Curricula: Journal of Curriculum Development *- e-ISSN 2830-7917 & p-ISSN 2964-7339*
Volume 4 No 2 (2025) 1719-1740

Curricula:
Journal of Curriculum Development
https://ejournal.upi.edu/index.php/CURRICULA/

Evaluation of Project-Based Learning (PjBL) implementation in Mathematics using the CIPP model

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ABSTRACT
Teaching methods should be evaluated regularly to adapt to students' needs. This study aims to evaluate the implementation of Project-Based Learning (PjBL) in mathematics subjects using the CIPP model at SMP Santa Angela Bandung. The research employs both qualitative and quantitative methods. Evaluation results from implementing PjBL in mathematics education using the Context, Input, Process, and Product (CIPP) model indicate that PjBL is effective in improving the quality and outcomes of mathematics learning. In the context aspect, the preparation of teaching modules and problem design has been developed in alignment with students' needs and learning objectives. Regarding input, the PjBL implementation is supported by competent teachers and adequate learning facilities. In the process aspect, learning activities demonstrate active student engagement, the systematic application of PjBL syntax, and the teacher's effective role as a facilitator, guiding and providing feedback. In terms of product outcomes, the implementation of PjBL has improved learning outcomes and fostered 21st-century skills, including critical thinking, communication, collaboration, and creativity. The study also concludes that PjBL has a significant effect on collaboration, communication, critical thinking, and creativity skills.

ARTICLE INFO
Article History:
Received: 9 Jul 2025
Revised: 10 Nov 2025
Accepted: 17 Nov 2025
Publish online: 22 Dec 2025

Keywords:
CIPP; evaluation; project-based learning

Open access
Curricula: Journal of Curriculum Development is a peer-reviewed open-access journal.

ABSTRAK
Metode pembelajaran perlu dievaluasi secara berkala supaya dapat mengikuti kebutuhan siswa. Penelitian ini bertujuan untuk mengevaluasi penerapan Project-Based Learning (PjBL) pada mata pelajaran matematika menggunakan model CIPP di SMP Santa Angela Bandung. Metode penelitian menggunakan pendekatan kualitatif dan kuantitatif. Hasil evaluasi penerapan Project Based Learning PjBL pada pembelajaran matematika kelas VIII SMP Santa Angela Bandung melalui model Context, Input, Process, Product (CIPP) menunjukkan bahwa penerapan PjBL dapat dikategorikan efektif dalam meningkatkan kualitas dan hasil pembelajaran matematika. Dari aspek context, penyusunan modul ajar dan desain masalah telah disusun secara relevan dengan kebutuhan siswa dan tujuan pembelajaran. Dari aspek input, pelaksanaan PjBL didukung oleh guru yang kompeten dan fasilitas pembelajaran yang memadai. Dari aspek process, kegiatan belajar menunjukkan adanya keterlibatan aktif siswa, penerapan sintaks PjBL yang sistematis, serta peran guru sebagai fasilitator yang efektif dalam membimbing dan memberikan umpan balik. Sementara itu, dari aspek product, penerapan PjBL berhasil meningkatkan hasil belajar serta mengembangkan keterampilan abad 21, meliputi kemampuan berpikir kritis, komunikasi, kolaborasi, dan kreativitas. Penelitian juga menyimpulkan bahwa PjBL berpengaruh terhadap kemampuan kolaborasi, komunikasi, berpikir kritis dan kreativitas.
Kata Kunci: *CIPP; evaluasi; project-based learning*

How to cite (APA 7)
Mulyawan, M. I & Rusman, R., (2025). Evaluation of Project-Based Learning (PjBL) implementation in Mathematics using the CIPP model. *Curricula: Journal of Curriculum Development, 3*(2), 1719-1740.

Peer review
This article has been peer-reviewed through the journal's standard double-blind peer review, where both the reviewers and authors are anonymised during review.

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https://doi.org/10.17509/curricula.v4i2.92043

INTRODUCTION

The skills that students need to possess and master in the 21st century include collaboration, critical thinking, communication, problem-solving, innovation, and creativity. All of these skills and abilities are essential foundations for equipping students to meet the challenges and demands of the 21st century (Milala et al., 2024). Mathematics learning can play a strategic role in developing students' 21st-century skills because the mathematics learning process requires students to think logically, systematically, and analytically to solve various problems (Fadli et al., 2024). To support mathematics learning, an effective learning model is essential. The Project-Based Learning (PjBL) model is an effective approach to supporting mathematics learning by emphasizing projects as the outcome of the learning process. PjBL is a learning model that emphasizes students' active involvement in the learning process by working on specific projects over a defined period. The project is designed to address questions or solve real problems relevant to students' lives (Damayanti, 2024).

PjBL can also be defined as a learning model that not only focuses on understanding academic material but also develops critical thinking, problem-solving, collaboration, communication, and independent learning through real-world projects, skills that are highly needed in the 21st century (Cahyani et al., 2025). However, despite PjBL's many advantages, learning evaluation remains a crucial part of the educational process. This evaluation is crucial to ensure that the implementation of PjBL remains effective, relevant, and aligned with students' needs. Learning evaluation involves gathering information from ongoing learning, analyzing, assessing, measuring, and using it to draw conclusions or make decisions. The evaluation results can reveal the strengths and weaknesses, as well as any potential obstacles that may arise during the learning process (Kurniawati, 2020). According to previous studies, the strength of this model lies in its ability to provide comprehensive, structured evaluation guidance at every stage of an educational program, from planning through implementation (Kurniawati, 2020).

The CIPP evaluation model has been extensively utilized to assess the effectiveness of various educational strategies, including PjBL and the Kurikulum Merdeka. In mathematics, the implementation of PjBL for elementary solid geometry was qualitatively assessed and demonstrated very good outcomes across all evaluation criteria (Wibowo et al., 2022). Meanwhile, at the senior high school level, the application of PjBL in economics was found highly appropriate in both context and product. However, limitations regarding teacher certification and facilities were identified in the input component (Santuso et al., 2024).

Furthermore, recent studies have expanded the use of CIPP to evaluate the Kurikulum Merdeka. A quantitative evaluation of Physical Education (PJOK) in elementary schools reported a "very good" category, with a high average score, indicating readiness across all implementation factors (Ilyas, 2025). Specifically in the Junior High School (SMP) setting, the implementation of the Pancasila Student Profile Strengthening Project (P5) was found to be effective in developing student creativity; however, while resources were adequate, the process aspect required scheduling adjustments to fully meet the program's objectives (Puspandari & Retnaningsih, 2025).

https://doi.org/10.17509/curricula.v4i2.92043

This evaluation is fundamental because it encompasses the core components of learning: objectives, materials, methods, and assessment. Furthermore, it is comprehensive because it considers all parties involved in the learning process. This model is also considered integrated because it engages all elements of the educational system, particularly students. At Santa Angela Junior High School in Bandung, the implementation of PjBL in Mathematics has not yet fully demonstrated optimal results. Based on initial observations, some students continue to have difficulty understanding concepts, are less active in the project process, and demonstrate varying levels of learning independence. Teachers also face challenges in time management, providing structured guidance, and consistently measuring project outcomes. These conditions indicate the need for a systematic evaluation of the suitability of the PjBL implementation for student needs and applicable learning standards. The Context, Input, Process, Product (CIPP) evaluation model was chosen because it provides a comprehensive, systematic approach to assessing the success of a learning model such as PjBL.

In the *Context dimension*, this model helps identify the relevance of PjBL objectives to students' needs in learning mathematics. The *Input dimension* assesses the availability of resources such as materials, the role of teachers, and the learning methods used. In *the Process dimension*, this model enables evaluation of PjBL implementation, including how the learning process unfolds, the extent of student involvement, and the effectiveness of the strategies employed. The *Product dimension* focuses on the outcome, namely the extent to which PjBL improves students' understanding and skills in mathematics. The advantage of the CIPP evaluation model lies in its flexibility, which can be applied across various stages of learning, from planning to evaluation. In addition, this model provides in-depth information to address shortcomings in the implementation of PjBL. With this structured approach, the CIPP evaluation model supports decision-making aimed at improving the effectiveness of project-based mathematics learning. The purpose of this study is to evaluate the application of the PjBL learning model in Mathematics subjects at SMP Santa Angela Bandung using the CIPP evaluation model.

LITERATURE REVIEW

CIPP Evaluation

The CIPP evaluation is highly effective and well-suited for educational applications. The CIPP evaluation was initiated by Daniel L. Stufflebeam and his colleagues at Ohio State University in 1967. This CIPP model uses the acronym CIPP, which stands for Context, Input, Process, and Product. One distinctive characteristic of CIPP evaluation is its focus on decision-making evaluation, which aims to assist administrators in making decisions about school learning programs. This model not only emphasizes learning objectives but also focuses on improving existing learning programs. In the book titled "*Evaluasi Pembelajaran (Konsep dan Manajemen)*" by Haryanto, it is stated that the CIPP model of evaluation provides helpful information for making alternative decisions to improve the quality of learning programs. The CIPP evaluation, developed by Stufflebeam, comprises four stages: context, input, process, and product evaluation. The evaluation process is as follows:

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1. **Context Evaluation** involves assessing learning needs, desired objectives, and the characteristics of students and the learning environment. This evaluation helps identify unmet needs in the learning process and establish goals aligned with the current context. The purpose of context evaluation is to gather information to inform the formulation of appropriate learning objectives and to support improved learning outcomes. This evaluation also addresses questions about the appropriateness of learning objectives for students' needs and the priority of the goals to be achieved.
2. **Input Evaluation** provides information on the elements selected as input, analysis of weaknesses and strengths, strategies, and designs to achieve predetermined goals. This evaluation supports decision-making by determining available resources, alternatives to pursue, plans and strategies to implement to achieve goals, and procedures to use. Components of input evaluation include: (a) human resources involved, (b) supporting facilities and infrastructure needed, (c) allocation of funds or budget, and (d) various procedures and regulations needed for the implementation of learning. This evaluation provides a deep understanding of the key aspects to consider in planning and implementing learning and helps assess the fit between available resources and desired goals.
3. **Process Evaluation** provides the evaluator with the information needed to monitor and supervise implemented procedures. It aims to utilize practical elements and eliminate ineffective ones. The purpose of this evaluation is to inform decision-making by assessing the extent to which plans have been implemented, whether implementation conforms to established procedures, and which aspects require improvement. Process evaluation provides a comprehensive view of learning implementation and helps identify corrective measures to enhance learning effectiveness.
4. **Product Evaluation** is an evaluation that aims to assess the extent to which predetermined objectives have been achieved. The data obtained from this evaluation will influence the decision whether to continue, modify, or terminate the program. Product evaluation results are expected to provide helpful information for project leaders or teachers in making decisions regarding the continuation, completion, or adjustment of learning.

Mathematics Subject

The concept of mathematics lacks a definitive, comprehensive definition because no single consensus has been reached regarding its meaning. The various definitions of mathematics are generally influenced by who proposed them, where and when they were created, and the perspective adopted. Some view mathematics as the science of numbers due to their interest in numerical aspects. Others view mathematics as the study of structure, given its focus on relationships and arrangement. Meanwhile, some scholars regard mathematics as a pattern of thought or a system, depending on the approach they adopt. The characteristics of mathematics can be identified by examining various definitions presented, although no single definition is considered absolute (Subanji, 2024). Some of the distinctive characteristics of mathematics include:

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1. **Having Abstract Objects of Study.** In mathematics, the basic objects studied are abstract. These objects are objects of thought. These basic objects include facts, concepts, skills, and principles.
2. **Based on the Agreement.** One of the most fundamental forms of agreement is the existence of undefined elements, also known as primitive elements. The existence of primitive elements is intended to avoid circular definitions; hence, the term "basic understanding."
3. **Deductive Thinking.** This mindset holds that reasoning begins with general principles and then applies them to more specific situations. This deductive approach can be implemented in simple forms, such as in basic learning activities, or in complex forms, such as proving theorems.
4. **Having Symbols Empty of Meaning.** In mathematics, the use of symbols is extensive and varied, ranging from letters and numbers to operational symbols. These symbols are used to construct mathematical models such as equations, inequalities, or functions.
5. **Paying Attention to the Universal.** In mathematics, every new symbol or sign has a precise meaning once its universal meaning is established. The universal is the scope or set of references that determines the meaning of the symbols used.
6. **Consistency in the System.** In mathematics, every system is built on the principle of strict consistency. This means that no statement within a system should contradict itself.

Project-Based Learning (PjBL) Learning Model

The Project-Based Learning (PjBL) learning model is often associated with the pragmatic and progressive views of education proposed by John Dewey in 1916. Dewey and his group rejected the view that students are merely passive recipients of information. Instead, they believed that students actively construct knowledge through experience, primarily through interactions with others and collaborative projects. Based on this concept, the PjBL model can be described as a learning approach that emphasizes assigning students projects to guide them through the inquiry process, namely, investigating and seeking information. However, it is important to distinguish PjBL from learning that ends with a project. Not all learning models that result in a project can be classified as PjBL (Fahlevi, 2022).

Table 1. Project-Based Learning (PjBL) Model Phases

Phase	Activity	Information
1	Start with the Essential Question	At this stage, the goal is to inspire students and explain the learning model that will be used. Assignments are given in the form of projects relevant to the learning topic. These assignments are delivered to each individual both online and in person in class.
2	Design a Plan for the Project	The second phase involves project planning, which refers to the tasks identified in the previous phase. This project planning will be conducted directly in the classroom to facilitate guidance from educators. This aims to provide more effective support to students.

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Phase	Activity	Information
3	Create a Schedule	After the second phase is approved by the educator, who serves as the project supervisor, students will establish a project schedule in accordance with the predetermined deadline. At this stage, students will collaborate with their group members and be directly guided by the educator (through face-to-face interaction) to plan the most effective schedule for completing the assignment on time. The educator has the authority to set the deadline in accordance with the agreed-upon terms. Therefore, if students fail to submit assignments by the predetermined deadline, they will face consequences.
4	Monitor the Students and the Progress of the Project	At this stage, students have begun implementing the project in accordance with the established plan. If they encounter obstacles or problems, they can consult directly with their instructors through face-to-face meetings. The final stage of this phase is the submission of project assignments.
5	Assess the Outcome	After students complete the stage 4 assignment, educators will conduct an assessment. This assessment can be conducted either in-person or online. In online assessment systems through e-learning platforms, educators can utilize commonly available features, such as the Grades menu. Through this menu, educators can evaluate and provide feedback on student assignments.
6	Evaluate the Experience	The final step in this activity is evaluation. Students are asked to provide criticism and suggestions throughout the learning process, both on their individual projects and on those of other groups. The teacher acts as a facilitator by summarizing the material presented. Afterward, the teacher can assign new assignments for the next topic.

Source: Hariyono (2020)

The phases of the PjBL model have been described in various references; to complete the explanation in this article, they are briefly summarized in **Table 1**.

METHODS

This study employed a mixed-methods approach, combining qualitative and quantitative methods in a sequential exploratory design. In the first stage, qualitative data obtained through interviews were collected to gather initial information regarding the implementation of PjBL in mathematics learning. The results of this exploration were used to develop quantitative instruments. The second stage involved quantitative data collection, which was used to verify, test, and strengthen prior qualitative findings. This design was chosen to enable an in-depth, measurable assessment of PjBL implementation.

The study population comprised all students at Santa Angela Junior High School in Bandung. The sampling technique used in this study was purposive sampling, which is the process of taking samples from the population by considering the following criteria: 1) Having participated in mathematics learning with *the* PjBL model; 2) Actively participating in all stages of mathematics learning with PjBL; 3) Able to complete projects given by mathematics

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teachers; and 4) Not having significant communication barriers. In this study, the sample comprised 27 students from Class VIII at Santa Angela Junior High School, Bandung.

In this study, the CIPP evaluation was used. In the book titled "*Evaluasi Pembelajaran (Konsep dan Manajemen)*" by Haryanto, the CIPP evaluation is an approach that uses systematic steps to assess a program across four interrelated components: *Context*, *Input*, *Process*, and *Product*. The instruments used include interviews, observations, and questionnaires. Data analysis in this study used the following approach.

1. **Qualitative (Exploratory) Stage** was conducted through interviews and observations. Qualitative data analysis in this study employed a descriptive-evaluative approach. The analysis stages were based on the CIPP evaluation model, developed by Stufflebeam in 1968.
2. **Quantitative (Confirmatory) Stage** was conducted through a questionnaire. Quantitative analysis included instrument testing (validity and reliability), classical assumption tests (normality, multicollinearity, heteroscedasticity, and autocorrelation), hypothesis testing (t-test), simple linear regression, and coefficient-of-determination tests.

RESULTS AND DISCUSSION

Evaluation results with the CIPP Model

1. Evaluation of *Context Stages*

a. Suitability of Teaching Modules

Based on an interview conducted with Mrs. Adelia Viani, a mathematics teacher in class VIII of Santa Angela Middle School, Bandung, regarding the preparation of teaching modules for PjBL-based mathematics learning, the following results were obtained,

> *"I personally developed the teaching modules for PjBL. Project development is not new, as collaborative project activities have been implemented in schools for several years. Therefore, we teachers are required to independently develop Module Implementation Plans (RPMs) to suit the characteristics of our respective subjects,"* (Interview with Ms. Adelia Viani on October 20, 2025).

Based on an interview conducted with Mrs. Adelia Viani, a mathematics teacher in class VIII of Santa Angela Middle School, Bandung, regarding the standards for compiling teaching modules for PjBL-based mathematics learning, the following results were obtained,

> *"Everything has its own syntax, sir. It is adapted to the existing syntax. If the previous course used PjBL, certain elements were automatically prioritized, such as reflection and application. All the modules I created also included important components such as learning objectives, assessments, and materials,"* (Interview with Ms. Adelia Viani on October 20, 2025).

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b. Suitability of Problem Design Compilation in PjBL

Based on an interview conducted with Mrs. Adelia Viani, a mathematics teacher in class VIII of Santa Angela Middle School, Bandung, regarding the relevance of problem formulation in PjBL to students' lives, the following results were obtained,

> *"In concrete terms, it is most likely implemented within an organization, where there are smaller organizations. For example, in the problem presented earlier, students work in smaller divisions within the organization. They must understand each member's role and carry out their duties accordingly. This is designed to help students understand the real-life context and enable them to interact and collaborate in a structured manner within their groups,"* (Interview with Ms. Adelia Viani on October 20, 2025).

In PjBL, the problem presented encourages students to seek information from diverse sources to complete the project. The teacher does not provide the material in advance. This is reflected in the following interview with Ms. Adelia Viani,

> *"Before starting the project, I do not provide the materials first, Sir. They first search for information and conduct experiments; I confirm later. However, they get to understand the concept before starting the project, including before creating the Mind Map. I also ask them to find information about each group's section or task, as each group member has a different task or section. In this project, I formed six groups. Each group consisted of 4-5 people,"* (Results of an interview with Ms. Adelia Viani on October 20, 2025).

Based on an interview conducted with Mrs. Adelia Viani, a mathematics teacher in class VIII of Santa Angela Middle School, Bandung, regarding the presentation of problems in PjBL activities, the following results were obtained,

> *"In presenting problems, I do it directly to students, in other words, I explain directly to students what the PjBL concept is, but for the PjBL module and practice questions, I provide them through the Moodle application,"* (Results of an interview with Mrs. Adelia Viani on October 20, 2025).

2. Input Stage Evaluation

a. Teacher Qualifications

Based on an interview conducted with Mrs. Adelia Viani, a mathematics teacher in class VIII of Santa Angela Middle School, Bandung, regarding teacher education qualifications, the following results were obtained,

> *"I am a bachelor's degree graduate and have taken the PPG program for a master's degree. The test was in August, and I was announced as having passed, but the certificate has not been issued yet,"* (Interview with Ms. Adelia Viani on October 20, 2025).

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b. Availability of Facilities and Infrastructure

Based on an interview conducted with Mrs. Adelia Viani, a mathematics teacher in class VIII of Santa Angela Middle School, Bandung, regarding facilities to support PjBL activities, the following results were obtained,

> *"The facilities at this school are excellent and very adequate. Projectors and computers are available to support PjBL activities without any problems and are easy to operate. Smartphone use is only done occasionally, sir, as needed. Incidentally, during this PjBL, smartphones are not used, so I told students to keep their smartphones in their bags,"* (Interview with Mrs. Adelia Viani on October 20, 2025).

3. Process Stages

a. Teachers Follow the PjBL Model Syntax

Based on an interview conducted with Mrs. Adelia Viani, a mathematics teacher in class VIII of Santa Angela Middle School, Bandung, regarding the implementation of PjBL, the following results were obtained,

> *"Yes, I definitely followed the PjBL syntax, starting from formulating ideas, creating topics, learning objectives, and the learning stages. I have explained the learning stages before creating the Mind Map. For the method in this PjBL stage, I used the Two-Stay-Two-Stray (TSTS) method. I randomly assigned students to six groups, without regard to their abilities. Each group consisted of 4-5 children. There were six groups in total. During the project, we used the speed build method. Each group created a Mind Map, and during the presentation, two children explained, while the other two sought information from other groups. This process was carried out in turns for five rounds, so that each student had the opportunity to change roles,"* (Results of an interview with Ms. Adelia Viani on October 20, 2025).

b. The Role of Teachers in PjBL

Based on an interview conducted with Mrs. Adelia Viani, a mathematics teacher in class VIII of Santa Angela Middle School, Bandung, regarding the teacher's role in ensuring that each child in the group works in a balanced and collaborative manner in PjBL activities, the following results were obtained,

> *"Throughout the project, I took a full role in ensuring each group could work in a balanced and collaborative manner. I reminded them repeatedly, but in reality, only a handful of children were working, and some were not. However, when I reminded them, I often reminded and reprimanded the children who were not participating,"* (Interview with Ms. Adelia Viani on October 20, 2025).

Furthermore, from an interview conducted with Mrs. Adelia Viani, a mathematics teacher in class VIII of Santa Angela Middle School, Bandung, regarding the role of teachers in providing support when PjBL activities are taking place, the following results were obtained,

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> *"I go from group to group. I ask what their difficulties are, and if they are having difficulties, I will explain and help guide them to solve the problem,"* (Interview with Ms. Adelia Viani on October 20, 2025).

Based on an interview conducted with Mrs. Adelia Viani, a mathematics teacher in class VIII of Santa Angela Middle School, Bandung, regarding the role of teachers in providing feedback to students during PjBL activities, the following results were obtained,

> *"I provide feedback on the learning process verbally. I rarely provide written feedback, sir. If I have time, I will write it down, but if I do not, I do it verbally,"* (Interview with Ms. Adelia Viani on October 20, 2025).

c. The Role of Students in PjBL

Based on the results of an interview conducted with a student named Risal regarding his experience facing problems in PjBL activities, the following results were obtained,

> *"The problem is about sets and set operations. When I first encountered the problem, I read the problem and discussed it with my group members to understand it,"* (Interview with Student Risal on October 20, 2025).

Furthermore, the results of interviews conducted with a student respondent named Risal regarding the ability to analyze information in projects obtained the following results:

> *"I can tell which information I already understand and which I do not. If something is unclear, I ask a friend or a teacher. I usually use textbooks, notes, and even Google search on Moodle to find information,"* (Interview with Siswa Risal on October 20, 2025).

Then, based on the results of interviews conducted with a student respondent named Risal regarding the development of solutions in the project, the following results were obtained,

> *"After understanding the problem, we try several ways to solve it. Initially, we discuss ideas together, then write down several solutions before choosing the most appropriate one. Sometimes we also try multiple methods to see which is most effective. The difficulty is usually when colleagues have different opinions, and time is also limited,"* (Interview with Siswa Risal on October 20, 2025).

4. Product Stage Evaluation

a. Student Learning Outcomes

Based on an interview conducted with Mrs. Adelia Viani, a mathematics teacher in class VIII of Santa Angela Middle School, Bandung, regarding the criteria for completing learning objectives in PjBL activities, the following results were obtained,

> *"Most students have achieved the learning objective completion criteria. To assess the achievement of these objectives, I use two assessments: individual and group. For group assessments related to Mind Maps, I assess the concept to determine its appropriateness. If it is not appropriate, the score is lower than that of students whose concepts are appropriate, even though the student may demonstrate high creativity in presenting the Mind Map. All of that will be the basis for my*

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assessment. For individual students, I look at when they present the results or product, namely the Mind Map. Whether they present it aloud or just read it. If they read only, the score is lower than that of a student who is confident in the concept presented," (Results of interview with Ms. Adelia Viani on October 20, 2025).

b. Collaboration Skills

Based on an interview conducted with Mrs. Adelia Viani, a mathematics teacher in class VIII of Santa Angela Middle School, Bandung, regarding collaboration skills when students participate in PjBL activities, the following results were obtained:

"In terms of collaboration, most students support each other and share group roles collaboratively. To assess this, as I said before, I walk around and confirm the material with the students, and the students themselves will seek out the information," (Interview with Ms. Adelia Viani on October 20, 2025).

c. Critical Thinking Skills

Based on an interview conducted with Mrs. Adelia Viani, a mathematics teacher in class VIII of Santa Angela Middle School, Bandung, regarding critical thinking skills when students participate in PjBL activities, the following results were obtained,

"All students have demonstrated critical thinking skills, such as identifying and analyzing problems. I give them story problems, and they understand when to combine elements and when to intersect. They can understand that. To assess critical thinking skills, I typically pose a question to students. They can either answer it or not," (Interview with Ms. Adelia Viani on October 20, 2025).

d. Communication Skills

Based on an interview conducted with Mrs. Adelia Viani, a mathematics teacher in class VIII of Santa Angela Middle School, Bandung, regarding communication skills when students participate in PjBL activities, the following results were obtained,

"In terms of communication, they can communicate and explain their ideas well. In terms of group communication, some students are good at communicating, some are very good, and some are less so. So, for the smart kids, they are reluctant to give assignments to the less skilled ones, so they take over everything," (Interview with Ms. Adelia Viani on October 20, 2025).

e. Creative Ability

Based on an interview conducted with Mrs. Adelia Viani, a mathematics teacher in class VIII of Santa Angela Middle School, Bandung, regarding innovation and creativity skills when students participate in PjBL activities, the following results were obtained,

https://doi.org/10.17509/curricula.v4i2.92043

"What I see in terms of innovation and creativity is that the children of the past and the children of today are more creative than the children of today. However, their abilities differ; academically, the children of the past are more prominent than those of today. However, in terms of creativity, the children of today are more creative," (Interview with Ms. Adelia Viani on October 20, 2025)

The Effect of PjBL Implementation on Collaboration, Communication, Critical Thinking, and Creativity Skills

1. The Effect of PjBL Implementation on Collaboration Ability

Table 2. T-Test Results

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-,615	6,133		-,100	,921
	Penerapan PjBL	1,038	,152	,807	6,826	,000

a. Dependent Variable: Kemampuan Kolaborasi

Source: Research, 2025

PjBL has a significant and positive effect on collaboration skills. This is evidenced by the calculated t value of 6.826, which is greater than the t table of 2.060, and the significance value (Sig) = 0.000 < 0.05, so H_0 is rejected, and H_1 is accepted (see **Table 2**). This means that the better the implementation of PjBL, the better students' collaboration skills will be.

2. The Effect of PjBL Implementation on Communication Skills

Table 3. T-Test Results

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-3,731	5,603		-,666	,512
	Penerapan PjBL	1,057	,139	,836	7,606	,000

a. Dependent Variable: Kemampuan Komunikasi

Source: Research, 2025

PjBL has a significant positive effect on communication skills, as shown in **Table 3**. This is evidenced by the calculated t value of 7.606, which is greater than the t table of 2.060, and the significance value (Sig) = 0.000 < 0.05, so H_0 is rejected, and H_1 is accepted. This means that the better the implementation of PjBL, the greater the improvement in students' communication skills.

https://doi.org/10.17509/curricula.v4i2.92043

3. The Effect of PjBL Implementation on Critical Thinking Skills

Table 4. T-Test Results

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-7,430	5,046		-1,472	,153
	Penerapan PjBL	1,144	,125	,877	9,138	,000

a. Dependent Variable: Kemampuan Berpikir Kritis

Source: Research, 2025

PjBL has a significant and positive effect on critical thinking skills. This is evidenced by the calculated t-value of 9.138, which is greater than the t-table of 2.060, and the significance value (Sig) = 0.000 < 0.05, so H_0 is rejected, and H_1 is accepted. This means that the more optimal the implementation of PjBL, the greater the improvement in students' critical thinking skills.

4. The Influence of PjBL Implementation on Creativity Ability

Table 5. T-Test Results

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-4,588	6,118		-,750	,460
	Penerapan PjBL	1,083	,152	,819	7,137	,000

a. Dependent Variable: Kemampuan Kreativitas

Source: Research, 2025

PjBL has a significant and positive effect on creativity. This is evidenced by the calculated *t value* of 7.812, which is greater than the *t* table of 2.060, and the significance value (Sig) = 0.000 < 0.05, so H_0 is rejected, and H_1 is accepted. This means that the more optimal the implementation of PjBL, the greater the increase in students' creativity.

Discussion

Evaluation Implementation of PjBL Using the CIPP Model

1. Evaluation of *Context Stages*

a. Suitability of Teaching Modules

Based on an interview with Mrs. Adelia Viani, a grade VIII mathematics teacher at Santa Angela Junior High School in Bandung, the development of teaching modules for PjBL mathematics was carried out independently by the teacher and tailored to students' needs and learning objectives. This research is supported by previous studies, which report that teachers play an active role in adapting teaching modules to subject characteristics and student needs (Fatmawati, 2021). Teacher independence and

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freedom in developing Module Implementation Plans (RPM) align with the principles of PjBL.

PjBL places a strong emphasis on flexibility and adaptation of learning to suit the student's context and learning objectives (Saputra & Stiawan, 2024). In addition, the developed teaching module has met the PjBL standards by adjusting the PjBL syntax. PjBL syntax encompasses identifying key questions, developing project designs, preparing schedules, monitoring project progress, assessing outcomes, and evaluating experiences throughout the learning process (Sariputri et al., 2024). Teaching modules that comply with the PjBL syntax will enhance learning effectiveness by enabling teachers to direct the learning process systematically and clearly.

b. Suitability of Problem Design Compilation in PjBL

The results of an interview with Mrs. Adelia Viani, a mathematics teacher in grade VIII of SMP Santa Angela Bandung, showed that the problems or projects given in PjBL are structured to be relevant to students' real lives. Students are placed in groups or divisions that simulate real organizations so they learn to recognize the roles of each member and work together effectively. This approach is in accordance with the statement in the previous research stated that PjBL must present authentic problems that challenge students to apply academic concepts in real contexts (Lubis & Kinanti, 2025). Students showed higher levels of engagement when learning was delivered through projects than through monotonous instruction. This is consistent with the previous studies, states that PjBL increases motivation, engagement, and interest in learning because students are actively involved in the learning process, rather than simply passive recipients of information (Farhin et al., 2023).

Furthermore, the projects provided are characterized by motivation, challenge, and novelty. For example, the Mind Map project, previously conducted individually, is now conducted in groups to encourage collaboration and discussion. This approach aligns with the principles of PjBL, as articulated in previous studies, which characterize PjBL as a challenging learning approach that can foster collaboration and creativity in solving real-world problems (Herlina, 2025). Furthermore, the PjBL strategy implemented is grounded in the principle of Student Active Learning, in which students independently seek information before undertaking projects and are assigned specific tasks within groups. The teacher only provides additional material and confirmation after students have conducted initial exploration.

This approach aligns with the Student Active Learning (SAL) principle, which emphasizes students as the center of learning through exploration, experimentation, and reflection (Agniena et al., 2025). The presentation of problems in this PjBL activity is carried out in a combined manner. Face-to-face explanations by teachers guide students in understanding the project's objectives and stages, and Moodle modules and exercises provide independent learning. Previous studies indicate that blended learning strategies, such as Moodle, increase student engagement and understanding by combining direct interaction with technology-based learning (Rani et al., 2025).

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2. Input Stage Evaluation

a. Teacher Qualifications

Based on the interview results, the eighth-grade mathematics teacher at Santa Angela Middle School in Bandung, Mrs. Adelia Viani, has adequate educational qualifications, as evidenced by a Bachelor of Education (S.Pd) degree in Mathematics Education and completion of the Teacher Professional Education (Pendidikan Profesi Guru, or PPG). This demonstrates the teacher's professional competence in mathematics and her ability to implement the PjBL method effectively. Teacher qualifications appropriate to the subject matter are a crucial factor in successful learning, as competent teachers facilitate students' optimal achievement of learning objectives (Amalia et al., 2024). Furthermore, teachers who have participated in professional programs such as PPG tend to have stronger pedagogical skills and can adapt learning strategies to students' characteristics.

b. Availability of Facilities and Infrastructure

Results of an interview with Mrs. Adelia Viani, a mathematics teacher in class VIII of Santa Angela Middle School, Bandung. The results show that the facilities and infrastructure at Santa Angela Junior High School, Bandung, strongly support the implementation of PjBL. Projectors and computers are readily available and easy to use, while *smartphone use* is regulated as needed to avoid disrupting the learning process. The availability of these learning facilities and infrastructure enables teachers and students to conduct PjBL activities effectively and to focus on achieving learning objectives. Adequate learning facilities and infrastructure are key to PjBL's success, as they provide learning resources and serve as delivery channels, facilitating collaboration and increasing student engagement. Furthermore, comprehensive and user-friendly facilities provide teachers with greater flexibility in implementing PjBL learning strategies effectively (Wibowo et al., 2022).

3. Process Stages

a. Teachers Follow the PjBL Model Syntax

Based on the results of the interview with Mrs. Adelia Viani, the teacher has implemented the learning stages according to the PjBL syntax well, starting from formulating ideas, determining topics and learning objectives, preparing the implementation schedule, implementing or working on the project in the form of a Mind Map, and proceeding to the evaluation stage of the results. In implementing this Mind Map project, the application of the two-stay-two-stray (TSTS) method and speed build enables students to collaborate, exchange information, and take turns presenting the project results, allowing each student to assume different roles. The teacher also actively guides group discussions and provides a one-week preparation period before the project, so that students can understand the mathematical concepts and are prepared to participate in PjBL effectively.

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Assessments are conducted comprehensively across aspects of the process and the final product and involve students in evaluating the contributions of group members. This process demonstrates that PjBL principles have been applied holistically to increase student motivation to collaborate, work together, and think critically. In addition, the PjBL process, which adheres to the syntax, can help students better understand the learning material. This finding aligns with previous research indicating that systematically applying PjBL syntax can improve skills such as collaboration, cooperation, and critical thinking in problem-solving (Himayatillah et al., 2024). Systematic application of PjBL syntax can also improve students' understanding of the material.

b. The Role of Teachers in PjBL

Based on an interview with Ms. Adelia Viani, in the PjBL activity process, the teacher plays an active role in ensuring that each group member works in a balanced and collaborative manner by providing direction, reprimands, and direct guidance throughout the project. The teacher circulates among groups to identify students' difficulties and assist in resolving them. Feedback is provided primarily verbally during the learning process, enabling students to adjust and improve their understanding and project outcomes in real time. This demonstrates the teacher's role as a facilitator who maintains effectiveness, fosters collaboration, and promotes active participation in PjBL activities. This finding is supported by research underscoring the teacher's role as a facilitator, guiding and providing direct feedback to support optimal PjBL (Damayanti, 2024).

c. The Role of Students in PjBL

Based on an interview with a student named Risal, students were able to approach problems critically, discuss them to understand the problem, examine information from various sources, and develop several alternative solutions before selecting the best one. Students were also active in group collaboration, dividing tasks clearly, and learning to present project results despite experiencing nervousness. The final product, a Mind Map, demonstrated the collaborative work process and resulted in student satisfaction. This indicates that students were actively involved, thought critically, and worked together to complete the project in accordance with the principles of PjBL. These results are consistent with previous research indicating that student involvement in PjBL increases motivation, conceptual understanding, and critical thinking skills through authentic learning experiences (Nurdian, 2024).

4. Product Stage Evaluation

a. Student Learning Outcomes

Based on an interview with Mrs. Adelia Viani, a Grade VIII mathematics teacher at Santa Angela Junior High School Bandung, most students have met the learning objectives (Kriteria Ketercapaian Tujuan Pembelajaran or KKTP) for PjBL activities and have

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achieved strong learning outcomes. To determine students' scores, the teacher conducts assessments in two ways: individually and in groups. Group assessment focuses on the suitability of the students' Mind Map concept, whereas individual assessment is conducted through observation during students' project presentations. The teacher assesses speaking skills, self-confidence, and clarity of concept delivery as indicators of individual achievement. These results are consistent with findings that implementing PjBL can improve student learning outcomes by actively involving students in problem-solving and product creation (Ramadhan & Hindun, 2023).

b. Collaboration Skills

Based on an interview with Ms. Adelia Viani, an eighth-grade mathematics teacher at Santa Angela Junior High School in Bandung, students' collaborative skills during the PjBL activity were generally strong. Most students were able to share roles and work together effectively. The teacher assessed collaboration by circulating and confirming students' understanding of the material being discussed without providing direct explanations. This strategy fostered independence and shared responsibility. These results align with earlier research, which explains that the PjBL model can improve students' collaborative skills through group work activities that require coordination, mutual assistance, and shared responsibility for outcomes (Reswari et al., 2025). Collaboration in PjBL is essential to success because it helps students respect differences of opinion and develop social skills essential to PjBL (Sriliza et al., 2021).

c. Critical Thinking Skills

Based on an interview with Ms. Adelia Viani, a grade VIII mathematics teacher at Santa Angela Junior High School in Bandung, all students demonstrated critical thinking skills during the PjBL activities. Students were able to identify and analyze problems, for example, by distinguishing word problems that fall under the concepts of sets and intersections. The teacher assessed critical thinking skills through direct question-and-answer sessions to evaluate students' understanding and reasoning. These results align with prior research indicating that implementing PjBL can improve students' critical thinking skills through exploration, analysis, and reflection on the problems they face (Sholeh et al., 2024). Furthermore, prior studies indicate that PjBL provides opportunities for students to develop higher-order thinking skills by requiring them to interpret, evaluate, and solve problems independently (Mufti, 2022).

d. Communication Skills

Based on an interview with Ms. Adelia Viani, a grade VIII mathematics teacher at Santa Angela Middle School in Bandung, students' communication skills during the PjBL activities were quite good. Most students conveyed ideas and explained concepts clearly, both individually and in groups. These results align with prior research indicating that implementing PjBL can improve students' communication skills, as this model requires collaboration, discussion, and group presentations (Fatah, 2023). PjBL can

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create a learning environment that encourages active student interaction, thereby fostering learning.

e. Creative Ability

Based on an interview with Ms. Adelia Viani, an eighth-grade mathematics teacher at Santa Angela Junior High School in Bandung, students' creativity and innovation skills have shown positive development. The teacher assessed that today's students are more creative than previous generations. Students can present new ideas through mind maps and produce engaging, varied project presentations. This creativity is evident in the students' ability to combine mathematical concepts with aesthetic visualizations and original presentations. These results align with previous research, which indicates that implementing PjBL can improve students' creative and innovative thinking skills by providing space to explore ideas and create learning products that align with their interests and creativity (Manasikana et al., 2025). Furthermore, project activities that emphasize solving real-world problems encourage students to develop their imagination and the ability to create original solutions (Ramadhan & Hindun, 2023).

The Effect of PjBL Implementation on Collaboration, Communication, Critical Thinking, and Creativity Skills

1. The Effect of PjBL Implementation on Collaboration Ability

PjBL has a significant and positive effect on collaboration skills. This is evidenced by a calculated t-value of 6.826, which exceeds the t-table value of 2.060, and by a significance value (Sig) = 0.000 < 0.05, so that H_0 is rejected and H_1 is accepted. This means that the better the implementation of PjBL, the greater the improvement in students' collaboration skills. This result is consistent with research indicating that implementing PjBL can improve students' collaboration skills in science learning (Pendit et al., 2024).

2. The Effect of PjBL Implementation on Communication Skills

PjBL has a significant and positive effect on communication skills. This is evidenced by a calculated t-value of 7.606, which exceeds the t-table value of 2.060, and by a significance value (Sig) = 0.000 < 0.05, so that H_0 is rejected and H_1 is accepted. This means that the better the implementation of PjBL, the greater the improvement in students' communication skills. This result is supported by prior research demonstrating that PjBL can foster an active, collaborative, and contextual learning environment, significantly improving students' communication skills (Sintia et al., 2025).

3. The Effect of PjBL Implementation on Critical Thinking Skills

PjBL has a significant and positive effect on critical thinking skills. This is evidenced by the calculated t-value of 9.138, which is greater than the t-table of 2.060, and the significance value (Sig) = 0.000 < 0.05, so H_0 is rejected, and H_1 is accepted. This means that the more optimal the implementation of PjBL, the greater the improvement in students' critical

https://doi.org/10.17509/curricula.v4i2.92043

thinking skills. These results are consistent with previous research indicating that implementing PjBL significantly influences students' critical thinking skills (Khoiriyyah et al., 2022).

4. The Influence of PjBL Implementation on Creativity Ability

PjBL has a significant and positive effect on creativity. This is evidenced by the calculated *t value* of 7.812, which is greater than the *t* table of 2.060, and the significance value (Sig) = 0.000 < 0.05, so H_0 is rejected, and H_1 is accepted. This means that the more optimal the implementation of PjBL, the greater the increase in students' creativity. These results are consistent with prior research, which shows that implementing the PjBL model significantly increases students' creativity (Hasibuan & Hasibuan, 2023).

CONCLUSION

This study concludes that PjBL is an effective learning model that improves the quality of mathematics learning. Evaluation of the context, input, process, and product aspects indicates that PjBL aligns with learning needs, is supported by teacher readiness and adequate facilities, and fosters active student involvement. In addition, this study directly demonstrates that implementing PjBL has a positive and significant effect on students' development of 21st-century skills, including collaboration, communication, critical thinking, and creativity. The more optimal the implementation of PjBL, the higher these abilities develop in students. Further research should examine the implementation of PjBL across other levels and subjects to assess the consistency of its effectiveness across educational contexts. Furthermore, further research should compare the effectiveness of PjBL with other learning models, such as PjBL or STEM-based learning, to identify the most appropriate model for developing certain competencies.

AUTHOR'S NOTE

The author declares that there is no conflict of interest regarding the publication of this article. The author confirms that all data and content of the article are free from plagiarism. The author also expresses gratitude to the teachers and eighth-grade students of Santa Angela Junior High School, Bandung, for their participation and cooperation during the research process, as well as to all parties who provided assistance and encouragement in completing this research.

REFERENCES

Agniena, D. R., Kusumawardani, S., & Astriani, L. (2025). Penerapan metode pembelajaran Student Active Learning (SAL) dalam meningkatkan kecerdasan logis matematis siswa kelas III SDN Kondangjaya III Karawang. *Jurnal Pengabdian Masyarakat dan Riset Pendidikan, 3*(4), 698-703.

https://doi.org/10.17509/curricula.v4i2.92043

Amalia, D. N., Lestari, D. H., Trihantoyo, S., & Nuphanudin, N. (2024). Peran penting penempatan guru dalam mencapai tujuan pembelajaran di SMK Negeri 4 Surabaya. *Jurnal Penelitian Ilmu Pendidikan Indonesia, 3*(1), 169-175.

Cahyani, E. L., Ningsih, D. S., Khamidah, L., Latifah, U., Maulandari, S. D. M., & Suttrisno, S. (2025). Evektifitas model pembelajaran berbasis proyek (*project-based learning*) dalam meningkatkan ketrampilan abad ke-21 siswa madrasah ibtidaiyah. *Jurnal Manajemen Pendidikan, 10*(2), 658-672.

Damayanti, N. A. (2024). Peran guru dalam menentukan model pembelajaran berbasis proyek (PjBL) di kelas rendah upaya untuk meningkatkan minat belajar peserta didik di sekolah. *Jurnal Pendidikan Guru Sekolah Dasar, 1*(2), 1-14.

Fadli, S., Supratman, M., & Mahyuni, S. (2024). Implementasi model evaluasi CIPP pada pelaksanaan pembelajaran matematika dalam program merdeka belajar di sekolah dasar. *Science: Jurnal Inovasi Pendidikan Matematika dan IPA, 4*(2), 154-163.

Fahlevi, M. R. (2022). Kajian project based blended learning sebagai model pembelajaran pasca pandemi dan bentuk implementasi kurikulum merdeka. *Jurnal Sustainable, 5*(2), 230-249.

Farhin, N., Setiawan, D., & Waluyo, E. (2023). Meningkatkan hasil belajar siswa SD melalui pembelajaran berbasis proyek: Studi kasus di SD Sukosari. *Jurnal Penelitian Tindakan Kelas, 1*(2), 132-136.

Fatah, A. (2023). Penerapan model pembelajaran berbasis proyek atau Project Base Learning (PJBL) melalui poster kreatif dalam pembelajaran daring materi pemanasan global untuk meningkatkan keterampilan komunikasi ilmiah. *Amerta Jurnal Ilmu Sosial dan Humaniora, 3*(2), 45-54.

Fatmawati, I. (2021). Peran guru dalam pengembangan kurikulum dan pembelajaran. *Revorma: Jurnal Pendidikan dan Pemikiran, 1*(1), 20-37.

Hariyono, V. S. A. (2020). Contribution of project-based blended learning (PjB2L) learning model to technoprenuership ability in higher education. *International Journal of Advanced Multidisciplinary Scientific Research (IJAMSR), 3*(4), 1-15.

Hasibuan, F. A., & Hasibuan, T. (2023). Pengaruh metode project based learning terhadap peningkatan kreativitas dan inovatif siswa kelas X SMA Negeri 3 Sibolga. *Ta'rim: Jurnal Pendidikan dan Anak Usia Dini, 4*(1), 84-93.

Herlina, Y. (2025). Implementasi model project-based learning untuk meningkatkan kemampuan berpikir kritis, kreatif dan kolaboratif siswa dalam menyelesaikan masalah nyata. *Journal of Community Dedication, 4*(4), 237-249.

Himayatillah, H., Sudirman, H., & Angga, P. D. (2024). Penerapan model Project Based Learning (PjBL) dalam pembelajaran bahasa Indonesia kelas IV di MI Darul Hikmah Darek. *Jurnal Pendidikan, Sains, Geologi, dan Geofisika (GeoScienceEd Journal), 5*(4), 826-833.

Ilyas, M. Y. (2025). Evaluasi pembelajaran pjok pada kurikulum merdeka belajar model CIPP (Studi Kasus pada SD di Kab. Mojokerto). *MAP (Jurnal Manajemen dan Administrasi Publik), 8*(2), 235-249.

https://doi.org/10.17509/curricula.v4i2.92043

Khoiriyyah, N., Qomaria, N., Ahied, M., Rendy, B., Putera, A., & Sutarja, M. C. (2022). Pengaruh model project based learning dengan pendekatan STEAM terhadap kemampuan berpikir kritis siswa. *Vektor: Jurnal Pendidikan IPA, 3*(2), 55-66.

Kurniawati, E. W. (2020). Evaluasi program pendidikan perspektif model CIPP (Context, Input, Process, Product). *Ghaitsa: Islamic Education Journal, 1*(1), 19-25.

Lubis, R. E., & Kinanti, A. A. (2025). Penerapan pembelajaran berbasis proyek dalam kurikulum merdeka: Tantangan dan solusi di era pendidikan 4.0. *Toga Jurnal Keguruan dan Ilmu Pendidikan, 2*(1), 24-31.

Manasikana, A., Rahayu, E., & Hidayati, L. (2025). Pengaruh penerapan Project-Based Learning (PjBL) terhadap kreativitas peserta didik pada mata pelajaran projek IPAS. *JSHP: Jurnal Sosial Humaniora dan Pendidikan, 9*(1), 1-11.

Milala, K. N. B., Harahap, F., & Hasruddin, H. (2024). Developing STEM-based LKPD to improve students' critical thinking abilities. *Inovasi Kurikulum, 21*(4), 2243-2262.

Mufti, A. (2022). Project-based learning untuk meningkatkan kemampuan berpikir tingkat tinggi pada mata pelajaran Bahasa Arab. *Al-Ma'Rifah, 19*(1), 13-22.

Nurdian, D. (2024). Strategi pembelajaran berbasis projek dalam pendidikan agama Islam sebagai upaya meningkatkan keterlibatan dan pemahaman siswa. *Al-Am: Journal of Interdisciplinary Research, 1*(1), 22-41.

Pendit, S. S. D., Sulnuraini. S., Azizah, A., & Handayani, N. P. D. (2024). Pengaruh penggunaan model pembelajaran PjBL terhadap keterampilan kolaborasi siswa pada pembelajaran IPA di kelas VI SD Inpres 1 Tanamodindi. *Collase, 7*(1), 120-131.

Puspandari, Y., & Retnaningsih, R. (2025). Evaluasi program kegiatan proyek penguatan profil pelajar Pancasila dimensi kreatif menggunakan model CIPP: Penelitian. *Jurnal Pengabdian Masyarakat dan Riset Pendidikan, 4*(1), 6350-6354.

Ramadhan, E. H., & Hindun. (2023). Penerapan model pembelajaran berbasis proyek untuk membantu siswa berpikir kreatif. *Protasis: Jurnal Bahasa, Sastra, Budaya, dan Pengajarannya, 2*(2), 43-54.

Rani, S., Koli, M. C. S., Rukmi, J. N. P., Maysyarah, S., & Kurniawan, C. (2025). Integrasi aplikasi berbasis mobile pada blended learning: A systematic literature review. *Journal of Education Research, 6*(3), 721-731.

Reswari, B. B., Dzarna, D., & Anggraeni, A. W. (2025). Efektivitas pendekatan project based learning untuk meningkatkan kolaborasi siswa. *Peteka: Jurnal Penelitian Tindakan Kelas dan Pengembangan Pembelajaran, 8*(2), 574-581.

Santuso, M. B., Suharso, P., & Herlindawati, D. (2024). Evaluasi penerapan model problem based learning pada mata pelajaran ekonomi menggunakan model CIPP di SMAN 1 Kencong Jember. *Cendekia: Jurnal Ilmiah Pendidikan, 12*(2), 205-213.

Saputra, A. A., & Stiawan, A. (2024). Kajian review kurikulum K13 dan kurikulum merdeka dalam implikasinya terhadap pembelajaran di masa mendatang. *Social Science Educational Research, 5*(1), 1-17.

https://doi.org/10.17509/curricula.v4i2.92043

Sariputri, V. R., Sunaengsih, C., & Ismail, A. (2024). Peran pembelajaran berbasis proyek terhadap kreativitas siswa kelas VI materi perkembangbiakan tumbuhan. *Jurnal Edu Research Indonesian Institute for Corporate Learning and Studies (IICLS), 5*(2), 1-15.

Sholeh, M. I., 'Azah, N., Tasya', D. A., Sokip, S., Syafi'i, A., Sahri, S., Rosyidi, H., Arifin, Z., & Rahman, S. F. binti A. (2024). Penerapan pembelajaran berbasis proyek (PJBL) dalam meningkatkan kemampuan berpikir kritis siswa. *Jurnal Tinta, 6*(2), 158-176.

Sintia, H., Safitri, D., & Sujarwo. (2025). Penerapan pembelajaran project based learning untuk meningkatkan kemampuan berkomunikasi peserta didik SMP dalam pembelajaran di kelas. *Jimad: Jurnal Ilmiah Mutiara Pendidikan, 3*(2), 78-93.

Sriliza, S., Rahmadifa, R., & Dari, U. (2021). Strategi pembelajaran berbasis PjBL, berbasis PBL, pembelajaran kolaboratif, belajar sambil bermain. *Jurnal Ilmu Pendidikan, 3*(2), 167-186.

Subanji, S. (2024). Berpikir matematis dalam mengonstruksi konsep Matematika: Sebuah analisis secara teoritis dan praktis. *Jurnal Kajian Pendidikan Indonesia, 1*(1), 1-10.

Wibowo, A., Armanto, D., & Lubis, W. (2022). Evaluasi pembelajaran berbasis proyek pada materi bangun ruang kelas V sekolah dasar dengan model CIPP. *Journal of Educational Analytics, 1*(1), 27-40.

https://doi.org/10.17509/curricula.v4i2.92043