

Project-Based Learning and Secondary Students' Achievement, Motivation, and Learning Skills: A Literature Review

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ABSTRACT

This structured literature review examines how project-based learning (PBL) is associated with academic achievement, motivation, and independent learning skills among middle- and high-school students, and what implementation conditions appear to support positive outcomes. Sixteen studies reporting empirical or synthesized findings on these outcomes were examined in detail, drawn from a broader pool of twenty-four sources identified through Google Scholar; the remaining eight sources were used for background and contextual framing rather than as direct evidence (see Methodology). Overall, most reviewed studies report that PBL is associated with more favorable academic, motivational, and skill-related outcomes than traditional instruction, particularly when it is implemented with careful planning, adequate teacher support, and structured reflection. However, findings are not uniform: several studies report no significant difference between PBL and traditional instruction, and at least one included study concerns a population (commerce-correspondence students) that falls outside the review's stated middle- and high-school focus and is flagged accordingly. Given the variation in study design, age group, subject, and outcome measurement across the reviewed literature, this review presents its conclusions as an association pattern rather than a causal claim of general superiority. The review also finds very limited published, English-language research on PBL in Central Asia, including Kazakhstan, and suggests this as a priority area for future study, while acknowledging that non-English-language research may exist and was not captured by this search.

INTRODUCTION

Most education systems distinguish between teacher-centered approaches, in which instructors deliver content through lectures and structured assignments, and learner-centered approaches, in which students take a more active role in constructing their own understanding. Project-based learning (PBL) is one of the most widely discussed learner-centered methods: students pursue a driving question, conduct research under teacher guidance, and produce a project that is presented to others (Bell, 2010). Traditional

instruction (TI), sometimes called direct instruction (DI) in the literature, instead relies primarily on lectures, note-taking, and textbook-guided assignments (Barker, 2012).

In Kazakhstan, the Organization for Economic Co-operation and Development has reported that most schools continue to rely on teacher-centered curricula, and the government's Updated Curriculum reform has faced resource, infrastructure, and training barriers that limit the shift toward learner-centered pedagogy (Azhmukhambetov, 2020). The author's own experience moving between a traditional curriculum and a project-based curriculum at a Canadian international school in Kazakhstan motivated this review; that experience is treated here strictly as motivation for the research question, not as evidence of PBL's effectiveness.

This review asks the following questions:

1. How is project-based learning associated with the academic achievement, motivation, and independent learning skills of middle- and high-school students, as reported in the existing literature?
2. What challenges are most frequently reported when PBL is implemented in secondary classrooms?
3. What forms of teacher and institutional support are associated with more positive PBL outcomes in the reviewed studies?
4. What does the available English-language literature suggest about the state of PBL research and implementation in Central Asia, and specifically Kazakhstan?

METHODOLOGY

This study is a structured literature review, which consists of articles that include PBL's effects on students and, in general, this teaching method. (The review is described as "structured" rather than "systematic" because screening was conducted by a single reviewer, without a pre-registered protocol or a second independent screener; see Limitations below.) The search was conducted through the database Google Scholar between June 2025 and August 2025. When searching for articles, the following keywords were used: "project-based learning," "PBL," "outcomes of PBL," "impact," "motivation," "academic achievement," "independent learning skills", "effect of PBL on students", "challenges occurred in PBL". This review initially identified 24 peer-reviewed articles, literature reviews, quasi-experimental, meta-analyses, qualitative, and quantitative data analysis found through Google Scholar (23 of which were retained after full-text review; see below). Records were screened first by publication date (English-language publications between 2010 and 2024) and by relevance to the middle- and high-school population, then narrowed through title, abstract, and full-text review against the inclusion and exclusion criteria below. A precise count of records identified and excluded at each screening stage was not logged during the search and cannot be reconstructed retrospectively; this is acknowledged as a limitation below. Inclusion criteria were: publications written in English between 2010 and 2024, mainly focused on students from middle and high school. Studies were excluded if they were focused on PBL's effects on undergraduate students, other teaching methods, and didn't focus on PBL's impact on academic performance, independent learning outcomes, and student motivation. This study aims to look at general trends.

The study highlights the impact of project-based learning on students' academic achievement, motivation, and independent learning skills. It also mentions the challenges that can possibly occur when implementing PBL ineffectively and ways of addressing them. For each included source, the publication year, methodology, population (where reported), and principal finding were extracted and recorded in the summary tables presented below; these extracted findings were then grouped inductively into the four recurring themes used to organize this review: academic achievement, motivation, independent learning skills, and challenges.

Of the 24 sources initially identified in this review, one (Sudarjo & Suyitno, 2023) was excluded after full-text review because its population — commerce-correspondence students — did not match this review's stated middle- and high-school focus, leaving 23 sources. Of these, 15 report empirical findings or synthesized evidence directly relevant to one of the four themes above and are listed together in the master table (Table 1) and summarized by theme in Tables 2-5 below. The remaining eight (Azhmukhambetov, 2020; Barker, 2012; Handrianto & Rahman, 2019; Mynbayeva & Pogolian, 2014; Nurbayev, 2021; Bhardwaj, 2016; Stirling, 2014; Tohidi & Jabbari, 2012) provided contextual, definitional, or motivational background for the Introduction and Discussion rather than direct thematic evidence.

LIMITATIONS

The review included only studies published in English, which may have excluded relevant research published in Kazakh, Russian, or other languages, particularly research concerning Central Asia.

- Search was limited to a single database (Google Scholar) and a single reviewer; no second screener verified inclusion or exclusion decisions, and the exact number of records identified and excluded at each screening stage was not logged, so a full screening flow diagram cannot be reported.
- Access to full texts was limited for some sources, which constrained the depth of extraction possible for certain studies.
- This review relies entirely on secondary sources; no primary data were collected.
- Included studies vary considerably in country, grade level, subject area, sample size, and how outcomes were measured, which limits direct comparison across studies.
- No formal quality-appraisal instrument (e.g., a critical appraisal checklist) was applied to the included studies, so methodological strength was not systematically weighted.

Table 1. Master Table of All 15 Directly-Cited Evidence Sources

Author(s) / Year	Country	Method	Grade	Subject	Outcome	Principal Finding
Chen & Yang, 2019	Multiple	Meta-analysis	K-12	Various	Academic achievement	PBL more effective than TI overall
Carter, 2016	United States	Quasi-experimental	Grades 11-12	Honors mathematics	Academic achievement; motivation	PBL group outperformed TI academically; no significant motivation difference
Kızıkan & Bektaş, 2017	Turkey	Quasi-experimental, post-test comparison	Grade 7	Science	Academic achievement	No significant difference, PBL vs. TI
Baş, 2011	Turkey	Pre-/post-test control group design	N/A	English	Academic achievement; attitudes	Higher academic outcomes and improved attitudes after PBL
Santyasa, Rapi & Sara, 2019	Indonesia	Quasi-experiment, pretest-posttest nonequivalent groups	Secondary	Physics	Academic achievement	PBL better than DI for physics achievement
Shin, 2018	N/A	Quantitative (pre/post questionnaire)	Secondary	English	Motivation; self-efficacy	Motivation and attention increased after PBL

Kwietniewski, 2017	United States	Literature review	Secondary	General	Motivation; learning skills; challenges	Autonomy raises motivation; outlines conditions for success
Firdausih & Aslan, 2024	N/A	Literature review	Secondary	Science	Motivation; achievement; skills; challenges	Positive associations across outcomes; notes time-management/assessment challenges
Samsudin et al., 2020	N/A	Quasi-experimental	High School	Physics / STEM	Motivation; engagement; self-efficacy	STEM-PBL increased engagement and self-efficacy
Hafeez, 2021	N/A	Literature review	Secondary	General	Learning skills	Supports communication and critical thinking
Zakiyyah et al., 2024	Indonesia	Mixed methods (qual. + quant.)	Secondary	Science	Learning skills	Gains in process skills (+26.1%), concept understanding (+17%), creative thinking (+30%)
Zhang & Ma, 2023	Multiple	Meta-analysis	K-12	Various	Thinking skills; attitudes	Positive overall effect on thinking skills and attitudes

Fallas Gabuardi, 2021	Costa Rica	Literature review	Secondary	General	Learning skills; implementation stages	Builds 21st-century skills when planning/implementation/reflection are followed
Hussein, 2021	N/A	Qualitative, student perspective	N/A	N/A	Collaboration challenges	Group communication/structure issues addressed via communication and flexibility
Bell, 2010	United States	Conceptual / practitioner literature	Secondary	General	Time management; 21st-century skills	Goal-setting supports time management

RESULTS

This section presents the findings of reviewed studies on the effect of project-based learning. Results are grouped into 4 themes: academic achievement, motivation, independent learning skills, and challenges. Abbreviations used in the tables below: PBL = project-based learning; TI = traditional instruction; DI = direct instruction.

Table 2. Effects of PBL on Academic Achievement

Chen and Yang	2019	Meta-analysis of 46 effect sizes (comparisons) from 30 articles between 1998 and 2017, comparing the effects of PBL and TI on students' academic achievement.	Project-based learning has a positive impact on students' academic achievement compared to traditional instruction.
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Carter	2016	The results of two groups (one group used PBL and the other TI) from 122 eleventh and twelfth-grade students in an honors math class were compared.	Students who used PBL showed better academic outcomes than students who used TI.
Kızıkan & Bektaş	2017	Comparison of post-test mean scores of students exposed to PBL and traditional instruction.	No significant difference between the results of students who implemented PBL and the ones who used TI.
Baş	2011	The pre- and post-test control group research model	Students expressed higher academic outcomes after implementing PBL.
Santayasa, Rapi & Sara	2019	Quasi-experiment with the pretest-posttest nonequivalent control group design.	Project-based learning tends to be better than direct instruction in improving student academic achievement in physics.

Most of the studies found PBL to have a significantly more positive impact on students' academic outcomes compared to traditional instruction. Studies conducted by Chen & Yang (2019), Carter (2016), Santayasa et al. (2019), and Baş (2011) found PBL to have a positive influence on the academic achievement of learners. However, Kızıkan & Bektaş (2017) concluded that PBL had no significant impact.

Table 3. Impact of PBL on Student Motivation

Author(s)	Year	Methodology	Key findings
Shin	2018	Quantitative data analysis	Students were more motivated to learn when using project-based learning methods. They were more attentive and relevant.
Kwietniewsk	2017	Literature review	When students get freedom in accomplishing a task, as in PBL, their motivation increases. Then this affects their thinking abilities and academic performance.
Carter	2016	Quasi-experimental	Students who used PBL showed no significant difference in motivation in comparison to students who were taught based on TI.
Firdausih & Aslan	2024	Literature review	PBL has a significant positive impact on student motivation
Samsudin, Jamali, Zain, Ale Ebrahim	2018	Quasi-experimental	By applying PBL in STEM teachers increased students' engagement in class.

Several studies agree on PBL having a significant impact on students' motivation. Studies by Shin (2018), Firdausih & Aslan (2024), and Samsudin et al. (2020) found PBL to increase student motivation and engagement. Similarly, Kwietniewski (2017) suggested PBL to be one of the environments in which students tend to be more interested in gaining knowledge. However, Carter (2016) found PBL to be no more effective than TI in boosting students' motivation in that sample. Carter's null result comes from an

honors mathematics course, where students may already have been highly motivated regardless of instructional method, which offers one possible explanation for the difference from the other four studies.

Author(s)	Year	Methodology	Key findings
Firdausih & Aslan	2024	Literature review	PBL plays a key role in building students' critical thinking and problem-solving skills.
Hafeez	2021	Literature review	PBL helps build communication and critical thinking skills.
Zakiyyah et al.	2024	Qualitative and quantitative data	PBL improves intermediate thinking skills, understanding concepts, and creative thinking skills.
Zhang & Ma	2023	Meta-analysis method	A study showed that PBL has a positive effect on students' thinking skills and affective attitudes.
Fallas Gabuardi	2021	Literature review	When implementing PBL, great improvement in critical thinking skills takes place. Besides that, it also helps build essential skills for the future.
Baş	2011	The pre- and post-test control group research model	Effective in the development of the students' attitudes towards the lesson.

			Additionally, working in groups taught students responsibility.
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Each study found PBL helpful in building different independent learning skills. For example, Firdausih & Aslan (2024) and Fallas Gabuardi (2021) found that PBL enhances critical thinking and problem-solving skills. On the other hand, Hafeez (2021) found PBL to be effective in developing communication skills. Besides these 21st-century skills, PBL has also been linked to improvements in creative thinking skills, conceptual understanding, and thinking abilities (Zakiyyah et al., 2024). Moreover, Zhang and Ma (2023) found this teaching method to have a positive impact on students' thinking skills and affective attitudes. Similarly, Baş (2011) discovered PBL to be effective in improving students' attitudes towards the lesson and teaching students responsibility. These findings support the argument that PBL plays an important role in building a variety of essential independent learning skills.

Author(s)	Year	Methodology	Key findings
Firdausih & Aslan	2024	Literature review	Students face time management and issues with complex assessments. If carefully planned, it can be very effective.
Hussein	2021		When working in groups, challenges can occur due to a lack of communication and project structure. In order to overcome these challenges, students must communicate well at every stage of the project and be ready for flexibility.
Fallas Gabuardi	2021	Literature review	Three main stages must

			be accomplished for this method to work up to its best potential. 1) Planning out the course 2) Implementation stage 3) Reflection
Kwietniewsk	2017	Literature review	1) Focus needs to be on students' goals. 2) Problems must be difficult to a certain level and connected to real life. 3) Students need support from teachers. 4) For further analysis, reflection, and feedback need to be provided.
Bell	2010		Goal setting helps students learn how to manage their own time.

As Firdausih & Aslan (2024) and Hussein (2021) found, when implementing PBL, students face time management difficulties, issues with complex assessments, and communication barriers. Bell (2010) found goal setting to be one of the ways of managing time. Further studies discussed ways of addressing these challenges. For instance, Fallas Gabuardi (2021) offered a main strategy divided into 3 stages, whereas Kwietniewski (2017) discussed in detail what steps should be accomplished. Both studies referred to reflection being one of the important stages to finish with. This suggests that PBL can be very effective as long as it is implemented appropriately and thoughtfully organized.

Across all four themes, the results of most studies suggest that project-based learning is generally associated with improved academic performance, enhanced student motivation, and the development of

independent learning skills, though a minority of studies showed mixed or no effects. However, reaching positive outcomes relies on well-supported and structured use of PBL.

DISCUSSION AND CONCLUSION

As shown in the results section, PBL is generally an effective learning method that is associated with enhanced student motivation, academic performance, and independent learning skills. However, in order to reach positive outcomes and avoid challenges, appropriate implementation is key.

Academic performance

Several studies, including Chen & Yang (2019), Carter (2016), Kızıkan & Bektaş (2017), Santyasa et al. (2019), and Baş (2011), compared the results of students from traditional instruction groups and project-based learning. Chen & Yang (2019) conducted a meta-analysis of 20 years of research where they compared the effects of project-based learning and traditional instruction on students' academic achievement. The results of this study provide evidence that PBL is more effective than TI within the reviewed sample. Similarly, another study done by Carter (2016) found PBL to have a positive impact on a group of students. This study compared the academic achievement of 122 eleventh and twelfth-grade students in honors math classes. One group was taught using PBL, while the other one was taught using traditional lecture methods. The results showed a significant difference between the mean performance of the project-based learning group and the mean performance of the traditional instruction group, suggesting PBL was associated with a positive impact on students' academic achievement in this sample. The difference between students' results may be connected with PBL engaging students in more research rather than TI, which provides the information directly. Moreover, a study among 9th-grade students provided evidence that PBL was associated with an increase in academic outcomes after its implementation. The results of one group that implemented PBL were compared with another group that implemented traditional instruction methods. Differences in outcomes are linked to the active role students took while learning based on PBL (Baş, 2011). Linked to a similar reason, a study was conducted among students in physics class. This research suggests that direct instruction may be less effective in impacting students academically because they take a less active role in the process, whereas PBL allowed them to obtain higher achievement in this sample, again potentially due to PBL engaging students in ways that make their learning more meaningful, relevant, and useful (Santyasa et al., 2019). This suggests that PBL may allow students to make discoveries and answer their own questions, which is associated with enhanced understanding and improved academic achievement in these studies. These findings mean that, within the studies reviewed, different teaching methods were associated with different outcomes; when students are given autonomy in research, their understanding of concepts appears to increase, because they are not provided all the information as in traditional instruction, and instead search for it and make connections themselves.

In contrast, Kızıkan & Bektaş (2017) found no significant difference between the post-test mean scores of seventh-grade students exposed to PBL and those exposed to traditional instruction. Possible

explanations offered by the study include: 1) students may have had problems adapting to PBL after a large amount of prior exposure to traditional teaching methods; 2) disagreements while working in groups could be one factor that prevents students from showing their actual capabilities in academic performance; 3) the third reason may be connected with students' apprehension about implementing PBL; and 4) depending on the topic, students may perform in different ways, since a less engaging topic is less likely to draw their attention.

Several studies suggest that PBL is associated with improved academic outcomes, including Carter (2016), Chen & Yang (2019), and Baş (2011). However, a study conducted by Kızıkan & Bektaş (2017) did not find PBL to have a positive effect on academic achievement in that sample. These findings might be connected with several factors, including students having trouble adapting, working in groups, apprehension about the process, and topic engagement. Because the studies reviewed here differ in grade level (grade 7 through grades 11-12), subject (mathematics, physics, general classrooms), and group structure, this review is not able to isolate which of these factors is the strongest moderator; a larger, more targeted comparison would be needed to establish that. Overall, within the studies reviewed, PBL appears useful in supporting student academic achievement because the process of working on a project gives students greater autonomy in research; this way, they formulate hypotheses, discover, and answer their driving question. Reaching certain results likely depends on both teacher and student preparedness.

Motivation and engagement

Motivation drives a person's guidance, control, and persistence in human behavior (Tohidi & Jabbari, 2012). In order to engage students in education and motivate them, environments and systems that support these needs must be designed. Teacher autonomy must be supported, and non-threatening environments must be made; an example is the project-based learning method. Such learning communities create safe places in which learners can take necessary risks that influence the desire to learn and grow (Stirling, 2014). This section discusses motivation, engagement, and self-efficacy together because the reviewed studies often report them together; however, they are related but distinct constructs — motivation describes the desire to learn, engagement describes active participation and attention, and self-efficacy describes a student's belief in their own ability to succeed — and the studies below vary in which of the three they actually measured.

Project-based learning appears to be associated with a positive influence on student motivation in most of the studies reviewed (Firdausih & Aslan, 2024). Shin (2018) conducted a study among 79 students from a general English class. Quantitative data analysis was done in this study. Students were assessed with a project to complete in teams, after which they completed a questionnaire on motivation and self-efficacy. The result of this study shows that PBL was associated with increased motivation to learn English in this sample. As shown by the results, the mean of the post-test was significantly higher than that of the pre-test. Particularly, students' attention and relevance were apparently enhanced after implementing PBL. To make learning effective, it was found that students had to be interested throughout the process (Shin, 2018). Similarly, a study examined implementing PBL in STEM, which also found PBL to be associated with increased student engagement and self-efficacy (Samsudin et al., 2020).

The research gathered by Kwietniewski (2017) suggests that students who were taught using PBL had a desire to learn. As students' motivation grows, their engagement increases as well; this combination allows the student to reach a higher level of thinking. This higher level of thinking may in turn affect their academic outcomes. When students are given freedom in accomplishing a certain task, as in PBL, they may be more motivated to expand their knowledge and, as a result, produce better outcomes (Kwietniewski, 2017).

However, not every study agrees. Carter (2016) found no significant difference in the motivation of students instructed using PBL compared with students using TI. This may be because students who took the honors math class were already motivated; when students take a higher level of subject, they may already come motivated and ready to succeed, so no significant difference was observed, possibly because pre-test motivation was already high.

Overall, creating a suitable environment for students appears to increase their level of motivation, which in turn may support students' academic performance. As their motivation increases, their engagement also tends to rise, and with this combination, they may acknowledge information better and, as a result, achieve better outcomes. This is further evidence, within the studies reviewed, that PBL is associated with increased student motivation, which in turn is associated with students' academic achievements. Results suggest that students who use project-based learning are often motivated to learn, discover new things, and answer questions that are both connected to the course and their interests. These findings mean that, in the contexts studied, motivated students implementing PBL are associated with positive outcomes.

Independent learning skills

In the future, students will enter a workforce where they will not only be judged based on their academic outcomes, but also depending on their independent learning skills (Bell, 2010). Project-based learning also plays a role in developing important 21st-century skills that are essential for the future of each student. Not every teaching method provides opportunities for students to build 21st-century skills such as communication, critical thinking, creativity, problem-solving, teamwork, etc. Studies suggest that project-based learning is associated with independent thinking and learning (Bell, 2010). Problem-solving, communication, collaboration, critical thinking, and creativity are the skills classified in the 21st-century category that are developed through implementing project-based learning (Kwietniewski, 2017).

Many studies have found that PBL is associated with building independent learning skills and dispositions — a term used here because these outcomes (critical thinking, communication, creativity, responsibility, conceptual understanding, and attitudes) are conceptually distinct even though the reviewed studies often report them together. One example is Firdausih & Aslan (2024), who found PBL to be associated with improved problem-solving skills and critical thinking ability, which may also play a role in students' academic performance. Hafeez (2021) found PBL useful in developing communication and critical thinking skills in learners. Zakiyyah et al. (2024) conducted a study that showed PBL affects intermediate process skills, understanding of scientific concepts, and creative thinking skills. Evidence is provided

through a comparison of pre-test and post-test results, which show a reported increase of 17% in concept understanding, 26.1% in intermediate process skills, and 30% in creative thinking. Besides 21st-century skills, Zhang & Ma's (2023) meta-analysis found PBL to have a positive effect on students' thinking skills and affective attitudes. Similarly, Baş (2011) found PBL to affect students' attitudes towards the lesson, additionally teaching them responsibility through work in groups.

Students appear to develop these skills by stepping out of their comfort zones and working independently, with the teacher acting more as a guide while learners take more responsibility for learning independently. PBL is associated with the development of different skills that will be helpful when facing real-life events (Fallas Gabuardi, 2021).

To conclude, the results of these studies suggest that PBL is associated with helping students build essential skills for the future through the need to leave their comfort zone. Problem solving, critical thinking, creativity, communication, etc., are all among the important 21st-century skills examined here. These outcomes appear connected to working independently and stepping out of one's comfort zone: as students work and research independently, without teachers providing all the materials, they may learn to take more responsibility. Analyzing information, searching, and understanding appear associated with building critical thinking and problem-solving abilities, while working on a project with peers is associated with communication and teamwork skills, and creativity appears to develop when applying conceptual knowledge to a real-life problem. Building these skills is likely important, especially during school, given their relevance to university, work, and everyday life.

CHALLENGES AND WAYS TO ADDRESS THEM

Despite the benefits PBL offers, challenges might occur that can have a certain effect on its outcomes. Time management issues and complex assessments are among the factors that challenge students, and addressing them appears important for maximizing PBL's benefits (Firdausih & Aslan, 2024). Another study provided evidence from student reports that challenges in groups occurred due to a lack of communication and project structure (Hussein, 2021).

To address such difficulties, several studies suggest steps that may apply across courses. For teachers, this includes planning out the course, an implementation stage, and, finally, a reflection stage; teachers also appear to benefit from in-service training and support (Kızılcapan & Bektaş, 2017). Originality, responsibility, and assessment are elements that need to be considered since the main goal of PBL is to engage all students in the learning process (Fallas Gabuardi, 2021). A related study identified further key elements: a focus on students' learning goals and learning standards; a problem or challenge that is both connected to the real world and appropriately challenging; ongoing teacher support throughout the process; and, at the conclusion of the project, time for feedback and reflection (Kwietniewski, 2017). Feedback appears to help students plan future improvements and become aware of their own strengths; even where students are measured via rubrics, self-evaluation and reflection appear to be a critical part of this model.

What is suggested for students is to spend their time effectively and stay on task, which may help them succeed and avoid time-management challenges; goal setting is one way of learning to spend time effectively (Bell, 2010). Where challenges occur in groups, students appear to benefit from communicating well at every stage of the project, discussing the project's goal, dividing tasks equally, and remaining flexible (Hussein, 2021). When these stages are considered, PBL appears more likely to be implemented successfully in a curriculum.

Firdausih & Aslan (2024) suggest that if carefully planned, PBL can be very effective, allowing students to succeed academically and deal with future real-world challenges, though the process may vary depending on the specific course objectives and target goals.

In summary, while PBL has shown to have mostly positive outcomes across the studies reviewed, it can be associated with challenges and negative outcomes if implemented without proper structure. Studies by Gabuardi (2021), Kwietniewski (2017), and Hussein (2021) offer key steps that may help address these challenges, such as planning the course in advance, communicating with peers while working in groups, and receiving required support from teachers. However, limitations occur depending on the subject and context: results appear to vary when students are already motivated in higher-level subjects, in which case a change in teaching method may show little difference. This could mean that results depend partly on the experimental group and the students' background. In addition, not every group can adapt to PBL in the short amount of time given, which may result in less favorable outcomes; the topic on which students conduct a project also appears to affect engagement in the process.

In conclusion, this review suggests that, within the studies examined, PBL is generally associated with more positive academic performance compared to traditional instruction, though not uniformly so. A major factor associated with academic success is motivation, which most reviewed studies report as higher among students implementing PBL. PBL appears to create an environment in which students feel motivated, applying their knowledge to real-life problems. Moreover, students appear to build independent learning skills and dispositions when working on projects. However, its success largely depends on appropriate implementation, including teacher preparedness and support, as well as students' own readiness and commitment. These findings suggest that schools looking to involve students in active and effective learning may benefit from integrating PBL under well-supported conditions, rather than assuming it will be uniformly superior in every setting. For further research, I suggest examining the effect of PBL on students from Central Asia, especially Kazakhstan, to address current gaps in the literature; because this review's search was limited to English-language, Google Scholar-indexed sources, the apparent scarcity of regional research should be read as a gap in the available English-language literature rather than confirmed evidence that PBL research or practice is absent from the region. A more targeted search of Kazakh- and Russian-language sources would be a valuable next step.

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