some data may affect the generalizability of the study results. There is also a certain subjective element in the cases for different regions.

However, it is undeniable that although there are some limitations in this study. Some perspectives and outlooks on the development of PBL in the Chinese high school sector are still offered. By exploring the challenges that high schools in China and the United States would face in the implementation of PBL, some perspectives are provided for the application of relevant curriculum arrangements or teaching practices in Chinese high schools, as well as an attempt to make the most of PBL as a teaching model in the existing teaching environment.

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