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Project -based Learning and Students' Performance

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Abstract: Project-based learning (PBL) is an educational model that is believed to enhance student learning experience and academic achievement. The Buck Institute for Education (BIE) is the promoter of PBL. The Chinese Ministry of Education emphasizes the importance of project-based learning in its curriculum standards. Research shows that PBL improves student academic achievement, engagement, critical thinking, and promotes collaboration and innovative thinking. However, the implementation of PBL faces many challenges, such as project design complexity, individual student differences, time management, assessment standards development, teacher role changes, resource constraints, and curriculum integration. Addressing these challenges requires teachers with keen insight, flexible teaching strategies and continuous professional development. There are differences between project-based learning and traditional teaching in student performance, such as initiative and engagement, critical thinking and problem solving, teamwork and communication skills, as well as in-depth understanding and transfer of knowledge. This study uses quantitative research design to numerically describe the implementation of investigation-based project-based learning and analyze its relationship with student achievement. The subjects were teachers and students (172 teachers, 2,154 students) from three schools in Guangdong, China, and the sampling was purposeful, focusing on teachers and students using project-based learning.

Keywords: Project-based learning, Students' Performance, Elementary school students, Exam-oriented education.

1. Introduction

Project-Based Learning (PBL), as a problem-oriented teaching method, holds significant importance in enhancing student learning experiences and improving academic performance. As a common educational model within the framework of progressive education paradigms, PBL has gained remarkable recognition and significance in the field of education in recent years. (Yuxuan Huang, 2022), The Influencing Factors of Project-Based Learning Implementation in K-12 Education proposed: Project-Based Learning (PBL) is different from the traditional teacher-centered teaching method and is currently advocated by many schools in the world. The Buck Institute for Education (BIE), commonly known as BIE or Buck Institute, has been at the forefront of pioneering and promoting project-based learning. Founded in 1987, the BIE has played a key role in shaping the conceptualization and practice of PBL through its research, resources, and professional training. (Shi Yu, 2023) The article "Barker Institute of Education Project-based Learning Research" mentioned that the expert team of Barker Institute of Education rebuilt the project-based learning research system with the core concepts of authenticity task, driving problem, subject core concept, subject practice and 21st century skills. This brings together a consistent research consensus - the gold standard for project-based learning.

In China, the importance of project-based learning has also been recognized and emphasized. In April 2022, the Chinese Ministry of Education issued the "Compulsory Education Curriculum Scheme and Curriculum Standards (2022 Edition)", which repeatedly mentions project-based learning. This further underscore the importance of adopting innovative and student-centered teaching methods to enhance the quality of education nationwide.

In recent years, there has been an increasing focus on research on the effectiveness of project-based learning both domestically and internationally. Researchers have conducted extensive studies to explore the impact of PBL on students' academic performance, engagement, critical thinking skills, and overall educational outcomes. These studies provided valuable insights into the benefits and challenges of implementing PBL in different educational environments.

Furthermore, research suggests that project-based learning promotes deep-level learning, enhances problem-solving abilities, fosters collaboration, and nurtures students' creativity and innovative thinking. Additionally, PBL encourages students' active participation in learning by providing them with opportunities to explore real-world problems and devise practical solutions. By actively engaging in authentic projects, students are able to apply their knowledge and skills in meaningful ways, thereby improving their overall academic performance. (Chen, Dengle 2023).

Despite the growing body of research on project-based learning, there are still areas that require further exploration and study. For example, there is a need for more comprehensive research on the impact of PBL on different subjects, grade levels, and diverse student populations. Additionally, identifying effective strategies and best practices for implementing PBL and evaluating its outcomes is crucial for successful integration into the education system.

Project-based learning (PBL) is of great importance and necessity to students in so many ways like, 1. increase learning motivation and engagement: PBL makes learning more meaningful and relevant by linking it to real-world problems and situations. Students in a specific project have the opportunity to apply their knowledge and skills to solve real problems, thereby stimulating their learning interest and motivation. This style of learning promotes students' active participation and self-directed learning, enhancing their learning experience, 2. develop critical thinking and problem-solving skills: PBL encourages students to learn in an inquiry-based manner and encourages them to think and solve problems for themselves. In the project, students need to analyze and evaluate information, come up with sound

solutions, and work with peers to reach consensus. These processes develop students' critical thinking skills, innovative thinking and problem-solving skills, 3. promote cooperation and teamwork skills: In PBL, students usually work together in small groups to complete projects. This encourages them to develop good cooperative skills, effective communication and teamwork skills. Students learn to work with others to achieve project goals through joint goal setting, division of labor, and mutual support, 4. foster creativity and innovative thinking: PBL provides students with the opportunity to solve real-world problems and apply creativity. Students are encouraged to think of new ideas, propose new solutions, and develop innovative practices in their projects. This helps to develop students' creativity and innovative thinking, making them lifelong learners with creative thinking and problem-solving skills; and emphasizing the application of comprehensive knowledge and skills: PBL requires students to apply interdisciplinary knowledge and skills to solve problems. This integrated application enables students to organically combine the knowledge and skills they have learned in different disciplines to achieve deeper learning and understanding. (Lu Changshun.2023). This helps students develop the ability of comprehensive thinking and comprehensive application. The researcher's observation on the use of project-based learning is viewed in different perspectives. Some of the teachers could be characterized as still found wanting in the employment of the project-based learning for classroom use. Others were inhibited to venture experimenting on its use as justified by their lack of training which is experienced by the researcher herself.

To sum up, it is necessary for students to engage in project-based learning because it enhances learning motivation, develops critical thinking and problem-solving skills, promotes cooperation and teamwork, fosters creativity and innovative thinking, and emphasizes the application of integrated knowledge and skills. PBL provides students with a more meaningful and enriching way of learning that allows them to apply what they have learned in real life situations to prepare them for future success.

However, despite the many potential benefits of PBL, there are a number of challenges and issues in its implementation as observed and encountered by the researcher that can affect student performance and learning outcomes. Designing evaluations for PBL is a big challenge for many teachers, as Calvin Baker, superintendent of the Vail School District in Arizona, says: "Everyone is talking about what the new evaluations will look like, but no one has shown us yet." Some of the issues observed and experienced in relation to project-based learning and student performance include the Project design complexity: Projects need to be complex enough to inspire students' passion for inquiry, but too much complexity can leave students confused and unsure of where to start. Individual student differences: In project learning, students' abilities, interests and engagement can vary, and it is a challenge to ensure that each student finds his or her place in the project and grows. Project time management is another pressing issue since project learning often takes a long time to complete, how to arrange the time reasonably, ensure the quality of the project at the same time, without affecting the learning of other courses, is a problem. And the last but not the least is the formulation of assessment criteria. In this concern, the assessment of project learning should reflect both the individual efforts of students and the factors of teamwork. How to formulate reasonable assessment criteria is a problem that needs deep consideration; and resource limitation: Some project learning may require relatively rich resource support, such as experimental materials, information technology, etc. How to provide the best learning experience in the case of limited resources is a practical problem.

Solving these problems requires teachers to possess keen insight, flexible teaching strategies and continuous professional development. At the same time, schools and education administrators need to provide the necessary support and resources to promote project-based learning to achieve better results in educational practice.

In the process of project implementation, based on the differences between project-based learning and traditional teaching, the researcher observed students' performance from the following aspects ofiInitiative and engagement: in project-based learning, students usually need to take the initiative to engage in inquiry and practice. This way of learning can stimulate students' interest and motivation, making them more engaged in the learning process (Yuan Junya (2023). In contrast, traditional teaching focuses more on teachers' teaching, and students are often passive receivers of knowledge, which may lead to lower participation of students; critical thinking and problem solving Project-based learning encourages students to acquire knowledge by solving practical problems, which helps to develop students' critical thinking and problem solving skills. During the project, students need to analyze problems, propose solutions, and continuously optimize and improve in team cooperation. In a traditional teaching environment, these abilities may not be developed as fully as project-based learning.

2. Theoretical Framework

The theory supporting this study is one of the most prominent theories known as constructivism. It suggests that learning is an active process where learners construct their understanding of the world based on their experiences and prior knowledge. Project-based learning allows learners to build their understanding of concepts through hands-on experiences. The theory of constructivism can be traced back to educational psychology in the work of Jean Piaget (1896–1980) identified with Piaget's theory of cognitive development. Piaget focused on how humans make meaning in relation to the interaction between their experiences and their ideas.

Constructivism is an educational theory that emphasizes that learning is the process by which individuals actively explore, solve problems, and construct new knowledge. Constructivism holds that students learn by subjectively constructing and reconstructing knowledge through interaction with their own experience and environment. The core idea of this theory is that learners are actively constructing their own knowledge and understanding, rather than passively receiving facts and information from outside.

Jean Piaget's theory is an important foundation of constructivism. Piaget is a Swiss psychologist whose research on children's cognitive development provided the theoretical basis for constructivism. Piaget enables children to construct their knowledge and thinking structures through active exploration and interaction. He developed a stage theory of cognitive development that emphasizes that children undergo a constant process of balance and adaptation to their interactions with their environment.

Piaget's theory and constructivism provide support and guidance for project-based learning. Project-based learning is

closely related to students' active participation, practical exploration and knowledge construction, which conforms to the core principles of constructivism and provides good conditions for students' cognitive development and learning effect. Project-based learning encourages students to actively participate in the process of building knowledge and solving problems, which is consistent with the idea of constructivism as emphasis on active participation: project-based learning encourages students to actively participate in project activities and construct their knowledge and understanding through practical exploration and problem solving; promotion of cognitive development by providing students with the opportunity to face real problems, find solutions, and promote the development and improvement of their cognitive and thinking skills; and emphasizing on adaptation and balance.

3. Statement of the Problem

This study examined the impact of project-based learning on students' performance.

Specifically, it sought answers to the following questions:

(1) What is the assessment of the teacher and student respondents on the execution of the project-based learning of students in terms of:

1.1 lesson organization

1.2 lesson execution

1.3 Project assessment

(2) Is there a significant difference in the assessment of the teacher and student respondents on the execution of the project-based learning?

(3) What is the level of performance of the students based on their grade point average reflected on their report cards?

(4) Is there a significant relationship between students' assessment of the project-based learning and their performance?

(5) Based on the findings of the study, what strategies may be proposed to address the effects of the project-based learning process?

4. Hypothesis

Ho1: There is no significant difference in the assessment of the teacher and student respondents on the execution of the project-based learning.

Ho2: There is no significant relationship between project-based learning and the students' performance.

5. Conclusions

Based on the findings of the study, the following conclusions were drawn.

(1) Teachers' involvement and teaching methods have a profound impact on students' curriculum organization, implementation and evaluation. Research shows that teachers' performance in project execution directly affects students' learning experience. Therefore, teachers need to focus on their own role in project-based teaching, not only in curriculum design and organization, but also in guiding students to self-assessment and reflection. This requires teachers to constantly reflect and adjust their methods in teaching in order to better promote students' learning.

(2) The assessment of teachers and students on the execution of project-based learning differs in their mean value. There are differences between teachers and students in evaluating the implementation of project-based learning, which may reflect different expectations and understandings of learning effects. Teachers may pay more attention to the achievement of learning goals and the quality of the learning process, while students may pay more attention to the fun and personal engagement of the lessons.

(3) The students' level of performance based on their on their grade point average reflected on their report card in courses as Chinese, Mathematics and English came to a not so high mean. The low grade point average of students may mean that project-based learning has not achieved the best results in the current teaching environment. This may be caused by many factors, such as insufficient teaching resources, teachers' unadaptability to project-based teaching, and students' lack of necessary prior knowledge. Therefore, schools and teachers need to work together to improve student learning outcomes by providing more support and training, as well as adapting teaching strategies.

(4) Students' evaluation of project-based learning is negatively correlated with students' actual performance in exam-oriented education, which may indicate a bias in students' self-assessment. This may be due to students' expectations of themselves being too high or too low, or a lack of understanding of the complexity and challenge of project-based learning.

6. Recommendations

Based on the above conclusions, the following recommendations are hereby forwarded:

(1) There is a need for teachers to use the major learning outcomes as the focal point in planning and executing their lessons in the context of project-based learning.

(2) Despite differences in mean value between the teachers and students on the execution of the project-based learning in lesson activities organization, activities execution and activities project assessment, teachers need a clear understanding of what the students need through development of learning resources aligned with project-based learning.

(3) Consistent monitoring of grades in the name of transparency through outcomes-based and authentic assessment forming part of the teachers' learning records.

(4) Teachers must focus on what the students can do after they were taught through a comprehensive line-up of project-based learning activities through collaboration with administrators and colleaugues in the discipline.

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