

Difficulties with the Application of Project-Based Learning in Chinese Compulsory Education

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Abstract: *In China, the recent compulsory education curriculum reform in 2022 set the enhancement of student comprehensive competence and practical capacities as its overriding goal. Project-based learning (PBL), as an effective approach to cultivating students' holistic competence, has garnered wide attention. Nevertheless, there are challenges in the application of PBL in Chinese compulsory education, impeding its popularization and application outcomes. This article focuses on delineating the difficulties with the integration of PBL into regular teaching, aiming to provide implications for promoting its application among compulsory education teachers.*

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Introduction

IN THE context of in-depth research into the development of comprehensive student competence across the globe, project-based learning (PBL) has garnered extensive attention from the Chinese education community in recent years (Ke, 2023). “*The Compulsory Education Curriculum Program and Course Standards 2022*” emphasizes the importance of intensifying teaching reform and strengthening practical instruction to foster students’ ability to apply knowledge to problem solving. The revised curriculum program also recommends promoting comprehensive learning in students by introducing teaching strategies such as module-based learning, theme-based learning, and PBL (State Council of China, 2022). The new curriculum program and the development of 21st century skills have highly advocated PBL as a fresh teaching and learning paradigm in Chinese compulsory education. PBL is a student-centered instructional strategy aimed at connecting academic learning with real-world situations through authentic research questions and scenarios (Liang, 2023). Its application has the potential to become a breakthrough in the reform of education in the new era. However, PBL, being a “non-native” teaching approach, does not align well with the current compulsory education system in China, leading to numerous issues with its implementation in regular teaching. This article focuses on analyzing the difficulties with the integration of PBL into curricular instruction with a view to providing implications for enhancing PBL’s application at the compulsory education level.

The Evolution of PBL

The development of PBL was distinguished by three major stages. William Heard Kilpatrick developed the earliest form of PBL, known as the “project method,” in the early 20th century, based on his progressive education theory. It advocates allowing the student to explore and experience their environment through their senses, as well as directing their own learning according to their individual interests. This teaching approach views the teacher more as a facilitator than as a provider of knowledge and information (Kilpatrick, 1918). PBL’s second stage was based on the theory of constructivist learning, which suggests that learners construct their understanding through experiences and social interaction instead of passively accepting knowledge through direct instruction. Krajcik & Blumenfeld (2006) emphasized the creation of artifacts as an external representation of the PBL process, facilitating the assessment of learning gains. In the early 21st century, hybrid project-based learning (H-PBL) emerged on the basis of connectivism. H-PBL uses modern technology to improve PBL results through online and offline blended learning, to make teachers and students more effective in the classroom,

and to support cross-disciplinary activities that help students connect what they've learned (Chua & Islam, 2021).

In the late 20th century, the Chinese education community successfully drew attention to PBL due to its innovative nature. Since then, Chinese compulsory education has extensively experimented with PBL. *Project-Based Learning Design: International and Domestic Applications of PBL from the Perspective of Student Learning Competence*, authored by Xia (2018), provided valuable theoretical guidance for the application of PBL in China. The Ministry of Education of China (2019) proposed to actively implement task-driven learning, project-based learning, problem-based learning, and collaborative learning in basic education in "Opinions on Strengthening and Modifying Experimental Instruction in Primary and Secondary Schools," giving impetus to the popularization of PBL in China. In 2020, the Shanghai Municipal Education Commission (2020) issued "*The Three-Year Action Plan for Implementing Project-Based Learning in Compulsory Education (2020-2022)*," which marked the regional, systematic introduction of project-based learning in China. The "*Compulsory Education Curriculum Program and Course Standards 2022*" says that theme-based and project-based learning must be used in primary and junior secondary schools. This shows that the government of China supports the widespread use of PBL across the country (State Council of China, 2022).

The Characteristics of PBL

A PBL classroom is a student-dominated one where students engage in collaborative investigations to explore real-world issues and seek out solutions to specific questions (Huo, 2023). Often, a PBL activity is centered around a driving question and enacted in an authentic scenario with the aim of helping students fulfill a prescribed learning goal (Lyu, 2023). In the process of project enactment, students have the opportunity to modify their investigations using their independent judgment to ensure the successful completion of the project (Jia, 2022). The main features of PBL can be summarized as follows:

Meaningful Driving Questions: A well-selected driving question is a key component of PBL. Typically, teachers derive the driving question from an authentic situation, which effectively piques students' interest in inquiry. It should be sufficiently challenging to suit learners' cognitive levels. A meaningful question motivates students to use their prior knowledge in problem solving while also constructing new knowledge (Huo, 2023).

Explicit Learning Goals: The design of PBL activities is directed by concrete learning goals specified in the curriculum. When preparing and implement-

ing the project, the teacher must keep the specific objectives and learning outcomes in mind (Sun, 2023).

Interdisciplinary Learning: PBL entails multidisciplinary subject matter and a wide range of information and skills, necessitating the restructuring of teaching materials and interdisciplinary coordination (Liu, 2023).

Tangible Products: PBL requires the generation of tangible products of knowledge construction. They are publicly accessible representations such as reports, videos, and models, subject to continuous improvements based on feedback (Yang, 2023).

Challenges of PBL in Regular Curricular Instruction in Chinese Compulsory Education

The Chinese education community places high value on PBL, and regional efforts to integrate it into the compulsory education curriculum are considerable, such as the Shanghai Municipal Education Commission's (2020) introduction of "The Three-Year Action Plan for Implementing Project-Based Learning in Compulsory Education (2020-2022)." Nevertheless, many issues have surfaced in the practical application of PBL in primary and junior secondary schools. In a PBL environment, teachers abandon established classroom procedures, transition from progressive study to seemingly unstructured learning, replace predictable learning with an unpredictable process, and replace assigned schoolwork with autonomous inquiry (Lyu, 2019). Radical changes like these are huge challenges for teachers and students alike. There are various complications in integrating PBL as an instructional strategy into the current curriculum program.

Conflicts between the Subject-Based Teaching System and PBL's Interdisciplinary Tendency

The subject-based teaching system has taken the lead for decades in Chinese compulsory education. Following the enactment of the Compulsory Education Law of China, the National Education Commission (the precursor of the Ministry of Education) released the "*Nine-Year Compulsory Education Curriculum Program for Full-Time Primary and Junior Secondary Schools (Trial)*" in 1993, which clearly stipulates that the basic education curriculum be implemented through subject-based teaching. Subsequently, it issued syllabuses for the 24 subjects included in the program (Li, 2005). "*The Compulsory Education Curriculum Program and Course Standards 2022*" provides

standards for 16 subjects, indicating adherence to the subject-based teaching paradigm (Ministry of Education of China, 2022).

The subject-based teaching paradigm emphasizes the complete structure of the curriculum and the individual value of each separate subject, aiming to develop students' disciplinary knowledge and skills through the independent instruction of each subject. However, the rigid division of subjects narrows the overall vision and knowledge of students and constrains the breadth of their thinking (Qiao, 2021). Conversely, PBL aims to dismantle subject boundaries and integrate all essential information and techniques, enabling students to solve real-world problems (Li, 2005). It aims to cultivate students' comprehensive competencies, encompassing creativity and critical thinking skills.

Also, there are distinctive gaps in teaching methods between the traditional subject-based paradigm and PBL. The former is more likely to adopt the transmission-and-acquisition style, focusing on optimizing students' academic progress, whereas the latter pivots instruction around big ideas or pressing issues and engages students in situated inquiry to help them construct new knowledge. As a result, the teacher has difficulty balancing the requirements of the subject-based curriculum and the interdisciplinary teaching method in implementing PBL instruction (Yin, 2021). How to ensure the building of solid knowledge foundations in students and, in the meantime, to follow the pedagogical methodology of PBL is a challenge to the teacher. According to the subject-based teaching paradigm, the school uses resources that are specific to that subject (Hu, 2023). On the other hand, PBL uses a wider range of resources, such as teaching materials from different subjects, experimental equipment, and support from specialists (Lei, 2023). Due to the limitations of the school's facilities, PBL's requirements for teaching resources are often unmet.

Inadequacies in PBL Design

Despite PBL's benefits as an advanced teaching notion and strategy, its practical applications in Chinese compulsory education classrooms have exhibited many inadequacies, among which the superficiality of driving questions and a lack of pertinent assessment and feedback are the most pronounced problems.

In PBL instruction, a proper driving question is the precondition for the effectiveness of the project, contributing to inspiring students' motivation for inquiry and leading them to in-depth contemplations (Jin, 2023). First off, the hallmark of PBL is its intimate connection with real-world situations, which requires meaningful driving questions that are effective in stimulating students' interest in authentic issues in society (Zhong, 2023). However, in practice, many teachers tend to pose overly theoretical driving questions that

lack real-life relevance, failing to elicit students' genuine concerns and engagement in the learning process. Furthermore, systematic implementation of PBL necessitates the creation of a well-structured cluster of driving questions that ensure the fulfillment of curriculum requirements (Zhong, 2023). Nevertheless, a portion of teachers, with insufficient understanding of PBL or experience in PBL teaching, have shown arbitrariness in designing driving questions for their PBL instruction. Questions as such make learning fragmentary and disorderly, depriving students of the chance of developing structured knowledge and competences (Mao, 2023).

Effective evaluation and feedback are an integral part of a PBL activity. Formative assessment, widely acknowledged as the most beneficial evaluation tool for PBL, focuses on students' engagement, progress, and the challenges they encounter during the learning process (Lin, 2023). Nonetheless, Chinese compulsory education teachers tend to neglect formative assessment in PBL instruction, resulting in a disconnection between evaluation and the teaching process, which is unfavorable for their timely adjustment of implementation strategies and substantially compromises the teaching outcomes of PBL activities (Huang, 2023). At the same time, in Chinese PBL classrooms, there is a lack of explicit, specific evaluation criteria for multi-dimensional PBL assessment, which entails multiple aspects of student performance such as their contribution to the project, teamwork spirit, problem-solving ability, etc. (Jiao, 2023). That makes it impossible for the teacher to give pertinent feedback on the students' PBL engagement or a reliable, objective appraisal of their PBL products (Zuo, 2021).

In Wang's (2023) survey on the assessment methods adopted by Chinese mathematics teachers in their PBL classrooms, 40% of teachers polled reported that they gave regular feedback to the class, timely summarizing and commenting on students' achievements; only 25% said that they managed to give feedback to individual students. In response to the question about the completeness of the current evaluation framework for mathematics PBL, 60% of teachers stated that it was acceptable but needed improvements; 40% said it was immature and incompatible with the actual teaching situations.

Insufficient PBL Instruction Capacities of Teachers

In traditional teaching practices, the teacher plays pivotal roles as the center of the classroom and the provider of knowledge (Kang, 1986). In PBL, the teacher has additional roles as the PBL curriculum designer, the project manager and evaluator, and the students' collaborator, in addition to being the knowledge imparter. However, a large portion of Chinese compulsory education teachers have difficulty accommodating these new roles, retarding the integration of the PBL method into regular instruction. Also, the shortage

of generalist teachers at the compulsory education level further exacerbates the issue.

In a PBL environment, the teacher needs to break the traditional transmission-and-acquisition pattern and realize a transition from a teaching-centered to a learning-centered position (Cheng, 2022). This requires the teacher to have plural competences in identifying core disciplinary ideas, restructuring teaching materials, and designing PBL programs, as well as managing the classroom in a decentralized manner. When the majority of teachers have not developed sufficient competences like these, the school has the responsibility to provide them with the necessary professional training and guidance that pertains to PBL instruction. Without organizational support, the teacher can hardly adapt to the new teaching paradigm that comes with PBL (Zhang, 2023). According to Wang's (2023) investigation of "challenges of PBL in mathematics instruction," 80% of teachers surveyed had problems with PBL curriculum design and 65% with assessment of PBL outcomes; 60% were reluctant to adopt PBL due to a lack of experience in this regard; and 55% complained of the scarcity of resource backing from the school.

Furthermore, the dearth of generalist teachers in China is another unfavorable factor for the application of PBL in its compulsory education schools. PBL, with interdisciplinary instruction as its key feature, demands that teaching staff have a multidisciplinary knowledge repertoire. The successful practice of PBL in the U.S. is closely related to the stable supply of generalist teachers in this country. Data show that there were 1,078,000 million generalist teachers in the American public primary schools in the 2011–2012 academic year, representing 62.46% of the total teaching force in the public elementary education system (Tao, 2021). The history of Chinese generalist teachers is a different story. There were once a considerable number of generalist teachers in China's rural areas in the last century, where there were acute shortages of teaching staff and every teacher had to teach several subjects (Li, 2020). As the universalization of compulsory education improved, the rural teacher supply saw a significant increase, and the number of generalist teachers underwent a radical fall. Currently, Chinese pre-service teacher education is based on a rigid division of disciplines, leading to teachers focusing on developing expertise in a certain specialty but having little knowledge of interdisciplinary instruction (Huang, 2023). In this context, schools have difficulty recruiting generalist teachers qualified for cross-disciplinary teaching when introducing PBL instruction.

The Challenges of PBL for Compulsory Education Students

PBL is a student-centered teaching approach. It seeks to help students develop capacities for self-directed learning, cooperation and collaboration, innovation, and problem solving while acquiring necessary curricular knowledge. Despite its numerous benefits, PBL seriously challenges students' competence in many ways.

First off, PBL requires a fundamental change in the learning methods of students. Under the traditional chalk-and-talk teaching pattern, students are passive receptacles of knowledge; all they need to do is memorize and comprehend information imparted by the teacher (Zhang, 2021). Yet, in PBL, they must adopt a more proactive approach to learning. They must use their initiative to identify issues, analyze questions, and experiment with solutions (Lei, 2023). This is difficult for students who have become accustomed to the long-established teacher-dominated classroom pattern. They may feel left alone all of a sudden and have no idea how to engage. Additionally, students struggle to adjust to the interdisciplinary learning method due to their familiarity with subject-specific learning (Luo, 2023). In Geng's (2021) research on "the status of project-based learning assisted by educational technology" based on four primary schools in Shenyang City, teacher X from C School said that students who could well accommodate the PBL method had fun in the very first PBL activity, whereas others needed longer time to adjust themselves to the new learning method, after which they could understand what PBL was really about and ascertain their new roles in the PBL classroom.

Furthermore, PBL imposes higher requirements on students' comprehensive competences, including self-directed learning, problem-solving, and critical thinking (Lao, 2023). Central to PBL is students' autonomous inquiry. Students need to seek out, analyze, and apply information independently. Due to their dependence on their prior passive role in the classroom and inadequacy in autonomous learning ability, the majority of students may have difficulty finding and leveraging resources in their initial PBL activities (Jia, 2023). Equally important in PBL are students' problem-solving skills. Real-world issues typically serve as the context for PBL. Developing solutions to these issues involves a series of processes, such as investigating problems, raising hypotheses, formulating, and executing plans (Guan, 2023). Students without these practical skills may benefit little from PBL. Also noteworthy is the importance of students' ability to make independent, critical evaluations of information in PBL (Zhu, 2023). Students who rely on established answers and notions are at a disadvantage in a PBL environment, where they are expected to make informed decisions on their own. In Yang's (2023) survey on "issues with the management of interdisciplinary project-based learning in primary schools," students polled scored the lowest on the items related to PBL learning environment and resource management, exhibiting low readiness for engaging in PBL.

In the meantime, the ability to maintain a sustained interest in and involvement in challenging tasks is also essential for students' successful fulfillment of PBL activities. As opposed to traditional learning patterns featured by textbook-workbook-driven activities, PBL entails a lot of in-person investigations and practical manipulations on the part of students, substantially increasing their input of time and energy (Geng, 2021). Furthermore, students often complete a PBL program in stages over an extended period of time, engaging in a variety of complex tasks that require a significant level of perseverance. Students prone to giving up in the face of difficulty and challenges have little chance of reaching the expected outcomes of PBL (Tian, 2023). In his research on "the status of project-based learning assisted by educational technology," Geng (2021) discovered through interviews that a PBL activity not only occupies a few scheduled sessions but also includes many after-class group discussions and preparations, which largely heightens students' workloads. That seriously put students' perseverance to the test.

Conclusion

PBL, an innovative instructional strategy aimed at fostering students' comprehensive competences, is of vital significance for intensifying Chinese education reform. There are many obstacles to overcome in integrating it into the compulsory education curriculum. The current subject-based teaching system needs modifications to become more flexible and open to accommodating PBL. Training on teacher PBL instruction should be strengthened to better serve the genuine purpose of PBL. Targeted assessment and evaluation mechanisms should be developed to ensure effective implementation of PBL. It is also important to adapt the curriculum management and school schedules to PBL to instigate active, sustainable engagement among students. The application of PBL as a regular part of the compulsory education curriculum is promising. What is needed is continuous exploration and experimentation to create educational environments that facilitate PBL implementation as well as student all-round development.

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